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FINAL ENVIRONMENTAL IMPACT STATEMENT ON THE PROPOSED POINT REYES-FARALLON ISLANDS MARINE SANCTUARY

VOLUME ONE

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Coastal Zone Management

National Oceanic and Atmospheric Administration.
Coastal Zone Management.

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Prepared on the Proposed
Point Reyes/Farallon Islands Marine Sanctuary

U.S. Department of Commerce
National Oceanic and Atmospheric
Administration
Office of Coastal Zone Management
3300 Whitehaven Street, N.W.
Washington, D.C. 20235

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DESIGNATION: FINAL ENVIRONMENTAL IMPACT STATEMENT

TITLE: Proposed Point Reyes/Farallon Islands Marine Sanctuary.

ABSTRACT: The National Oceanic Atmospheric Administration proposes the designation of the waters around Point Reyes and the Farallon Islands as a marine sanctuary.

The proposed sanctuary extends shoreward to the mean high tide line or the seaward boundary of the Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands, the sanctuary extends seaward 3 nautical miles (nmi) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi of Noonday Rock and the mean high tide line on the Farallon Islands, and between the Islands and the mainland from Point Reyes Headlands to Rocky Point (just southeast of Bolinas Lagoon). The proposed sanctuary includes Bodega Bay, but not Bodega Harbor. The proposed sanctuary includes 948 square nautical miles.

The designation of a marine sanctuary would provide a program of integrated management including research, assessment, monitoring, education, long-term planning, coordination and regulation. The proposed regulations prohibit hydrocarbon exploration and exploitation activities. The laying of pipeline is prohibited within 2 nmi of certain sensitive areas and sanctuary review and certification is required for laying pipeline elsewhere in the sanctuary. The proposed regulations prohibit discharges except for marine sanitation device effluents, vessel cooling waters, exhaust, deck wash, certain galley wastes, fish cleaning wastes, and chumming material (bait) and require sanctuary review and certification for the location of municipal outfalls, and any dredge disposal at the interim disposal site. The proposed regulations prohibit construction on, or alteration of the seabed, except for certain specified dredging and certain construction activities. The proposed regulations prohibit the operation of certain commercial vessels within 2 nmi of important wildlife habitats at the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance. Vessels engaged in fishing, recreation, research, enforcement, or transportation of persons or supplies to or from the Islands are not prohibited from the nearshore waters. The proposed regulations prohibit disturbing marine mammals and birds by overflights below

1000 feet near important habitats and prohibit removing or damaging historical resources. Fishing is specifically excluded from sanctuary regulation. All regulations would apply only within the sanctuary boundaries, and must be applied consistently with recognized principles of international law.

Alternatives to the proposed action include the no action alternative, modification of the sanctuary boundaries, and more stringent and less stringent regulations.

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B. NOTE TO THE READER

The major segments of this FEIS are Section E, the Description of the Affected Environment, which presents a review of the resources and activities in the Point Reyes-Farallon Islands area; Section F, Alternatives, which discusses the preferred alternative of designating a marine sanctuary and regulating certain activities, and four other alternatives including a status quo or no action alternative; and Section G, Responses to Comments received on the Draft Environmental Impact Statement. Certain additional documentation is appended. Particular attention should be paid to the proposed final draft Designation Document and the proposed regulations presented in Appendix 1.

Citations are referenced in the text by the name of the author or source in parentheses. Section H, Literature and Personal Communications Cited, contains detailed information on both documentary references and personal communications.

C. SUMMARY

INTRODUCTION

The Marine Protection, Research and Sanctuaries Act of 1972 (16 U.S.C. 1431-1434) authorizes the Secretary of Commerce to designate ocean areas having distinctive conservation, recreational, ecological, or aesthetic values as marine sanctuaries, after consultation with appropriate Federal agencies, concurrence of the affected State, if State waters are involved, and Presidential approval. In 1977, the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce sent out a nationwide letter asking for recommendations of sites appropriate for consideration as marine sanctuaries. The Point Reyes and Farallon Islands offshore regions were two of ten candidates subsequently recommended by the Resources Agency of the State of California. These recommendations proposed the establishment of a sanctuary in waters around the Islands as well as along the mainland coast between Bodega Head and Rocky Point. Portions of both State waters and the high seas were included. NOAA later combined these overlapping areas into one proposal.

This final environmental impact statement (FEIS) proposes the creation of a marine sanctuary in the waters extending shoreward to the mean high tide line or the seaward boundary of the Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands the sanctuary extends seaward to 3 nautical miles (nmi) (5.6 kilometers (km)) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi (22.2 km) of Noonday Rock and the mean high tide line on the Farallon Islands, and the waters between the Islands and the mainland from Point Reyes Headlands to Rocky Point (just southeast of Bolinas Lagoon). The proposed sanctuary includes Bolinas Bay and Lagoon, most of Tomales Bay, Estero Americano, Estero de San Antonio, and Bodega Bay, but not Bodega Harbor (see Figure C-1). These waters contain marine and nearshore habitats for a significant and diverse array of marine mammals and marine birds, as well as fishery, plant, and benthic resources. Marine birds and mammals, present in vast numbers on the Farallon Islands and the mainland coast, depend as much on the integrity and productivity of these adjacent ocean and estuarine waters as on the preservation of the shore areas they use for breeding, resting, and hauling out.

The protection and management afforded the shoreline by the Point Reyes National Seashore and the Farallon Islands by their State and national refuge status extends only to the very near shore waters. In the face of increasing human activity in the marine area existing regulatory controls beyond the nearshore zone which do not provide long term management may not ensure comprehensive protection for this unusual assemblage of marine mammals, numerous seabirds, and important fishery resources including kelp and shellfish.

Considering the increasing uses of the Point Reyes/Farallon Islands marine area and the unique characteristics of the marine sanctuary program, designation and management of a sanctuary at this site would focus, over the long term, on the range of actions necessary to preserve these

resources. The proposed sanctuary will concentrate on the management of this marine area in a manner which will complement the management plan of the Point Reyes National Seashore and the Farallon Islands National Wildlife Refuge.

The management of the sanctuary will include long term planning, research, resource assessment, education, coordination and regulation. A comprehensive program of this nature does not exist and will not be created in the absence of a sanctuary. Preservation of these marine resources requires an understanding of their condition, both current and evolving. A research assessment and monitoring program is essential and would be instituted by the marine sanctuary.

Likewise, the long-term preservation of ecological, conservation, and recreational values requires public awareness of the value of the resources and of potential harm to the resources. Users of the proposed sanctuary should be informed and educated in order to reduce harm to sensitive areas. The proposed sanctuary would undertake a variety of such educational programs. The proposed sanctuary would also provide a focus for the coordination of the variety of regulatory action which State, local and Federal agencies have already undertaken in this area. This coordination would occur through a sanctuary advisory committee or some other management structure created by mutual agreement, and would help assure that complete information concerning the cumulative impacts of activities in the proposed sanctuary is considered as each separate agency pursues its discrete mission. Finally, through the promulgation of limited additional regulations, the sanctuary would control certain activities which are currently not addressed in a manner most appropriate to the preservation of the special values of this rich marine area.

To determine the desirability and feasibility of proceeding with the designation, NOAA has gathered and analyzed information and consulted with other Federal agencies; State agencies, particularly the California Coastal Commission (CCC); the Pacific Regional Fishery Management Council; and local interest groups.

In April 1978, NOAA held a public workshop in Mill Valley, California to discuss the sanctuary proposal. An Issue Paper on possible California marine sanctuary sites, including the Point Reyes-Farallon Islands area, was circulated for review and discussion in December 1978. In March and April 1979, the California Coastal Commission (CCC) held regional and State hearings to solicit reaction to the possibility of a marine sanctuary offshore Point Reyes and the Farallon Islands. Based on public response and a recommendation by the CCC to develop a DEIS, NOAA prepared a DEIS which described the proposed alternative of sanctuary designation and included draft regulations on activities and uses. In October 1979, NOAA distributed copies of and solicited comments on a preliminary draft of the Description of the Affected Environment (Section E) and the chapter discussing the alternative courses of action considered by NOAA (Section F). Representatives

of the Sanctuary Programs Office held a public meeting in Point Reyes Station, California, on November 5, 1979, to discuss these chapters and answer questions about the program. The DEIS was distributed for review on March 31, 1980, and NOAA held public hearings in Point Reyes Station and San Francisco, California on May 13, 1980. The comment period on the DEIS was extended from May 27, 1980, to June 17, 1980, to assure receipt and consideration of comments from the maximum number of interested parties.

This FEIS proposes the designation of a marine sanctuary in the waters around Point Reyes and the Farallon Islands and responds to the comments received on the DEIS through June 17. The boundary and regulations proposed for the Point Reyes/Farallon-Islands Marine Sanctuary are summarized below, discussed in Section F, and set forth in Appendix 1. The changes in the proposal from the preferred alternative in the DEIS are as follows:

1. The proposed regulation on navigation and operation of vessels has been revised to prohibit vessels engaged in the trade of carrying cargo or servicing offshore installations from the navigating waters within 2 nmi of the Farallon Islands, Bolinas Lagoon, and State designated Areas of Special Biological Significance. The regulations as originally presented created a buffer zone extending only 1 nmi from the above-listed sensitive habitat areas.

2. The proposed regulation of discharges has been clarified to fully set forth NOAA's original intent to allow recreational boating in the sanctuary by exempting the discharge of exhaust and removing the word "non-polluted" from the exemption allowing discharge of vessel cooling waters. The phrase non-polluted might have otherwise been misinterpreted to ban discharge of normal cooling waters which do contain traces of hydrocarbons from engine exhaust. An exemption has been added allowing deposit overboard of biodegradable food stuffs or water from vessel galleys. Precluding the limited deposit of such harmless materials was inappropriate and beyond the intent of the original proposed regulation.

3. The proposed regulation of discharges has been revised to allow the disposal of dredged material at an interim disposal site in the proposed sanctuary until a final site is designated. Permits for disposing of dredged material at the interim site will require sanctuary certification.

4. The proposed regulation on dredging or alteration of or construction on the seabed has been revised to allow dredging for the purposes of ecological maintenance and the construction of docks and piers, but prohibit the construction of residences in Tomales Bay. Language has been included in this regulation to clarify NOAA's intent that the disturbance of the seabed caused by anchoring shall not be a violation of this regulation.

5. Section 936.12 of the proposed regulations as printed in the Federal Register Notice of April 1980 has been deleted. In part this section simply stated the Federal consistency requirements established under the Coastal Zone Management Act of 1972.

To the extent that this section made it easier to alter the regulatory regime for the sanctuary in the future, the State wished to provide the greatest degree of stability possible.

6. Waterfowl hunting has been exempted from marine sanctuary regulation in the proposed Designation; mariculture has been specifically exempted by the proposed Designation consistent with the exemptions for fishing.

7. The navigation of vessels within vessel traffic separation schemes (VTSS) and port access routes (PAR) designated by the Coast Guard outside 2 nmi from the Farallon Islands, Bolinas Lagoon or any existing area of Special Biological Significance is exempted from regulation. Although this provision was not included in the DEIS discussion of the preferred alternative, it did appear in the Federal Register Notice of Proposed Rulemaking with a 1 nmi restricted area (45 Federal Register 20907, March 31, 1980).

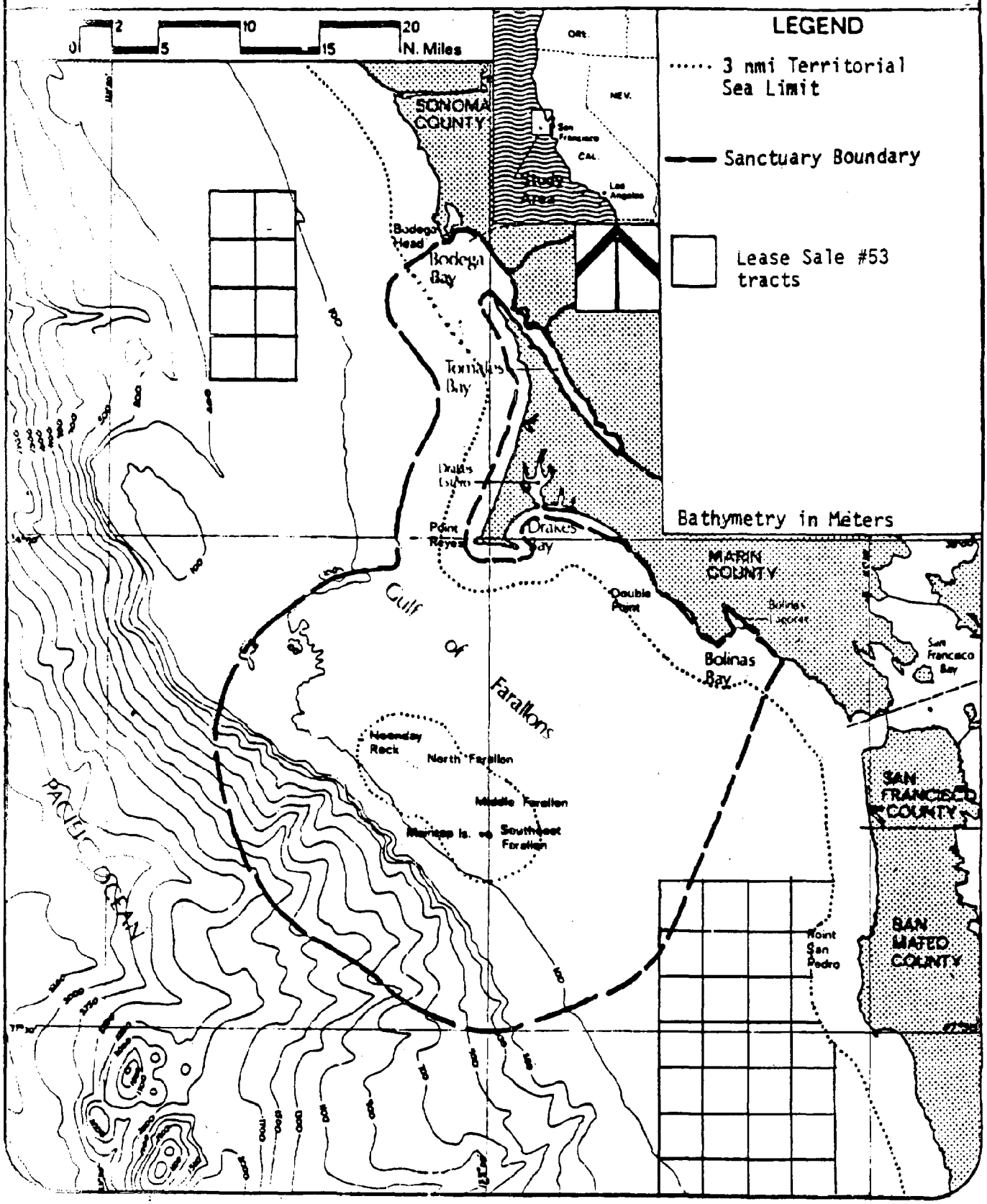
The proposed Designation and regulations do not represent a final decision. NOAA will receive comments on the FEIS and reopen the comment period on the proposed regulations for thirty days following publication and consult with Federal agencies. After review and consultation, a decision will be made whether to proceed with the designation. If so, Presidential approval of the designation is required.

The final rules will be promulgated after designation. The Designation and, therefore, the regulations, are not effective within State waters for a period of at least sixty days following publication of the Designation. During this period, if the Governor certifies that any of the terms of the Designation are unacceptable to the State, those terms and the relevant regulations will not become effective in State waters. In addition, if Congress passes a concurrent resolution disapproving any of the terms of the Designation within 60 calendar days of continuous session, such terms and regulations will not become effective. In either event, the sanctuary may be withdrawn entirely if it no longer meets statutory and regulatory objectives.

PROPOSAL TO DESIGNATE THE POINT REYES-FARALLON ISLANDS MARINE SANCTUARY

The Office of Coastal Zone Management, which is responsible for the marine sanctuary program within NOAA, proposes the designation of a marine sanctuary in the Point Reyes-Farallon Islands region. This sanctuary would include waters extending shoreward to the mean high tide line or the seaward boundary of the Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands the sanctuary extends seaward to 3 nmi (5.6 km) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi (22.2 km) of Noonday Rock and the mean high tide line on the Farallon Islands and the waters between the Islands and the mainland from Point Reyes Headlands to Rocky Point (just southeast of Bolinas Lagoon). The proposed sanctuary includes Bodega Bay, but not Bodega Harbor (see Figure C-1). The exact boundary coordinates appear in Appendix 1. The proposed sanctuary encompasses approximately 948 square nautical miles.

FIGURE C-1. The preferred marine sanctuary and the area exempted from oil and gas leasing around the Point Reyes wilderness area.



Management

Management of the marine sanctuary will be designed to preserve the resources of the waters in the Point Reyes-Farallon Islands offshore region. By integrating long-term planning, education, environmental monitoring, research, interagency coordination and compatible use regulations into a comprehensive management strategy, NOAA will promote a system where the public can derive maximum benefit from the marine sanctuary with a minimum of environmental damage.

NOAA anticipates delegating onsite sanctuary management to the California Department of Fish and Game (DFG), an existing authority with local experience. The onsite manager will coordinate with other Federal and State agencies, conduct research, monitoring, review permit applications, and make recommendations to NOAA concerning changes in regulations or overall management policies. NOAA will assist the onsite manager in establishing an advisory council with representatives from Federal, State, and local agencies, public interest groups, and local citizens. This Committee would advise the sanctuary manager on permit applications and certifications, research priorities, amendments to the regulations and other matters.

Enforcement and surveillance will be an integral part of the management and protection of the Point Reyes-Farallon Islands Marine Sanctuary. The National Marine Fisheries Service, the U.S. Coast Guard, the National Park Service, the Fish and Wildlife Service and DFG have experience in such operations, and NOAA will further explore the possibility of cooperative effort with each of these agencies. The participation of any enforcement agent will, of course, be subject to further discussion, and will be affected by the precise scope and content of the final regulations, as well as by other demands and priorities facing NOAA and the other agencies involved.

If a sanctuary is established, NOAA will emphasize the national importance of the sanctuary's resources. NOAA will establish a Sanctuary Information Center and will promote the public's awareness of sanctuary resources through brochures and other techniques. NOAA will encourage and seek to coordinate research within the sanctuary. Such coordination will not only help to improve the data base on area resources and stimulate information exchange, but also should help to eliminate duplicative research and close data gaps. Sanctuary management will strive also to improve public access where appropriate. Finally, both resource quality and effects of human activities in the sanctuary will be monitored. These results should aid in further upgrading the management system whenever necessary.

A detailed management plan will be developed following designation of the sanctuary. The California Department of Fish and Game is currently preparing a draft management study for this proposed sanctuary under a cooperative agreement with NOAA. The management plan will be subject to public review and comment prior to adoption by NOAA.

In its study DFG will also explore the mechanisms and resources appropriate to enforce the proposed regulations. Some regulations are unlikely to require to hydrocarbon exploration and development and

dredging. Others, such as the regulation of discharges, may require surveillance of areas of the proposed sanctuary or intensive education of sanctuary users. The U. S. Coast Guard has indicated its willingness to cooperate within the limits of its normal enforcement activities.

Designation

The Designation Document for the proposed Point Reyes-Farallon Islands Marine Sanctuary serves as a constitution for the sanctuary (see Appendix 1 for the proposed Designation). It establishes the boundary and purposes of the sanctuary, identifies the types of activities that may be subject to regulation, specifies the extent to which other regulatory programs will continue to be effective within the sanctuary, and provides a framework for sanctuary management. The Designation requires the approval of the President. Its content can be altered only after repeating the entire designation process and securing Presidential approval.

If the sanctuary is designated, the following activities will be subject to reasonable and necessary regulations:

a. Hydrocarbon operations,
b. Discharging or depositing any substance,
c. Dredging or alteration of or construction on the seabed,
d. Navigation (except within a designated VTSS or PAR) and operation of vessels (other than fishing vessels),
e. Disturbing marine birds and marine mammals, by overflights, and
f. Removing or otherwise harming historic and cultural resources.

The restrictions on these activities are set forth in the proposed regulations (see Appendix 1 and Section F.2.b). NOAA may promulgate regulations only in relation to the specific activities listed in the Designation. Article 5 of the proposed Designation specifically exempts fishing, mariculture, and waterfowl hunting activities from sanctuary regulation, except that discharges from fishing vessels are prohibited and mariculture operations that actually alter the seabed could be regulated, but are not now, as no current need exists.

Proposed Regulations

Specific regulations are proposed as reasonable and necessary for the protection of the natural resources. To the extent possible, the sanctuary managers will coordinate with existing authorities in both the administration and enforcement of the regulations.

All arrangements will be the subject of discussion with the individual agency concerned. If no specific arrangements are agreed upon, and more than one regulation affecting certain activities is in effect, all

regulations will apply and the most stringent restrictions must be met. These regulations will apply only within the the sanctuary boundaries. The full text of the proposed regulations is presented Appendix 1.

The proposed regulations would impose the following controls:

Hydrocarbon operations

Hydrocarbon exploration and development activities would be prohibited, except that pipelines related to operations outside the sanctuary may, after sanctuary certification, be located in the sanctuary outside of a 2 nmi (3.7 km) buffer zone around the Farallon Islands, Bolinas Lagoon, or any State designated Area of Special Biological Significance encompassed by the sanctuary's boundaries. Beyond this restricted area, the permits, licenses, and authority for pipelines issued by other agencies will be subject to case-by-case certification by the Assistant Administrator for Coastal Zone Management according to the procedure detailed in the regulations.

These measures are designed to reduce the risk of contamination of resources by spilled oil and other discharges related to petroleum development, and to protect marine mammals and birds from visual and acoustical disturbances. Currently, the Bureau of Land Management (BLM) and the U.S. Geological Survey (USGS) regulate hydrocarbon activities on the Federal Outer Continental Shelf (OCS), and the State Lands Commission has responsibility for oil and gas leasing in State waters. Congress has excluded part of the area proposed for sanctuary status from leasing, but, absent other sanctuary regulation, tracts may be considered for and offered in future lease sales. The Federal Energy Regulatory Commission also has certain responsibilities. Pipeline location, design, and safety features are subject to various regulations issued by the Department of Transportation, Department of the Interior, the Corps of Engineers and, if linked to interstate commerce, by the Department of Energy and the Interstate Commerce Commission. None of these agencies has currently designated the proposed sanctuary area for particular attention based on environmental concerns. No agency has a mandate to examine pipeline location primarily from the point of view of impacts on the protection of marine mammals and marine birds, their habitat, and the rich ecosystem of this area.

The prohibition of petroleum operation within the sanctuary's boundaries will establish a buffer zone between the potentially adverse effects of petroleum and both near and off-shore marine resources. Sanctuary resources which are particularly vulnerable to oil spillage and to other activities associated with petroleum operations may be impacted by acute and long-term exposure to hydrocarbon discharges. These marine resources will thereby gain some protection from the effects of petroleum development.

The prohibition of pipeline placement within 2 nmi (3.7 km) of the Farallon Islands, Bolinas Lagoon, or any Area of Special Biological Significance will provide a protective buffer for biologically sensitive areas against acoustical and visual disturbances associated with construction activity during placement. In addition, it will protect

these sensitive resources from the potentially adverse effects of sediment deposition as well as from as from human intrusion accompanying maintenance and repair. The certification of any permits or other authorities allowing pipeline location in the sanctuary will provide for a special review of this particular transportation activity from the viewpoint of the sanctuary, and will take into account factors such as seismic stability, the likelihood of rupture or spills, and other potential threats to sanctuary resources.

Discharges

Discharges of any substance would be prohibited with the exception of fish wastes and chumming materials (bait), effluents from marine sanitation devices, exhaust, vessel cooling waters, water and certain other biodegradable wastes. Municipal sewage outfalls and dredged material disposal at an interim site permitted by other agencies would be evaluated and permits certified on a case-by-case basis as discussed below. The prohibition of discharges and littering will help maintain and enhance water quality in the sanctuary, in addition to preventing aesthetic degradation. The exemptions are needed to allow activities such as recreational boating and fishing, which are encouraged within the sanctuary.

The certification of permits for municipal sewage outfalls will provide the opportunity for special review of this important activity, and could be especially significant for the protection of sanctuary resources.

Existing regulations control, through permits, some of the present sources of contamination of these ocean waters. Point source discharges are controlled by permits issued by the Environmental Protection Agency (EPA), which also has authority to regulate oil and hazardous substance discharges and ocean dumping. However, discharges may be permitted by EPA in the proposed sanctuary since no special status is permanently assigned to this site. Other than ocean dumping, solid waste overboard discharges from vessels are not currently regulated beyond the territorial sea. The limited discharge standard proposed by the sanctuary would eliminate a variety of currently allowed discharges and create a permanent protected status for these waters beyond the territorial sea.

Seabed alteration and construction

Dredging, drilling, and construction on, or altering of, the seabed within the sanctuary would be prohibited except that where permitted by other relevant authorities, particularly the California Coastal Commission, for routine navigational and marina maintenance dredging, ecological maintenance, mariculture, pier and dock construction in Tomales Bay, and oil, water, or gas pipeline placement or outfall construction (under a certified permit) are permitted. Disturbance of the seabed caused by anchoring a vessel or bottom trawling from a commercial fishing vessel is not a violation of this provision. This prohibition offers a buffer zone for sensitive nearshore resources--particularly marine mammals and marine birds, but also benthic

organisms--from visual, acoustic, and pollution/sedimentation disturbances associated with seabed alteration. The Army Corps of Engineers, the State Lands Commission, and the California Coastal Commission currently have permitting authority over construction, dredging, and dredge spoil disposal. The Bureau of Land Management and State Lands Commission have authority over mining. No agency has issued particular restrictions on dredging and construction which are intended to benefit and preserve the ecosystem of this area. Dredge spoil disposal is not otherwise prohibited in the proposed sanctuary.

Vessel traffic

Passage of regular cargo vessels or OCS service vessels within 2 nm (3.6 km) of the Farallon Islands, Bolinas Lagoon, or any State-designated Area of Special Biological Significance would be prohibited. Vessels transporting personnel or supplies to or from the islands, or vessels used for fishing, recreation, law enforcement, national defense, and sea rescue would be allowed throughout the sanctuary. The prohibition would not apply in emergencies and would apply only as consistent with international law. This regulation is intended to protect sensitive areas from unnecessary disturbance and possible oil spills or discharges resulting from groundings, collisions, or normal commercial shipping operations. The U.S. Coast Guard currently recommends traffic lanes but does not require adherence to them. No regulations currently restrict approach to these areas except in a small State-designated Ecological Reserve.

Disturbing marine birds and marine mammals

To insure that sensitive nearshore and offshore resources, particularly marine mammals and marine birds, are not unnecessarily disturbed overflights of less than 1,000 ft (305 m) would be prohibited within 1 nmi (1.8 km) of the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance, except as necessary to land on the islands or for air sea rescue operations. The Federal Aviation Administration (FAA), which currently regulates air traffic will indicate some sensitive areas on charts, and will print a request that pilots maintain a certain altitude. However, the FAA's regulations, which address primarily the safety of air traffic, will not close this area, since the concern here is potentially adverse impacts on ecosystems, species, or habitat. The California Department of Fish and Game has issued regulations banning overflights in the portion of the proposed sanctuary which is Farallon Islands Game Refuge.

Historical or cultural resources

Removing or damaging historical or cultural resources without a permit would be prohibited in order to maintain archeological sites in a condition appropriate for research and educational use. The California Historical Resources Commission can recommend sites for listing as a

landmark or on the National Register of Historic Sites, but neither list establishes authority to regulate all activities potentially harmful to these resources.

Certification of permits

No permit, license, or other authorization allowing dredge material disposal at the interim disposal site, the discharge of municipal sewage or the laying of any pipeline would be valid unless certified by the Assistant Administrator as consistent with the purposes of the sanctuary. The regulations propose to certify in advance all other permits, licenses, or authorizations issued pursuant to any other authority within the sanctuary as long as the activity does not violate marine sanctuary regulations. This notice of validity avoids duplication of permit delays and costs.

Other provisions

Activities otherwise prohibited by a sanctuary regulation would be allowed pursuant to permits granted by NOAA. Military activities necessary for national defense or in an emergency would be exempt from regulation. NOAA will consult with the appropriate military entities to ensure that national defense activities and long-term resource protection are as compatible as possible.

Consequences of the Proposed Action

The proposed action would institute an integrated management program including research, monitoring, education, long-term planning, coordination and regulation that would provide increased protection for the special resources of the proposed sanctuary, particularly marine birds and mammals.

The research, assessment and monitoring programs would increase available knowledge on the present condition of the resources and would help measure impacts of human activities. Results from these programs would be utilized not only to increase the effectiveness of sanctuary management, but to advise other agencies proposing actions. The sanctuary would establish a special institutional voice for the resources of this area.

The sanctuary would also address long-range planning issues and other concerns which may arise in the future, which are presently not addressed by any institution. For instance, the sanctuary management plan would address matters such as the desirability of a public transportation system to all or parts of the sanctuary, and other methods to increase access to and enjoyment of the sanctuary.

The sanctuary managers would be concerned with the separate and cumulative impacts of all activities occurring within its boundaries, and would therefore perform a coordinating function. Coordination, even in the simple form of assuring transfer of information, will help assure full consideration is given by all agencies to the resources of the area.

Finally, through limited proposed regulations, the sanctuary would control certain activities which require further restriction to assure preservation of the resources of the area. The regulations attempt to minimize any adverse socioeconomic consequences on affected industries, to the extent consistent with the primary mission of resource preservation. In addition, by contributing to the preservation of the natural resources of the area, the proposed action would benefit those activities such as fishing, tourism and recreation which depend on these resources.

Because the proposed regulations have been formulated in detail and are the aspect of the sanctuary management program most likely to produce socioeconomic consequences, they are discussed in some detail below.

The cost of the prohibition of oil and gas development is unlikely to be significant, although, at present, it is difficult to quantify long-term effects. Lease Sale #53, scheduled for May 1981, includes no tracts which fall entirely within the proposed sanctuary, and only two tracts which fall partially within it (southeast of the Farallon Islands). Although the proposed regulation would prohibit drilling in the sanctuary, even the oil underlying the sanctuary in these tracts would probably be partially recoverable by directional drilling. Approximately 50 tracts which might be included in future lease sales are fully or partially encompassed by the proposed sanctuary boundaries. However, these tracts drew relatively few nominations for Lease Sale #53, an indication of relatively low resource potential. Such projections might, of course, change based on new information gathered from exploration and development of Lease Sale #53 tracts. In addition, if oil prices continue to rise, resources that were not economically recoverable at the time of the call for nominations for Lease Sale #53 may become so. At present, however, there are no data with which these future costs can be projected or assessed with certainty.

The economic impact of the prohibition on discharges on most vessel operators will be minor since they will simply be required to retain their trash for proper disposal on land. Exemptions from the exclusion for cooling waters, fish, bait, marine sanitation wastes, and biodegradable food stuffs, assure that vessel operations are not unnecessarily impacted. The additional costs likely to be imposed by prohibiting disposal of dredge material in the sanctuary vary according to the amount of projected ocean disposal that would occur in the area without sanctuary designation.

The Corps of Engineers has estimated that requiring the use of a disposal site outside the sanctuary (3 nmi further from the largest potential project site), would increase costs of disposal by approximately 6 percent. Over 20 years, at the most probable rate of disposal, the increased distance would add slightly over $10 million dollars to disposal costs.

The sanctuary certification review of the location of municipal outfalls may impose requirements for location or rate and content of discharge, or could result in prohibition. The costs of land-based disposal or higher levels of treatment could be greater than those likely to be

incurred otherwise. The certification process will be preceded by early discussions with existing licensing agencies; such consultation will minimize delay attributable to the sanctuary certification.

The prohibition of vessels engaged in the trade of carrying cargo or servicing OCS installations within 2 nm should not significantly affect shipping costs or travel times because most commercial vessels already comply with the Vessel Transportaion Separation Scheme (VTSS) which does not pass through the proposed prohibition zone.

The economic impact of restricting overflights below 1,000 ft (305 m) in sensitive areas would be slight as commercial air carriers do not fly over these areas at low altitudes, and the cost to recreational private planes would be minimal.

The prohibition of removal and damage to historical or cultural resources will have minimal, if any, economic consequences.

The requirement that research activities otherwise in violation of sanctuary regulations must obtain a permit may impose minor costs and delays on certain research projects. However, the sanctuary manager will seek to minimize any inconveniences to the permit applicant.

The preservation of the aesthetics in this area and the maintenance of the wealth of biological resources which will result from the designation of the sanctuary may also bring economic benefits by insuring the continued viability of fishing and recreation as sources of income.

D. PURPOSE AND NEED FOR ACTION

NOAA proposes that, as an offshore area containing exceptional natural resources, the waters around the Farallon Islands and along the mainland coast of the Point Reyes Peninsula between Bodega Head and Rocky Point deserve special recognition, protection, and management as a marine sanctuary.

Significant seabird populations flourish in the study area and, historically, have been the most thoroughly studied and protected resource. An extremely large number of nesting pairs (estimated at 100,000 in 1969-70) have been inventoried, probably representing over half of all California's nesting seabirds. The proposed sanctuary contains some of the largest rookeries in the contiguous United States, and at least 12 of the 16 seabird species known to breed on the west coast nest here. Virtually the entire world's population of the ashy storm petrel nests here, as well as the world's largest single colony of western gulls. The peregrine falcon and brown pelican, both endangered species, are found in small numbers on the Farallon Islands. Waters around the Islands and along the mainland coast provide rafting habitat and foraging area for both seabird and shorebird communities. At least 23 species of ducks and geese are found seasonally in the area, and several species nest in the estuaries.

A large and varied marine mammal population (some 23 species) is present in the Point Reyes-Farallon Islands vicinity. Whales and porpoises, including several endangered species, pass through the proposed sanctuary on their annual migrations. On and around the Farallon Islands, and along the mainland coast, elephant seals, California sea lions, and harbor seals use the extensive deep- and shallow-water feeding grounds, as well as littoral sites for haul-out and pupping purposes.

Complementing marine mammal and seabird populations are marine and anadromous fish stocks, marine plants, invertebrates, and diverse intertidal habitats. Finfish and shellfish, and their associated habitats, have exceptional recreational, commercial, research, and ecological value, as detailed below in Section E.

With this concentration of highly productive, diverse, and rich living resources over a fairly broad geographic area, the waters around the Farallon Islands and along the Marin County coast are also of high research value. Extensive studies of these marine areas have been, and and continue to be, conducted by a number of nearby scientific organizations, e.g., the Point Reyes Bird Observatory.

The recreational opportunities in the waters surrounding the Farallon Islands and off the mainland coast include boating, skin diving, sportfishing, and nature study such as bird and mammal watching.

To date, human activities in the region have been relatively sparse and have not posed serious threats to the preservation of significant marine resources. The remoteness of the Farallon Islands, the generally rough

offshore water conditions throughout the area, and the mainland coast's dominant recreational/wilderness character all have discouraged intensive activity and the establishment of special management or additional regulatory protection was not necessary. More recent developments and the potential future uses have changed this picture.

For instance, the expansion of oil and gas activity on the Outer Continental Shelf (OCS) will bring a lease sale in May 1981. Lease Sale # 53 will offer tracts to the north and south of the Point Reyes-Farallon Islands region, and two tracts partially in the proposed sanctuary. Other tracts within the proposed sanctuary could be offered in future lease sales. The region's northern and main shipping lanes carry commercial oil tanker traffic originating in Alaska and bound for San Francisco Bay refineries. Additional offshore oil and gas development related traffic may be expected in the future should Lease Sale #53 operations commence on Bodega Basin tracts or in others north and south along the coast. For example, it is likely that tug barging will be utilized to transship crude oil from the Bodega Basin tracts to refineries on the mainland. Supply and maintenance vessel traffic servicing offshore platforms will also occur as a result of oil and gas exploration and development. Pipeline construction is possible through the area if hydrocarbon resources are sufficient.

Commercial fishing activity, already firmly established over the continental shelf along the mainland coast and around the Farallon Islands, will continue and possibly increase in intensity as domestic and foreign markets expand. Northern California's growing population and the urbanization around San Francisco have increased use of the study area as an easily accessible recreational resource. Finally, the Department of Defense uses portions of the Point Reyes-Farallon Islands region for training and testing activities.

Although various agencies have responsibilities for specific activities or for particular natural resources in the area, there is no regime to monitor comprehensively the cumulative effects of these activities, nor any agency responsible for protecting the system as a whole. There is no formal recognition of the area as one of special environmental value, nor any mechanism to promote research and public education.

The designation of a marine sanctuary in these waters would create a system for assessing the overall impacts of current and future activities in the area. Formal acknowledgment of special resource values would insure that it is given special protection and consideration in an overall planning sense, and would encourage particularly careful review of any proposals for future siting of potentially harmful activities. Monitoring and study of the sanctuary would provide the basis for a greater understanding of the area's needs and ecological balance and would provide the foundation for better management. Finally, a program of public education should promote greater sensitivity to the significance of the area's natural resources which ultimately form the basis for truly effective long-term protection. In summary, increasing development is gradually eroding the buffer of isolation that previously protected the area's outstanding natural resources, and pressures are likely to continue growing in the future.

Therefore, some form of special management providing research, assessment, education, coordination, long-term planning, and additional protection is desirable in order to ensure that the extraordinary wealth of natural resources in the area is not jeopardized.

In light of the identified needs, the proposed sanctuary would have the following objectives:

1. To preserve an extraordinarily rich marine ecosystem by ensuring that human uses and activities within the proposed sanctuary boundaries do not (a) degrade intertidal and subtidal habitats and their associated communities or foraging, resting, migratory, or other open water habitat areas of value to marine birds and mammals, or (b) otherwise threaten the continued health, stability, and diversity of the marine ecosystem and the seabird and marine mammal populations using sanctuary waters.

2. To encourage scientific research consistent with objective 1 on the the significant resources of the area which will contribute to the understanding of ecological relationships and to the resolution of management and regulatory issues.

3. To enhance public awareness of sanctuary resources by ensuring adequate interpretive and educational services.

E. DESCRIPTION OF THE AFFECTED ENVIRONMENT

E.1 Overview of the Nominated Area

E.1.a. Location

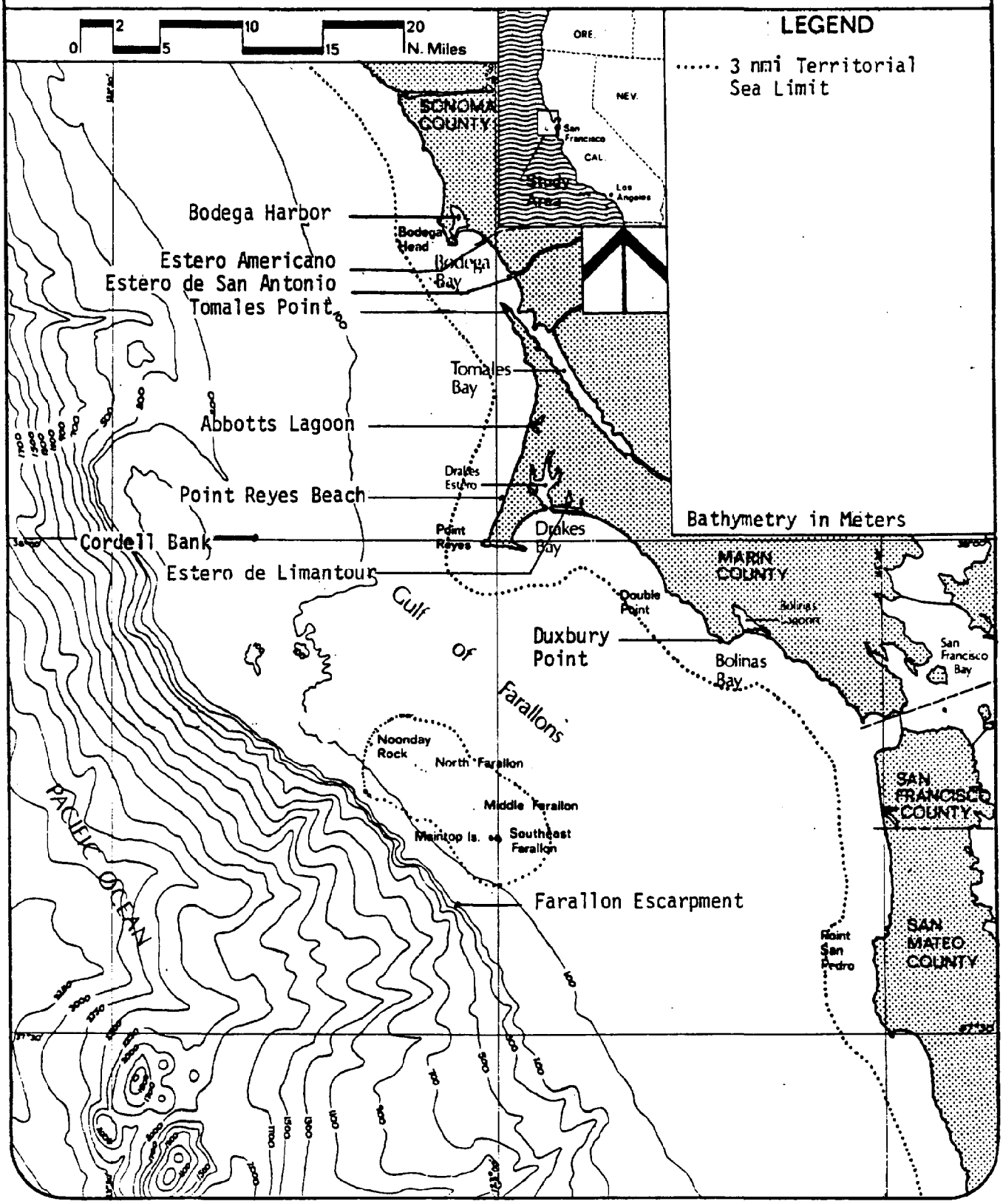
The marine area under consideration for designation as the Point Reyes-Farallon Islands Marine Sanctuary (also referred to as the study area) lies off the California coast to the west and north of San Francisco. Included are nearshore waters as far as the mean high tide line from Bodega Bay to Bolinas Lagoon and offshore waters extending out to and around the Farallon Islands (Figure E-1). The coastal boundary of the study area is the shoreline of southern Sonoma County and northern and central Marin County; the Islands fall under the jurisdiction of San Francisco County. The Point Reyes Headlands, which lie approximately mid-way along the study area shoreline, are about 32 nmi (59 km) northwest of San Francisco. The shoreward boundary of the study area extends to the high tide mark on ocean and estuarine shorelines. That area encompasses many of the region's significant coastal fish, birds, marine mammals, and invertebrate and plant resources. Coastal embayments, such as Tomales Bay, Estero Americano, Estero de San Antonio, Bolinas Lagoon, and Bodega Bay, which provide protected habitats benefiting resources during critical life stages, are included. Discussions of resources and activities in this section are not limited to any fixed boundaries. This assessment of the resources has determined that the following biological groups contribute to the study area's special significance: 1) seabirds; and waterfowl 2) marine mammals; 3) fish; 4) marine flora (particularly kelp, salt marsh vegetation, and eelgrass); and 5) benthic fauna. Each of these resource categories is discussed separately in Section E.2 below.

E.1.b. Environmental Setting

Topography, current patterns, and meteorology combine to characterize the unique marine resources of the study area.

The continental shelf here is wider than that of any other area on the west coast of the contiguous United States. In the Gulf of the Farallons, the shelf reaches a width of 26 nmi (48 km). It provides an especially large, relatively shallow foraging and habitat area for coastal and oceanic seabirds, marine mammals, and fish. The Farallon Islands lie along the outer edge of the continental shelf, between 13 and 19 nmi (4 and 35 km) southwest of Point Reyes and roughly 26 nmi (48 km) due west of San Francisco.

FIGURE E-1. Geographic features of the Point Reyes-Farallon Islands marine sanctuary study area.



The islands are located on part of a larger shore submarine ridge and extend for a distance of approximately 16 nmi (30 km) along the shelf break. These islands provide a secluded shoreline habitat that is essential for seabirds and marine mammals. The continued existence of such habitat areas is particularly important due to the sensitivity of these animals to high levels of human disturbance which characterize the mainland coast.

Shoreward of the Farallon Islands lies the Gulf of the Farallons. This section of the continental shelf is a relatively flat, sandy to muddy plain which slopes gently to the west and north from the mainland shoreline.

Several coastal embayments, including Bolinas Bay, Drakes Bay, Bodega Bay, Estero Americano, Estero de San Antonio, and Tomales Bay, are located along the shore. Bolinas, Drakes, and Bodega Bays are open to the ocean, but are somewhat protected from southward moving coastal currents by Duxbury Point, Point Reyes Headlands and Bodega Head, respectively. Tomales Bay is actually a submerged rift valley formed by the San Andreas Fault. Several estuaries, including Bodega Harbor, Abbotts Lagoon, Drakes Estero, Limantour Estero, and Bolinas Lagoon, are located inshore. The shoreline along the mainland coast is comprised of sandy beaches and rocky cliffs (U.S. Bureau of Land Management, 1979b).

The study area is characterized by two major currents, representing significant components of the northeast Pacific's general circulation pattern, one flowing southward (the California Current), and another northward, and a number of local eddy current dynamics. In addition, the outflow from San Francisco Bay's estuarine ecosystem exerts influence on regional water circulation patterns.

The California Current exhibits a broad southerly flow, is situated fairly close to the coast at most times, and brings water into the study area which is noticeably cooler and less saline than offshore waters (Reid et al., 1958). In places, this current is several hundred kilometers wide over the continental shelf; it moves southward at an average speed of 0.5 knots. The oceanic period associated with the California Current lasts typically from late summer to early fall, i.e., August-September to mid-November.

Within the study area, large counterclockwise eddy currents accompany this flow north of the Point Reyes Headlands and in Bodega Bay. Toward mid-November, however, the northwest winds decline sharply. In terms of circulation, previously elevated cold water sinks and is replaced by a thin layer of warmer water at the surface. The source of these warmer waters is the Davidson Current which runs counter, i.e., northward, to the California Current, but normally at depths of over 656 ft (200 m). Once having risen to the surface, the Davidson current forms a wedge between the California Current and the mainland coast. Its rate of flow approaches 0.5-0.9 knots while its breadth often reaches 50 smi (80 km). Like the oceanic period, nearshore eddies also characterize

this phase in many places; moreover, northward flowing waters function as the dominant inshore transporter of suspended nutrients. In effect, southwest winds and the Coriolis effect drive Davidson current waters shoreward so as to displace formerly resident coastal waters and to induce downwelling. During a good part of winter, therefore, surface temperatures are relatively high immediately along the coast. Surface salinities tend to be low, variable, and declining at this time.

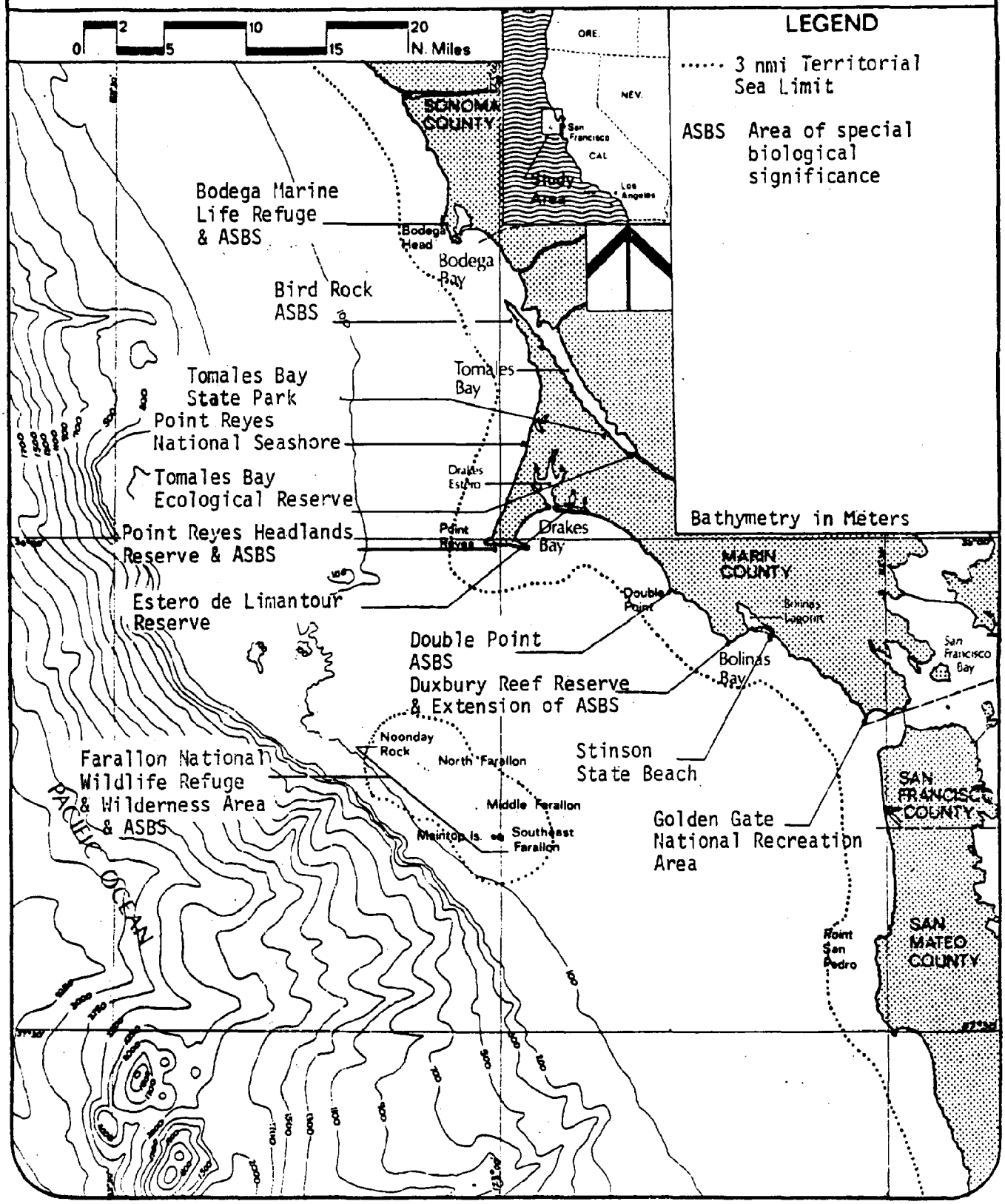
In roughly mid-February, an upwelling period commences, lasting into September. This phase correlates with intermittent shifts in prevailing winds from south to northwest, thus diminishing or reversing the previously northward flow of surface water. In spring and summer, as the broad California Current streams southward, surface water is carried offshore. Deeper water which is cold, dense, and nutrient-rich, rises up to take its place. Salinity levels, too, rise during the first half of upwelling, but decrease slowly toward the end of the period. Upwelling processes are an especially well-known characteristic of the Gulf of the Farallons (Winzler and Kelly, 1977). Although a seasonably distinct oceanographic phase, upwelling may also occur during both the Oceanic and Counter Current periods. Variable wind directions and intensities are major determinants of this tendency. In addition, the transition between these upwelling dynamics and the ensuing Oceanic Current patterns is not always well-defined (Winzler and Kelly, 1977).

During each of these seasons, local terrestrial and seabottom topography influences current patterns along with winds. The Point Reyes Headlands, Bodega Headlands, and Duxbury Point all modify nearshore ocean currents to some degree, especially as they cause local eddies within Drakes, Bodega, and Bolinas Bays. Current circulation is highly variable in these areas, however. In Bodega Bay, for example, studies have shown the prevailing circulation of nearshore surface waters to be southerly, except in December, during the Counter Current period (Winzler and Kelly, 1977). In Tomales Bay, on the other hand, the principal driving force for currents here are complicated by the configuration of the coastline and the tidal prism inputs of both Bolinas Lagoon and San Francisco Bay. Longshore currents are driven by the prevailing west-northwest swell and accompanied by a counterclockwise eddy generated by San Francisco Bay currents (Winzler and Kelly, 1977).

Regional current patterns also influence the movements and other behavior of marine fauna. Upwelling dynamics, for example, bring nutrient rich waters from great depths to the surface, producing seasonal surges in nutrient levels. Exceptionally prolific phytoplankton growths are produced and provide a rich food source for fish larvae, zooplankton, and finfish. Other marine resources such as seabirds and mammals, benefit indirectly. As a result, the study area is one of the most productive offshore zones along the California coast (Winzler and Kelly, 1977). Without this high productivity resulting from regional oceanic currents, the study area could not support its exceptional diversity and stocks of marine resources.

Intense winter storms and dense summer fogs characterize winter storms and dense summer fogs characterize the study area. The winter storm season usually stretches from December to early March (Association of

FIGURE E-2. Designated parks and biological reserves established by State and Federal authorities in the Point Reyes-Farallon Islands marine sanctuary study area.



Monterey Bay Area Governments, 1978). During winter storms, winds peaking at velocities of 40 to 50 knots generally shift from the south or east during approach to a prevailing northwesterly direction after passage. These storms affect nutrient suspensions in the water column, and, hence, many forms of marine life.

Differences between air and water temperatures, particularly during the summer, often produce dense fogs. Subject to salinity and the effects of upwelling, water temperatures at the surface are usually in the low 50's F (about 10°C) during summer. The cold temperatures are, in part, a result of the cold northern waters of the California Current moving south along the coast, combined with upwelling flows originating offshore at greater depths.

The environmental setting in the study affords a wide diversity of marine habitats. The combination of upwelling and land runoff from San Francisco Bay insures that basic nutrients necessary for phytoplankton growth are unusually high. San Francisco Bay, which includes more than half of all northern California's saltmarsh acreage, is also utilized as a food source by marine fauna. This broad base of primary production (plant growth) supports exceptionally large numbers of invertebrates, fish, seabirds, and marine mammals.

The coastline topography adjacent to the winter study area also provides essential food sources and habitat for marine fauna (Winzler and Kelly, 1977). Nearshore and shoreline habitats are biologically rich areas characterized by irregular rocky headland and submerged rocky reefs. These areas provide substrate for kelp, other marine algae, and numerous species of intertidal and benthic animals. Highly productive salt marshes, eelgrass beds, and tidal mud flats are also found in inshore areas. In addition to heavy use by shorebirds, these coastal and estuarine areas are important nursery areas for many fin and shellfish whose adult life is spent in oceanic environments. The coastline topography of the study area also includes shelter and breeding habitat from which rich sources of food are easily accessible. Most important of these are the Farallon Islands and their associated ecosystems.

Because of the rich diversity of marine life in the area, the exceptionally scenic qualities of shoreline areas, and the proximity to the San Francisco metropolitan area, the study area is an especially important region for wildlife and recreation. Numerous geographic areas in and along the current study area have been set aside as reserves, parks, or refuges (see Figure E-2).

E.2. Natural Resources of Exceptional Value

E.2.a Marine Birds

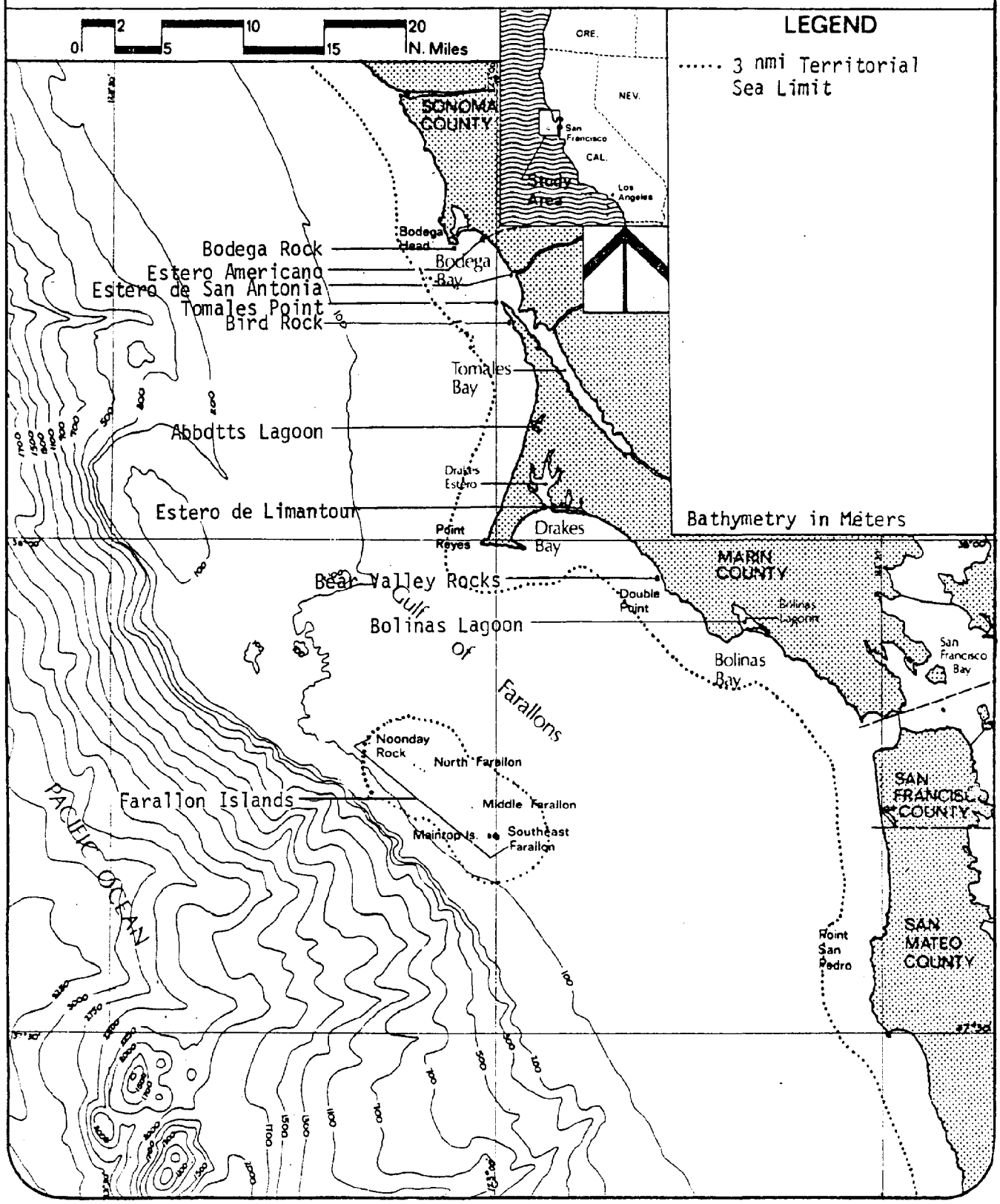
One of the most spectacular components of the area's abundant and diverse marine life is its nesting seabirds. As shown in Table E-1 and Figure E-3, the number of nesting seabirds in the current study area was

Table E-1. Nesting seabirds in the Point Reyes/Farallon Islands marine sanctuary study area (developed from Osborne and Reynolds, 1971 as presented in Winzler and Kelly, 1977).

Species	Numbers Per Breeding Site * (Breeding Pairs)							
	Farallon Islands	Double Point	Bear Valley	Pt. Reyes Headland	Bird Rock	Tomales Point	Bodega Rock	SPECIES TOTAL
Ashy storm-petrel	2,000				5			2,005
Leach's storm-petrel	700							700
Brandt's cormorant	11,000	170	15	480			400	12,065
Pelagic cormorant	1,000	40	10	264		86		1,400
Double crested cormorant	40							40
Black oystercatcher	20	1		3	3		1	23
Western gull	11,500	50	200	13	30			11,593
Common murre	10,000	700		3,820				14,720
Pigeon guillemot	1,000	1		24	12	4		1,041
Cassin's auklet	60,000							60,000
Rhinoceros auklet	3							3
Tufted puffin	25							25
BREEDING SITE TOTALS	97,288	962	225	4,604	50	90	401	103,620

* Locations of breeding sites are shown on Figure E-3

FIGURE E-3. Geographic locations important to seabirds as nesting, feeding, and/or roosting areas (developed from Osborne and Reynolds, 1971 as cited in Winzler and Kelly, 1977).



estimated in 1969-1970 to exceed 100,000 pairs. This number probably includes over half of all California's nesting seabirds. In the Farallon Islands, the study area encompasses the largest seabird rookeries in the contiguous U. S. (Winzler and Kelly, 1977). Of the 16 species of seabirds known to nest in the U. S., 12 species have been known to nest on the west coast (Table E-1) (Ainley, 1976).

As indicated in Table E-1, the largest concentration of seabirds in the study area occurs on the Farallon Islands. The Farallons' seabird population includes virtually the entire world population of the ashy storm petrel. Also found on the Farallons, are one of the largest single colonies of western gulls in the world, and the largest concentrations of pelagic cormorant, Brandt's cormorant, black oystercatcher, pigeon guillemot, and Cassin's auklet in northern and central California (Winzler and Kelly, 1977). Ecological information on these and other birds found on the Farallons is contained in Table E-2.

Several species in the Point Reyes-Farallon Islands region are on State or Federal endangered/threatened species lists; none, however, are found in large concentrations. Those on the Federal list include the peregrine falcon, southern bald eagle, California clapper rail, brown pelican, and California least tern (Shepherd, 1979, personal communication). Those on California's list also include the brown pelican, peregrine falcon, southern bald eagle, California clapper rail, and least tern (Schlorff, 1979, personal communication; Burns, 1980, personal communication).

The significance of the large seabird populations at the Farallon Islands led, in 1909, to the establishment of a National Wildlife Refuge on North and Middle Farallon Islands. In 1969, Southeast Farallon Island was added to the Refuge. A long history of bird observations at the Farallons make it one of the best known seabird habitat areas on the west coast. Research by the permanently manned Point Reyes Bird Observatory on Southeast Farallon Island has expanded tremendously the understanding of area bird biology and ecology, (see also Section E.3.f.).

A wide variety of marine and coastal bird species are also found throughout the study area. Important nesting locations and prominent breeding species include: Bodega Rock (Brandt's cormurant), Tomales Point (pelagic cormorant), Bird Rock (western gull, pigeon guillemot, ashy storm-petrel, black oystercatcher), Point Reyes Headlands (common murre, Brandt's cormorant, pelagic cormorant, pigeon guillemot, western gull, black oystercatcher), Bear Valley Rocks (common murre, Brandt's cormorant, pelagic cormorant), and Double Point (common murre, Brandt's cormorant, pelagic cormorant, and western gull) (Table E-1 and Figure E-3). Of particular importance to the proposed marine sanctuary are the

Table E-2. Ecological information for nesting seabirds found in the Point Reyes/Farallon Islands marine sanctuary study area (developed from Winzler and Kelly, 1977).

Species	Ecological Notes
Leach's storm-petrel *Oceanodroma leucorhoa*	Five known nesting areas in California with a total state population of about 10,000 pairs; 1,400 pairs at the Farallon Islands; individuals visit nesting sites from March to September with egg laying during May; during fall and winter species move to oceanic waters of the central Pacific; since the species prefers warmer waters than either the ashy or fork-tailed petrel it is found further offshore; seen nearshore regularly only during the fall.
ashy storm-petrel *Oceanodroma homochroa*	Endemic to California and northern Baja California; only six nesting sites; approximately 2,000 of the 2,100 nesting pairs breed at the Farallon Islands; individuals visit the island throughout the year although few do so during the fall; egg laying is rather extended from late April to August with the peak early in this period.
double-crested cormorant *Phalacrocorax auritus*	Breeds at about seven sites in the state; With a total state population of about 250 pairs; about 160 pairs nest in Del Norte County and at the Farallon Islands; California population has declined greatly since 1900, apparently because of pesticide pollution, human disturbance of nesting colonies, and perhaps the decline of the sardine due to overfishing; species frequents shallow bays and lagoons; feeds mainly on mid-water schooling fish.
Brandt's cormorant *Phalacrocorax penicillatus*	Nests at about 45 sites in California; state breeding population of about 20,000 pairs with about 11,000 pairs nesting on the Farallons; during non-breeding season they disperse widely; occurring mainly in shallow areas over the continental shelf; feed on a wide variety of fish including both benthic and mid-water species.

Table E-2 continued

Species	Ecological Notes
pelagic cormorant *Phalacrocorax pelagicus*	Total California breeding population about 3,000 pairs with about 1,500 occurring on the Farallons; not known to be particularly mobile; confined to coastal waters overlying kelp beds and rocky reefs where they feed on benthic fish and crustaceans; breeding season extends from late March to August; species lays 4 to 5 eggs per nesting attempt.
black oystercatcher *Haematopus bachmani*	Found mainly on rocky intertidal zone along exposed coast; current populations may be reduced in areas where there is considerable human disturbance; reproductive potential is low because they do not breed until three years of age and lay only 2 to 3 eggs per nesting attempt; feed on mussels, limpets, crustaceans, and barnacles; on the Farallons also feed on tenebrionid (beetle) larvae on marine terraces above intertidal zone.
western gull *Larus occidentalis*	Farallon Island population more numerous now than ever before due to increased winter survival made possible by feeding on garbage and fish offal and availability of greater numbers of nesting sites previously occupied by fur seals; depend heavily on anchovies to feed chicks.
common murre *Uria aalge*	Occur year round mainly in waters over the continental shelf; California population has increased rapidly in recent years, the primary site of which has been the Farallons; state population estimated at about 80,000 pairs; very susceptible to oil pollution; reductions in egg shell thickness resulting from high pesticide levels has been detected in murres on the Farallon Islands; feed mostly on mid-water schooling species of fish; squid and crustaceans.

Table E-2 continued

Species	Ecological Notes
pigeon guillemot Cepphus columba	Concentration at the Farallons is easily the world's largest and has increased recently; nests in shallow cavities of talus slopes; susceptible to oil spills but since breeding populations are not highly concentrated, clutch size is large; pigeon guillemots have a relatively high potential for recovering from decimation; feed principally on benthic fish of rocky substrates sometimes diving rather deeply for them.
Cassin's auklet Ptychoramphus aleuticus	The largest nesting population by far occurs at the Farallon Islands; nests in cavities; travels to and from nesting sites at night; lays only one egg during each nesting attempt; usually in deep waters particularly those overlying the continental slope; feed on planktonic organisms.
rhinoceros auklet Fratercula corniculata	California breeding population of about 175 pairs; abundant during winter; prefers deep waters beyond the continental shelf; feeds on mid-water schooling fish and crustaceans.
tufted puffin Lunda cirrhata	Numbers at the Farallon Islands (about 50 pairs) are remnants of earlier populations; population at the Farallon Islands was affected adversely by oil pollution and possibly by reduction of sardines from overfishing; occurs throughout the year but is rare in October and March; raise one chick per year; feed on mid-water schooling fish, squid, and crustaceans in coastal waters.

correspondingly high concentrations of seabirds found in ocean areas adjacent to these nesting sites. As discussed above in Section E.1.b., submarine topography and ocean current patterns have combined to make the study area one of the most highly productive areas off the California coast. The Farallon Islands and the mainland nesting sites provide seabirds with comparatively remote, favorable physical environments for nesting, along with ready access to rich foraging areas that are necessary during breeding season.

Marine birds in the area can be broadly classified as those preferring nearshore habitats from the shoreline to about 3 to 4 nmi (6 to 8 km) out to sea, those preferring offshore habitats from 3 to 4 nmi (6 to 8 km) offshore out to the edge of the continental shelf, and those preferring pelagic habitats which include oceanic waters beyond the continental shelf (Table E-3). Offshore and pelagic birds gather in large colonies during breeding seasons and frequent inshore ocean or open estuarine waters (Table E-3). Although the Farallons and Point Reyes Peninsula are known primarily for their concentration of large seabird colonies, significant numbers of waterfowl and shore birds are found in the major estuarine systems of the study area.

Several major estuarine systems are located in the study area, including Bodega Bay, Bolinas Lagoon, Tomales Bay, Estero de Limantour, Drakes Estero, Estero Americano, Estero de San Antonio, and Abbotts Lagoon (Figure E-3). Two of the most important estuarine habitats are wetlands and tidal flats. Birds found in these estuarine margins feed on worms, snails, shellfish, fish, and aquatic vegetation (California Department of Fish and Game, 1979). For example, one significant site in the study area is an estuarine heron and egret rookery supporting 160 nests, located in the Audubon Canyon Ranch fronting the east side of Bolinas Lagoon.

In moderately deep and more open estuarine areas, such as those where eelgrass beds are located, diving birds tend to predominate. Such waters, particularly those in Tomales Bay, Drakes Estero, and Estero de Limantour, are vital links in the west coast chain of black brant feeding areas. An average of 15,000 to 20,000 black brant migrate along the California coast during February, March, and April (California Department of Fish and Game, 1979).

E.2.b. Marine Mammals

Twenty-three species of marine mammals have been sighted within the study area, including five species of pinnipeds (seals and sea lions), one fissiped (the sea otter), and 17 cetaceans (whales and dolphins) (Tables E-4 and E-5). With the possible exception of the northern fur seal, the pinnipeds are year round inhabitants, and seasonally use the Farallon Islands and various sites along the coast for haulout and pupping purposes (Ainley, 1979b, personal communication). The cetaceans, on the other hand, are

Table E-3. Marine bird species and habitats found in the Point Reyes/ Farallon Islands marine sanctuary study area (Developed from Ainley, 1976. Winzler and Kelly, 1977; Udvardy, 1977).

INSHORE [Shorelines, bays and estuaries out to 3 to 4 nmi (6 to 8km) from shore]

Estuarine margins (tide flats and wetlands):

dabbling ducks	long-billed dowitchers	dunlins
sandpipers	great blue herons	American avocets
black turnstones	snowy egrets	killdeers
willets	snowy plovers	American coot

Open estuarine waters:

black brant	American coot	common tern
diving ducks	surf scoter	Arctic loon
western grebes	double-crested cormorant	California gull

Rocky exposed coast:

black oystercatcher	surfbirds	pelagic cormorant
black turnstones	wandering tattler	rock sandpier
black-bellie plover	spotted sandpiper	herring gull

Sandy beaches:

semipalmated plover	western sandiper	elegant turn
sanderlings	long-billed curlee	herring gull
least sandpiper	whimprel	California gull

Onshore ocean waters:

pelagic cormorant	common loon	California gull
Brandt's cormorant	igeon guillemot	common tern
western gree	marbled murrelet	surf scoter

OFFSHORE [3 to 4 nmi (6 to 8 km) from shore out to the edge of the continental shelf]

Cassin's auklet	western gull	ashy storm-petrel
common murre	onaparte's gull	Leach's storm-petrel
tufted puffin	sooty shearwater	

PELAGIC [Beyond the edge of the continental shelf]

sooty shearwater	fork-tailed storm-petrel	rhinoceros auklet
pink-footed shearwater	Leaches storm-petrel	skua
Buller's shearwater	ashy storm-petrel	Sabine's gull
northern fulmar	black-footed albatross	

primarily transients passing through on their annual migrations. Relatively few (around nine) sea otters have been seen in the vicinity.

Because the Farallons provide a secluded area with relatively easy access to both shallow and deep water foraging areas, they represent the most important habitat area for pinnipeds in northern California. Research on the pinniped populations in 1977 indicated the substantial dependence of seals and sea lions on the Farallons for haulout and breeding (Ainley et al., 1977). Furthermore, the Farallons support the northernmost breeding population of elephant seals (U. S. Bureau of Land Management, 1979). Sightings of the northern fur seal have increased in recent years; the possibility exists that the Farallons may eventually provide a breeding site for this species (Ainley, 1979, personal communication). Significant changes have been observed in pinniped populations on the Farallons over the last several years (Ainley, 1979, personal communication).

The elephant seal has recently established a breeding population on the islands. Between 1972 and 1977, the number of pups born on the islands increased from 1 to 104. A few harbor seals and California seal lion pups have been born on the islands in the past few years; both these species may be in the process of establishing breeding populations on the islands. A fourth species, the Steller sea lion, has been declining in numbers over the past 50 years for unknown reasons. Further study of their population dynamics and protection from potentially adverse human impacts appear necessary if this species is to remain on the Farallons (Ainley, 1979a, personal communication).

Although the Farallons are easily the most important breeding and pupping area for pinnipeds within the study area (Figure E-4), several sites along the mainland coast are also vital for haulout (Figure E-5). There have also been sightings of male sea otters within the study area; the area may be well-suited for permanent establishment of sea otters (Benech, 1979, personal communication).

Although their populations are somewhat smaller today than in the past, one of the most common pinniped species (along with harbor seals) in the study area is the California sea lion, with over 1,150 animals sighted hauled out on the Farallon Islands during the 1977 census (Ainley et al., 1977). These sizable sea lion concentrations seem to correlate closely with the seasonal presence of the finfish hake, which frequent shallower waters around the Islands during the spring. During this time, hake are the primary food source for sea lions, and the mammals compete directly with fishermen for these commercially valuable stocks (Ainley et al., 1977).

Seventeen species of cetaceans have been recorded within the study area (Figure E-6). Among these are the blue, humpback, and sperm whales, as well as the more common California gray whales which are observed each year from late November until June or July during their annual migrations (Figure E-6). Observing gray whales during

Table E-4. A list of the marine mammals found within the study area and their status as residents. (Developed from the California Department of Fish and Game, 1979)

Common Name	Genus/Species	Status
Pinnipeds:		
California sea lion	(Zalophus californianus)	year round
Steller sea lion	(Eumetopias jubatus)	year round
Harbor seals	(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 novaeangliae)	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
Curier'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

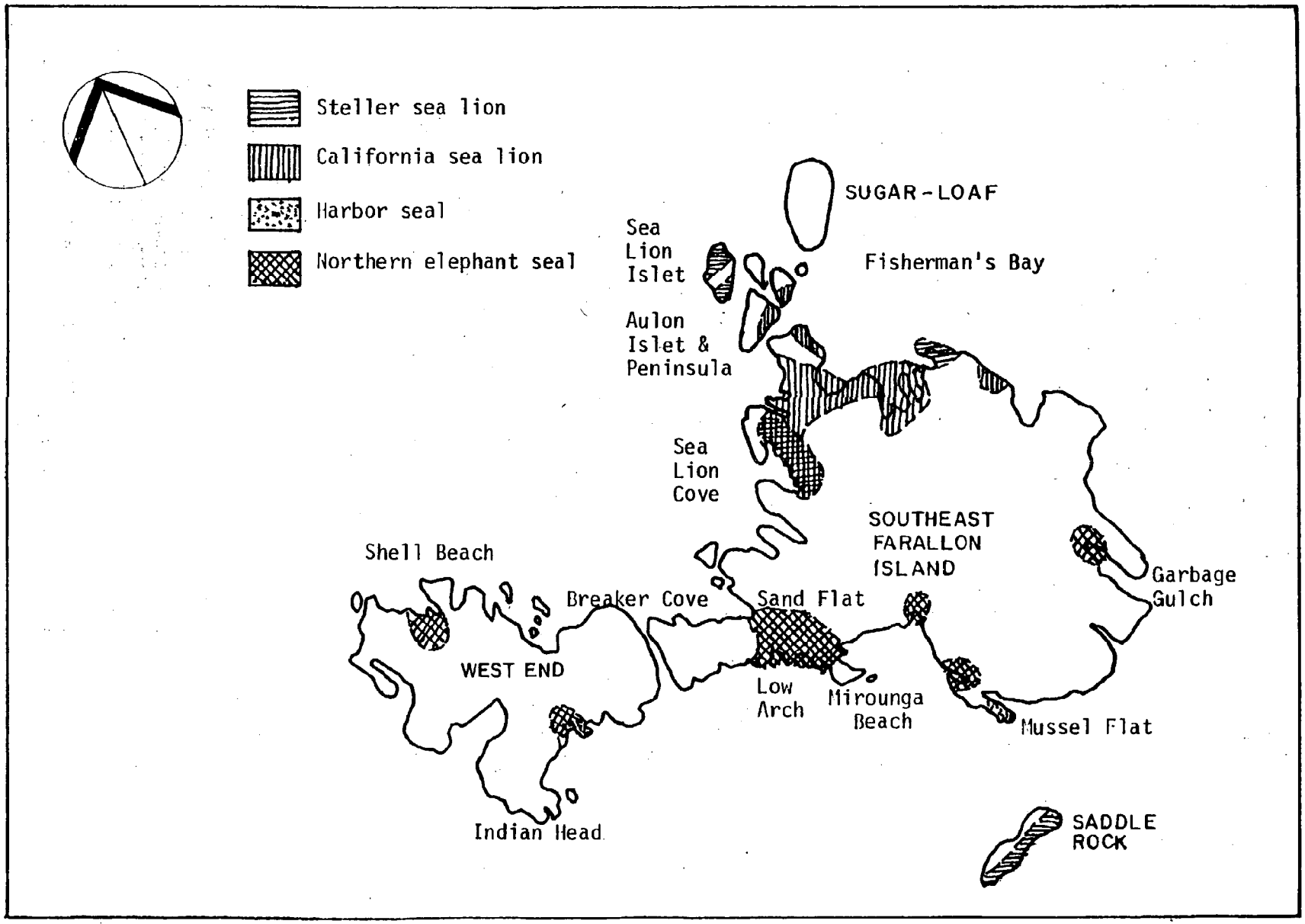
Table E-5. A summary of the ecological information for sea otters, sea lions, and seals in the waters around the Point Reyes-Farallon Islands area. (Daugherty, 1965; Woodhouse *et al.*, 1977; National Marine Fisheries Service, 1978).

California sea otter (*Enhydra lutris nereis*)	The California subspecies is a discrete breeding population geographically separated from more northern sea otter populations in Alaska and Russia and has been classified as a threatened species. After severe exploitation in 18th and 19th centuries, the population is now expanding from central California. Breeding females tend to stay in the central part of range, from Monterey Bay to just south of Piedras Blancas, while the males may wander greater distances and expand the range. California otters primarily feed on sea urchins, abalone, crabs and clams. Otters are generally found in shallower waters and are very susceptible to oil pollution.
Steller sea lion *Eumetopias jubatas*	Range extends from Bering Sea to the California Channel Islands in the eastern Pacific, also found in the western Pacific. Abundant in Alaska but less common in southern ern California, numbers have decreased drastically in the Farallons and the Channel Islands but remain more stable in the Monterey Bay area. Breeding season occurs from late May until early June; principal diet consists of clams, rockfish, squid, octopus, flounder, and other fish.
California sea lion *Zalophus californianus*	Most commonly seen and recognized pinniped in Monterey area. range from British Columbia into Mexico, breeding occurs between June and July; principal diet consists of squid, octopus and a variety of fishes. The amount of food required by seals in the wild is not known though captive seals consume from 15 to 20 pounds of fish per day.

Table E-5 continued

Harbor seal *Phoca vitulina*	Eastern Pacific range extends from Bering Sea to Mexico, also in western Pacific and Atlantic. Hauled out individuals are relatively shy and secretive and seen less frequently than sea lions; approximately 700 individuals in the study area most often observed in bays and harbors; breeding season begins in early summer; pups usually born on land but occasionally born in the water; principal diet consists of fish, crustaceans, and mollusks.
Northern fur seal *Callorhinus ursinus*	Highly exploited in the 18th and 19th centuries; range from the Bering Sea to Mexico; (southernmost breeding site is on San Miguel Island) abundant in northern part of range but very scarce in southern; tend to stay 10 to 100 miles out to sea, although nearshore sightings have been reported. Feed primarily on anchovies, saury, hake, squid, and other small fish; particularly susceptible to oil pollution.
Northern elephant seal *Mirounga angustirostris*	Range extends from the Bering Sea to Mexico; abundant in northern part of range but scarce in southern; stable breeding population on Ano Nuevo Island; spend most of their time in the water but haul out to breed in the winter and to molt in the spring; feed primarily at night. Principal diet consists of small sharks, rays, rockfish, and squid; probably feed in deeper waters of the continental slope or beyond.

FIGURE E-4. Map of the South Farallon Islands showing major haulout and pupping areas for Steller sea lions, California sea lions, harbor seals, and the northern elephant seal (modified from Ainley, 1977).



their annual migrations provides both aesthetic and recreational value to visitors to the area as well as to coastal residents.

Marine mammals constitute a major and vital link in the ecosystem of the Point Reyes/Farallon Islands region. Besides playing a major role in area food chains and thereby affecting numbers and diversity of fish and intertidal resources, they also provide socio-economic, scientific, and educational benefits to many people visiting the study area. To preserve these values, the stability and health of mammal habitats must be maintained.

E.2.c. Fish Resources

Fish resources are abundant over a wide portion of the Point Reyes and Gulf of the Farallons area. Because of the comparatively wide continental shelf and the configuration of the coastline, the study area is vital to the health and existence of salmon (chinook and coho or silver), northern anchovy, rockfish, and flatfish stocks (Squire and Smith, 1977). The curvature of Point Reyes and the resulting current patterns tend to retain larval and juvenile forms of these and other species within the area, thereby easing recruitment pressures and insuring continuance of the stocks. The Farallon Islands act as an offshore mecca for shallow and intertidal fishes which further enhance finfish stocks.

The study area includes many diverse habitats, thereby contributing to the region's high productivity. Nearshore waters in the study area include bays, estuaries, rocky shores, sandy beaches, and mud flats. Bays and estuaries are especially important as feeding, spawning, and nursery areas for a wide variety of finfish. Important fishes of the major bays and estuaries (Bodega Harbor, Estero Americano, Estero de San Antonio, Tomales Bay, Drakes Estero, and Bolinas Lagoon) include the Pacific herring, smelts, starry flounder, surfperch, sharks and rays, and silver salmon (California Department of Fish and Game, 1979). Species that occur in, or migrate to, bays, estuaries, and nearshore waters for spawning include the California halibut (February to July), starry flounder (November to February), rex sole (all year), and, occasionally, other soles (Winzler and Kelly, 1977).

Several existing reports have summarized fish resources in the study area. Winzler and Kelly (1977) provide the most comprehensive review of finfish and shellfish resources and also of mariculture ventures. Squire and Smith (1977) offer species information, by area, from the angling perspective. A review of taxonomy and geographic distribution of each species is presented by Miller and Lea (1972). Finally, the California Department of Fish and Game (1979) has summarized fish resource information for the study area. The following descriptions are based upon this literature.

The rocky intertidal zone is characterized by a rather small and specialized group of fish adapted for life in tide pools and wash

FIGURE E-5. Marine mammal haulout areas throughout the study area (California Department of Fish and Game, 1979).

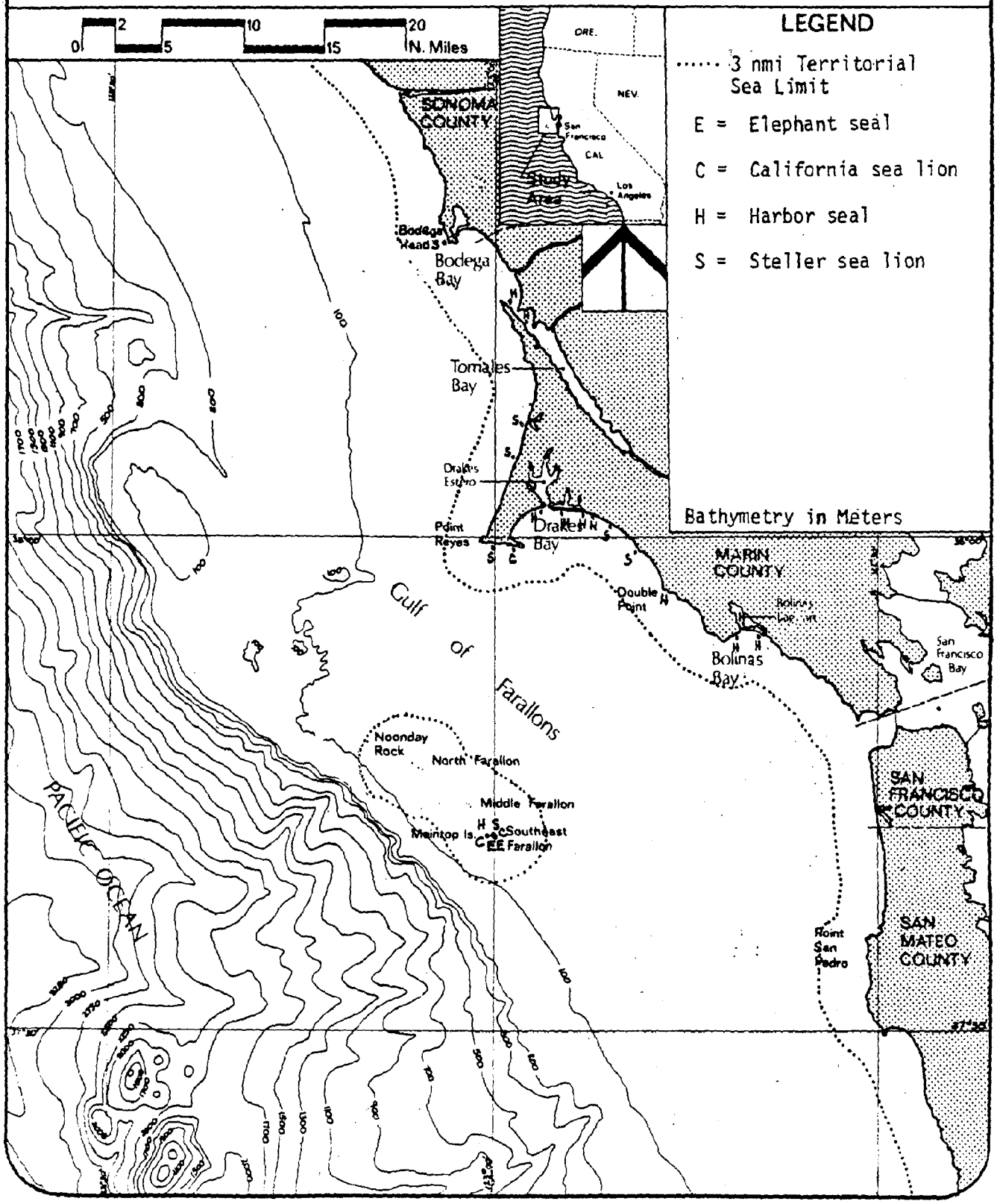
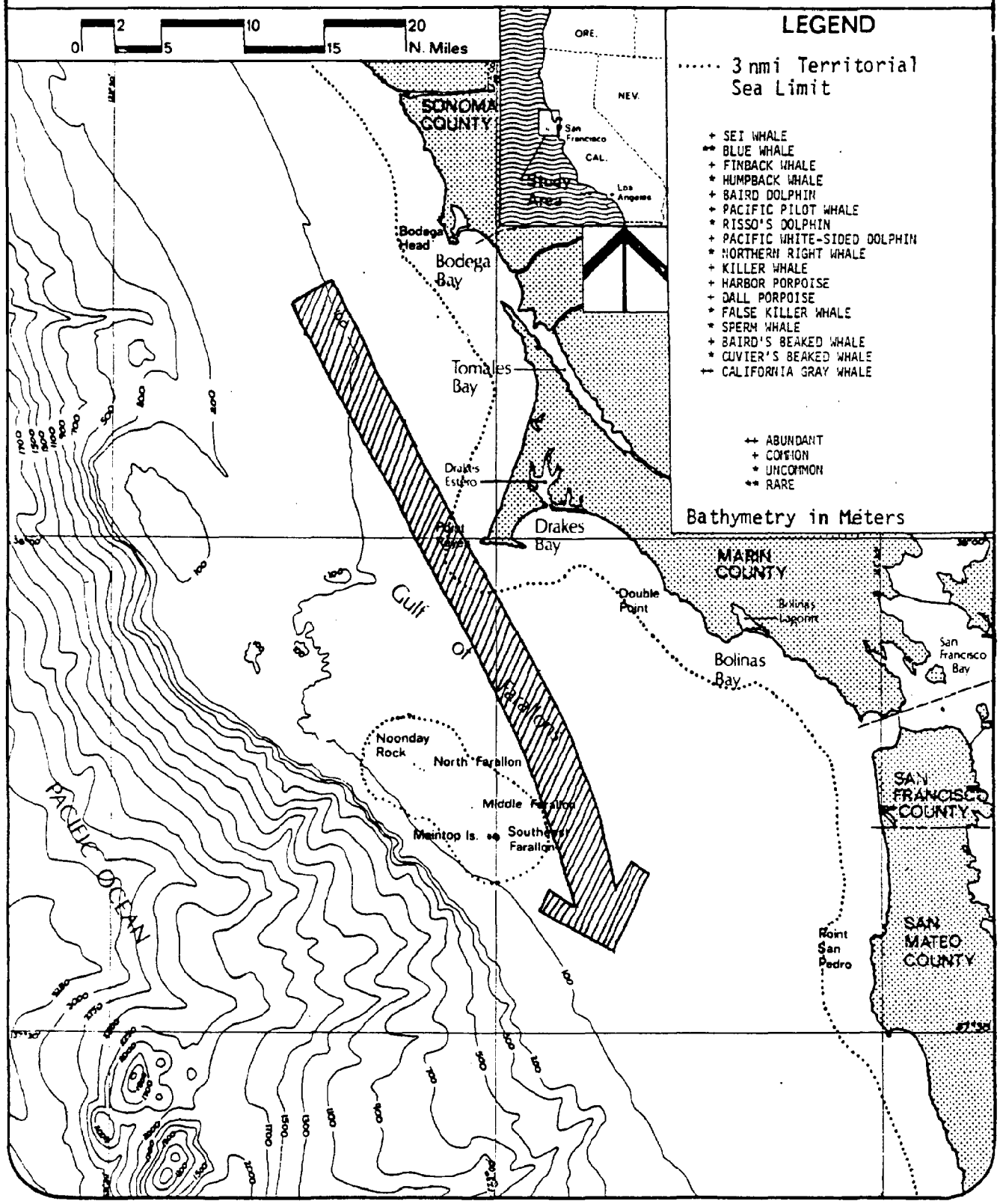


FIGURE E-6. A list of cetaceans observed in the Point Reyes/Farallon Islands area and a generalized depiction of the southern migratory route of the California gray whale (California Department of Fish & Game, 1979).



areas. Most representative of these species are the monkey face eel, rock eel, dwarf surfperch, juvenile cabezon, sculpins, and blennies (California Department of Fish and Game, 1979). Many of these stocks are important as forage for shore and seabirds.

Subtidal fish resources are more abundant than intertidal, reflecting the diverse habitats and less-stressed nature of subtidal waters. Shallow rocky reefs represent a median in biota between deeper waters and sandy bottoms located on the reef flanks.

Juvenile finfish (e.g., sandsole, copper rockfish, and canary rockfish) and endemic adults abound. Nearshore pelagic environs are habitat to large predatory finfish such as sharks, tunas, and mackerel. Northern anchovies, Pacific mackerel, and the market squid are abundant and commercially valuable.

Offshore demersal habitats resemble shallower ecosystems (rocky reefs, soft bottoms, etc.), but are limited herein to waters more than about 180 ft (55 m) deep. Rocky banks are prime habitat for large populations of rockfishes that support much of the recreational activity in the study area (Squire and Smith, 1977). Soft bottom areas are dominated by recreationally valuable flatfishes (e.g., soles, sanddabs) due to the lack of vertical relief.

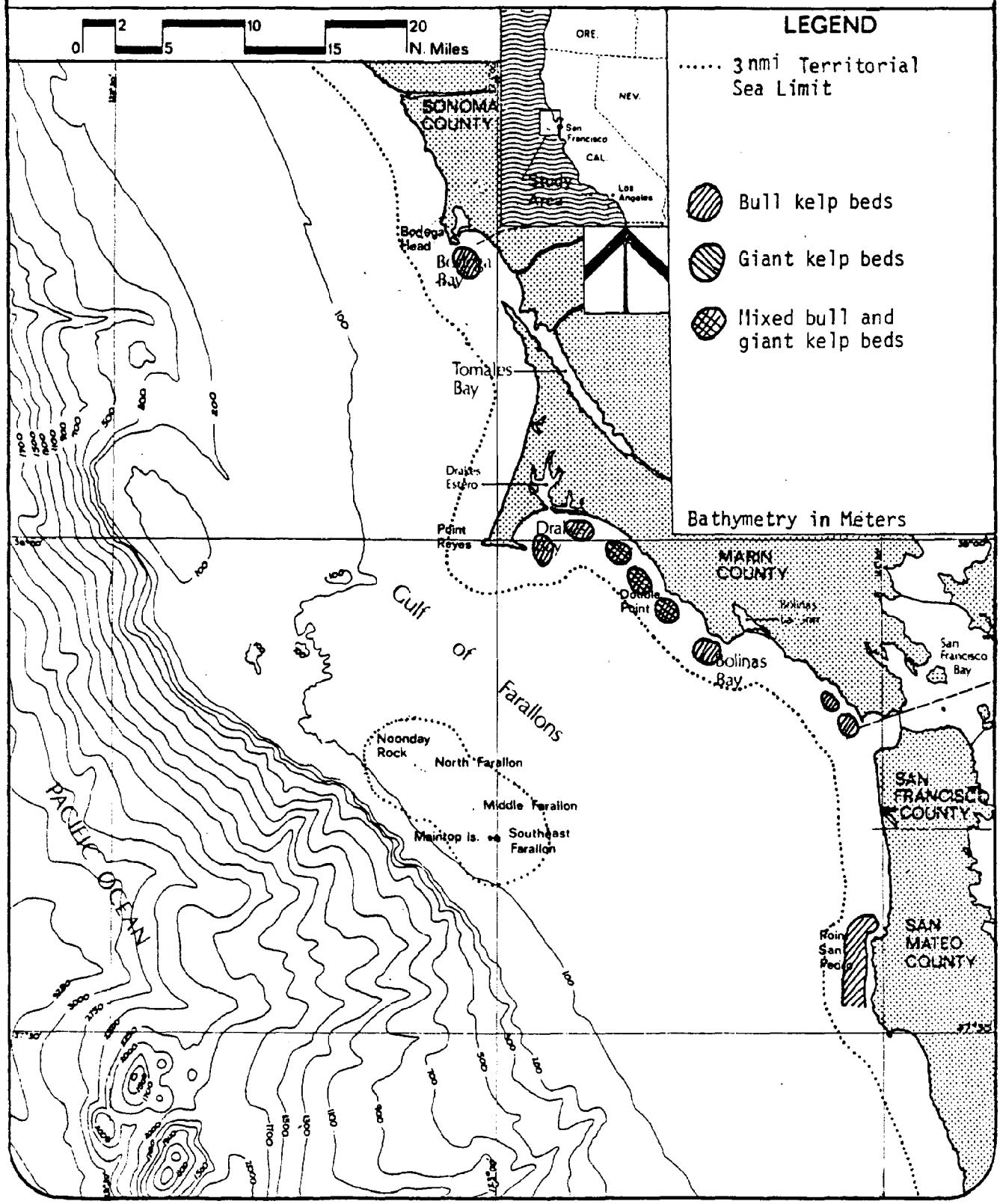
Pelagic fish resources in the study area generally parallel species living in the nearshore subtidal zone. At the mid-depth or mesopelagic range over sand and mud bottoms, bocaccio, chilipepper, widow rockfish, and Pacific hake were specifically identified by the California Department of Fish and Game (1979). Hake are harvested commercially, while the three rockfishes contribute to the recreational fishery.

The primary special habitat areas in the Point Reyes-Farallon Island vicinity are the kelp beds. Most of the finfish found in shallow rocky reefs are also common in kelp beds (California Department of Fish and Game, 1979). However, the kelp canopy, stipes, and holdfasts substantially increase the available habitat for pelagic and demersal species and offer protection to juvenile finfish. Kelp is also a direct (fronds, stipes, holdfasts) and indirect (epibenthos on kelp) food source.

E.2.d. Marine Flora

Significant plant communities within the Point Reyes-Farallon Islands include kelp beds, salt marshes, and eelgrass beds. The importance of these plants and microscopic phytoplankton for habitat and food cannot be overestimated. The existence of ecologically, commercially, and recreationally valuable fish resources here is dependent upon plant resources.

FIGURE E-7. Kelp bed areas in the Point Reyes-Farallon Islands marine sanctuary study area (California Department of Fish and Game, 1979).



Kelp resources in the study area include the giant kelp species (dominated by Macrocystis integrifolia) and bull kelp (Nereocystis luetkeana). These species have large stalks, grow from rocky depths of up to 100 ft (31 m), and reach to the sea surface. However, there are differences in productivity that sharply contrast the two species. First, bull kelp is an annual species whose winter beds represent only one to five percent of their summer size (U. S. Bureau of Land Management, 1979); giant kelp beds, on the other hand, remain intact and grow throughout the entire year. Second, bull kelp fronds originate from a single large float or pneumatocyst, while giant kelp fronds branch off the entire length of the stem of stipe. The difference between canopies of the two species is considerable. Giant kelp produce a much larger and more dense canopy, plus a far more unique mid-water habitat.

The highest concentration of kelp beds in the study area occurs along the mainland coast between Point Reyes Headlands and Bolinas Lagoon, inside the 3 nmi (5.6 km) depth contour (Figure E-7). Most of these beds are dominated by short kelp algae, including Pterygophora californica and several species of Laminaria. They are far less luxuriant than those giant kelp beds found in southern California coasts (Phillips, 1974).

The value of kelp to marine ecology is substantiated by its growth rate and the number of species for which it provides food, shelter, and anchorage. Kelp has one of the highest growth rates of any plant species on record; increases in stipe and frond length of several feet per day have been recorded. This phenomenal growth rate compounds the value of kelp in food chains of both kelp grazers and detritus consumers. Probably the most important grazer on live kelp is the sea urchin, which grazes on kelp holdfasts. Other grazers and consumers of detrital kelp include abalone and numerous finfish and invertebrates that form key links in study area food chains.

Two other marine plant communities, salt marshes and eelgrass beds, are also important here. Although marshes are relatively sparse in the central California region, the study area has an unusually large concentration: Tomales Bay, Bodega Bay, Drakes Estero, Estero de Limantour, and Bolinas Lagoon (Figure E-1). Salt marshes offer food for many coastal species, plus protected habitat to key phases in the life cycles of both fish and marine birds. For example, the striped bass and some flounders breed near salt marshes to allow juveniles to develop in the marsh system; herrings use eelgrass to attach their eggs (Frey, 1971). Herons, sandpipers, ducks, rails, and geese are also dependent upon the marsh for feeding and breeding. Eelgrass beds are situated on subtidal estuarine flats, in bays, and coastal inlets (Standing et. al., 1975). Although some marine organisms feed directly on living plants, the principal food chain supported by eelgrass is based on detritus (Phillips, 1974).

E.2.e. Benthic Fauna

This section addresses invertebrates living directly on or in the seafloor; bottom fish and attached plants are discussed above (Section E.2.c. and Section E.2.d., respectively).

Benthic fauna communities differ according to habitat type. Within the study area, bays and estuaries, intertidal zones, nearshore areas, and offshore areas all possess special habitat characteristics and, hence, different benthic assemblages. Generally, each habitat area supports representatives from most classes or organisms, i.e., worms, clams, or crabs.

The benthic fauna of coastal northern California has been reviewed by the California Department of Fish and Game (1979) and the U.S. Bureau of Land Management (1979). Among the species commonly reported are abalone, crabs, and sea urchins; these species are utilized by man for food, bait, or other purposes. Literally hundreds of other species (starfish, clams, amphipods, shrimp, etc.) are critical links in the food chains of other fish resources, birds, and mammals.

E.3. Human Activities

E.3.a. Introduction

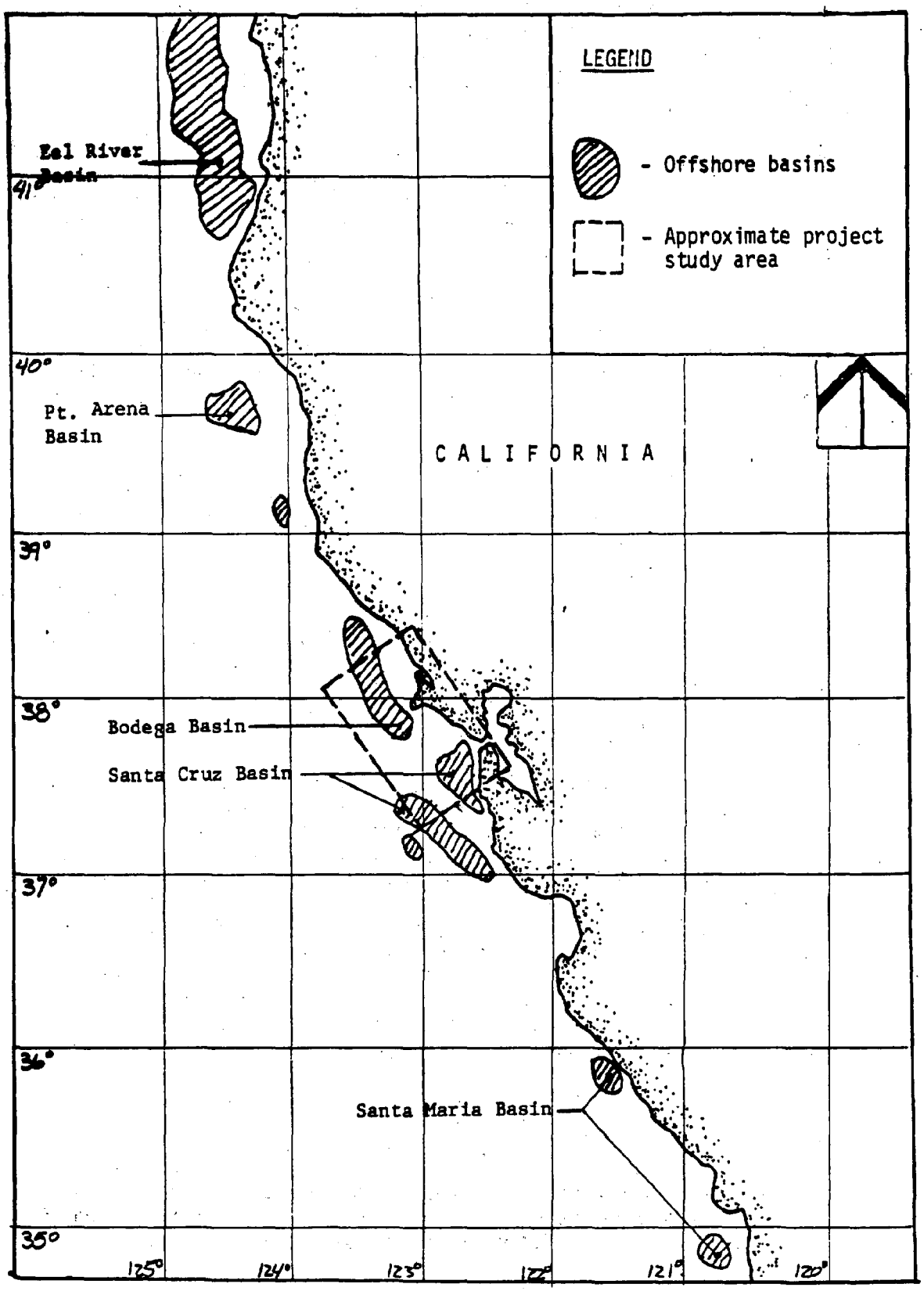
The Point Reyes-Farallon Islands study area is the scene of numerous water-oriented human activities. The expanding San Francisco Bay metropolitian region exerts considerable user influence on the scale and intensity of uses (often competitive) occurring in the Point Reyes area. Among the major near and offshore activities, either existing or proposed, are: oil and gas development, commercial fishing and mariculture, commercial shipping, recreation (including sport-fishing), scientific research, and military operations. The following section describes both current use patterns and trends for future activity expansion or decline.

E.3.b. Oil and Gas Development

Oil and gas development in the study area began in 1963 with the first Federal lease sale of California shelf resources. A total of 57 tracts in the six offshore basins (Figure E-9) of central and northern California were leased, including 27 between Russian River and Bolinas (3 to 21 nmi or 5.6 to 38.9 km offshore), one 11 nmi (20.4 km) off Pescadero Point, and one 6 nmi (11.2 km) off Ano Nuevo Point. There has been no offshore leasing in State waters of central and northern California. State oil and gas sanctuaries, which were legislatively designated and precluded leasing in State waters in the area, expired in 1975, therefore, leasing could occur in State waters. As discussed in Section F.1.b., provisions of the Outer Continental Shelf Lands Act prohibit leasing for oil and gas develoment outside State waters but within 15 statute miles (smi*),(24.1 km) of the

* 1 statute mile = 5,280 ft. 1 nautical mile = 6,076 ft.

FIGURE E-8. Offshore basins of central and northern California (U. S. Geological Survey, 1977).



Point Reyes Wilderness area unless the State leases relevant State waters for oil and gas development (Figure E-8A). Several tracts just outside the exclusion area have been tentatively selected for bidding in Lease Sale #53, offshore or the Marin County-Sonoma County line (numbers 61-68) and southwest of the entrance to San Francisco (Figure E-9).

Table E-6 shows the formal steps and decision points in the process leading up to a sale. For OCS Lease Sale #53, BLM issued a call for nominations in November 1977, and tentatively selected tracts on October 10, 1978. The tentative tract selection determines the areas to be analyzed in the environmental statement, initiates the preparation of development scenarios by the U. S. Geological Survey (USGS), and starts work on the socio-economic and oil spill trajectory models used in the environmental statement. Tentative tract selection also provides the public and governmental agencies with a preliminary tract list on which to comment. Only tentatively selected tracts may be offered in the sale. However, at several points up to the final notice of sale, any tract may be withdrawn from bidding.

The draft environmental impact statement (DEIS) was released in April 1980. A final environmental statement is scheduled for release in September 1980. The actual sale is scheduled for May 1981, unless unforeseen postponements occur before then.

The call for "nominations and comments" process allows tracts to be either favorably recommended or negatively commented upon. Nominations generally indicate those tracts on which industry wants to bid, while comments apply to those tracts which other interests desire withdrawn from the sale. Many public groups and State and local governments recommended that all or large numbers of the tracts originally offered for Sale #53 not be sold.

Estimates of the magnitude of petroleum resources in an area are an important determinant of whether tracts will be sold and what level of oil and gas activity will ultimately take place. Historically, the 57 tracts leased in 1963 were abandoned after exploratory wells failed to substantiate the presence of reserves capable of supporting commerical production (U. S. Bureau of Land Management, 1978). In Lease Sale #53, the location of the tracts tentatively selected for bidding (Figure E-9) emphasizes the importance of the resource potential of the Bodega Basin. However, as exemplified by Table E-7, estimates of the quantity of the Bodega Basin reserve are quite variable. The Basin does not appear to extend into the proposed sanctuary boundary.

In 1974, a petroleum industry ranking of resource potential (conducted at the request of the Department of the Interior) in 17 offshore areas classified the Sale #53 area 16th out of all 17 areas considered, and 11th out of the 12 frontier areas; only the areas off Oregon and Washington were ranked less desirable (California Office of Planning and Research, 1978). In the most recent ranking of resource potential for offshore areas, industry ranked central and

FIGURE E-8a The preferred marine sanctuary and the area exempted from oil and gas leasing around the Point Reyes wilderness area.

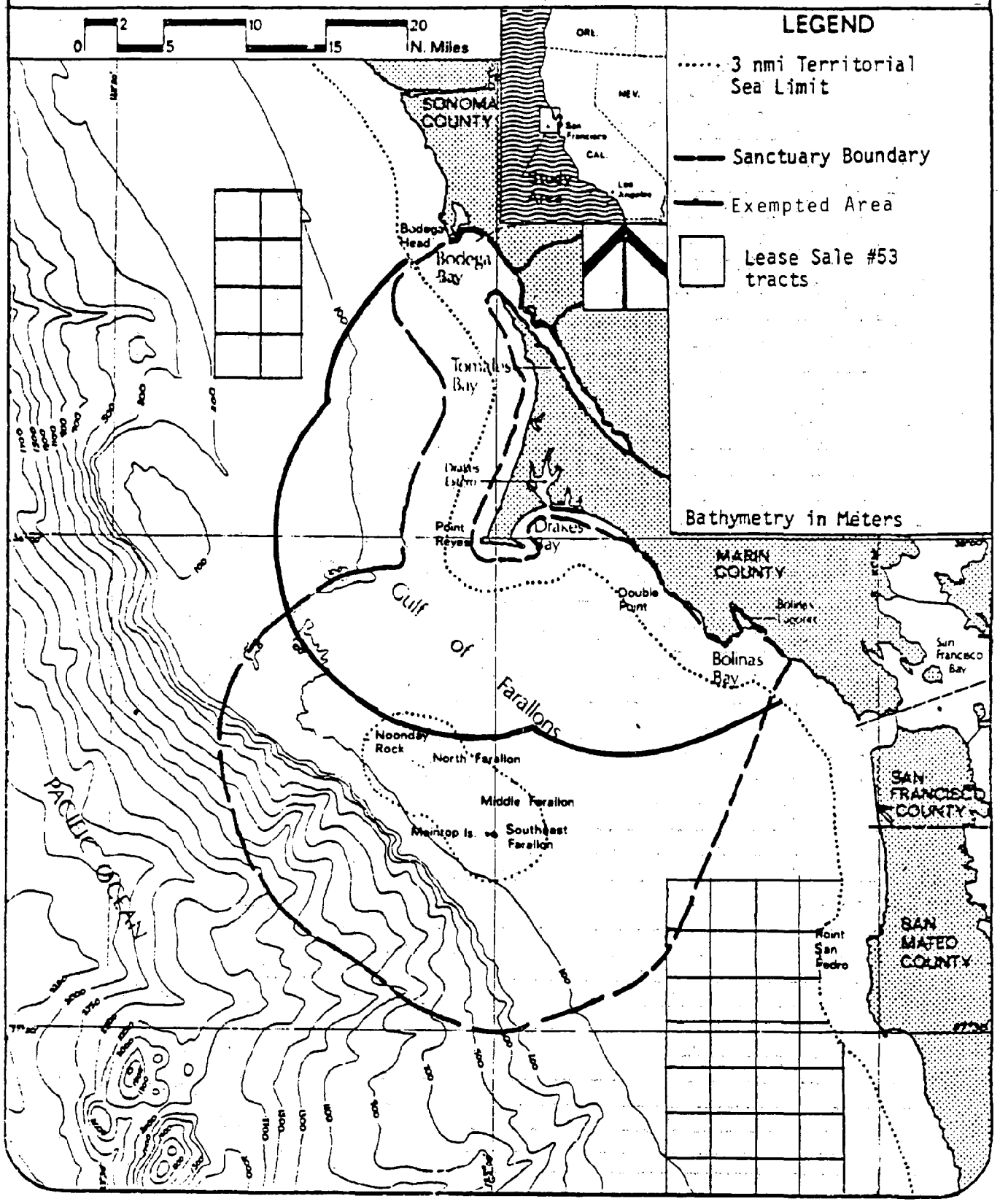


FIGURE E-9. Tentative tracts selected for proposed lease sale #53 in the vicinity of the Point Reyes-Farallon Islands study area (U. S. Bureau of Land Management, 1978a).

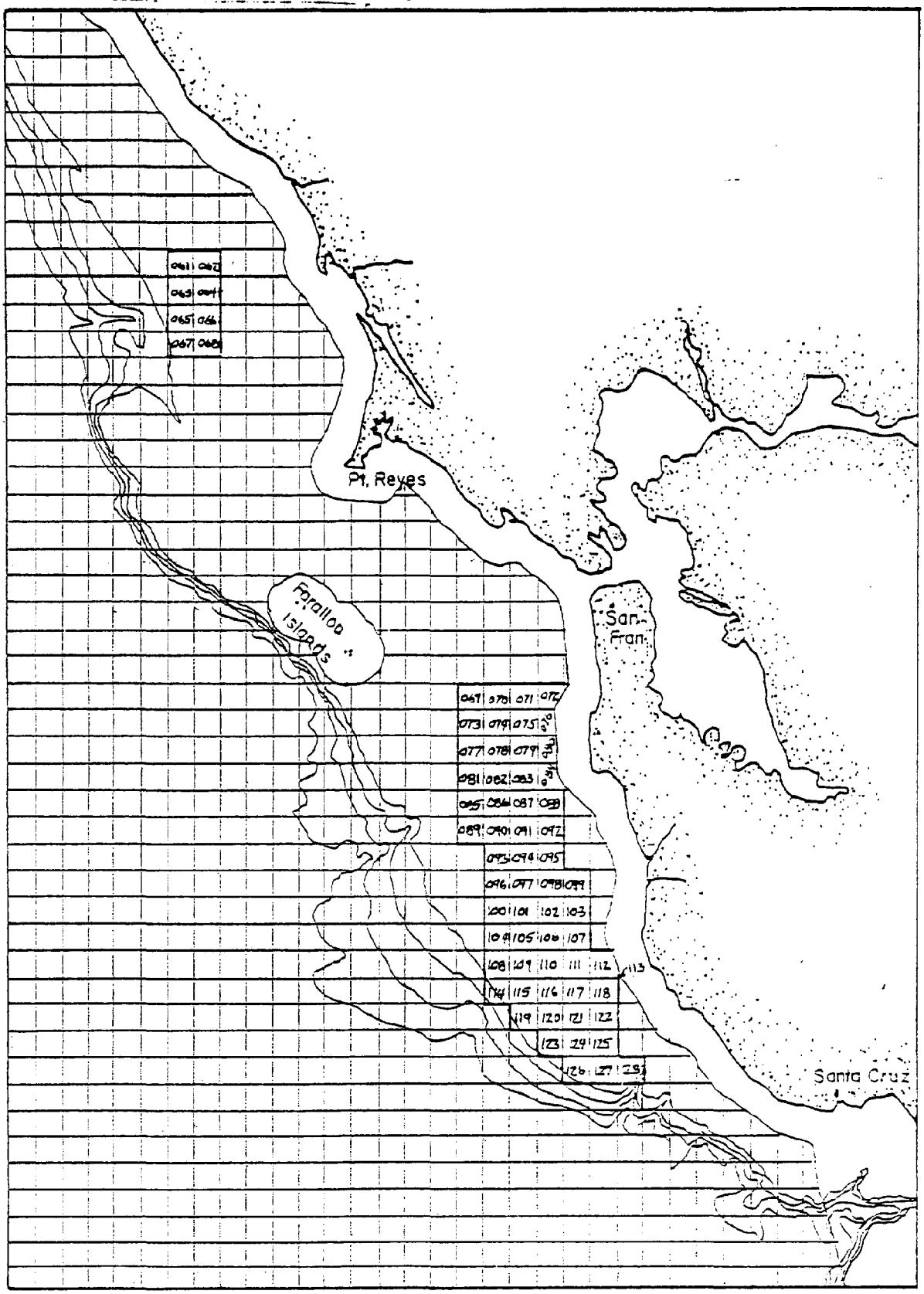
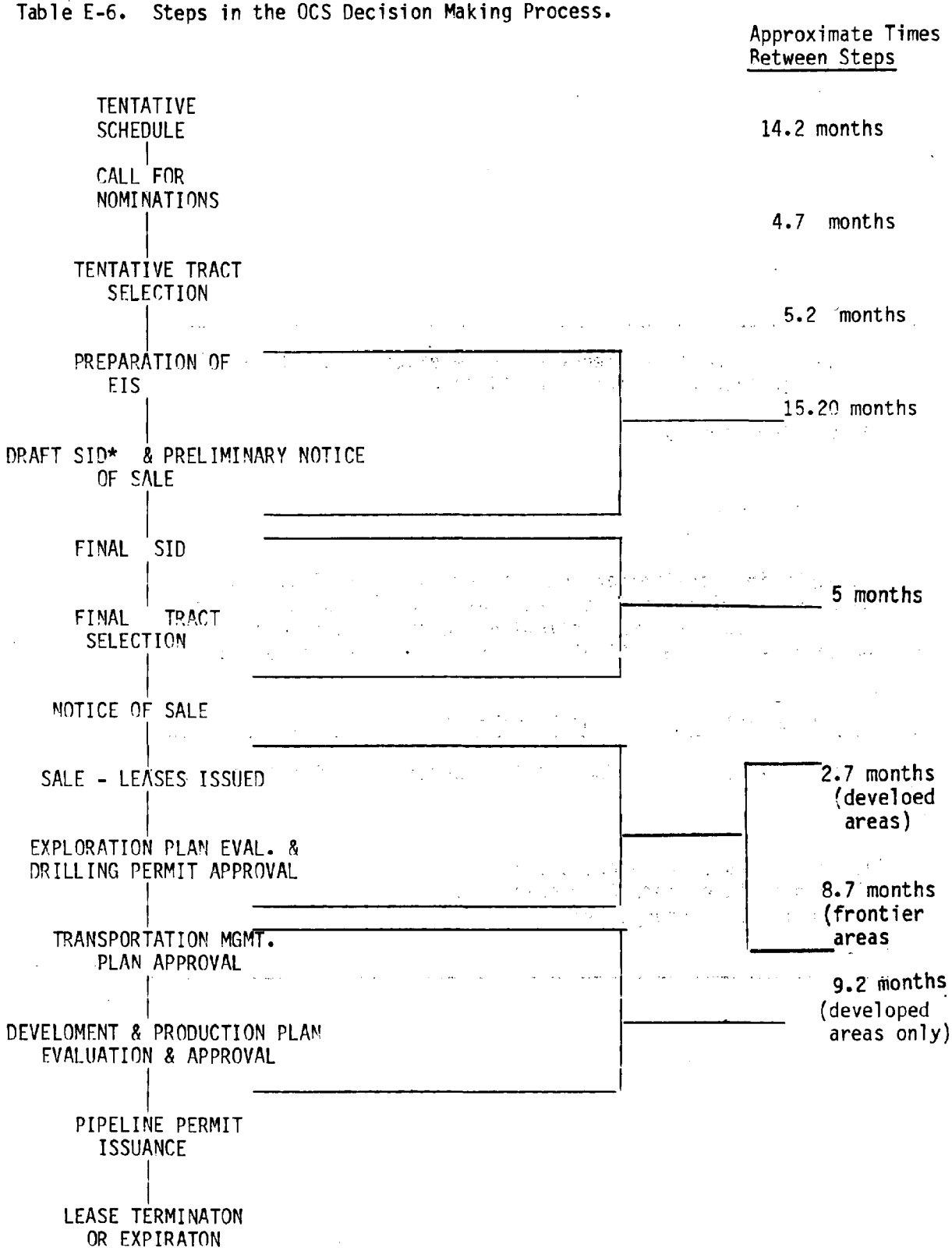


Table E-6. Steps in the OCS Decision Making Process.



*Secretarial Issue Document. A review of the Proposed Final OCS Oil and Gas Leasing Schedule, March 1980, shows the elapsed time to be typically 31 to 45 months, assumming no delays.

Table E-7. Estimates of recoverable reserves in the Bodega Basin. (California State Lands Division, 1978).

A. 320 million barrels

B. 112 million barrels

C. The USGS (in a preliminary report for Sale #53) included the Bodega Basin with the Santa Cruz Basin to the south. Using probability factors, the following amount of undiscovered recoverable oil are estimated for the two basins combined:

95% Probability	5% Probability	Statistical Average
no reserves	530 million barrels	130 million barrels

1. California Resources Agency, 1970.
2. California State Lands Commission, 1976.
3 U.S. Geological Survey, 1977

northern California 12th, and USGS ranked the area 16th out of 22 areas. (Webb, 1980, personal communication). Industry ranked the area 7th of 22 in terms of interest in exploration. Given the substantial and persistant increases in world oil prices, the potential for economically recoverable reserves in these low priority areas appears to be improving and may increase interest in the future.

E.3.c Commmercial Fishing and Mariculture

The Point Reyes/Farallon Island vicinity is characterized by thriving commercial fishing and mariculture activities (recreational fishing is also an important activity within the study area, as discussed in Section E.3.e). Invertebrate harvest (including mud and ghost shrimp, clams, worms, and mussels) under permits from the California Department of Fish and Game (DFG) also occurs, primarily in the form of bait sales.

The following section reviews commercial fishing efforts in terms of catch levels and geographic concentration, and then briefly surveys the mariculture industry. This section is based largely on a report reviewing resources and marine uses of the Point Reyes ocean area by the California Department of Fish and Game (1979), and on the 1975 DFG catch statistics (Pinkas, 1977).

The study area represents only one offshore segment of a considerably larger San Francisco statistical region for which commercial fish landings are regularly reported. The study area supports five main types of commercial fishing activity: bottomfishing, crab fishing, salmon trolling, albacore trolling, and pelagic fishing for anchovy, herring, and other species. Effort by season in these fisheries is not uniform (Table E-8). As shown in Table E-9, approximately 30 percent of all fish landed by weight at ports in the San Francisco region were caught in study area waters (Pinkas, 1977; California Department of Fish and Game, 1979). This same area accounted for only 0.1 percent of the tonnage and three percent of the value of the total State catch. Geographically smaller areas, such as Los Angeles and San Diego, contributed as much as twenty times more catch, in both volume and value terms (Pinkas, 1977); however, the figures for these areas include landings of tuna caught in international waters (Leitzel, 1980, personal communication).

As shown in Table E-10 for 1971 to 1975, catch from the study area accounted for a major portion of fish landed commercially at San Francisco district ports between Bodega Bay and Half Moon Bay (Baxter, 1979, personal communication). On average, 100 percent of the oyster, 79 percent of the croaker, 63 percent of the flounder, 54 percent of the sand sole, 55 percent of the English sole, and 53 percent of the salmon landings recorded for the San Francisco region came from the 18-block statistical survey zone representing the study area during this period.

Table E-8. Fishing activity by month in the San Francisco statistical region. (Caliiornia Department of Fish and Game, 1979).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bottomfish	xx	xx	xx	xx	x	x	xx	x	xx	x	xx	xx
Crab	xx	xx	xx	x	x	x					xx	xx
Shrimp					x	x	x	x	x			
Salmon				x	x	xx	xx	xx	x			
Sportfish	x	x	x	x	x	xx	xx	xx	x	x	x	x
Albacore								x	x	xx		
Anchovy	x	x	x	x	x	x	x	x	x	x	x	x
Herring	xx	xx	xx									

x - Fishing Active

xx - Fishing Most Active

Time of Least Activity

Fishing occurs all year in this productive area, but the periods of least activity fall in April and May and again in September and October.

Table E-9. Commercial fishing landings and values by port in the Pt. Reyes-Farallon Islands sector of the San Francisco area. (Pinkas, 1977).

Port Region	Landings		Value
	lbs.	kg.	($)
Bodega Bay	4,603,542	2,092,519	1,485,660
Point Reyes	274,851	124,932	354,450
Tomales Bay	782,826	335,830	139,754
Study area totals	5,661,219	2,573,281	1,979,864
San Francisco area totals	18,205,797	8,275,362	4,909,895

Bottomfishing relies principally on trawling, although longlining and trapping are also evident. The fishery is a fairly steady, year-round industry, with the most intense trawling between November and April. The principal bottom fish taken from the study area and their 1971-1976 percentage of the San Francisco region's total are: Petrale sole (1 percent), English sole (55.3 percent), dover sole (5.8 percent), and bocaccio and chilipepper rockfish (21 percent).

Crab fishing (market crab and several bait species) by pot or trap centers upon a coastal strip stretching between 30 and 300 ft (9 and 90 m) isobaths running south of the Point Reyes Headlands. The fishery is most intense between November and June (the open season), especially during the initial 2 month interval. Approximately 4.1 percent of the San Francisco region's crab landings were harvested from study area waters in 1975 (Pinkas, 1977).

The study area crab fishery represents one of California's prime market production zones. Over 400 nmi^2 (170 km^2), stretching from the Gulf of the Farallons north to the Russian River are presently productive. Fleet size, after reaching 200-230 boats in the 1950's, has been reduced to only 10 to 20 vessels in the San Francisco area (Winzler and Kelly, 1977).

Trolling, most notably for salmon, but also for albacore, occurs throughout the bottomfishing trawl zone delineated in Figure E-10 above. The season begins in April, peaks in mid-summer, and continues at a less intensive level through September. Salmon trollers frequent waters up to 25-nmi (46 km) offshore, but the Gulf of the Farallons is reportedly the region's major salmon trolling ground (California Departent of Fish and Game, 1979). Well over 50 percent of the San Francisco area's total 1971-1975 salmon landing originated in the Point Reyes-Farallon Islands offshore area (Pinkas, 1977). While considerably smaller in scale and regional significance, albacore fishing activities also occur, particularly near the Farallon Islands and continental shelf bank grounds.

Commercial fishing for pelagic species focuses on herring. The anchovy fishery, once a hallmark of this region, has remained relatively inactive since 1952, even though small numbers continue to be taken for live bait reduction and limited canning (Pacific Fishery Management Council, 1978a). The herring fishery, on the other hand, is expanding, particularly within Tomales Bay. An increasing export market to Japan and the bay's naturally high spawning (January-March) capacity have encouraged sharp industrial growth in recent years. The 1971-1975 survey period (Table E-10) reported that 36.1 percent of regional herring landings originated from the study area (Pinkas, 1977; Winzler and Kelly, 1977).

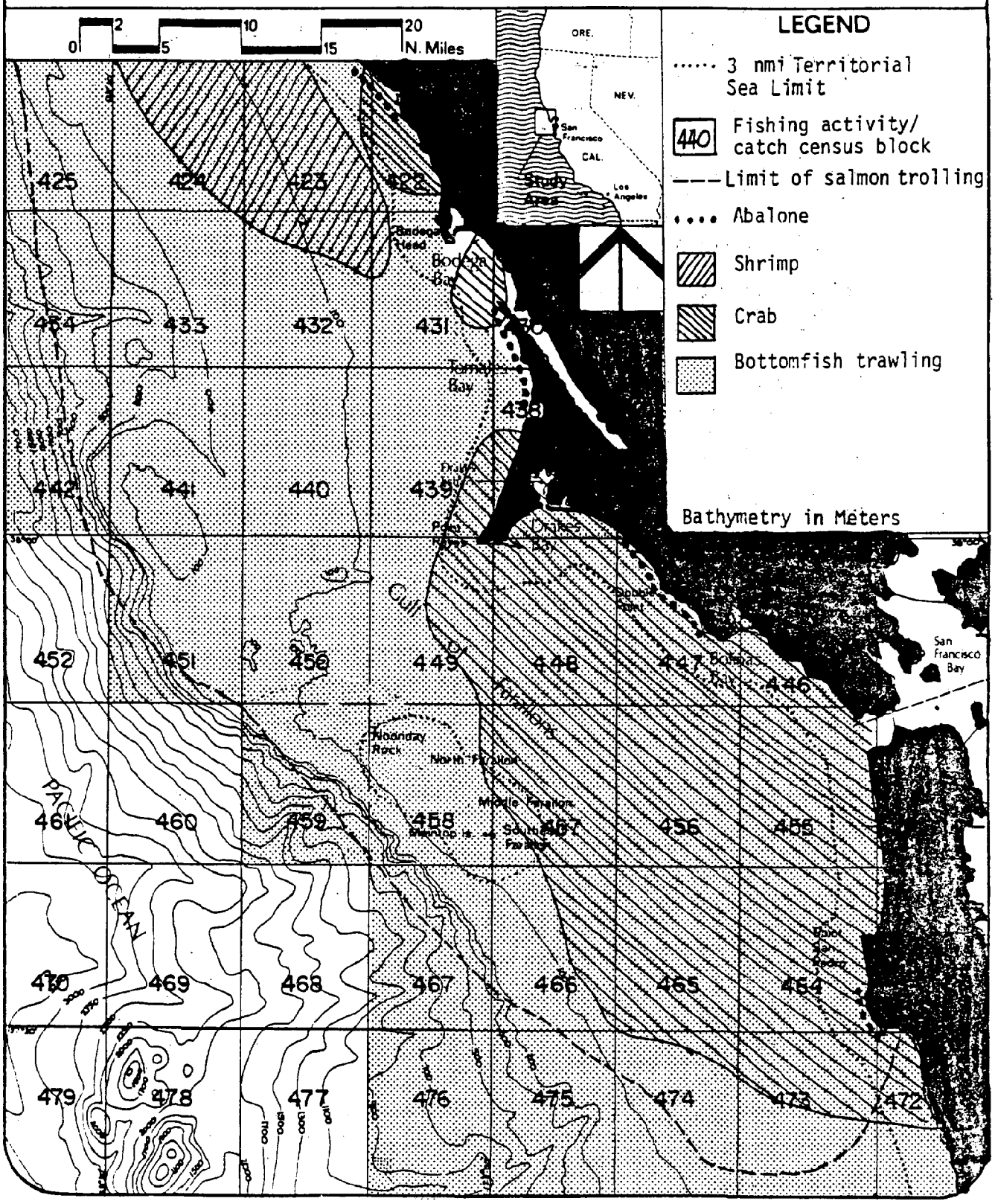
Finally, some smaller commercial markets center upon dungeness crab, and, to a lesser extent, market squid, and shrimp. According to Pinkas (1977), crab ranked fifth in value among species landed at

Table E-10. Catch by species (in pounds) in the Point Reyes-Farallon Island vicinity. * (California Department of Fish and Game, 1979).

Species	1971	1972	1973	1974	1975	Mean	5 yr x % S. F. Total
Albacore	130,916	1,089,463	44,516	171,360	63,571	299,965	12.6
No. Anchovy	0	0	59,000	159,957	96,300	63,051	9.9
Croaker, WA	1,195	16,670	34,252	39,617	23,736	23,094	78.6
Flounder	94,303	208,805	51,531	108,145	141,704	120,897	63.2
Halibut, CA	16,186	38,919	7,375	16,975	19,438	19,778	31.9
Herring, Pacific	11,746	21,700	1,202,762	1,042,717	1,027,662	661,317	36.1
Lingcod	249,820	233,068	160,788	409,587	496,406	309,933	48.6
Rockfish	285,639	352,372	345,179	562,096	617,663	432,589	21.0
Sablefish	32,586	148,708	147,399	77,687	214,058	124,087	12.3
Salmon	191,854	1,818,819	1,114,055	1,672,207	1,262,543	1,211,895	53.4
Sanddab	100,382	70,347	39,463	94,659	104,519	81,874	26.0
Shark-Ray	17,284	14,471	12,140	24,321	30,945	19,832	26.2
Sole, Dover	105,199	72,387	69,580	284,045	307,390	167,720	5.8
Sole, English	686,489	441,177	344,803	663,094	779,289	582,970	55.1
Sole, Petrale	456,821	347,768	145,607	360,111	311,415	324,344	31.6
Sole, Rex	106,440	34,385	46,507	100,222	105,038	78,518	32.4
Sole, Sand	104,320	74,036	43,493	28,265	80,252	66,073	54.4
Crab, Dungeness	19,572	182,797	223,020	85,583	180,977	138,389	43.1
Abalone, Red	0	0	0	8,938	18,240	5,435	15.7
Oyster, Pacific	198,385	95,555	144,963	188,554	253,667	176,223	100.0
Other	43,426	62,489	62,537	76,385	270,434	103,054	
Total	2,852,563	5,323,936	4,298,970	6,174,525	6,405,247	5,011,048	27.7

* These catch totals represent data summed from 18 statistical blocks (Figure E-10) selected from the larger San Francisco statistical area.

FIGURE E-10. Commercial shellfishing areas and trawling/trolling locations for bottomfish and salmon (adapted from California Department of Fish and Game, 1979).



Bodega Bay ports. Squid are processed for export, shrimp primarily for bait, and crab for human consumption. Commercial mariculture companies are licensed to operate offshore in eight bay bottom areas within the study area under lease arrangements with the California Department of Fish and Game (Table E-11). Seven of these operations are located in Tomales Bay, and one in Drakes Estero which is the largest in terms of both area and annual production (Figure E-11).

Johnson Oyster Co. began operations on Drake's Estero in 1960 and now holds 1,060 acres of state water bottom allotments there. The company maintains an inventory of growing oysters on a rack and stake culture of approximately 200,000 units valued at $8.00 per string or 1.6 million dollars. The structures employed in raising oysters have a value of about $400,000.00, bringing Johnson's total investment to about 2 million dollars. Johnson generates 40,000 gallons of oysters per year having a value of $18.00 per gallon or approximately $720,000.00 (Studdert, 1980, personal communication).

Mariculture ventures within Tomales Bay operate on a considerably smaller scale. International Shellfish Enterprises, Inc., the largest of the Tomales Bay mariculture operations, hold 419 acres of water bottom allotments and has a capacity of to produce 800,000 shellfish in 1980 valued at about 1.4 million dollars (Dr. John Dupuy, 1980 personal communication). In 1977, 30,589 lbs (13,904 kg) of oysters (10 percent eastern and 90 percent giant Pacific) from Tomales Bay reached market, an increase of about 70 percent since 1973. Bay bottom lease sites range in area from 320 acres (120 ha) (American Shellfish Corporation) to 10 acres (4 ha) of submerged State lands; in three instances, privately-owned tidal zones are leased in tandem with public areas. All but one company raise oysters explicity for market. The exception, Morgan Oyster Co., "relays" grown clams from private lands within San Francisco Bay to Tomales Bay for natural pollution cleansing (depuration).

E.3.d Commercial Shipping

The Point Reyes-Farallon Island study area is located near the convergence of three major shipping lanes lying west-northwest of the entrance to San Francisco Bay. A circular vessel precautionary zone 11.9 nmi (22.1km) in diameter surrounding the intersection of these lanes has been established to facilitate safe turning movements into and out of the Golden Gate entrance (Figure E-12).

Ports located within San Francisco Bay are primary destinations (and ultimately, origins) of commercial vessesls transitting these lanes. In 1978 the Bay entrance accounted for a total commodity throughput of 52,377,043 short tons (U.S. Army Corps of Engineers, 1978.) Roughly 22 percent of this volume was classified as imports from abroad. Exports from these ports to foreign ports accounted for 13 percent of the tonnage. The remainder was domestically oriented (39 percent inward; 26.6 percent outward). Following a general lag in traffic in 1974 and 1975, these levels reapproached San Francisco's tonnage record established in 1973, and equalled it in 1977 and 1978 (M. Sarantopulos, personal communication).

FIGURE E-11. Oyster mariculture areas in Tomales Bay and Drakes Estero (Smith, 1979, personal communication).

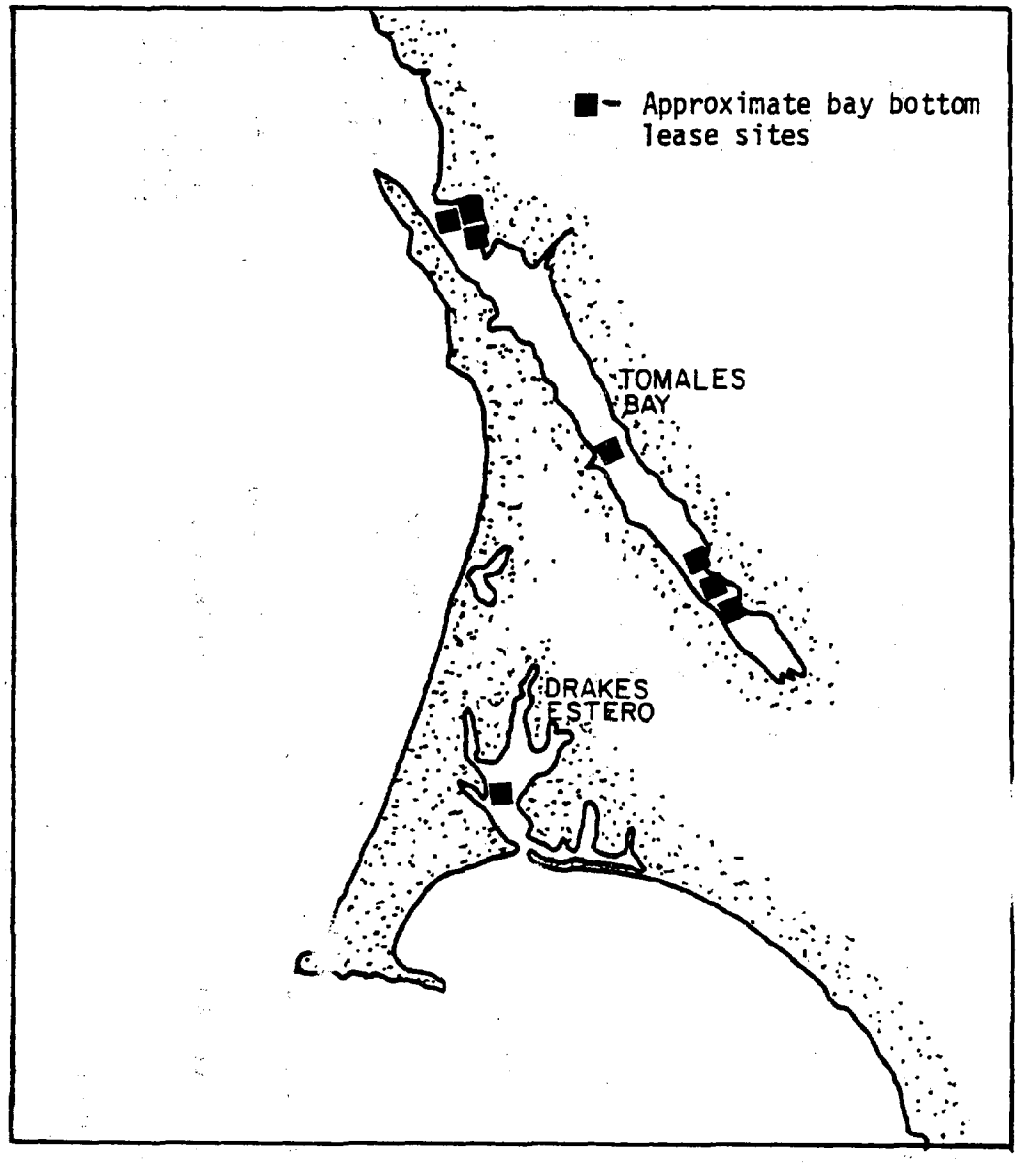


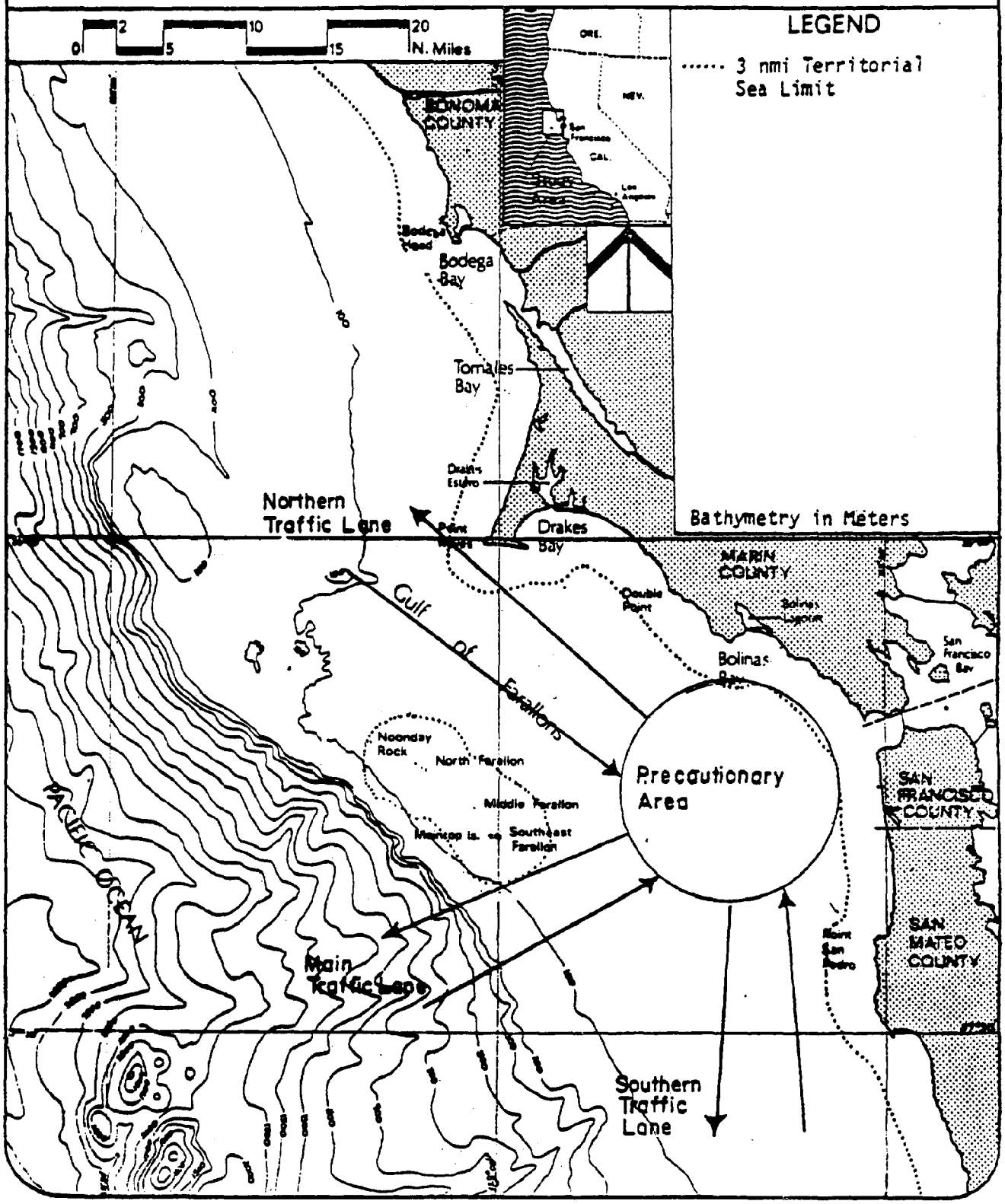
Table E-11 Commercial mariculture licensees in Tomales Bay as of January 1, 1979 (Smith, personal communication, 1980.)

ORGANIZATION/PARENT COMPANY	AREA OF OPERATION	COMMERCIAL SPECIES
1. Johnson Oyster Company*	Drake's Estero (1060 acres state land)	Giant Pacific Oysters
2. Jensen Oyster Beds	Tomales Bay (30 acres state; 2 acres private)	Giant Pacific Oysters
3. Buchan Oyster Company	Tomales Bay (260 acres state)	Giant Pacific Oysters
4. International Shellfish Enterprises, Inc.	Tomales Bay (159 acres leased from state)	American and Olympic Oysters and the little neck clam (conditional permit)
5. American Shellfish Corp.	Tomales Bay (320 acres state; 2 acres private)	Giant Pacific Oysters
6. WHD Enterprises	Tomales Bay (19 acres state)	Giant Pacific, Eastern, European flat, sumino, and native oysters
7. G. R. Johnson and P. H. Dunn	Tomales Bay (20 acres state)	Giant Pacific oysters, European flat oysters
8. Morgan Oyster Company**	Tomales Bay	"Relay" of various clam species (unspecified) from San Francisco Bay.

* Major producer

** In start up phase

FIGURE E-12. Commercial shipping lanes and precautionary area near the San Francisco Bay entrance (NOAA Nautical Chart No. 18645, 1978).



Breakdowns of trip frequencies by vessel type for 1976 indicated a total of 3,789 inward commercial movements through the Bay entrance. Nearly 69 percent of these were classified as passenger and/or dry cargo vessels; tankers made up the balance. Except for an additional two passenger/cargo trips, reported outward volumes were identical. No statistics are regularly kept on commercial shipping traffic in the precautionary area. Estimates of traffic patterns based on personal observation vary widely. Recent data using a 6 month study indicates that 26 percent of all traffic utilizes the northern lanes, 16 percent, the main lanes, and 58 percent, the southern lanes during San Francisco Bay approaches and departures (Rasmussen 1980, personal communication), while others have witnessed a consederably higher use rate for the main lanes compared to the northern lane (Ainley 1979b, personal communication).

A review of selected dates (every other odd numbered day) of tanker arrival traffic data from January 1, 1978, to August 1, 1979, on file at the Port of San Francisco's Marine Exchange revealed that approximately 85 percent of these arriving tankers (some 367 vessels over the sample period) are less than 30,000 deadweight tons* (dwt) in size; the 10,000 to 20,000 dwt range accounts for nearly half of that total. Only two tankers over 90,000 dwt were recorded during the 20-month sample period. Monthly tanker traffic levels did not show any apparent annual cycle in activity. Data on file also included registry (mostly American) but did not specify the traffic lane used during approach to the Golden Gate Bridge counting station. However, the Western Oil and Gas Association estimates that 95 percent of its member company's tankers entering San Francsco Bay normally adhere to the main (western) traffic lane upon approach (Wright, 1979, personal communication).

Vessel traffic (especialy tankers and barges, as well as OCS supply boats) is expected to increase in this area as a result of Lease Sale #53. The Bureau of Land Management (1980) projects that about 130 barge trips per year and 15 OCS supply and crew boat trips per month will traverse the Gulf of the Farallons from the Bodega Basin tracts to the entrance to San Francisco Bay. About 200 additional tanker trips each year are expected to approach San Francisco Bay from the main and southern lanes as a result of OCS Sale #53 activities.

The U.S. Coast Guard is conducting a study on possible vessel traffic routing systems for the central and northern California coast. Several of the options under consideration would involve designating a shipping lane paralleling the California Coast from Point Conception to the Oregon border and eliminating the northern access to San Francisco Bay through the Gulf of the Farallones. The coastwide shipping lane would pass well west of the Farallon Islands. (Louks, 1980, personal communication).

*Deadweight tonnage is the actual carrying capacity of a vessel in long tons (one long ton equals 2,240 pounds or approximately 1,018 kg.)

E.3.e Recreation

The study area is a popular recreation area because of its many outstanding natural features and its proximity to the San Francisco-Oakland metropolitan area. The Point Reyes Peninsula's rugged shore provides unparalleled opportunities for studying and observing natural vegetation and a wide variety of animal life, including several marine mammals and many species of shore and pelagic birds. Additionally, many species of sport fish thrive in the Bays and coastal waters. The San Francisco-Oakland Bay metropolitan area, containing nearly five million people, is only an hour drive away from the Point Reyes National Seashore (PRNS) and other regional recreational facilities (U. S. National Park Service, 1976).

The PRNS is a 65,300 acre (26,125 ha) national recreation area operated by the U. S. National Park Service (1976). The Park is located on the Point Reyes Peninsula between Tomales Bay and Bolinas Bay (Figure E-13). It encompasses 41.5 nmi (66.8 km) of ocean shoreline (Winzler and Kelly, 1977), as well as lands fronting on Tomales Bay, Drakes Estero, and the Estero de Limantour.

Recreational use of the PRNS is consistently heavy throughout the year. The Park receives between 1.6 and 1.7 million visitors annually, the vast majority of whom seldom stay for a full day. Overnight stays in the camping areas average 35,000 annually (National Park Service, 1978).

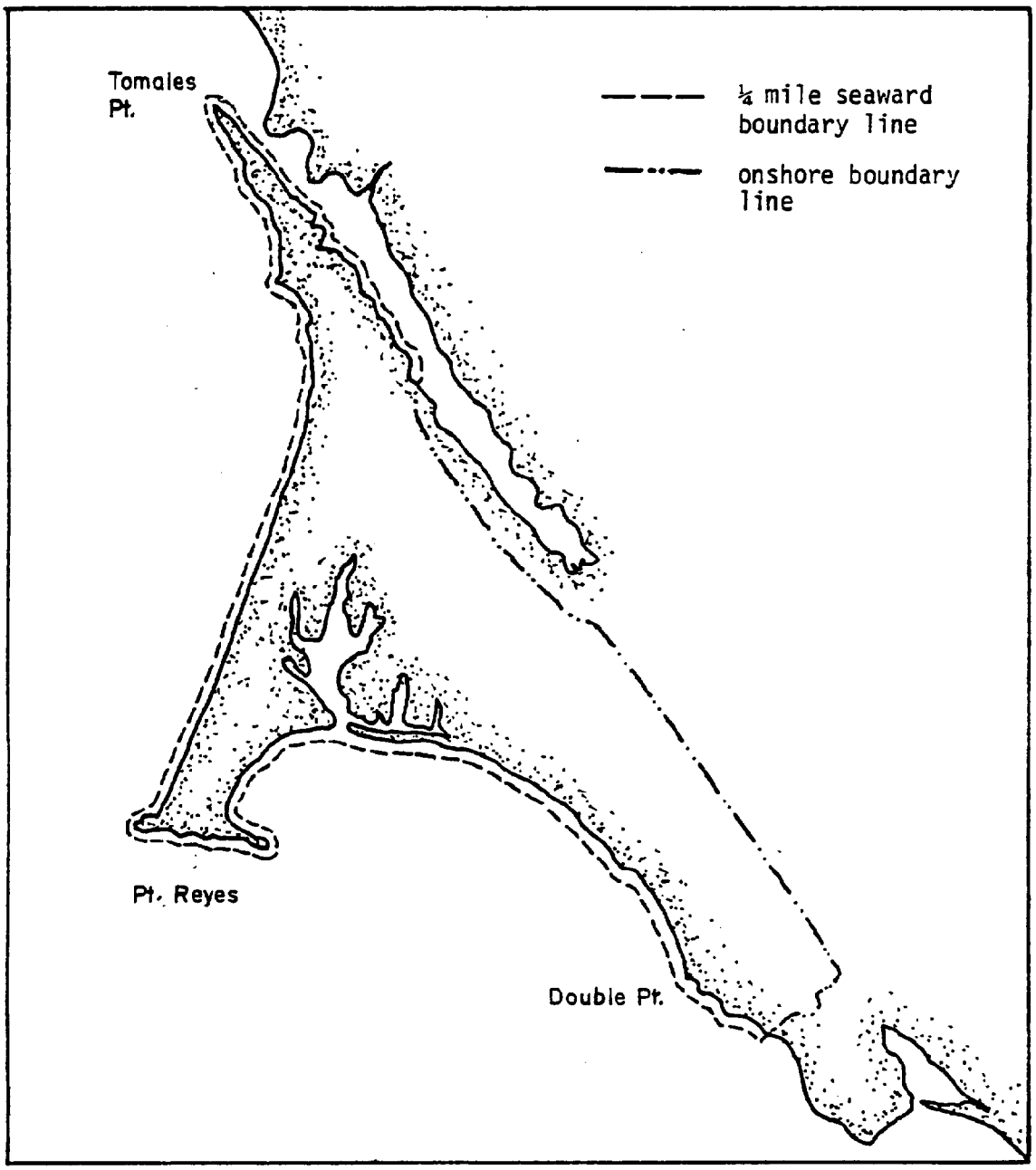
Another major public recreation area adjoining the proposed sanctuary is the Golden Gate National Recreation Area (GGNRA) which extends from the San Francisco waterfront to the Point Reyes National Seashore and includes Stinson Beach Park along with eight other state parks which have been included in the GGNRA by means of acquisition.

The GGNRA is run by both the National Park Service and the California Department of Parks and Recreation and includes 34,938 acres (14,138ha). For management purposes the GGNRA is divided into natural, special use, and historic zones. It includes a wide variety of natural environments and recreational activities and facilities.

Several other public scenic and recreational facilities are located along the cost in the vicinity of the study area (Figure E-14; Table E-12 lists the major recreational features of these parks and beaches). For example, Tomales Bay State Park is entirely encompassed by, and two other parks lie very close to, the study area's limits: Sonoma Coast State Beach to the northwest near Bodega Head and Mount Tamalpais State Park to the southeast. Portions of the Sonoma Coast State Beach are an underwater park, and the offshore area adjacent to Mount Tamalpais State Park is currently being considered for similar underwater park designation (California Department of Parks and Recreation, 1979).

Over 50 percent of the PRNS (32,073 acres or 12,829 ha) is designated as wilderness (25,370 acres or 10,148 ha) or potential wilderness

FIGURE E-13. Point Reyes National Seashore (U. S. National Park Service, 1978).



(8,003 acres or 2,681 ha)(National Park Service, 1976)(see Section F.1.b.i. for wilderness designations). The Estero de Limantour, an ecological reserve regulated by the California Department of Fish and Game (DFG), is used almost entirely for wildlife observation and study. Another DFG ecological reserve, the Point Reyes Headlands, has been similarly established, but public recreational use there is prohibited (National Park Service, 1976) (see Section F.1.b.i. for Ecological Reserve Regulations).

The diverse marine and estuarine conditions throughout the study area offer excellent sport fishing opportunities (see Section E.3.c. for details of commercial fishing activities.) Party boats out of San Francisco, Tomales Bay, and Bodega Bay frequently fish the open ocean in the Gulf of the Farallons. Bodega and Tomales Bays are particularly popular sites for skiff fishing and clamming since inshore nautical conditions are usually less violent than in the open ocean. Also, the sandy beaches and rocky coast (where it is accessible) provide ample shore-based fishing opportunities.

Party boats from San Francisco Bay consistently harvest over half of the State's annual sportfish salmon catch (Smith et al., 1976). An abundance of two-year old salmon (primarily king or chinook) are caught by sport fishermen in the Gulf of the Farallons alone; the salmon season generally runs from mid-February through mid-November, with larger fish being taken in late summer and early fall (Squires and Smith, 1977). California DFG estimates that over 400,000 annual angler days in pursuit of salmon occurred from private and party boats docked in San Francisco and Tomales Bay landings (Smith et al., 1976).

The coastal region's variable physical geography produces a diverse range of fish and fishing conditions. Habitats ranging from sandy beaches to rocky cliffs provide sportfishermen with ample fin and shellfish resources. As depicted in Table E-1, sections of the study area have established notable sport fisheries.

Tomales Bay and Estero Americano represent Marin County's two prime waterfowl hunting areas; hunting is no longer allowed in Drakes Estero (Ainley 1979b, personal communication). A 1969-1970 hunter survey estimated that 45,000 ducks and 4,500 geese (including black brant) were taken (California Department of Fish and Game, 1976).

Bird and marine mammal watching are also popular recreational activities. The Audubon Canyon Ranch at Bolinas Lagoon services an estimated 30,000 visitors annually to observe the largest rookeries of great blue herons and common egrets in California (Smith et al., 1976). Estimates of bird watchers frequenting the remaining parts of the Lagoon indicate that an additional 700,000 persons visit annually. Estuarine birding activities elsewhere in the study area are thought to be substantial (Smith, et al., 1976). Several species of whales can be observed from the coastal ridges of Point Reyes National Seashore (PRNS) during the whale's annual migrations. While the

FIGURE E-14. Recreation facilities in the Point Reyes area (from California Department of Parks and Recreation files and maps).

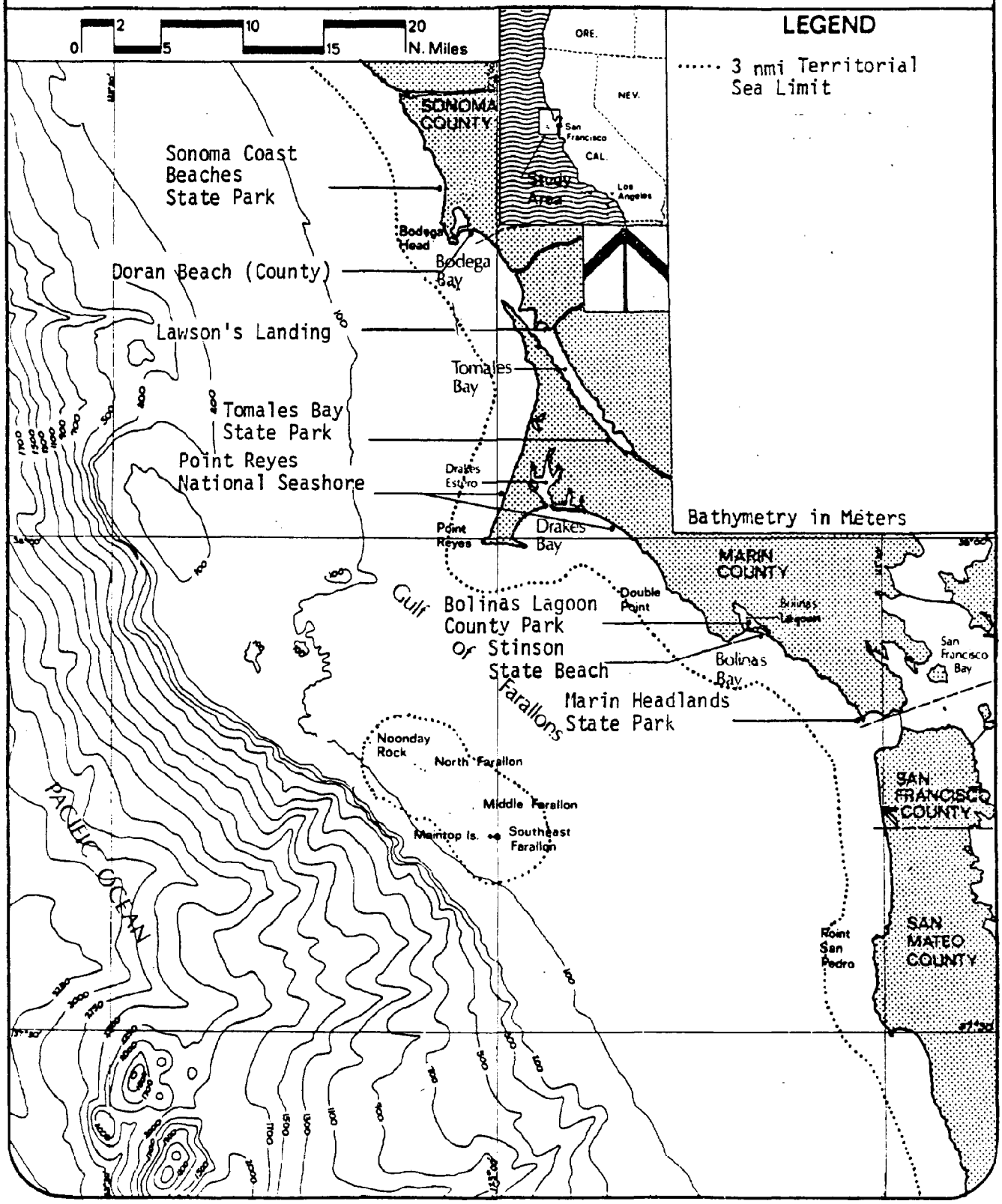


Table E-12. Public reecreational facilities and activities
(Winsler & Kelly,1977; Alban and Skaer, 1980 personal communication)

Unit	Size (ac)	Annual Visitors (millions)	Pick-nicking	Hiking	Horse back riding	Camping	Fishing	Nature observation	Water sports
Pt. Reyes NS	64,546	1.6	X	X	X	X	X	X	X
Golden Gate NRA	34,938	10.8*	X	X	X	X	X	X	X
Tomales Bay SP	1,081	0.06	X	X			X		X
Stinson Beach Park NRA	51	0.4	X	X			X	X	X
Mt. Tomalpais SP	6,223	1.2	X		X	X	X	X	X
Sonoma County SB	2,806	1.4	X	X		X	X		X

NS National Seashore

NRA National Recreation Area (Soper, 1980, Personal Communication)

SB State Beach

SP State Park

level of shore-based whale watching at PRNS has not been verified, Frey (1971) estimated that as many as 162,000 people along the entire California coast watch gray whales during their annual migrations. On some days, whale watchers in the study area, particularly around the Point Reyes Headlands, reportedly number in the thousands (Ainley 1979, personal communication).

The popularity of cruises through the Gulf of the Farallons to observe migrating whales, and to the Farallon Islands to view pelagic birds and marine mammals which roost and haul out seems to be rapidly increasing (Betchart, 1979, personal communication; Bromback, 1979, personal communication). (For a discussion of bird and mammal resources on and around the Islands, see Sections E.2.a and E.2.b, respectively.)

The San Francisco Bay Chapter of the Oceanic Society took approximately 3,000 people whale watching during the fall and spring migrations (1978-1979 season) along the north central California coast (Bromback, 1979, personal communication). Nature Expeditions, a non-profit, educationally-oriented tour group, took approximately 600 birdwatchers to the Farallons. Since access onto the Farallons is strictly prohibited except by permit (see Section F.1.b.), these tours operate entirely at sea.

Although cold water temperatures and strong currents combine to limit extensive swimming and surfing activities along the ocean beaches of the study area, a certain amount of both these waterbased uses does occur. Diving is somewhat constrained by poor underwater visibility (Dalby, 1979); however, spearfishing for California halibut remains popular in Tomales Bay (Smith et al., 1976), as does abalone collecting elsewhere along the nearshore coast.

The harsh weather and strong currents in the open ocean and in Bodega Bay limit much boating in the study area to protected coastal embayments (Squires and Smith, 1977; Swehla, 1979, personal communication). In Tomales Bay, for example, there are approximately 160 berths and moorings (Tomasevich, 1979, personal communication), and another 280 slips in Bodega Harbor (Winzler and Kelly, 1977); about half of these are for commercial fishery vessels (Tomasevich, 1979, personal communication). In addition, construction of 50 recreational berths in a new Spud Point marina has been proposed for Bodega Harbor. Spud Point Marina would provide 238 berths for boats from 70-80 feet in length. 80 percent of these boats would be commercial and greater than 30 feet in length. The remaining 20 percent of the boats would be less than 30 feet and would be used for recreational purposes. The project is primarily oriented toward upgrading both the infrastructure and economic capacity of the region's commercial fishing fleet (Rolf, 1979, personal communication). There are also 10 skiff launching facilities around Tomales Bay (Squires and Smith, 1979).

Despite adverse climatic and physical conditions posed by waters in certain parts of the study area's open ocean environment, both pleasure sailing or motoring and boat racing are popular pastimes. For example, an average of about six sailboats per month (originating within San Francisco Bay for the most part) have been observed in the vicinity of

TABLE E-13. Sport fishing characteristics for geographic subsets of coastal portions of the study area (Smith *et al.*, 1976, Squires and Smith, 1977).

REGION	CHARACTERISTCS
General coastal areas	Sandy beaches provide redtail, calico, and walleye surfperches; rocky coastal areas offer kelp greenling and blue rockfish, among others; rock and monkey-face eels are popular catches in limited areas; clam digging occurs on muflats in bays and estuaries, occasionally on the open coast.
Tomales Bay	Fishing mostly from skiffs sharks and rays are prime catch; California halibut (caught year-round), jacksmelt (September to November), silver salmon and steelhead (October to February), surfperch, rockfish, and greenlings are caught. Washigton and gaper clams are dug on mudflats and in Bay waters from a special clammers barge operation out of Dillon Beach. Mostly clamming from skiffs for Washington and gaper clams.
Drakes Estero	Mostly clamming from skiffs for Washington and gaper clams.
Bodega Bay	Uniformly shallow, sandy bottom limits fishery variability, primarily starry flounder and surfperches but occasionally steelheads and California halibut.

the Farallon Islands, and many more can be seen there in times of good weather (Kellogg et al., 1978). Occasionally, sailors will anchor overnight at the islands in Fisherman's Bay (Kellogg et al., 1978). In addition, sailing and motoring clubs sponsor races at various times throughout the year which often utilize the Farallons as a turning point, e.g., the Single-Handed Sailing Society's Yacht Race.

E.3.f. Research Activities

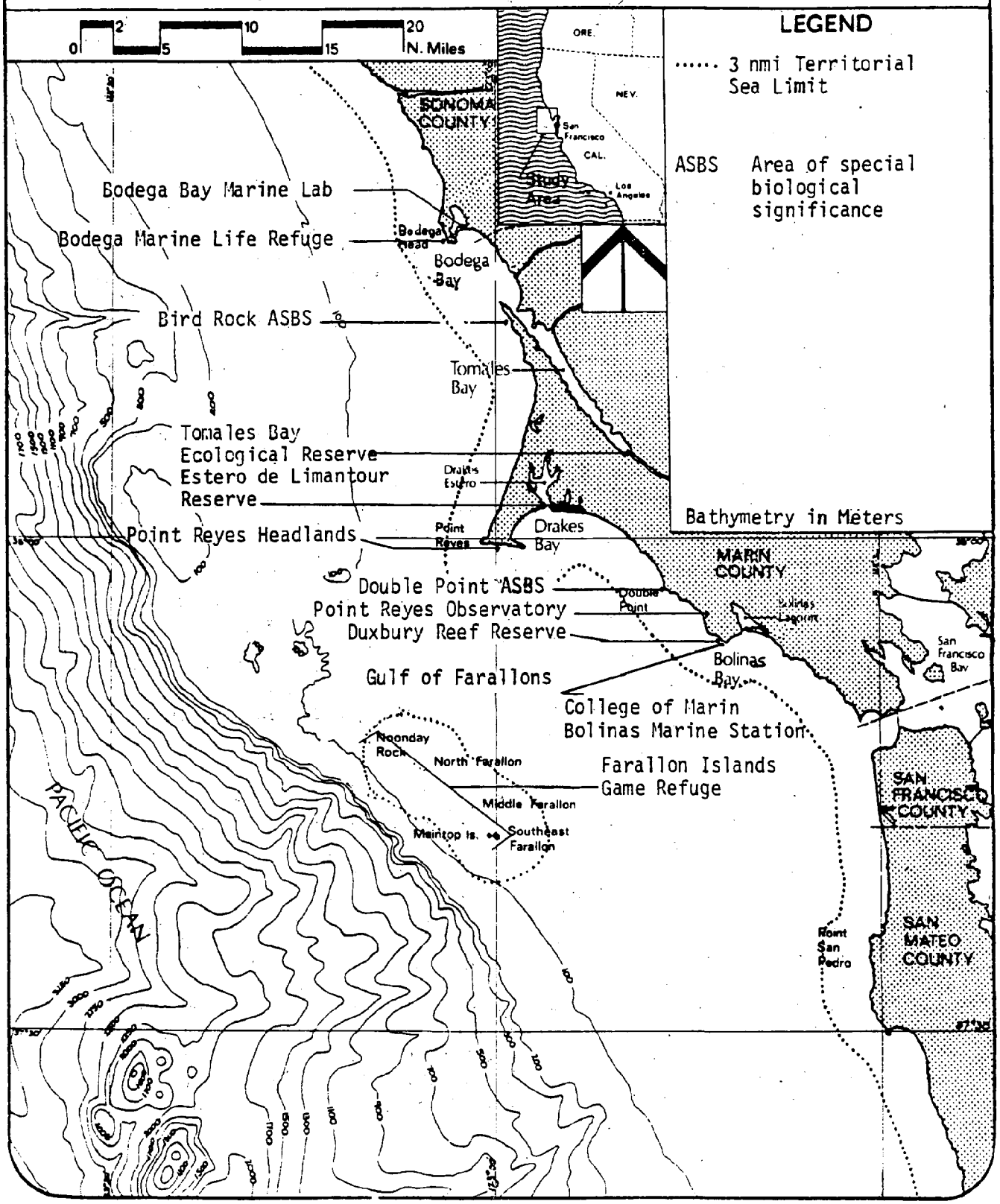
The diversity of physical and biological habitats throughout the Point Reyes-Farallon Island area offers an outstanding opportunity for scientific research on both marine and estuarine ecosystems. Marine research activities focus primarily on seabirds and mammals which use the Farallon Islands for breeding and raising young. As noted in Sections E.2.a. and E.2.b., the islands constitute one of the largest rookeries for seabirds in the continental United States, and provide an important pupping site for California sea lions, Steller sea lions, and elephant seals. Research on the Islands is coordinated by the Point Reyes Bird Observatory (PRBO) and the U.S. Fish and Wildlife Service (FWS). At present, the Outer Continental Shelf Office of the Bureau of Land Management (BLM) is also funding a detailed inventory of marine bird and mammal concentrations throughout northern and central California.

In addition to research opportunities on and around the Farallon Islands, numerous bays and headlands offer prime locations for ecological studies of coastal ecosystems. Two areas within the Point Reyes National Seashore, the Point Reyes Headlands and the Estero de Limantour, have been formally designated as "reserves" by the DFG, and as "research natural areas" by the National Park Service (National Park Service, 1976). Scientific research is the sole permitted use of the Headlands area (National Park Service, 1976). While regulated visitor access is possible at the Limantour reserve, disturbing or removing any life form without a permit is prohibited.

The study area's value for research purposes is also indicated by the California State Water Resources Control Board's (1976) designation of six offshore zones as "Areas of Special Biological Significance" (ASBS). These ASBS's encompass ocean space around, within, or adjacent to the Farallon Islands, Point Reyes Headlands, Duxbury Reef, Double Point, Bird Rock, and Bodega Marine Life Refuge (Figure E-1). Each acknowledged area contains unique resources warranting protection for scientific and educational use. (See also Section F.1.b.i. concerning various protective sanctions afforded by ASBS designation.)

Most research in the study area is conducted by investigators associated with university labs (both coastal and inland), DFG, NPS, or PRBO. At Bodega Bay Marine Laboratory (affiliated with the University of California) and the College of Marin's Bolinas Marine Station, for example, scientists concentrate their efforts on the ecology of intertidal invertebrates as well as on the monitoring of oil spill

FIGURE E-15. Research laboratories and unique biological areas within the study area (California Department of Fish & Game, 1979a; California Water Resources Control Board, 1976b; Connors, 1979; E. J. Smith, 1979; Ainley, 1979).



impacts on organisms (Connors, 1979, personal communication; Smith, 1979, personal communication). Most PRBO investigators study either shore birds, pelagic birds, or marine mammals (Point Reyes Bird Observatory, Annual Report, 1978). As part of their management activities, the NPS and DFG also conduct related research on human interaction with, and its effects on, the natural resources, e.g., recreational intrusion. The presence of four permanent research facilities and numerous biologically significant natural areas within the study area indicates its value as a unique ecological laboratory benefiting scientists from all over California and the United States.

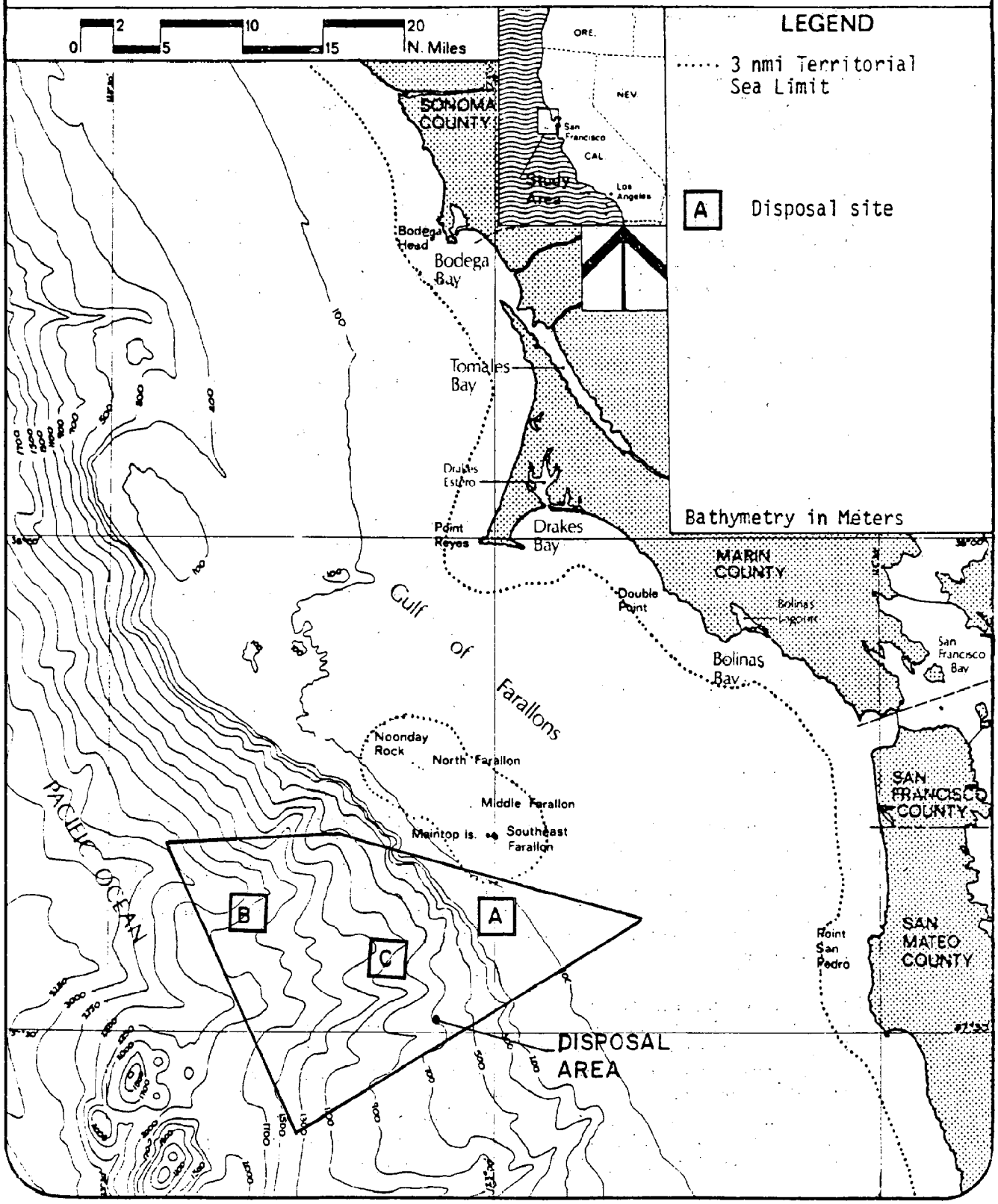
E.3.g. Ocean Waste Disposal and Dredging

At the present time, there are no municipal or industrial ocean outfalls originating from within Marin or Sonoma County which discharge wastewater effluent directly into the study area (Feldman, 1979, personal communication). All wastes are disposed of via septic systems. An ocean outfall in the Bodega Bay vicinity is one of the disposal alternatives being evaluated to service the city of Santa Rosa's wastewater management needs. The draft Environmental Impact Review assessing both on-land and coastal discharge options rejected ocean disposal in favor of land based wastewater reclamation for environmental and economic reasons (Tamcreto, 1980, personal communication).

Limited dredging activities are conducted in the Point Reyes-Farallon Island region. At Bodega Bay Harbor, for example, the U. S. Army Corps of Engineers (COE) helps maintain navigation channels for the large commercial fishing fleet headquartered there. Sonoma County is in the process of evaluating a proposed 250-berth marina (80 percent commercial, 20 percent recreational) to be situated nearby, within Bodega Bay harbor. Its construction is likely to increase both short- and long-term dredging burdens and may lead to further review of the need for offshore dredge disposal. (Rolf, 1979, personal communication). A Draft Environmental Impact Report on this project was completed in 1979 (Brown, 1979, personal communication). The COE is also investigating the possibility of selective dredging to "improve and restore" natural tidal flushing processes and ecological diversity in Bolinas Lagoon, both of which are being gradually affected by increased sedimentation.

There is one relatively small interim dredge material disposal site in the proposed sanctuary (Adsit, 1979, personal communication). This site, located about 10 nmi (18.5 km) south of Southeast Farallon Island at a depth of 100 fathoms, has a radius of approximately 1000 yards (920 m) and, on the average, received annual waste loads of 50,000 cubic yards (38,000 m^2) from 1975 to 1978 (Vais, 1979, personal communication). The site has not been used since 1978 (Vais, 1980, personal communication). EPA is now in the process of designating a permanent deep water dredge material disposal site in the area. In cooperation with COE, EPA will prepare a DEIS analyzing the proposed permanent designation. Although the COE and EPA initially expected to designate the interim site for permanent use, the agencies now anticipate evaluation of a site outside the sanctuary boundaries (Musser, 1980, personal communication.) Tentative dredging plans for San Francisco

FIGURE E-16. Farallon radioactive waste disposal region, 1946-65 (Noshkin, 1978).



Bay ports could require the initial disposal of up to 42 million cubic feet of dredged material, in addition to increased annual maintenance loads of dredged material (Brown, 1980, personal communication.)

This estimate includes several projects at various stages of planning and completion. Some projects, such as the construction of the John F. Baldwin Ship Channel, have been authorized and begun, while others, for example a dredging project for Oakland Harbor which could generate about 5 million cubic yards of dredged material, have not yet been authorized by Congress. (Tong, 1980b, personal communication). If possible, the dredged material will be dumped in San Francisco Bay at the Alcatraz dump site, since transportation to the interim disposal site greatly adds to the cost of disposal. The COE has estimated the most probable level of disposal at a deepwater site would be 1 million cubic yards a year (Daniels, 1980, personal communication.)

On State-owned tide or submerged lands, the California State Lands Commission is empowered to authorize dredge materials deposition and extraction for specific projects, such as those relating to improvement of navigation (Trout 1979, personal communication). The Commission does so occasionally, but this activity is not extensive within the study area.

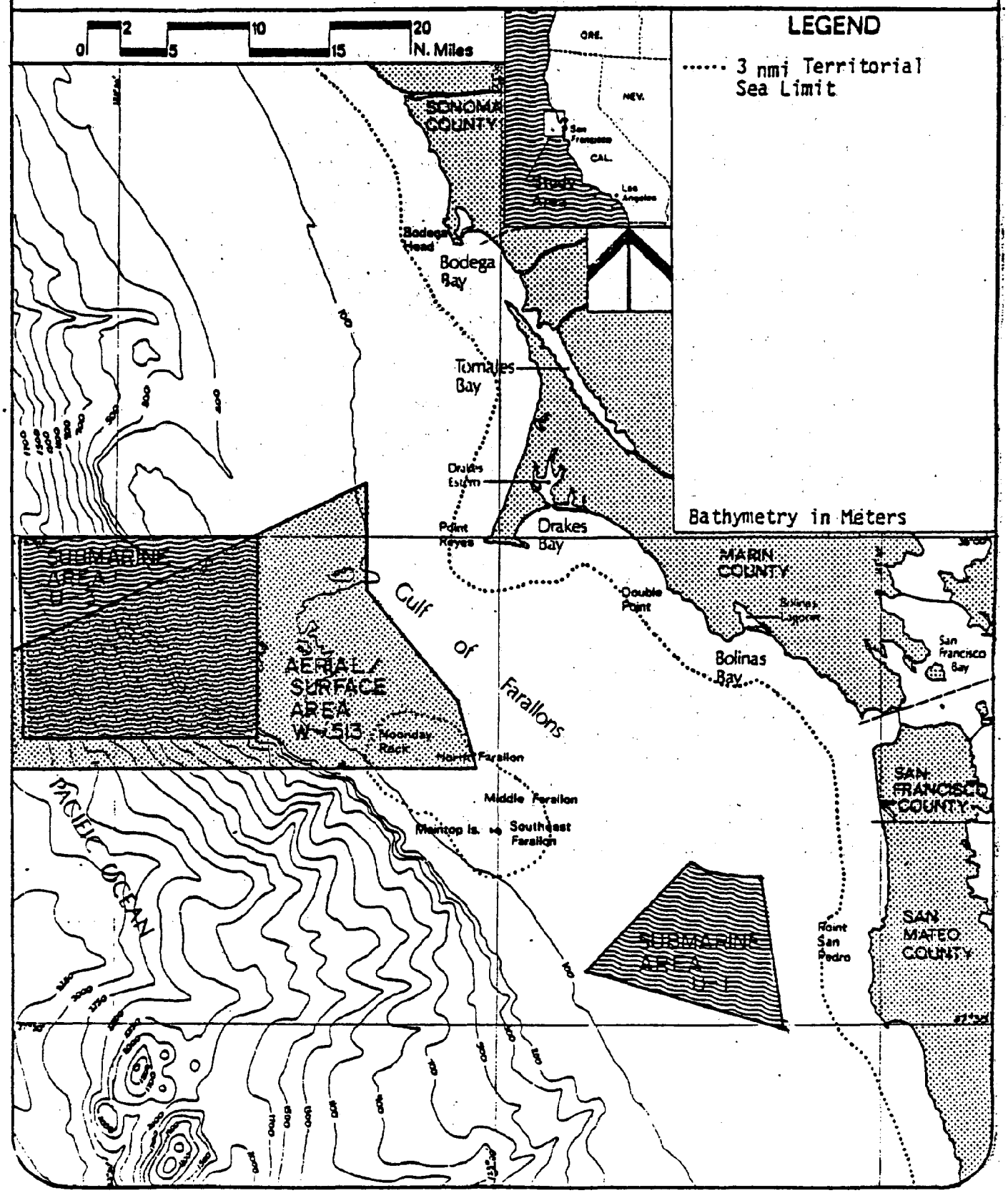
Although no longer utilized as such, three locations within or near the study area, situated south-southwest of the Farallon Islands, once served as offshore radioactive waste disposal sites between 1946 and 1965. These sites lie approximately 2, 8, and 13 nmi (4, 15, and 24 km) away from the Southeast Farallon Island (Figure E-16). An estimated 47,500 drums (55 gallons each), concrete blocks, and other types of containers were deposited here at irregular intervals (Noshkin, 1978). Thorium, uranium, transuranics, and other activation-product radionuclides and mixed fission products (derived in large part from research laboratories) comprised the predominant waste elements.

E.3.h. Military

The Point Reyes-Farallon Island region is the site of regular offshore U. S. Navy (USN) surface, air, and submarine operations by the Third Fleet, as well as less frequent aerial overflight missions carried out by the U. S. Coast Guard (USCG)(Figure E-17). Just outside the sanctuary area to the north, there is also a special submarine transit lane utilized primarily upon approach to, and departure from, San Francisco Bay.

The USN's two submarine operations areas are located some 8 nmi (14.8 km) southeast and 9 nmi (16.7 km) northwest of the Farallon Islands, respectively. Area U-1 was reportedly not used with any regularity in 1979; area U-3, on the other hand, receives "moderate" use approaching a monthly average of 10 days (Scruggs, 1979, personal communication). This submarine activity is comprised of a trial diving exercise and various equipment checkouts normally following vessel refitting or overhauls.

FIGURE E-17. Naval operation zones within or near to the marine sanctuary study area (Scruggs, 1979, personal communication).



A third, but considerably larger, USN offshore operations zone (W-513) lies partly within the sanctuary study area, approximately 10 nmi (18.5 km) southwest of the Point Reyes Headlands. This area encompases North Farallon Island and Noonday Rock along its southern margin, and overlaps the submarine operations zone U-3 described above (Figure E-17). The USN conducts both aircraft and surface vessel exercises here which are often coordinated with submarine operations. P-3 "Orion" aircraft originating at Moffett field (near Palo Alto) carry out anti-submarine training throughout the area, including all-weather missions, air intercepts, surface vessel coordination and the dropping of inert ordinance (Scruggs, 1979, personal communication). Surface operations primarily involve manual reserve vessel and other auxiliary training maneuvers by San Francisco Bay Port-based crews and equipment. Taken together, these activities occur at a "moderate" level which, at times, may total 15 use-day per quarter year (Scruggs, 1979, personal communication). No projected alterations in use patterns within the three USN offshore operations areas are evident at this time (Scruggs, 1979, personal communication).

For periodic navigation servicing purposes, the USCG flies maintenance personnel by helicopter from San Francisco out to their lighthouse post on Southeast Farallon Island (Lott, 1979, personal communication). The USCG also regularly conducts helicopter flights within the study area for purposes of aerial offshore enforcement around the Farallon Islands (about five sorties per week), and search and rescue missions (SRM's) to a variety of destinations located elsewhere along the coast. Many of these SRM's (also about five per week) pass over Bolinas Lagoon and Tomales Bay when enroute to marine areas northwest of the Point Reyes Peninsula (Emerson 1979, personal communication).

Submarine transit lanes run parallel to the mainland and due west of Bodega Head and vary in width from 7 to 10 nmi (13 to 18.5km). When activated, all other vessels in the vicinity are cautioned against towing submerged objects (e.g., trawling equipment) across the lanes to insure safe underwater passage. There are no reliable estimates of the frequency with which submarines utilize these lanes, however.

Although NOAA has received informal reports of low level military overflights over Bolinas Bay and Lagoon and the Farallon Islands, NOAA has not been able to obtain any official confirmation of such flights.

F. ALTERNATIVES

Introduction

NOAA proposes to designate the Point Reyes/Farallon Islands area to protect its valuable ecosystem, and to promote scientific understanding, public appreciation and wise use of its resources. Various management, boundary and regulatory alternatives have been considered in the evaluation of the proposed action.

This section analyzes all reasonable alternatives, including a no action alternative (status quo), the program action (a marine sanctuary with proposed boundary and regulatory measures), and three alternative boundaries and regulatory measures, and the physical, biological, ecological and socioeconomic impacts resulting from these alternatives. Table F-1 summarizes the boundaries and controls considered for designating alternatives 2 through 4.

NOAA has only considered alternatives which are politically, economically, and environmentally realistic. Thus, certain options metioned in the Issue Paper on three possible California Marine Sanctuary sites are not discussed below.

F.1. No Action Alternative: Rely on the Status Quo.

F.1.a. Introduction

An alternative to designating a Marine sanctuary is to rely solely on existing State and Federal programs. This section sets forth these existing mechanisms and the environmental consequences of relying on these alone.

The following section (F.1.b., Existing Management Authorities) includes a brief description of each of the authorities now in effect in the study area. Readers may prefer to review Tables F-2 and F-3, which provide an overview of the authorities before proceeding to Section F.1.c., which describes the environmental consequences of relying on the existing regulatory structure.

F.1.b. Existing Management Authorities

F.1.b.i. State Authorities

California's jurisdiction in the area under consideration extends 3 nmi (5.6 km) offshore from the mean low tide line. State authorities range in approach and scope from broad regional management programs such as the California Coastal Act to laws intended to control specific threats or protect certain resources.

Table F-1 Summary of boundary, activity regulation, and management alternatives for a marine sanctuary designation excluding the status quo alternative.

	Alternative 2 preferred alternative	Alternative 3	Alternative 3b	Alternative 4
Boundaries	From the mean high tide line or the seaward boundary of the National Seashore between Bodega Head and Rocky Point to 3 nautical miles beyond State waters; 12 nmi around the Farallon Islands and Noonday Rock; and the intervening waters.	12 nmi around the Farallon Islands	Between 3 and 12 nmi seaward of the Farallon Islands including State waters.	12 nmi around the Farallon Islands and the waters between the Islands and the mean high tide line on the mainland between Tomales Pt. and Bolinas Lagoon
Oil and Gas Activities	Prohibit exploration and exploitation in the sanctuary Allow placement of pipelines certified by the Assistant Administrator for OCZM except within 2 nmi of sensitive areas.*	Prohibit within 6 nmi of the Farallon Islands. Require special containment equipment beyond 6 nmi. Allow pipeline placement.	Prohibit exploration and exploitation in the sanctuary. Allow pipeline placement, certified by the Assistant Administrator.	Same as Alternative 2
Discharges	Prohibit except for vessel cooling waters, marine sanitary device effluents, and chumming material. Permit municipal outfalls and dredged material at the interim disposal site if certified by the Assistant Administrator.	Prohibit except for vessel cooling waters marine sanitary device effluents, chumming material and dredged material if certified by the Assistant Administrator.	Same as Alternative 3	Same as Alternative 3a

* These areas include the Farallon Islands and Noonday Rock, Bolinas Lagoon, and Areas of Special Biological Significance designated by the State of California.

Table F-1 (cont.)	Alternative 2 preferred alternative	Alternative 3a	Alternative 3b	Alternative 4
Seabed Alteration and Construction	Prohibit except for routine navigation and marine maintenance, and pier construction, ecological maintenance, allowed pipeline placement, mariculture and anchoring.	Prohibit, except for pipeline placement and anchoring.	Same as Alternative 3a.	Prohibit except for routine navigation and marine maintenance dredging, mariculture, pipeline placement, and ecological maintenance.
Vessel Traffic	To the extent consistent with international law, prohibit vessels engaged in the trade of carrying of cargo or servicing offshore installations from within 2 nmi of sensitive areas*,except to land on the Farallon Islands. Fishing, recreational, research and enforcement vessels will not be affected by this regulation.	Prohibit vessels within 2 nmi of the Farallon Islands as specified in alternative 2.	---	Require vessels to stay in the VTSS lanes. Prohibit vessels within 2 nmi of the islands. Fishing, research, recreational, and enforcement vessels would be exempt, as would vessels transporting persons or supplies to or from the Islands.
Disturbing Marine Mammals and Birds	Prohibit overflights below 1000 feet within 1 nmi of sensitive areas*, except to land on the Farallon Islands.	Prohibit overflights below 1000 ft. within 1 nmi. of the Farallon Islands.	---	Prohibit overflights below 1000 feet in the sanctuary within 2 nmi of sensitive areas*, except to land on the Farallon Islands.
Historical Resources	Prohibit removal and damage within the sanctuary.	----		Same as Alternative 2.

*These areas include the Farallon Islands and Noonday Rock, Bolinas Lagoon, and Areas of Special Biological Significance designated by the State.

Table F-1 continued

	Alternative 2 preferred alternative	Alternative 3a	Alternative 3b	Alternative 4
Firearms	---	---	---	Prohibit use within the sanctuary.
Fishing and Mariculture	Rely on the California Dept. of Fish and Game and the Pacific Management Council.	Same as Alternative 2.		
Military Activities	Allow military activities necessary for national defense or emergency. NOAA will consult with DOD on specified activities.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Research Activities	Allow. Issue permits for research or educational activities otherwise prohibited.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Management	To be developed in coordination with the State of California and interested Federal agencies.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

Authorities with broad jurisdiction are described first, followed by those addressing a specific threat or resource.

The California Coastal Act of 1976 (California Public Resources Code §§30000 et. seq.)

The California Coastal Act of 1976 (the CCA) is the foundation of the California Coastal Management Program. It establishes a comprehensive set of specific policies for the protection of coastal resources and for the management of orderly economic development throughout the coastal zone. The CCA defines the coastal zone as the land and water area of the State extending seaward to the outer limit of the State's jurisdiction, including all offshore islands, and extending inland generally 1,000 yds (900 m) from the mean high tide line. In significant estuarine, habitat, and recreational areas, it extends inland to the first major ridgeline or 5 smi (8 km) from mean high tide, whichever is less.

Activities in State waters must comply with the policies established by the CCC. In addition, seaward of State jurisdiction, Federal developments and activities (including DOI's OCS pre-lease sale activities) directly affecting the coastal zone must be conducted in a manner consistent with these policies to the maximum extent practicable. Activities seaward of State jurisdiction which require a Federal permit or license, or which form part of an OCS exploration, development, and production plan that affects the coastal zone must be conducted in a manner consistent with these policies (16 USC 1456; 15 CFR 930).

Several of the planning and management policies established by the CCA address activities or concerns relevant to the consideration of a marine sanctuary:

1) Article 4, Section 30230 authorizes the provision of "special protection to" areas and species of special biological or economic significance (e.g., marine mammals or the salmon troll fishery), and requires uses of marine environment to be carried out so as to maintain biological productivity.

2) Article 5, Section 30240 authorizes the protection of sensitive habitat areas (e.g., rookeries) against any significant disruption of habitat values, and against impacts from adjacent development which would "significantly degrade" the area.

3) Article 4, Section 30244 limits dredging and filling in coastal waters to situations where "there is no feasible less environmentally damaging alternative and it is related to specific listed purposes."

4) Article 7, Section 30262 permits the regulation of oil and gas development.

Procedures and guidelines may be established to implement these policies in particular areas (California Public Resources Code (§30330). This mechanism could be used to manage and protect marine resources of the study area.

The CCA established the California Coastal Commission and various regional commissions to implement the Act. Regional commissions have permit authority until such time as local governments adopt local plans approved by the Commission. The North Central Coastal Commission is currently coordinating the preparation of a regional plan which will encompass the study area. Marin County has been divided into two units for the purpose of developing the local coastal program (LCP). Unit I contains the southern part of the Marin County coastline, including most of the Point Reyes Peninsula. Unit II includes the ocean side of Tomales Point, Tomales Bay, and the remainder of the coastline north to the Sonoma County border. A final draft of the program for Unit II has already been prepared; the program for Unit I is currently being developed. Preparation of the LCP for Sonoma County, which includes the shoreline along the northernmost portion of the study area, is also currently at the draft stage (Brown 1979, personal communication).

In ocean areas, the California Coastal Commission will continue to be the permitting agency after approval of local coastal programs. It will be responsible for reviewing the consistency determinations for Federal developments and activities (including Department of the of the Interior OCS pre-lease activities), and for concurrence with applicants' certifications of consistency for Federally licensed activities (including OCS activities) which are of particular importance to the area under consideration. Local governments are invited by the CCA to participate in the public hearing(s), CCC deliberations, and to present determinations of whether OCS activity is consistent with the LCP.

The State Lands Commission (SLC) administers lands including the beds of all waterways of the State below the Ordinary High Water Mark as well as tidelands (located between the mean high and low tide lines) and submerged lands (located below the mean low tide line and extending 3 nmi (5.6 km) seaward). These sovereign State lands are held by the State "in trust" for the benefit of the public.

As the State agency with sole responsibility for administering the trust, the SLC has adopted regulations for the protection and use of trust lands in the coastal zone (California 2 Administrative Code 2500). The State Lands Commission also participates in local coastal planning (LCP) along with the DFG in efforts affecting State lands. For example, staff of the State Lands Commission, together with the Coastal Commission and Marin County, are developing land use policies for Tomales Bay as a part of the preparation of Marin County's Local Coastal Program pursuant to the California Coastal Act of 1976.

	STATE AUTHORITIES									FEDERAL AUTHORITIES												
	AQCA	ASBS	CAA	ER,GR,MLR	FGC	HCPRA	OCS	UP	WQCA	CAA	CWA	ESA	FCMA	FNWR	MBTA	MPRSA	MMPA	NHPA	OCSLA	OPA	PRNS	PWSA
Resource Protection Marine Mammals				DFG	DFG							FWS NMFS		FWS			NMFS FWS					
Marine Birds				DFG	DFG							FWS		FWS	FWS							
Fish and Shellfish				DFG	DFG PFMC								NMFS PFMC									
Research		WRCB										NMFS		FWS			NMFS				NPS	
Recreation		CCC						DPR													NPS	USCG
Historic Cultural				DFG		HRC												NPS HCRS			NPS	
Activity Mgt. Oil and Gas Development -Exploration Development			CCC				SLC			EPA	COE EPA								BLM USGS			
--platform placement			CCC				SLC												BLM USGS COE			
pipelines			CCC																BLM USGS COE			
Water Discharges		WRQB							WRQB		EPA											
Air Discharges	ARB									EPA									USGS			
2. Fishing				DFG	PFMC DFG								NMFS USCG PFMC									
3. Shipping	ARB			DFG					WRCB	EPA	EPA									USCG		USCG
4. Recreation				DFG	DFG					USCG EPA											NPS	
5. Research				DFG	DFG										FWS		NMFS FWS				NPS	
6. Ocean Dumping																EPA COE						

Table F-2. Existing State and Federal manmagement authorities as they relate to resources and activities. See Table F-3 for definition of abbreviations.

Table F-3. Abbreviations of State and Federal authorities and agencies.

State

AQCA	-	Air Quality Control Act; California Health and Safety Code, §§39000-42708
ASBS	-	Areas of Special Biological Significance; California Water Code §13260
CCA	-	California Coastal Act; California Public Resources Code §27000
ER	-	Ecological Reserves; California Fish and Game Code §1580
GR	-	Game Refuges; California Fish and Game Code 10500
FGC	-	Fish and Game Code California Fish and Game Code, California Administrative Code, Title 14
HCRPA	-	Historical and Cultural Resources Protection Act; California Public Resources Code §5000
OGS	-	Oil and Gas Sanctuaries; California Public Resources Code §6870
UP	-	Underwater Parks; California Department of Parks and Recreation
WQCA	-	Water Quality Control Act; California Water Code §13000

Federal

CAA	-	Clean Air Act; 42 USC §§7401-7642
CWA	-	Clean Water Act; 33 USC §§1251-1376
ESA	-	Endangered Species Act; 16 USC §§1531-1543
FCMA	-	Fishery Conservation and Management Act; 16 USC §§1801-1882
FNWR	-	Farallon National Wildlife Refuge; U.S. Fish & Wildlife Service
MBTA	-	Migratory Bird Treaty Act; 16 USC §§703-711
MMPA	-	Marine Mammal Protection Act; 16 USC §§1361-1407
MPRSA	-	Marine Protection, Research & Sanctuary Act; 33 USC §§1401-1444
NHPA	-	National Historic Preservation Act; 16 USC §§470-470n
OCSLA	-	Outer Continental Shelf Lands Act; 43 USC §§1331-1343
OPA	-	Oil Pollution Act of 1961; 33 USC §§1001-1016
PRNS	-	Point Reyes National Seashore; 16 USC§459C
PWSA	-	Ports and Waterways Safety Act; USC §§1121-1227

Table F-3. (cont'd)

Abbreviations of Agencies

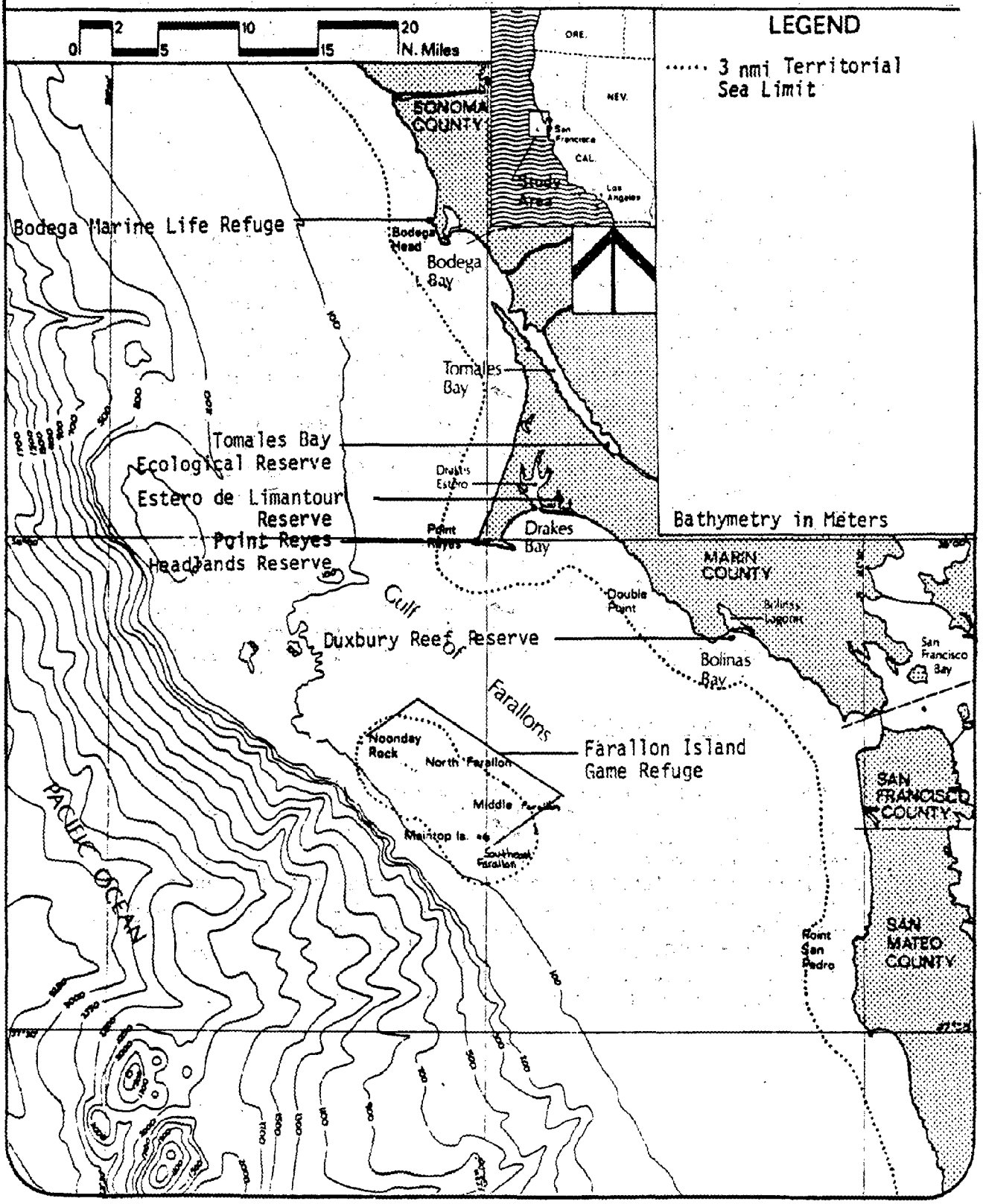
State

ARB	-	Air Resources Board
CCC	-	California Coastal Commission
DFG	-	Department of Fish and Game
HRC	-	Historic Resources Commission
PFMC	-	Pacific Fisheries Management Council; (Joint Federal-State-Private Body)
SLC	-	State Lands Commission
WRCB	-	Water Resources Control Board

Federal

BLM	-	Bureau of Land Management - Department of the Interior
COE	-	Army Corps of Engineers - Department of Defense
EPA	-	Environmental Protection Agency
FWS	-	Fish and Wildlife Service - Department of the Interior
HCRS	-	Heritage Conservation and Recreation Service - Department of the Interior
MMC	-	Marine Mammal Commission
NMFS	-	National Marine Fisheries Service - Department of Commerce
NPS	-	National Park Service - Department of the Interior
PMFC	-	Pacific Fisheries Management Council
USCG	-	United States Coast Guard - Department of Transportation
USGS	-	United States Geological Survey - Department of the Interior

FIGURE F-1. California State Refuges and Reserves. (Marine Life Refuges and Reserves of California, California Department of Fish and Game, 1979).



In three areas within the proposed sanctuary, the Bolinas Lagoon Recreation District, Bodega Bay and the Point Reyes National Seashore, both tide and submerged lands have been granted to local jurisdictions; however, the SLC retains all residual authority over such lands. Also the California DFG is responsible for leasing State tidelands for mariculture and oyster cultivation and management of wetlands. The Department of Fish and Game is also participating in the LCP for Tomales Bay and Bolinas Lagoon.

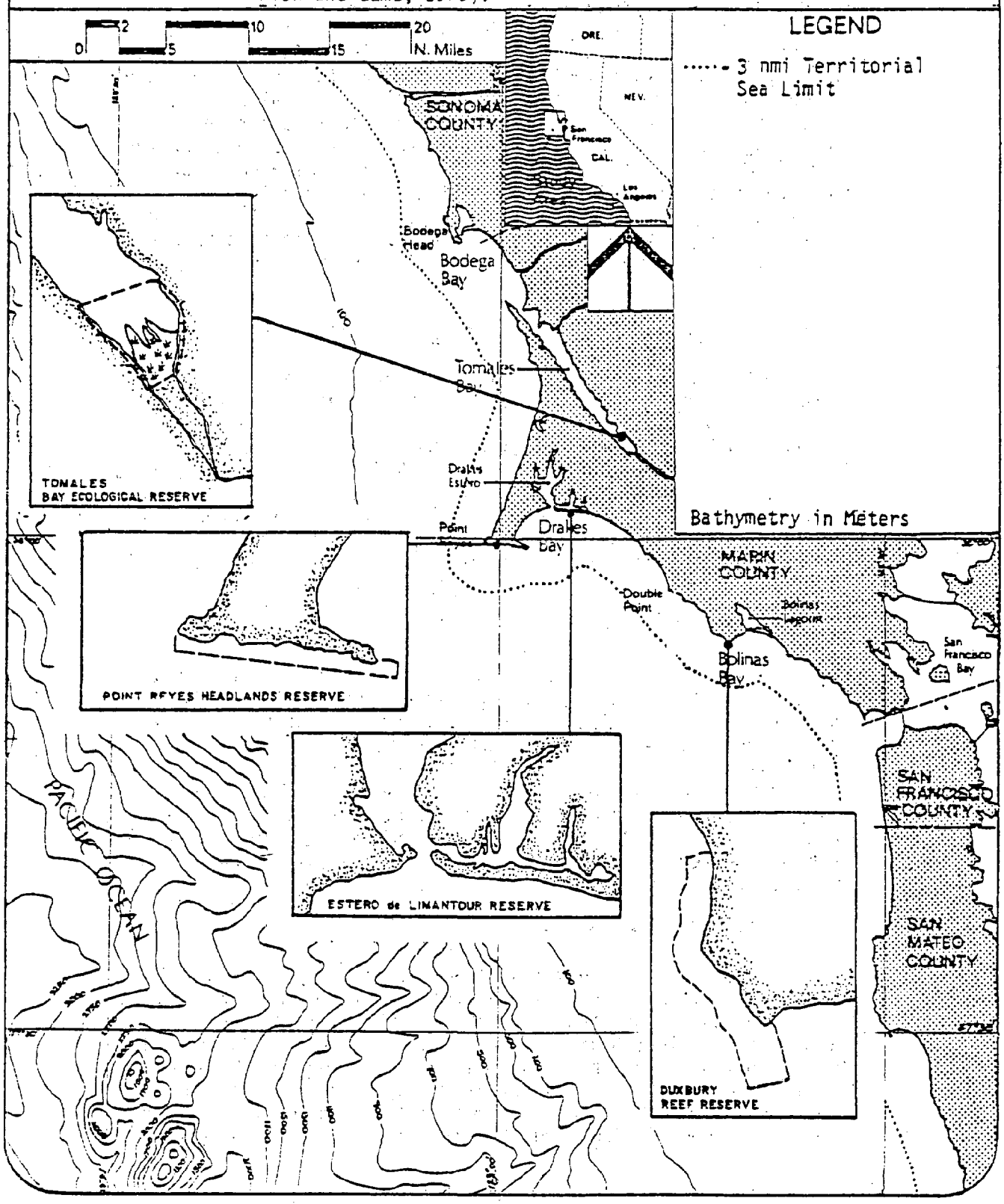
Through the Federal consistency provision of the Coastal Zone Management Act the CCC also has jurisdiction over petroleum activities affecting the coastal zone, especially regarding the assignment of exploration and production permit conditions. For example, to facilitate early containment of an oil spill, the Commission has required lease holders in the Santa Barbara Channel to have certain minimum oil spill containment and cleanup equipment on drillships or at the site at all times. These are: (1) 1500 ft (455 m) of open ocean containment boom and a boat capable of deploying the boom, (2) one oil skimming device capable of ocean use, and (3) 15 bales of oil sorbent material. The need for comparable requirements for offshore activities located elsewhere is reviewed by CCC on a case-by-case basis. Also, the CCC will hold the placement of drillships in or within 1650 ft (500 m) of sea lanes established by the U. S. Coast Guard to be inconsistent with the CCA, for reasons of navigation safety and environmental protection.

Finally, the CCA requires the Commission to designate Sensitive Coastal Resource Areas. The Legislature must then act upon these designations within two years. The Commission, however, has preliminarily determined such designation may be unnecessary in view of the existing mechanisms, such as those described above, available through the LCP process (Pillsbury 1979, personal communication).

State Refuges and Reserves

Several refuges and reserves to provide extra management and protection of marine life have been established in the study area by the California Fish and Game Commission (see Figure F-1). These areas fall into four general categories which provide different management and protective mechanisms: ecological reserves, game refuges, marine life refuges, and marine reserves. In the following discussion, the general authorities exercised by the Department of Fish and Game (DFG) for each category of refuge or reserve will be summarized. A detailed description of the regulations in force within specific refuges or reserves is then presented.

FIGURE F-2. Tomales Bay Ecological Reserve; Point Reyes Headlands Reserve; Estero de Limantour Reserve; and Duxbury Reef Reserve. (Marine Life Refuges and Reserves of California, California Department of Fish and Game, 1979).



Ecological Reserves (California Fish and Game Code (CFGC) §§1580 et seq.)

Of the types of refuges and reserves administered by the DFG, ecological reserves provide the most comprehensive regime. Within ecological reserves, the DFG has the authority to prohibit any activity which may harm the resources, including specifically fishing, collecting, swimming, boating, aircraft, and pulic entry (15 California Administrative Code §630(a)). General regulations provide that "no person shall disturb geological formations or archaeological artifacts or take or disturb any bird nest, or eggs thereof, or any plant, mammal, fish, mollusk, crustacean...or any other form of plant life or animal life in an ecological reserve" (14 California Administrative Code §630(a)(1)). These activities may, however, be permitted by the DFG in certain areas of particular reserves pursuant to specific regulations.

Tomales Bay Ecological Reserve (see Figure F-2)

The Tomales Bay Ecological Reserve is located at the southern extremity of Tomales Bay and contains marsh land, tidal flat habitat, and adjacent bay waters. Seasonal waterfowl hunting is allowed in accordance with general waterfowl regulations. Swimming, wading, and diving are also permitted. Fishing is permitted from boats as well as from shore; only lightweight, hand-carried boats may be launched and operated. Finally, the land area of the reserve is closed to all entry from March 1 through June 30 for the protection of breeding waterfowl (14 California Administrative Code §630(b)(17).

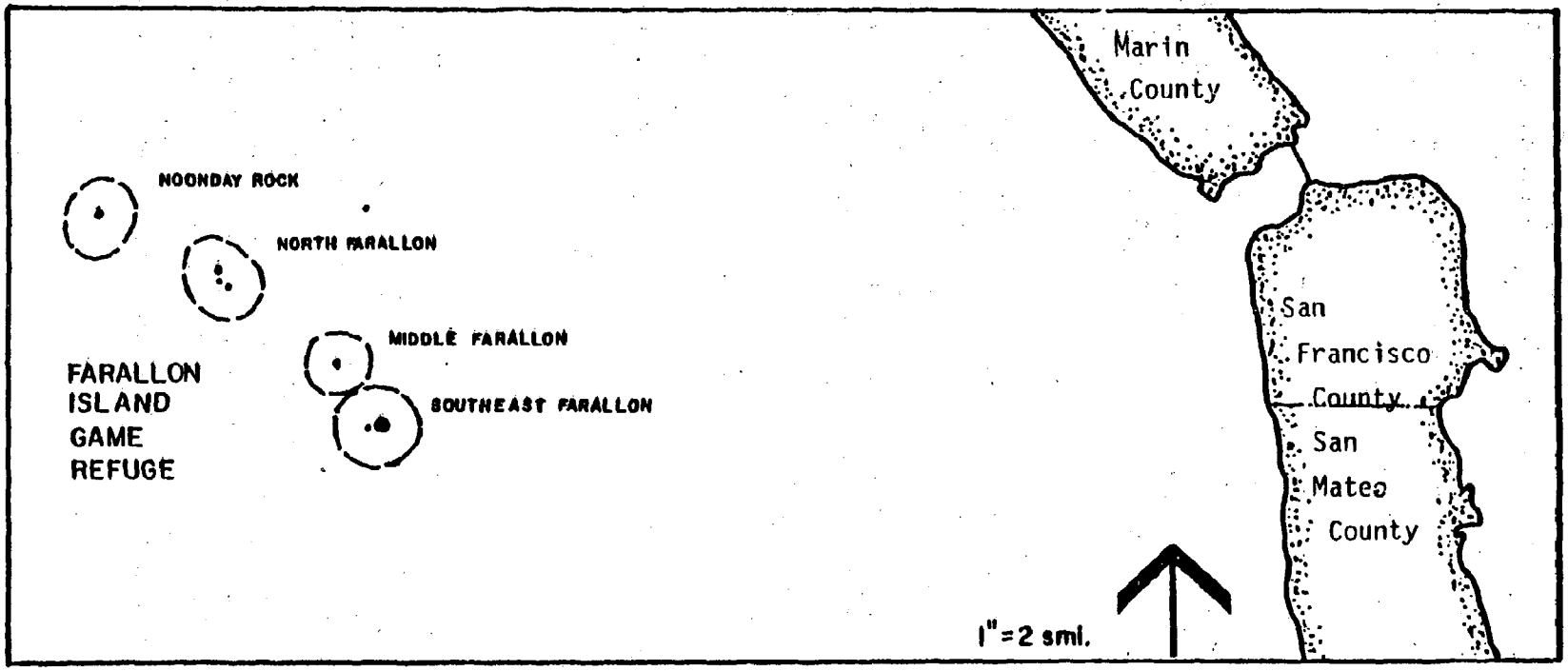
Game Refuges

It is unlawful in general to take or possess any bird or mammal, or part thereof, in any game refuge (CFGC §10500(a)(b)). The use or possession of any firearm, bow and arrow, or any trap or other contrivance designed to be or capable of being used to take birds or mammals is also prohibited (CFGC §10500). The DFG has complete authority to exercise control over 11 non-marine mammals and all birds in any game refuge, including the authority to issue permits for their taking (CFGC §10502). In navigable water areas of game refuges, however, general regulations do not prohibit the taking of birds or mammals.

Farallon Islands Game Refuge

The Farallon Islands Game Refuge (see Figure F- 3) is composed of Southeast Farallon Island, Maintop Island, Middle Farallon Island, North Farallon Island, Noonday Rock, and the ocean waters to a distance of 1 nmi (1.8 km) from the coastline of each island. In the case of the Farallon Islands Game Refuge, the prohibition on the taking of any bird or mammal has been extended to include the navigable waters of the refuge. Persons on commercial vessels may possess unloaded firearms when travelling through the navigable

FIGURE F-3. Farallon Island Game Refuge. (Marine Life Refuges and Reserves of California, California Department of Fish and Game, 1979).



waters of the refuge, notwithstanding general game refuge regulations (CFGC §10843). Finally, no aircraft may fly less than 1000 ft (300 m) above land or water in the refuge except for rescue operations and for scientific purposes pursuant to a DFG permit. This prohibition does not apply to the landing of any aircraft for administrative or operational purposes by the National Park Service, United States Navy, or United States Coast Guard (CFGC §10501.5).

Marine Life Refuges

It is unlawful to take or possess any invertebrate or specimen of marine plant life in a marine life refuge (CFGC §15000(f)). All other provisions are specific to particular refuges.

Bodega Marine Life Refuges

The boundaries of the Bodega Marine Life Refuge (see Figure F-4) correspond to those of the University of California Marine Laboratory located on Bodega Head, immediately adjacent to the boundaries of the study area, including ocean waters to a distance of 1000 ft (300 m) from the northern side of the laboratory (CFGC 10903). While general regulations prohibit the taking of invertebrates and marine plant life, the officers, employees, and students of the University may take such specimens for scientific purposes without a DFG permit.

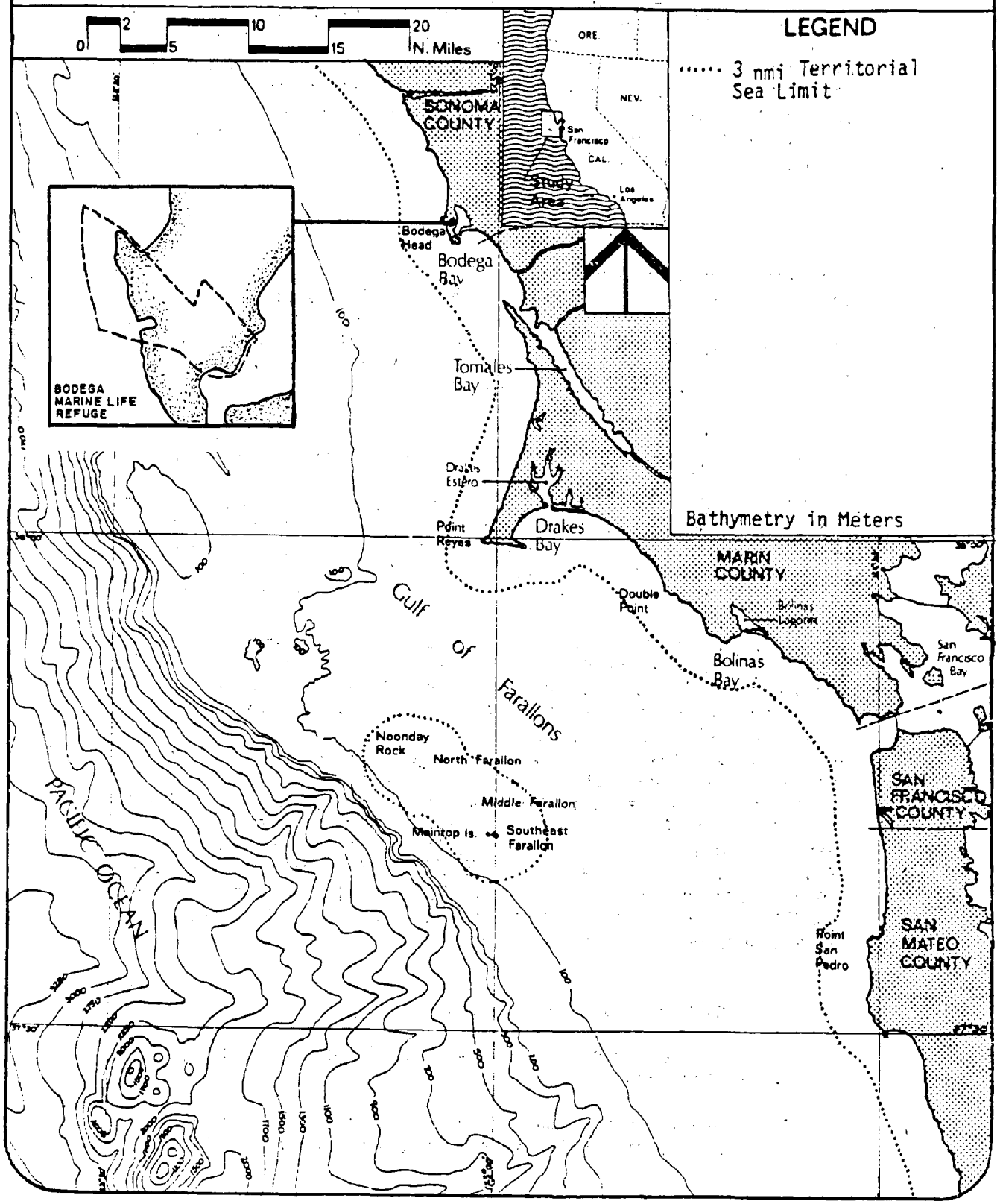
Marine Reserves

No general regulations exist for marine reserves; rather, specific regulations for each reserve are designed to protect unique forms of marine life peculiar to the area.

Duxbury Reef Reserve

Duxbury Reef Reserve (see Figure F-2), located off Bolinas Head, encompasses ocean waters extending 1000 ft (300 m) from the low tide mark along Duxbury Reef. No fish may be taken within the reserve (between the high water mark on the coastline or reef and the boundaries of the reserve) except abalone, dungeness crab, rockcrab, rockfish, lingcod, cabezon, surfperch, halibut, flounder, sole turbot, salmon, kelp greenling, striped bass, steelhead, monkeyface-eel, wolf-eel, smelt, and silversides. No other aquatic life may be taken without a written permit from the DFG (14 California Administrative Code §27.20). No permit can be issued for the taking of invertebrates (14 California Administrative Code §123(f)(2)).

FIGURE F-4. Bodega Marine Life Refuge. (Marine Life Refuges and Reserves of California, California Department of Fish and Game, 1979).



Point Reyes Headlands Reserve

The Point Reyes Headlands Reserve (see Figure F-2) encompasses ocean waters extending 1000 ft (300 m) from the mean high tide on Point Reyes Headlands, bounded on the west by the Point Reyes Lighthouse and on the east by Chimney Rock. No marine life may be taken from the reserve without a written permit from the DFG (14 California Administrative Code §27.30). Permits cannot be issued for the taking of invertebrates within the reserve (14 California Administrative Code §123(f)(2)).

Estero de Limantour Reserve

The Estero de Limantour Reserve (see Figure F-2) includes all tideland waters to the high water mark east of Drakes Estero in the Point Reyes National Seashore. Regulations on taking marine life and invertebrates in the reserve are identical to those cited in the preceding paragraph for Point Reyes Headlands Reserve (14 California Administrative Code §27.35).

Water Quality Control Act (California Water Code §13300 et seq.)

The Porter-Cologne Water Quality Control Act is designed to enhance and maintain water quality in the waters, including ocean waters, under the jurisdiction of the State. The State Water Resources Control Board and the nine regional water quality control boards have primary authority for regulating water quality in California.

The Water Quality Control Plan for Ocean Waters of California (1978), which sets standards for water quality characteristics for ocean waters within State jurisdiction, placed particular emphasis on maintaining water quality in Areas of Special Biological Significance (ASBSs). To be classified as an ASBS, an area of ocean water must be considered to contain biological communities of such extraordinary value that no risk of change in their environments resulting from man's activities is considered acceptable (California Water Resources Control Board, 1976). Dischargers must ensure that their wastes are released a sufficient distance from designated ASBSs to assure that the natural water quality conditions within the area are not affected. Regional Water Quality Control Boards (RWQCB's) implement the criteria via a permit procedure setting waste discharge restrictions upon:

a) elevated temperature wastes,

b) discrete, point source sewage or industrial process wastes, and

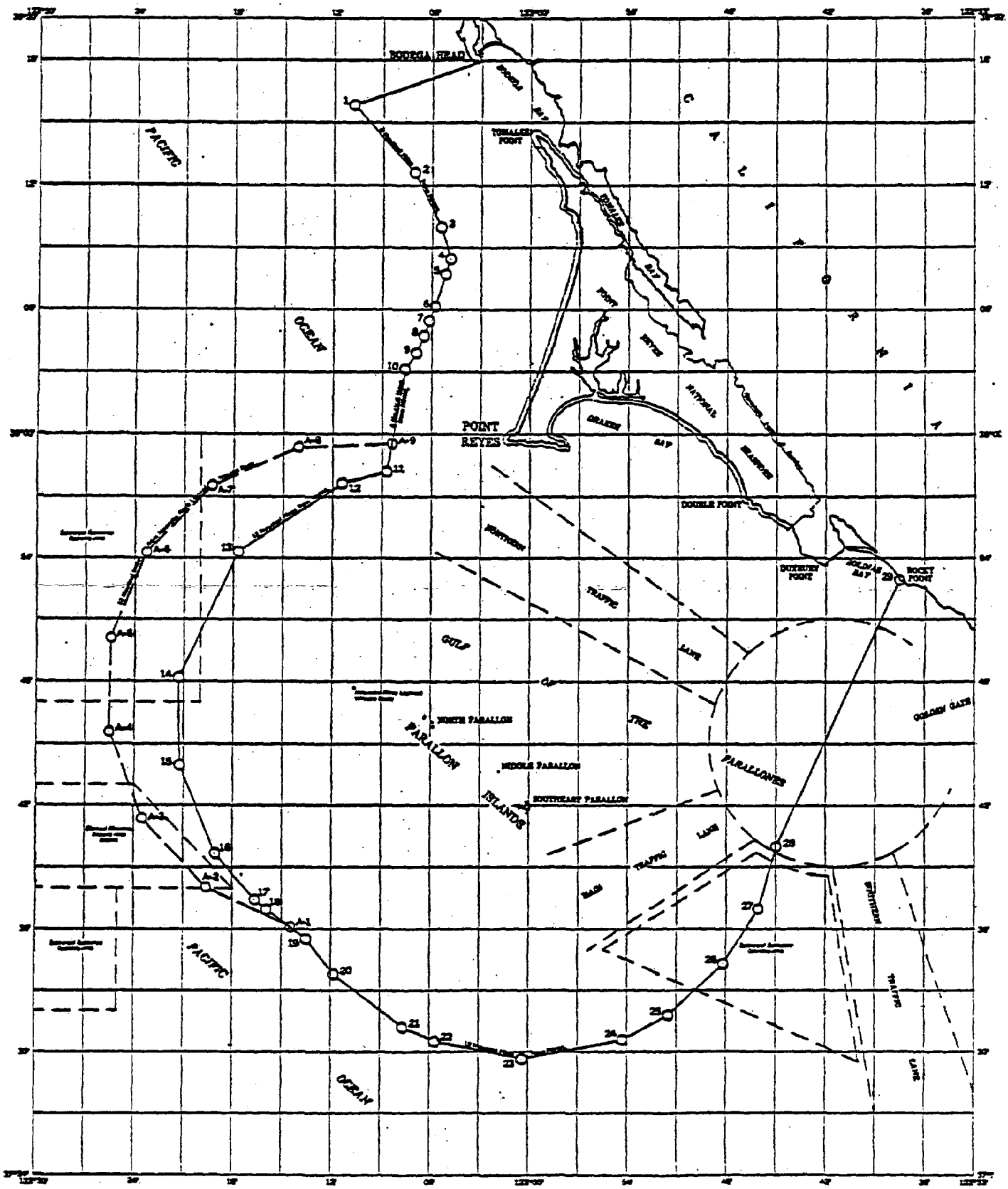
c) non-point source wastes such as, but not limited to, storm water runoff, silt, and urban runoff.

POINT REYES/FARALLON ISLANDS PROPOSED MARINE SANCTUARY
CALIFORNIA
WEST COAST UNITED STATES

LISTING OF 'PRACTICAL'(ROUNDED-OFF) COORDINATES FOR THE TWO BOUNDARY ALTERNATIVES. COORDINATES HAVE BEEN ROUNDED-OFF TO WHOLE VALUES FOR SECONDS OF LATITUDE AND LONGITUDE.

PT NO	LATITUDE 0	/	//	LONGITUDE 0	/	//
1	38	15	50	123	10	49
2	38	12	36	123	07	05
3	38	09	57	123	05	27
4	38	08	27	123	04	53
5	38	07	42	123	05	11
6	38	06	08	123	05	49
7	38	05	27	123	06	10
8	38	04	45	123	06	29
9	38	03	54	123	06	58
10	38	03	08	123	07	38
11	37	58	11	123	08	44
12	37	57	39	123	11	25
13	37	54	19	123	17	41
14	37	48	10	123	21	20
15	37	43	57	123	21	16
16	37	39	38	123	19	05
17	37	37	25	123	16	39
18	37	36	55	123	15	58
19	37	35	30	123	13	31
20	37	33	47	123	11	51
21	37	31	12	123	07	40
22	37	30	30	123	05	42
23	37	29	39	123	00	24
24	37	30	34	122	54	18
25	37	31	48	122	51	32
26	37	34	18	122	48	10
27	37	36	59	122	46	06
28	37	39	59	122	45	00
29	37	52	56	122	37	35
A-1	37	36	05	123	14	30
A-2	37	38	01	123	19	37
A-3	37	41	20	123	23	30
A-4	37	45	34	123	25	33
A-5	37	50	06	123	25	29
A-6	37	54	17	123	23	18
A-7	37	57	32	123	19	19
A-8	37	59	22	123	14	06
A-9	37	59	32	123	08	25

REFER TO PAGES 1 AND 3 FOR ADDITIONAL INFORMATION



LEGEND

11 DIGITIZED POINT ON PROPOSED BOUNDARY BASED ON MEAN HIGH WATER LINE

A-1 DIGITIZED POINT ON OPTIONAL PROPOSED BOUNDARY BASED ON NOONDAY ROCK LIGHTED WHISTLE BUOY

LAMBERT CONFORMAL PROJECTION
NORTH AMERICAN 1927 DATUM
SCALE 1:80000

UNITED STATES - WEST COAST
CALIFORNIA
GULF OF THE FARALLONES
POINT REYES/FARALLON ISLANDS
PROPOSED MARINE SANCTUARY

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF COASTAL ZONE MANAGEMENT
Washington, D.C. 20235

September 30, 1980

Memo: To all recipients of the Point Reyes/Farallon Islands Final Environmental Impact Statement.

From: The Office of Coastal Zone Management's National Environmental Policy Act Compliance Unit.

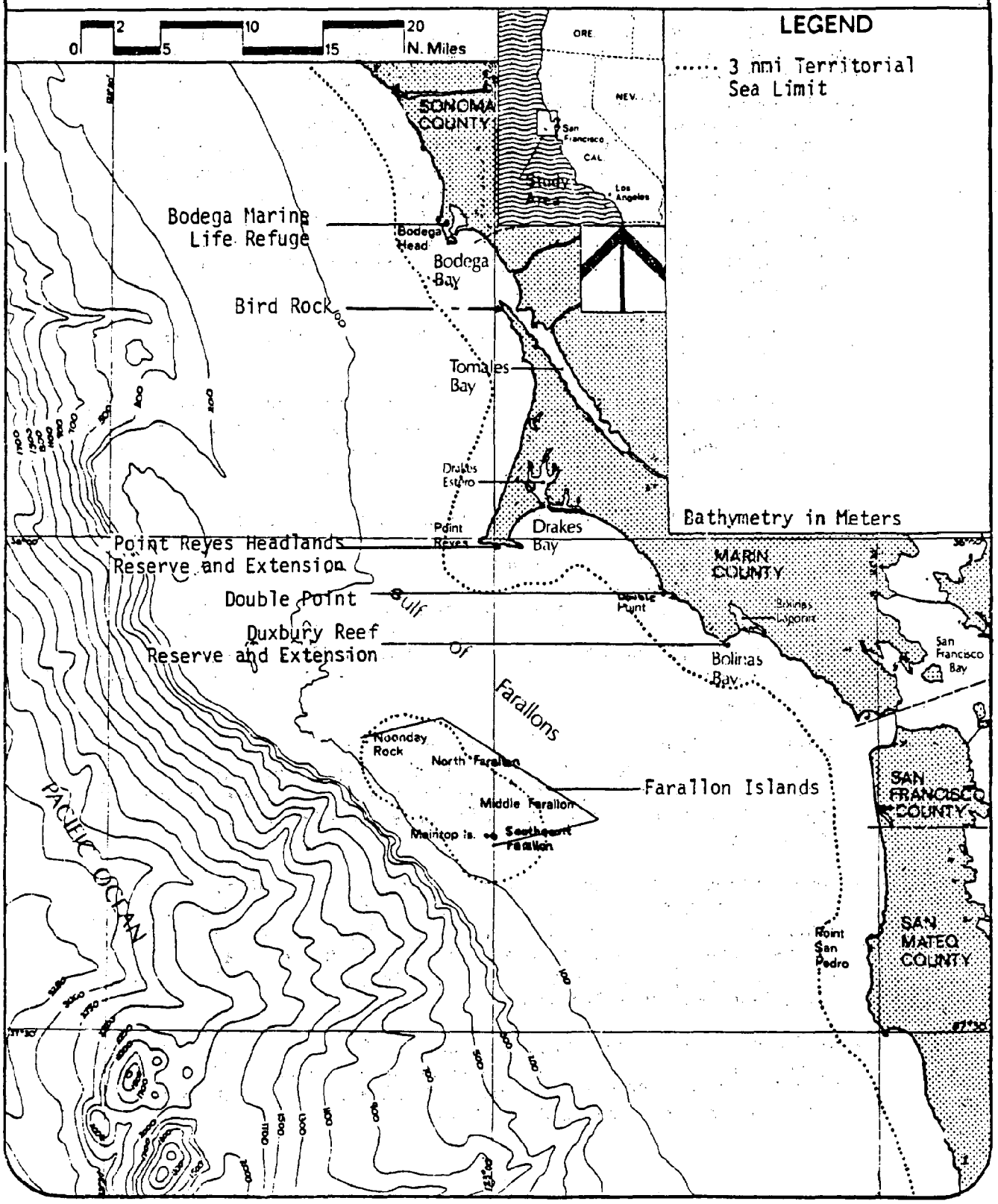
Please find enclosed a map and the coordinates of the Proposed Marine Sanctuary for the Point Reyes/Farallon Islands area. This sheet is to be inserted in Appendix I of the document.

Yours respectfully,

Robert R. Kifer

Dr. Robert Kifer
Chief, NEPA Compliance Unit

FIGURE F-5. Areas of Special Biological Significance (California Water Resources Control Board, 1976).



ASBS designations have no impact on vessel wastes, dredging control, or dredge spoil deposition because the California Ocean Plan, of which ASBSs are a part, is not applicable to those activities.

RWQCBs are responsible for integrating ASBS designations into their area-wide basin plans which outline waste discharge prohibitions and restrictions. A routine ASBS reconnaissance survey conducted by the SWRCB provides RWQCBs with detailed resource information as well as data on existing or future activities apt to threaten their environmental quality. ASBS surveillance and monitoring is the responsibility of RWQCBs, which ensure compliance with discharge regulations in the broader context of basin-wide enforcement. Should either an actual discharge violation or a threat thereof become apparent, the regional board is empowered with specific administrative procedures and remedies to enforce compliance.

The following ASBSs have been designated within the study area (Figure F-5):

- Bodega Marine Life Refuge -- ocean waters extending 1000 ft (300 m) from mean high tide line off the University of California Laboratory at Bodega Head. These boundaries correspond to those of the Bodega Marine Life Refuge.

- Farallon Island -- ocean waters extending 1 nmi (1.8 km) from the Farallon Islands. These boundaries correspond to those of the Farallon Island Game Refuge.

- Duxbury Reef Reserve -- ocean waters extending 2000 ft (600 m) from the mean high tide line between Duxury Point on Bolinas Beach to the southern boundary of the Point Reyes National Seashore. These boundaries represent an extension of the Duxury Reef Reserve boundaries.

- Point Reyes Headland Reserve -- ocean waters extending 2000 ft (600 m) from the mean high tide line off Point Reyes Headlands between Point Reyes Lighthouse and Chimney Rock. These boundaries represent an extension of the Point Reyes Headlands Reserve boundaries.

- Double Point Area -- ocean waters extending to the 40 ft (12.2 m) isobath from the mean high tide line, including the northern and southern points along 6,568 ft (2000 m) of coastline near where Pelican Lake Creek outlet enters the Pacific Ocean (Chan 1979). This 272-acre (109-hectare) area lies almost entirely within the Point Reyes National Seashore.

- Bird Rock Area -- ocean waters extending 1000 ft (300 m) in all directions from the principal rocks which are located approximately 1000 ft (300 m) offshore of Tomales Point and approximately 90 ft. (27 m) of adjacent mainland coastline.

Several study stations for the worldwide Mussel Watch Program, coordinated domestically by the U.S. Environmental Protection Agency, have been established within two ASBSs (Bodega Head and the Farallon Islands). This program involves periodic tissue analysis of collected mussels as indicators of pollution levels. The establishment of these stations includes no special management of, or protection for, the research value of these sites.

Fish and Game Code

--Chapter 14, Administrative Code

The California Department of Fish and Game (DFG), under the Fish and Game Code (and Chapter 14 of the Administrative Code), regulates and manages a wide variety of activities affecting the fish and game resources found in the land and water areas under State jurisdiction, in addition to the reserve programs described above. Specific programs of relevance to the study area are regulation of sport and commercial fishing, protection of endangered species, protection of migratory birds, coordination of the oil spill contingency plans, and restriction of overflights.

Before discussing specific provisions of the Fish and Game Code, it will be helpful to describe DFG enforcement efforts in the study area. The California DFG has two 40 ft. (13 m) patrol boats stationed in San Francisco for patrolling the Point Reyes-Farallon Islands area. Both areas are patrolled by four wardens on a weekly basis when weather permits. Reserves and refuges adjacent to accessible land areas (Estero de Limantour, Duxbury Reef, and Tomales Bay) are also patrolled from the land (Hudson 1979, personal communication). These patrols are responsible for the enforcement of not only specific regulations in reserves and refuges but also of general regulations concerning commercial and sport fishing, hunting, endangered species, and migratory birds.

An informal relationship exists between DFG and the National Park Service (NPS) manager of the Point Reyes National Seashore (PRNS) for the enforcement of California DFG regulations along the shoreline of the Point Reyes Peninsula. Cooperation is particularly important with regard to the Point Reyes Headlands and Estero de Limantour Reserves because these areas are designated as research natural areas pursuant to PRNS management policies (see Section E.3.f). In these two areas, the DFG and PRNS regulatory provisions concerning the taking of marine organisms and entry are identical. The NPS regularly patrols both reserves from the land, but does not have any boats capable of conducting enforcement operations in the ocean (Gercky 1979, personal communication).

Regulation of Sport and Commercial Fishing

The DFG regulates sport fishing through license and bag limit systems. A sport fishing license is required for the taking and possession of fish for any non-commercial purpose (CFGC §7100). Numerous invertebrates are regulated in certain areas, as depicted in Table F-4.

Commercial fishing, including the taking of tidal invertebrates for commercial purposes, is also governed by a licensing system. Certain species found in the study area are protected from commercial harvesting; all other species may be taken in season (CFGC §8140). These protected species include: striped bass, kelp bass, sand bass, spotted bass, yellowfin, croaker, spotfin croaker, sturgeon, and California corbina (CFGC §8370-8373); all are reserved for recreational taking only. Several other species are subject to minimum size, seasonal, and volume limitations. The restrictions applicable to species found in the study area are listed in Table F-5.

Every person who operates or assists in using any boat or gear to take fish for profit must procure a license (CFGC §7580); party boat operators must get special licenses (CFGC §7920 et seq.). Vessels used in commercial fishing operations must also carry a Department of Fish and Game registration number (CFGC §7880). Fishing reports must be supplied by buyers, processors, and others who receive fish from fishermen (CFGC 8010 et. seq.) These reports form the basis of DFG statistics used in formulating fishery management policies.

Licenses must also be obtained by any person engaged in mariculture (CFC §6480) or oysterculture (CFGC §6510). State water bottoms may be leased for these purposes by the Fish and Game Commission (CFGC §6487). The number of applications for such leases has been increasing rapidly, particularly in Tomales Bay (see Section E.3.c). As part of an on-going effort to prepare the Tomales Bay portion of the Marin County local coastal program a determination will be made of how many additional leases for mariculture should be issued, and in what locations.

Under the Federal Submerged Lands Act of 1953 (43 USC §130(c)), California has jurisdiction over kelp within State waters as a seabed resource. A license is also required to harvest kelp for profit (CFGC §6650). As with other commercial fisheries, a record book must be maintained (CFGC §6652). The DFG retains the power to close any kelp beds if harvesting results in destroyed or impaired beds (CFGC §6654).

Through a cooperative agreement reached in 1978 between the DFG and the National Marine Fisheries Service, officials of both agencies may enforce each other's laws (see discussion of the Federal Fishery Conservation and Management Act, FCMA, below).

TABLE F-4. Restrictions on the recreational taking of invertebrates in tide pools or other areas between the high tide mark and 1000 ft beyond the low tide mark (California 14 Administrative Code §29.05).

abalones, chiones, clams, cockles, crabs, lobsters, scallops, sea urchins, and worms	--must have a valid sport-fishing license from DFG to take in State marine life refuges and other special closures.
ghost shrimp	--must have a valid sport-fishing license from DFG to take anywhere other than in State parks, beaches, recreation areas, underwater parks, and national monuments and seashores.
limpets, mussels, sand dollars, octopi, shrimp, sea urchins, turban snails, and squid	--must have a valid sport-fishing license to take in State marine life refuges parks, beaches, recreation areas, underwater parks and seashores.

TABLE F-5. Catch restrictions for species of commercial fish in the Point Reyes-Farallon Islands Area. (References are to the California Fish and Game Code).

Sardines	Catch limited to 20,000 tons or as adjusted by the Department proportional to increase in spawning population (§8150.7).
Anchovies	Restricted acccrding to the PFMC plan.
Salmon	Restricted according to the PFMC plan.
Crab	Fishery open between the second Tuesday in November and June 30th (§8276).
Abalone	Unlawful to take for commercial purposes (§8305).
Clams, Molluscs	Fishery open year round (§8340 and 8341).
Scallops	Illegal to sell or purchase (§8345).
Saltwater and Anadromous Fish	Kelp bass, sand bass, and spotted bass may not be sold (§8372); yellowfin and bluefin tuna may be taken at any time (§8374); bluefin tuna must exceed 7 and a half lbs. to be marketed (§8375); albacore and skipjack may be taken at any time (§8376 and 8378); white seabass, barracuda, and yellowtail not less than 28 inches in length may be taken by hook and line at any time (§8382).
California Halibut	May be taken at any time (§8391).

Endangered Species (California Fish and Game Code §§2050 et. seq.)

The DFG maintains a list of rare and endangered species. It is unlawful within the State to take or possess any listed species. "Taking" is defined in a manner analogous to the interpretation under the Federal Act (see below) (CFGC §§2050 et. seq.). Listed endangered species found in the study area are the California Brown pelican, peregrine falcon, southern bald eagle, California clapper rail, and least tern.

Protection of Migratory Birds (California Fish and Game Code §§355 et. seq. and §§3500 et. seq.)

In accordance with the Federal Migratory Bird Treaty Act, California has provided protection for migratory birds, their nests, and their eggs by fixing areas, seasons, hours, bag, and possession limits (by species) for migratory game birds (CFGC §356). The peregrine falcon, brown pelican, trumpeter swan, California black rail and clapper rail, and golden and southern bald eagle and have all been accorded "fully protected" status, which protects these birds from taking except as authorized for scientific research (CFGC §3511).

Oil Spill Contingency Plans (California Fish and Game Code §§5650 et. seq.)

It is unlawful to "deposit or permit any petroleum to pass into the waters of the State" (CFGC §5650). The DFG, together with a State Interagency Committee, coordinates the State's oil spill contingency plan. Because Federal law preempts State regulation of oil spill cleanup operations, the State's role is that of observer, assistant, and advisor, with the important exception that the State has veto power over the use of chemical agents in State waters. In practice, DFG personnel: 1) investigate all spills in State waters and many spills in Federal waters, 2) monitor, assist, and advise Federal and industry cleanup operations, and 3) maintain liaison between various government agencies and industry.

Overflights (California Fish and Game Code §10501.5).

The DFG prohiits overflights below 1000 ft (305 m) over the land and water area of the Farallon Islands Game Refuge (CFGC §10501.5).

Regulation of Offshore Oil and Gas Development Activities, Cunningham Shell Tidelands Act, as Amended (California Public Resources Code §§6850 et. seq.)

The State Lands Commission (SLC) has jurisdiction over all State-owned lands, including submerged lands extending 3 nmi (5.6 km) from the mean high tide line. Administration of State lands includes leasing of those lands for various legislatively authorized purposes, in particular oil and gas exploration and development. The Public Resources Code specifically requires that development of publicly-owned mineral resources not be undertaken at the expense of environmental values.

The SLC, together with the CCC, regulates activities pursuant to leases for oil and gas development to ensure that they proceed safely and that marine resources are adequately protected. In this regard, the SLC enforces requirements similar to those of the United States Geological Survey concerning blowout prevention, drilling practices, production procedures, pollution control, and oil spill prevention, containment, and cleanup (see below).

In order to protect particularly sensitive marine areas, the California State Legislature may designate Oil and Gas Sanctuaries in which petroleum development is prohibited within submerged lands. Although leasing is normally excluded from sanctuaries, underlying oil and gas deposits might be drained by wells located on adjacent Federal lands, thereby threatening the State's proprietary interest in the resource. In that case, the SLC may open up affected sanctuary areas for a drainage sale. Oil and gas sanctuaries were legislatively established in the State waters adjacent to Sonoma, Marin, and San Francisco counties in 1970 (California Public Resources Code §6871.2(f)); however, these sanctuary provisions expired automatically in 1975. Therefore, no State water oil and gas sanctuaries exist anywhere within the study area (Sanders 1979, personal communication).

Control of Oil Discharges from Vessels (California Harbors and Navigation Code §133)

Any person who intentionally or negligently causes or permits any oil to be deposited in the waters of the State is liable for cleanup costs and is subject to a $6,000 civil penalty (California Harbors and Navigation Code §151).

Air Resources (California Health and Safety Code §§3900 et. seq.)

The California Air Resources Board (ARB) is charged with the maintenance and enhancement of the ambient air quality of the State. The ARB has set air quality standards designed to meet National Ambient Air Quality Standards and delegated their implementation to local Air Pollution Control Districts (APCDs). Several regional Air Pollution Control Districts have been established in areas which are considered to have special air pollution problems. In counties or portions of counties not included in a regional Air Pollution Control District, a county district is charged with implementation of ARB standards. The entire study area is within the boundaries of the Bay Area Air Pollution Control District.

Generally, offshore oil and gas development facilities located within State waters must both obtain a permit from the appropriate ARB and meet ARB emission standards. ARB emission standards are also applicable to sources of emissions located beyond State waters that are related to an onshore facility. The permit for the onshore facility effectively covers both. Emissions from offshore sources are considered together with those of the related onshore facility. The total emissions level must meet standards set by ARB as implemented by the appropriate APCD, in this case the Bay Area APCD (Stamey 1979, personal communication).

Emissions from tankers which dock at onshore facilities located in California are also considered together with those of the related onshore facility. As with onshore oil and gas development facilities, the total emissions level of the tanker and the related onshore facility must meet standards set by the ARB as implemented by the appropriate APCD. Unlike other offshore facilities, however, neither the ARB nor an APCD has authority to issue permits solely for tanker emissions (Stamey 1979, personal communication).

Preservation of Historic Resources (California Public Resources Code §5020.4)

Preservation of representative and unique archaeological, paleontological, and historical sites in the land and water areas of the State is the responsibility of the California Historical Resources Commission (CHRC). Historical resources satisfying certain criteria may be listed as either landmarks or points of interest (California Public Resources Code 5020). In addition, the CHRC makes recommendations to the State Historic Preservation Officer concerning nominations to the National Register of Historic Places pursuant to the National Historic Preservation Act (see below).

At present, no underwater sites within the study area have been registered as either landmarks or points of interest (Winzler and Kelly 1977).

Underwater State Parks

In order to protect special marine resources and water-based recreational values in ocean waters within State jurisdiction, and to expand coastal park units beyond the water's edge, the California Department of Parks and Recreation has established an Underwater Parks Program (Califoria Department of Parks and Recreation 1979). While there are presently no underwater parks within the study area, one lies just to the north off Sonoma Coast State Beach (near Bodega Head) and another is being considered for designation off Mount Tomalpais State Park, due southeast of Bolinas Lagoon.

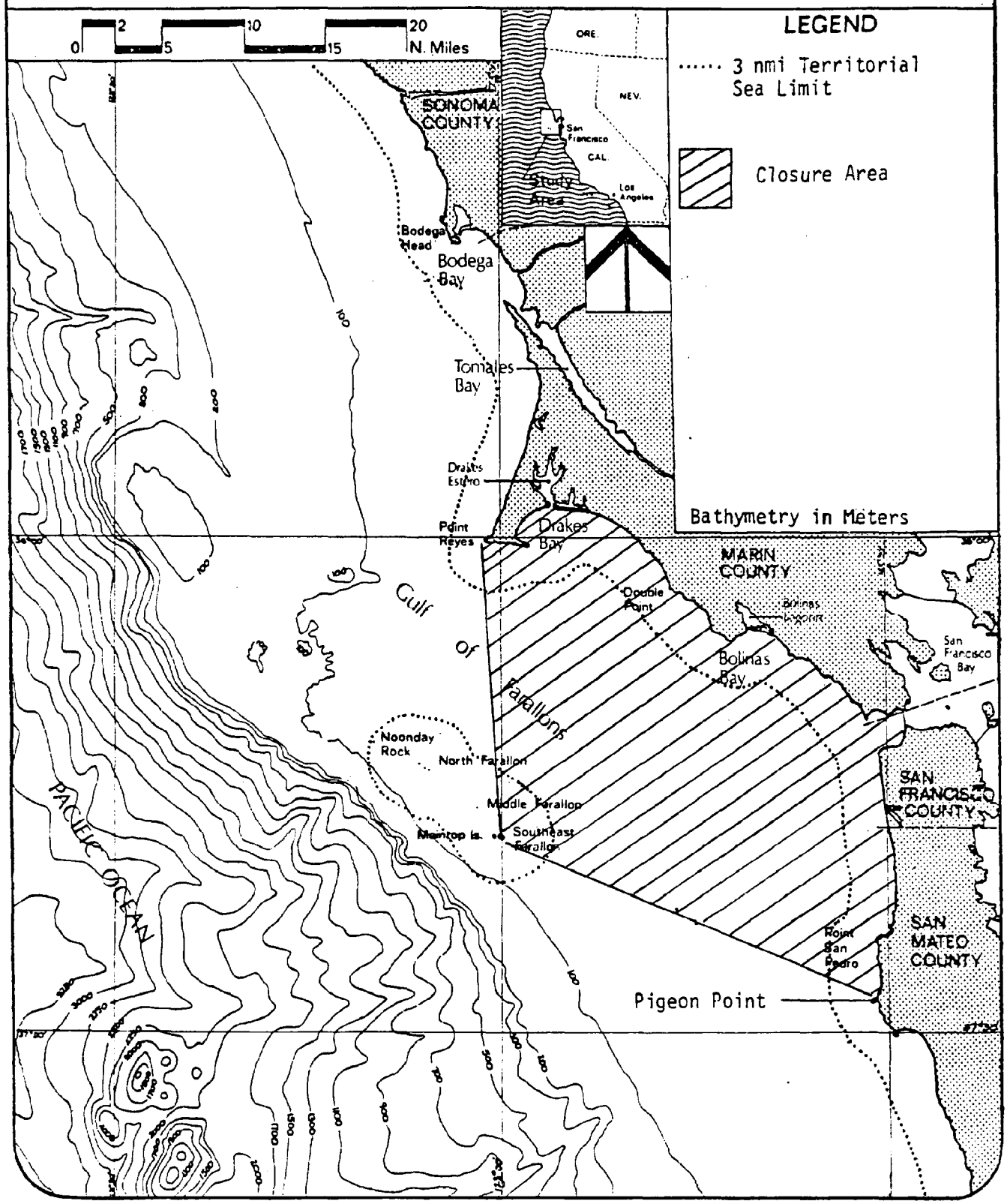
F.1.b.ii. Federal Authorities

Like State authorities, Federal programs vary greatly in approach and scope, ranging from broad-based legislation providing for resource management such as the Fishery Conservation and Management Act to control of specific threats and protection of specific resources.

Fishery Conservation and Management Act (FCMA) (16 USC §§1801 et. seq.)

The FCMA provides for the conservation and management of all fishery resources in the zone between 3 and 200 nmi (5.6-370 km) offshore. The National Marine Fisheries Service (NMFS) is charged with establishing guidelines for and approving fishery management plans (FMPs) prepared by the regional fishery management councils for selected fisheries. These plans determine the levels of commercial and sport fishing consistent with the goal of achieving and maintaining an

FIGURE F-6. Anchovy closure area (Pacific Fishery Management Council, 1978a).



optimum yield of each fishery. In the Point Reyes-Farallon Islands area, this authority is vested in the Pacific Fishery Management Council (PFMC).

The FCMA has already completed a management plan for anchovy and salmon, is currently preparing plans for groundfish and jack mackerel, is preparing a joint billfish plan with the Western Pacific Council, and has recently suspended work on a dungeness crab plan, all of which are found in the study area. The Council is also working on a fisheries management plan for the shrimp fishing which occurs periodically within the area (Leitzell, 1980).

The final anchovy FMP (Pacific Fishery Management Council, 1978a) proposes several fishing area closures, one of which, the Farallon Islands closure, includes a large part of the study area. The closure includes the area of the Fishery Conservation Zone (3-200 nmi, 5.6-370 km) landward of a line beginning at Pigeon Point in San Mateo County to the U. S. Navigation Light on Point Reyes see Figure F-6). It is intended to preserve anchovies for forage by such species as salmon and striped bass. Four different fishing seasons were proposed in the plan, some of which would also prohibit fishing during important times of the life cycle of marine mammals and birds. A final decision on the preferred season is pending.

The salmon FMP (Pacific Fishery Management Council, 1978b) establishes several management areas having different restrictions on season, size, and gear. The study area is part of two management areas: Management Area D, which covers the area from the Oregon-California border to Tomales Point, and Management Area E, which covers the area from Tomales Point to the United States-Mexico border.

Use of nets to fish for salmon is not allowed in either management area. Different size and seasonal restrictions are established for commercial and recreational fishing (Pacific Fishery Management Council, 1978b).

The draft FMPs for groundfish (Pacific Fishery Management Council, 1978c) and jack mackerel (Pacific Fishery Management Council, 1979) address limitations on catch but do not consider closures. Although the FMP for groundfish is only in a draft stage, it does appear possible that the final FMP may aim to protect intertidal spawning grounds and kelp bed habitats such as those found in the study area which are vital to the survival of lingcod, bocaccio, rockfish, and other groundfish. Benthic continental shelf fishery resources located outside State waters, such as abalone, lobster, crabs, sea urchins, and coral, are subject to management under the FCMA.

The FCMA is enforced by the U. S. Coast Guard (USCG) and the National Marine Fisheries Service (NMFS) within the Department of Commerce. The Act empowers the Secretary of Commerce to enter into agreements with any State agency for enforcement purposes. Such an agreement

exists between the DFG and NMFS whereby both parties have been deputized to enforce each others' laws (Cooperative Agreement between DFG and Department of Commerce, December 3, 1978). As a result, NMFS enforcement personnel can now enforce State law within 3 nmi (5.6 km) and State officers can enforce Federal laws between 3 and 200 nmi (5.6 and 370 km). The Coast Guard also has agreements with NMFS and DFG under which the Coast Guard provides transportation and other facilities for law enforcement.

Endangered Species Act

The Federal endangered species program provides protection for listed species of plants and animals (including marine mammals, birds, and invertebrates, etc.) in both State and Federal waters. The U. S. Fish and Wildlife Service (FWS) and NMFS determine which species need protection and maintain a list of endangered and threatened species. The most significant protection provided by the Endangered Species Act (ESA) is the prohibition on taking. The term "take" is defined broadly to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in such conduct" (16 USC §1532(14)). The FWS regulations interpret the term "harm" to include significant environmental modification or degradation and acts which annoy listed species to such an extent as to significantly disrupt essential behavior patterns (50 CFR 17.3).

The ESA also provides some protection of endangered species and their habitat from less direct threats. This is accomplished by means of a consultation process designed to insure that projects authorized, funded, or carried out by Federal agencies do not jeopardize the continued existence of endangered or threatened species or "result in the destruction or modification of habitat of such species which is determined by the Secretary (of the Interior) to be critical" (16 USC §1536). Critical habitat areas for endangered species are designated by the FWS and NMFS depending on the species. The 1978 amendments to the ESA established a Cabinet level committee authorized to exempt Federal agencies from compliance with their responsibilities with regard to critical habitats for endangered and threatened species upon a finding that there are not reasonable alternatives to the Federal action, and that the benefits of such Federal action outweigh those of conserving species or their critical habitat.

Seven species of whales which are on the endangered species list have been sighted in the study area, including the two most endangered great whales in the northern Pacific (Storro-Patterson 1979, personal communication). The Pacific right whale is in the most critical situation with an estimated population of only 200 animals, while the humpback population is estimated to be 850 animals (Storro-Patterson 1979, personal communication). There are fears that the right whale population may not survive for long. In the meantime, it is probable that the Farallon Islands represent an important focus of the remaining population (Storro-Patterson 1979, personal communication).

In addition to the Pacific right whale and the humpback, finback, blue, sei, sperm, and gray whales are also listed as endangered and are known to frequent the area. The sea otter, which has occasionally been seen here along the coast, is currently listed as a threatened species. The brown pelican, southern bald eagle, peregrine falcon, California clapper rail, and the California least tern are endangered species found in the area. No seabirds currently listed as endangered or threatened breed in the study area.

Marine Mammal Protection Act (MMPA) (16 USC §§1361 et. seq.)

The MMPA applies to U. S. citizens and foreign nationals subject to U. S. jurisdiction and is designed to protect all species of marine mammals. The primary management features of the Act include: (1) a moratorium on the "taking" of marine mammals, (2) the development of a management approach designed to achieve an "optimum sustainable population" (OSP) for all species or population stocks of marine mammals, and (3) additional protections for those populations determined to be "depleted."

The MMPA is implemented by the Department of Commerce, National Marine Fisheries Service (NMFS), which is responsible for whales, porpoises, and pinnipeds other than the walrus, and the Department of the Interior, U. S. Fish and Wildlife Service (FWS), which is responsible for all other marine mammals. The Marine Mammal Commission advises these implementing agencies and sponsors relevant scientific research. While the MMPA allows States to petition for the return of management responsibility over marine mammals, California has done so only with regard to the sea otter and that petition was later withdrawn. However, NMFS has a contract with DFG to enforce pinniped protection regulations.

The term "take" is defined broadly to include "harass, hunt, capture, or kill any marine mammal" (16 USC §1362(13)), emphasis added). The term "harass" has been interpreted to encompass acts unintentionally adversely affecting marine mammals, such as operation of motor boats in waters in which these animals are found (Bean 1977). The MMPA allows certain exceptions to the moratorium. The only exception which has been applied in the Point Reyes-Farallon Island area is taking for scientific or display purposes (King 1979, personal communication).

The Secretaries of the Interior and Commerce can also waive the moratorium on taking of particular species or populations of marine mammals, provided that the species or population is at or above its determined OSP. No such waiver, however, has been granted for the study area.

Secondly, the MMPA directs officials to seek "an optimum sustainable population (of marine mammals)" (16 USC §1361(6)). That OSP is defined to mean "the number of animals which will result in the maximum productivity of the population or species keeping in mind the carrying capacity of the habitat and health of the ecosystem of which they form a constituent element" (16 USC §1352(9)).

Marine mammal species whose population is determined to be depleted receive additional protection (16 USC §1362). Except for scientific research purposes, no permit may be issued for the taking of any marine mammal determined to be depleted. The fin, humpback, gray, sperm, sei, and blue whales, as well as the southern population of sea otter (a possible resident), are treated as "depleted" based on their listing as endangered or threatened species under the Endangered Species Act.

Migratory Bird Treaty Act (MBTA) (16 USC §§703 et. seq.)

The essential provision of the MBTA, which implements conventions with Great Britain and Japan, makes it unlawful except as permitted by regulations "to hunt, take, capture...any migratory bird, any part, nest or egg" of any protected bird (16 USC §703). The Secretary of the Interior is charged with determining when, to what extent, if at all, and by what means to permit these activities. Each convention established a "closed season" during which no hunting is permitted. Of the birds found in the study area, only certain species of ducks, geese, coots, gallinules, and doves are considered game birds under the MBTA. A distinction is made between game and nongame birds. The closed season for migratory birds other than game birds is year round. As specifically permitted by the MTA, the California Department of Fish and Game has supplemented this authority with its own regulations (see Fish and Game Code discussion above).

Clean Water Act (CWA) (33 USC §§1251 et. seq.)

It is the goal of the CWA to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. To varying degrees, waters in the territorial seas, contiguous zone, and the ocean beyond are subject to the requirements of the CWA, as outlined below.

The CWA sets out two basic regulatory mechanisms for preventing and reducing water pollution: 1) the regulation of discharges from point sources by the National Pollutant Discharge Elimination System (NPDES), and 2) the regulation of discharges of oil and hazardous substances. The Act also regulates vessel sewage disposal and disposal of dredged material. Under the NPDES program, administered by the Environmental Protection Agency (EPA), a permit is required for the discharge of any pollutant from a point source into the navigable waters of the U. S., and the discharge from any point source other than a vessel into the waters of the contiguous zone or ocean waters. Within California waters, EPA has delegated NPDES permitting authority to the State government.

An NPDES permit from EPA, or the State in State waters, is required for discharges associated with oil and gas development. EPA generally grants NPDES permits for offshore oil and gas developments based on the effluent guidelines shown on Table F-6. Other conditions beyond these guidelines can be imposed by the Regional EPA Administrator on a case-by-case basis.

TABLE F-6. EPA effluent guidelines and standards for far offshore* oil and gas extraction facilities (40 CFR Pt 435).
Effluent Limitations

Pollutant parameter waste source	Oil and Grease: Maximum for any 1 d, milligram per liter	Oil and Grease: Average of daily values for 30 consecutive days shall not exceed, milligram per liter	Residual chlorine, minimum for any 1 d, milligram per liter
Produced water	72	48	NA
Deck drainage	72	48	NA
Drilling muds	(1)	(1)	NA
Drill cuttings	(1)	(1)	NA
Well treatment	(1)	(1)	NA
Sanitary:			
M10	NA	NA	1[2]
M9IM[3]	NA	NA	NA
Domestic[3]	NA	NA	NA
Produced sand----	(1)	(1)	NA

[1]No discharge of free oil.

[2]Minimum of 1 mg/l and maintained as close to this concetration as possible.

[3]There shall be no floating solids as a result of the dischare of these wastes.

NOTE: M10 means facilities continuously manned by ten (10) or more persons. M9IM means facilities continuously manned by nine (9) or less persons or intermittently manned by any number of persons.
*Beyond 3 nmi (5.6km).

The CWA prohibits the discharge of oil and hazardous substances in such quantities as may be harmful to public health or to the environment except for discharges outside the territorial sea permitted by the International Convention for the Prevention of Pollution of the Sea by Oil, 1954 (33 USC §1321(b)(3)) (see Oil Pollution Act below). When such discharges do occur, the National Contingency Plan (NCP) for the removal of oil and hazardous substance discharges (33 USC §1321(c); Executive Order 11735, August 3, 1973), which is designed to minimize the impacts on marine resources, takes effect. The Coast Guard, in cooperation with EPA, administers the NCP, which applies to all discharges of oil and hazardous substances in the contiguous zone, and to activities conducted under the Outer Continental Shelf Lands Act (OCSLA). This includes oil and gas activities conducted pursuant to a lease as well as geological and geophysical exploration independent of a lease. As a result of a memorandum of understanding between the Secretaries of Transportation and the Interior, however, USCG has exclusive authority to institute measures to abate the source of pollution (United States Department of the Interior and Transportation, Memorandum of Understanding, August 16, 1971).

The NCP establishes the organizational framework whereby oil spills are to be cleaned up. To carry out the national plan, regional coastal plans (RCP) have been established; the United States Coast Guard (USCG) has issued a RCP for Federal Region 9 which includes the Point Reyes-Farallon Islands area. Under the RCP, USCG personnel investigate all reported offshore spills, notify the party responsible (if known) of their obligation to clean up the spill, and supervise the cleanup operation. The USCG retains final authority over the procedures and equipment used in the cleanup. If the party responsible for the spill does not promptly begin cleanup operations, the USCG will coordinate the cleanup.

Permits from the Army Corps of Engineers, which are based on EPA guidelines, are required prior to the discharge of dredged materials within 3 nmi (5.6 km) of shore (33 USC §1344). Finally, the CWA requires non-commercial craft to comply with marine sanitation regulations issued by EPA and enforced by the Coast Guard (33 USC §1322).

The River and Harbor Act (33 USC 401 *et seq.*)

Section 10 (33 USC §403) prohibits the unauthorized obstruction of the navigable waters of the United States. The construction of any structure in the territorial sea or on the outer continental shelf is prohibited without a permit from the Army Corps of Engineers (COE).

Section 13 (33 USC §407) prohibits the discharge of refuse and other substances into navigable waters, but has been largely superseded by the CWA, discussed above. In effect, such discharges are regulated under this section only insofar as they affect navigation or anchoring.

Ports and Waterways Safety Act, as amended (PWSA) (33 USC §1221)

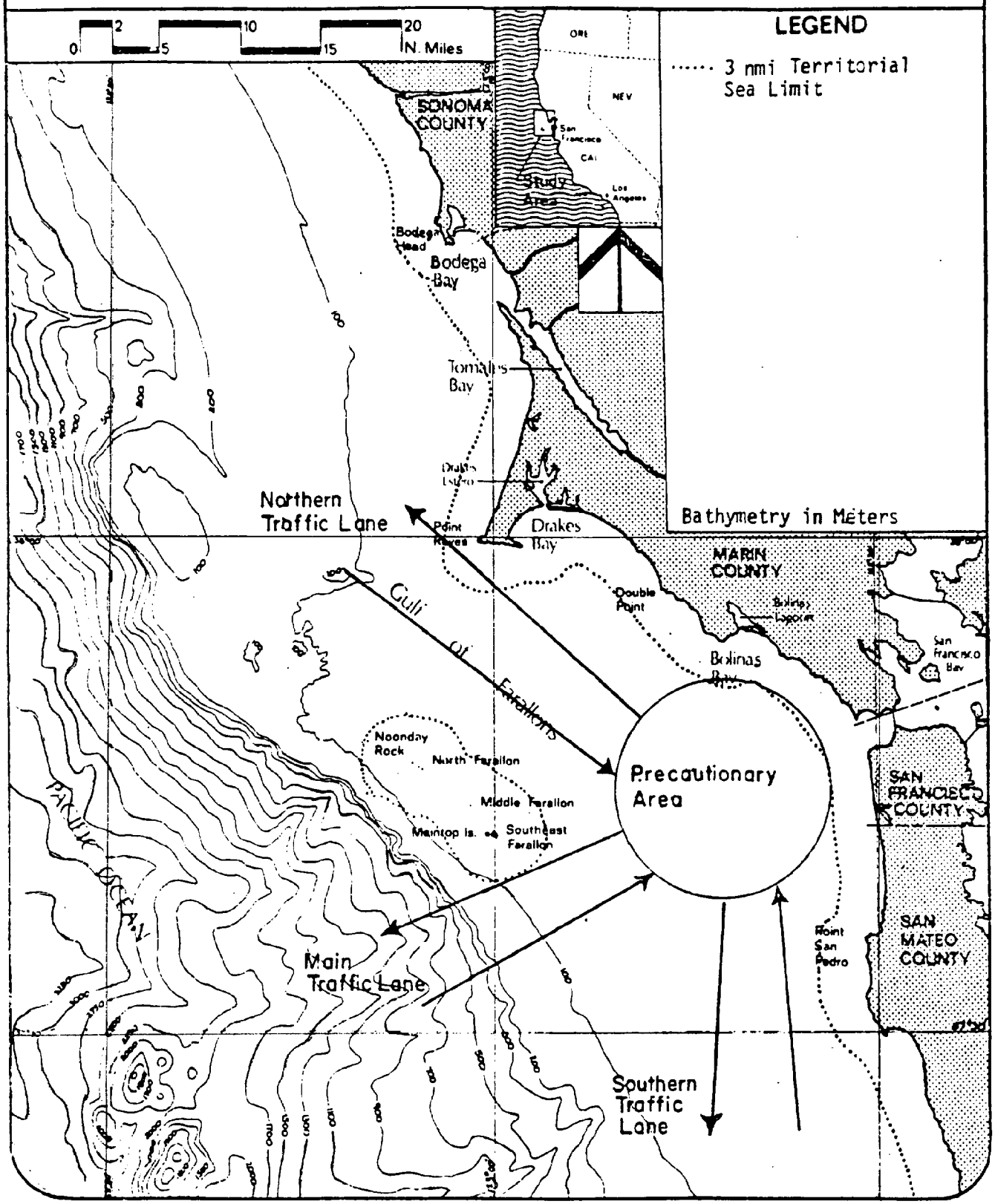
The PWSA, as amended by the Port and Tanker Safety Act of 1978, is designed to promote navigation and vessel safety and the protection of the marine environment.

The PWSA authorizes the U. S. Coast Guard (USCG) to establish vessel traffic services and systems for ports, harbors, and other waters subject to congested vessel traffic. Two established Vessel Traffic Separation Schemes (VTSSs), guiding San Francisco Bay approaches and departures, traverse the study area (see Figure F-7). The VTSSs consist of two mile wide inbound and outbound vessel traffic lanes, with a separation zone located in between. The lanes are designed to prevent vessel collisions by separating vessels going in opposite directions. The separation zone is not to be used by vessels except for crossing between inbound and outbound traffic lanes. In addition, a circular Precautionary Area established by USCG lies partially within the study area near the mouth of San Francisco Bay (see Figure F-7). Mariners are warned to proceed with extreme caution when navigating within the Precautionary Area. The VTSSs have been officially recognized by the Intergovernmental Maritime Consultative Organization (IMCO), and appear as recommended traffic routes on all navigation charts of the area.

The VTSS, which is applicable to commercial ships other than fishing vessels weighing 300 gross tons (270 gross metric tons) or more, is considered violated only when a vessel is moving in the wrong direction in a designated lane. Violators are subject to flag state enforcement if their violation occurs outside the 3 nmi (6.6 km) territorial sea. Within the territorial sea, however, the U. S. may take enforcement action. Outside the traffic lanes, vessels may proceed in any direction consistent with good seamanship.

In addition to vessel traffic control, the USCG regulates other navigational and shipping activities. They have promulgated numerous regulations relating to vessel design, construction, and operation designed to minimize the likelihood of an accident and to reduce vessel source pollution. The 1978 Amendments establish a comprehensive program for regulating the design, construction, operation, equipping, and manning of all tankers using U.S. ports to transfer oil and hazardous materials. These requirements are, for the most part, in agreement with protocols (passed in 1978) to the International Convention on Safety of Life at Sea, 1974 (33 USC §1221). The 1978 Amendments also require the USCG to conduct a nationwide study on the need for Port Access Routes and to designate such routes as necessary to reconcile competing uses and protect marine resources. The USCG is also vested with the primary responsibility for maintaining boater safety, including the tasks of conducting routine vessel inspections and coordinating rescue operations.

FIGURE F-7. Traffic Separation Scheme and Precautionary Area in the study area (NOAA Nautical Chart No. 18645, 1978).



The Federal Aviation Act of 1958 (49 USC §§1301 et. seq.)

The Federal Aviation Act of 1958 establishes the Federal Aviation Administration and gives it broad powers to promote air commerce and to regulate the use of navigable airspace to ensure aircraft safety and efficient use of such airspace. In furtherance of this mandate, the FAA publishes aeronautical charts which provide a variety of information to pilots, including the location of sensitive areas which should be avoided.

Clean Air Act (42 USC §§7401 et. seq.)

The Clean Air Act (CAA) sets general guidelines and minimal air quality standards on a nationwide basis in order to protect and enhance the quality of the Nation's air resources. States are responsible for developing comprehensive plans on a regional basis to achieve minimal air quality standards within their boundaries. As noted above, discharges of air pollutants within State waters are subject to the control of the California Air Resources Board.

Oil Pollution Act of 1961 (33 USC §§1001-1016)

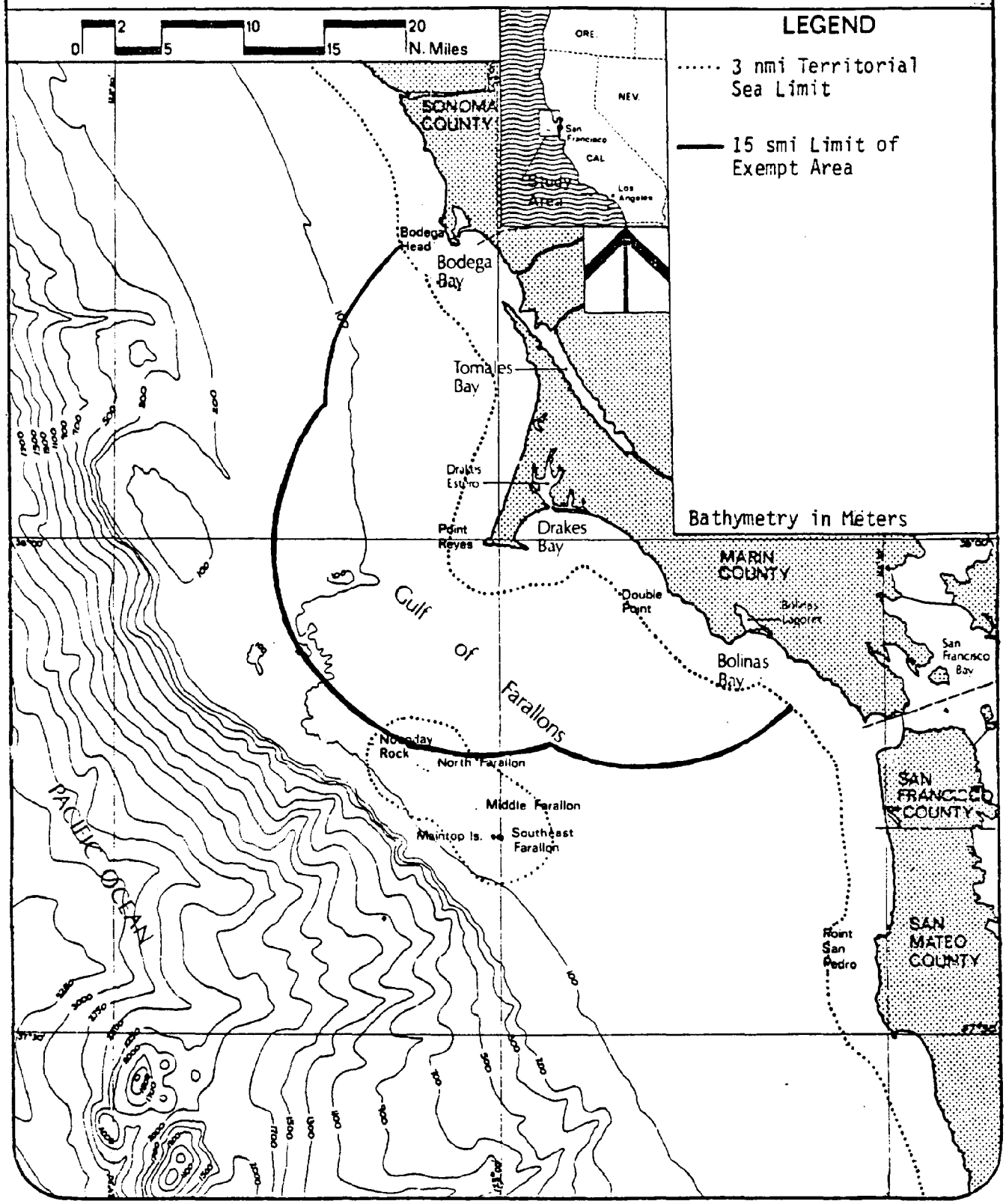
The Oil Pollution Act of 1961 (which implements the International Convention for the Prevention of Pollution of the Sea by Oil, 1954) regulates discharges of oil or oily mixtures from vessels, with the exception of tankers of less than 150 gross tons and other vessels of less than 500 gross tons. Except for discharges from machinery space bilges, tankers subject to the Act may not discharge oil or oily mixtures unless they are 50 nmi (93 km) from the nearest land; the total quantity of oil discharged can not exceed 1/15,000 of the total cargo capacity. Discharges from other vessels regulated by the Act, and discharges from the machinery bilges of takers, must be made as far as practicable from land and may not have an oil content of more than 100 parts per million. In addition to the above requirements, a discharge by any vessel regulated by the Act must be made while the vessel is en route. The instantaneous discharge rate must not exceed sixty liters per mile.

Outer Continental Shelf Lands Act (43 USC §§1331 et. seq.)

The Outer Continental Shelf Lands Act, as amended in 1978 (OCSLA), establishes Federal jurisdiction over the natural resources of the Outer Continental Shelf (OCS) beyond 3 nmi (5.6 km), and gives the Secretary of the Interior primary responsibility for managing OCS mineral exploration and development. The Secretary's responsibility has been delegated to two bureaus within the Department of the Interior: the Bureau of Land Management (BLM) and the U. S. Geological Survey (USGS).

At present no lease sales have occurred within the study area. However, Lease Sale No. #53, which is scheduled for May 1981, covers an area from 3 to 70 nmi (5.6 to 130 km) offshore central and northern California, including the ocean region off Sonoma and Marin counties

FIGURE F-8. Outer Continental Shelf Lands Act Amendments exempted area around the Point Reyes wilderness area (P.L. 95-372, §206(2)(h)).



(U. S. Bureau of Land Management, 1977). A group of eight tracts located north of the study area were selected by the Secretary of the Interior (October 1, 1978) for further study. These tracts are located approximately 15 nmi (28 km) off the Sonoma-Marin County line and 60 tracts 3 to 20 nmi (5.6 to 37 km) seaward of San Mateo County south of the study area. The northern eight tracts encompass 34,560 acres (13,824 ha); the southern 60 tracts include 329,052.5 acres (131,621 ha) (U. S. Bureau of Land Management, 1978b). The next major step in the leasing process for these tracts will be the preparation of a series of environmental studies of the areas, leading to the release of a Draft Environmental Statement in April, 1980 (U. S. Bureau of Land Management, 1978).

The OCSLA amendments of 1978 exclude from any lease sale tracts within 15 smi (24 km) of the Point Reyes wilderness area (P.L. 95-372, §206(2) (h)) (Figure F-8). The wilderness, which is a portion of the Point Reyes National Seashore (PRNS), has been designated by Congress as part of the National Wilderness Preservation System and, like PRNS, is administered by the National Park Service (see below). If California authorizes exploration and development activities in State waters abutting PRNS, the OCSLA Amendments exclusion will automatically be withdrawn (Conference Report 95-1474, 95th Cong. 2nd Session).

The BLM has overall responsibility for leasing OCS lands. In unique or special areas, BLM may impose special lease stipulations designed to protect specific geological and biological conditions. These stipulations may vary between lease tracts and sales. BLM also has the authority to approve applications for pipeline rights-of-way on the OCS (43 CFR Part 2883) (U. S. Bureau of Land Management, 1979).

The USGS is charged with approving plans for exploratory drilling and development and supervising OCS operations. Several types of regulatory authority are used by USGS in carrying out its supervisory role. Such authority includes enforcement of regulations made pursuant to the OCSLA (30 CFR Part 250) and the enforcement of stipulations applicable to particular leases. In addition, OCS Orders have been issued by the USGS to supplement regulations in particular regions. Twelve such Orders have been issued for the Pacific region and three more are under review (see Appendix 3). These Orders apply to various aspects of day-to-day drilling and production operations, including: (1) marking of platforms and structures, (2) general drilling well procedures, (3) testing of blowout preventers, (4) characteristics and use of drilling muds, (5) plugging and abandonment of wells, (6) contingency plans, (7) oil spill pollution equipment, (8) oil spill reports, (9) subsurface safety devices, (10) pollution and waste disposal, and (11) design and maintenance of oil and gas pipelines. The USGS also issues notices to lessees and operators when clarifications, corrections, or additions to OCS orders and regulations are necessary. These notices have the same status as OCS orders and regulations, and are used to keep lessees and operators informed of changing USGS requirements.

Finally, pursuant to the 1978 OCSLA Amendments, USGS is developing regulations to control air emissions occurring on the OCS that significantly affect a State's air quality. According to the proposed regulations (44 Fed. Reg. 27488, May 10, 1979), activities on the OCS will not be approved if they prevent any State from achieving or maintaining national ambient air quality standards (NAAQSs). For OCS lessees, USGS proposes to require companies to include in their exploration, development, and production plans specific information concerning emissions and their effects on coastal areas. It is presently unclear whether standards designed to prevent significant air quality deterioration will also be applied.

Secretarial Order No. 2974 of August, 1978 establishes a framework for interagency coordination during the OCS leasing process. Pursuant to this Order, other agencies within DOI, including the FWS, NPS, and the Heritage Conservation and Recreation Service (HCRS), are consulted on various potential impacts from OCS development, such as the development of necessary stipulations.

In addition to DOI, COE and the U. S. Coast Guard (USCG) have responsibility over OCS mineral development under the PWSA, to the extent that such development may affect navigation. COE is responsible for ensuring, through a permit system, that OCS structures including pipelines, platforms, drill ships, and semisubmersibles do not obstruct navigation (43 USC §§1333(f)). USCG ensures that structures on the OCS are properly marked on navigational charts and maps (43 USC §1333(e)).

Marine Protection, Research, and Sanctuaries Act (33 USC §§1401-1444)

Title I of the Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the Ocean Dumping Act, prohibits the transportation of any materials from the United States for the purpose of dumping them into the territorial sea, i.e., State waters, the contiguous zone, and the ocean beyond, without a permit from EPA. The dumping of dredged materials is controlled by the COE. The dumping of any materials transported from outside the U. S. into the territorial sea or contiguous zone without a permit is also prohibited.

No ocean dumping of non-dredged material has occurred in the study area since 1965 (see Section E.3.g). During the previous twenty-year period, disposal of radioactive wastes occurred at a site within the study area, south-southwest of the Farallon Islands (Figure E-16). Since this dumping occurred prior to the passage of the Ocean Dumping Act, it was not done pursuant to a permit.

An interim dredge material disposal site has been designated in the study area although no disposal has occurred there since 1978 (see section E.3.g.). Routine navigational and marine-related dredging activities currently being carried out by the COE in Bodega Harbor and San Fransisco Bay and any ocean disposal resulting from future activities tentatively planned for Bolinas Lagoon, must meet the criteria of the Ocean Dumping Act (33 USC §1413(e)).

National Historic Preservation Act (16 USC §470)

The National Historic Preservation Act (NHPA) authorizes the Secretary of the Interior to maintain a National Register of "districts, sites, building, structures, and objects significant in American history, architecture, archaeology, and culture." The National Register includes sites which encompass ocean waters and submerged lands within both State and Federal waters (Lebovich 1979, personal communication). The Farallon Islands and surrounding waters (a 211-acre (4-hectare) rectangle) were placed on the Register in March, 1977.

Point Reyes National Seashore (PRNS)

The National Park Service is responsible for the management of the Point Reyes National Seashore (16 USC §§ 459c et. seq.). The PRNS includes the entire Point Reyes peninsula, with the exception of the towns of Inverness and Bolinas, and their surrounding areas plus Tomales Bay State Park. In addition, certain tide and submerged lands have been legislatively conveyed by the State to PRNS for all purposes except exploration and development of minerals (Chapter 983, California Statutes, 1965). The conveyed lands include all tide and submerged lands seaward for a distance of 1320 ft (400 m) from the mean high tide line along the entire ocean coast of the seashore, and the same distance into Tomales Bay from Tomales Point to the northern boundary of Tomales Bay State Park (P.L. 87-657 §2(a)). The State has reserved the right to manage the waters and tide and submerged lands conveyed to the National Seashore and thereby continues to control activities such as the oyster allotment in Drake's Estero.

As noted previously, over half of PRNS has been legislatively designated as wilderness or potential wilderness (P.L. 94-567). These lands are administered by the National Park Service pursuant to the requirement of the Wilderness Act that their wilderness character be preserved (16 USC §1133). The wilderness includes large portions of the seashore's coastline and offshore areas (Figure E-13).

National Park Service (NPS) management policies for PRNS are designed to protect the natural and cultural resources while providing appropriate opportunities for public enjoyment. The NPS Statement for Management presents a predominantly land-oriented classification scheme that establishes different types of Natural Zones which are to remain largely unaltered by human activity. However, of these zones, the Environmental Protection Subzones for Reserves and Wilderness are designed to complement those California Marine Life Reserves designated at Point Reyes Headlands, Estero de Limantour, and the Point Reyes Wilderness. The NPS assists the California Department of Fish and Game by prohibiting all entry into the Point Reyes Headlands Reserve Subzone, except for entry pursuant to an approved research project, and by requiring a collecting permit for any removal or disturbance of lifeforms from the Estero de Limantour Reserve (National Park Service, 1978).

Farallon National Wildlife Refuge

The U. S. Fish and Wildlife Service (FWS) has responsibility for managing the Farallon National Wildlife Refuge. The refuge includes North, Middle, and Southeast Farallon Islands, Maintop Island, and Noonday Rock. The refuge is operated primarily as a migratory bird refuge to protect murres, auklets, guillemots, puffins, and others, and secondarily, to protect seal, sea lion, and other marine mammal assemblages. Nearly all of Southeast Farallon is owned by the U. S. Coast Guard (USCG) for the maintenance of a lighthouse and other navigational aids. Several USCG personnel used to reside on the Island year-round, but no longer do so. FWS owns the remainder of the refuge (U. S. Fish and Wildlife Service, 1976).

Wildlife management activities within the refuge are confined to periodic inventories of wildlife resources and accumulation of information having an influence on those resources. Currently, use of the refuge is reserved almost exclusively for scientific research, although many writers and photographers occasionally make visits (Ainley 1979b, personal communication). Access is prohibited except by permission of the FWS (Fowler 1979, personal communication).

In addition, approximately 141 acres (56 hectares) of the refuge have been designated as part of the National Wilderness Preservation System (P.L. 93-550 §101). The Wilderness Area includes all Islands within the Wildlife Refuge, except for Southeast Farallon which is not eligible for consideration due to USCG facilities there (U. S. Fish and Wildlife Service, 1979.) Pursuant to this designation the FWS must administer the area in a manner which will preserve its wilderness character (16 USC §1133)

Enforcement operations at the Farallon Islands National Wildlife Refuge are the responsibility of the FWS. Pursuant to a memorandum of agreement with the FWS, two employees of the Point Reyes Bird Observatory (PRBO) permanently reside on the Islands, conduct regular patrols, and notify USCG or FWS of anyone attempting to gain unauthorized access. These notifications occasionally result in prompt and effective enforcement action (Ainley 1979b, personal communication). Although the FWS has no boats, it does tour the Islands monthly with the USCG whenever a boat is available (Crabb 1979, personal communication).

Golden Gate National Recreation Area (GGNRA)

The National Park Service along with the California Department of Parks and Recreation are responsible for the management of the Golden Gate National Recreation Area, (GGNRA). The GGNRA includes 34,938 acres,(13,490 hectares) of both inland and coastal natural resources. The GGNRA boundary spans a portion of two California counties, San Francisco county to the South, and Marin County to the North. Along with the Point Reyes National Seashore these two areas comprise almost 100,000 acres of North Pacific coastal landscape,

including beaches, headlands, open grasslands, forests, lakes, streams, estuaries and marshes. The State and the National Park Service also have under their jurisdiction certain tide lands and submerged lands seaward for a distance of 1320 feet (404 m) from the mean high tide line along the ocean coast from South of Bolinas Bay to north of Fort Baker in Marin County, and from the fishing pier in San Francisco to south of Lake Merced City, located in San Francisco County. The GGNRA was created by an Act of Congress in 1976, P.L.92-589, for the purpose of preserving the areas of Marin and San Francisco Counties for public use and enjoyment. The management policies for the GGNRA are designed to protect the natural and cultural resources which represent a chronicle of two hundred years of history concerning the Port of San Francisco, and provide a wide variety of park experiences, and recreational opportunities to a broad range of park users.

The GGNRA is composed of various user zones to facilitate land use planning. These areas include a natural zone of 20,633 acres (7966 hectares), a historic zone of 351 acres,(135.5 hectares) and a special use zone of 13,954 acres,(5387.6 hectares) Some of the activities included in the GGNRA are hiking, picnicking, camping, horseback riding, fishing, scenic driving and education,etc. A number of activities do, however, require a permit from the NPS and California Department of Fish and Game. These activities include the collection of specimens, commercial photography, television and cinema production, livestock grazing, and special events such as foot races and weddings.

F.1.c. Environmental Consequences

Maintaining the status quo and not designating a marine sanctuary around the Point Reyes and the Farallon Islands will preserve the existing level of management and protection and forego the opportunity for positive management of this rich marine area. In the absence of a sanctuary, there will be less ecosystem research, no new education or public awareness programs directed at users, and no institutional mechanism for long-term planning and coordination of agency activities in this particularly valuable geographic area.

Currently, no institution addresses the range of significant questions concerning the interaction of resources and uses in the area. While a variety of organizations conduct research, there is no systematic coordination to insure that information needs are addressed in a timely and adequate manner. Even if information becomes available through research projects, no institution is charged with applying that information to practical management issues, such as modification of regulations. Similarly, no agency attempts to monitor the health, stability and changing conditions of this valuable marine ecosystem. Resource assessment, through gathering baseline data and continued monitoring of environmental conditions is essential in order to assess the adequacy of the protection afforded these important resources. The status quo alternative would leave the

protection of this area to the chance coordination of the regulatory efforts of a number of agencies and would forego opportunities for affirmative management.

Presently, numerous government agencies are vested with some regulatory authority over certain activities within the area. These authorities provide a considerable degree of protection for marine resources in general; the Point Reyes National Seashore and the Farallon Islands Game Refuge and National Wildlife Refuge protect the resources within those smaller areas in particular. In general, however, the statutes described above and the agencies administering them are directed at a single purpose, region or activity. No entity looks to the welfare of all the living resources or the ecosystem of this marine area. Cumulative impacts on the resources, arising from various activities subject to the jurisdiction of separate agencies, may escape the attention of any agency.

Although certain uses of the area do not now seriously threaten resource quality here, they could have more significant impact if and when activity intensities grow. The various agencies, many of which have different objectives and jurisdictions, may not be able to respond to future activities on the basis of ecosystem issues. There is no existing mechanism to foster long-term planning, which could mitigate or eliminate harmful activities. Because these waters contain so many valuable resources, which in turn support so many beneficial uses, they require the special acknowledgement and study possible in a marine sanctuary to ensure that their particular values are preserved.

Some particular problems which may arise if the present institutional and regulatory structure continues to control activities in the absence of the proposed sanctuary are discussed below.

Habitat and Species Protection

The Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) prohibit the "taking" of marine mammals and threatened or endangered species, including marine species. The Migratory Bird Treaty Act (MBTA) prohibits the hunting of seabirds. The term "taking" has been interpreted broadly by the administering agencies, so that the ESA and MMPA provide considerable protection. However, the potential threats to marine mammals and endangered species range from direct injuries to a specific animal or population, to indirect or cumulative degradation of habitat, and neither the MMPA nor the ESA fully prevent cumulative or indirect degradation of habitat. Section 7(a) of the ESA does provide protection against actions which jeopardize endangered species or their critical habitats, but this section applies only to activities authorized, funded or carried out by Federal agencies, not to private or State actions. There is no explicit provision for designation or protection of the habitat of marine mammals under the MMPA. This is particularly significant because of the small number of prime habitats in and around the study area.

Through the establishment of special areas, California DFG has the ability to protect exceptional marine habitats but only in territorial waters. While the Farallon Islands Game Refuge, which includes the Islands and 1 nmi of waters surrounding them, protects these important haul-out areas, marine mammals, seabirds, the resources they feed on depend on habitat areas much larger than this designated protection zone; areas which extend across the boundary of the territorial sea. State agencies cannot manage such habitat area.

Petroleum Development

Under various statutes including the California Coastal Zone Management Program, the State comprehensively controls oil and gas activities involving State lands and waters. Regulations governing protection of marine resources, oil spill control equipment, and the siting of development adjacent to environmentally sensitive areas may prohibit or severely restrict any such activities within the State waters included in the study area. However, the States legislative designation of the State waters within the area as an an oil and gas sanctuary, which precluded leasing, has expired. If activities on adjacent Federal leases threatened to drain resource basins underlying State lands the State might lease its own tracts. This could legally occur in the area although there are no current indications that such State action is likely.

Beyond State waters, California's coastal policies, applied through the Federal consistency, also may prohibit or restrict hydrocarbon exploration, development, or production activities. However, even in Southern California waters, there has been extremely limited experience in the application of consistency to hydrocarbon activities on the OCS therefore, predicting a pattern of decisions is somewhat speculative.

Under the OSCLA, the Secretary of the Interior can comprehensively regulate activities associated with oil and gas leasing. While the Secretary is responsible for protecting the marine environment, this responsibility is exercised in the context of carrying out the primary objective of the OSCLA to expedite OCS oil and gas development. Of course, this responsibility is carried out in consultation and coordination with other affected agencies and parties as mandated by general environmental protection statutes, such as the National Environmental Policy Act and the Fish and Wildlife Coordination Act. Nevertheless, these priorities and objectives could result in administrative decisions on leasing, exploration or development that differ from those which would be reached where preservation of marine resources has first priority.

A substantial portion of the proposed sanctuary has been withdrawn from oil and gas consideration for development by the 1978 OCS Lands Act Amendments, which forbid the leasing of tracts on the Federal OCS within 15 smi (24 km) of the Point Reyes Wilderness. The statute also provides that if the State of California decides to permit oil and gas exploration or exploitation in the submerged lands within the territorial sea adjacent to the area

affected by the 1978 OCS Lands Act Amendments, the prohibition becomes void. Morover, the Amendments do not apply to the waters south and west of the Farallon Islands, and this region could be considered for future leasing.

Although the stipulations on oil and gas leases imposed by BLM in environmentally sensitive areas, and USGS operating orders deal with many safety and environmental concerns, considering the known vulnerability of marine birds to oil spillage and the difficulty of containing oil spills in the open ocean, a prohibition of oil and gas development may be necessary, particularly around the Farallon Islands. Current patterns in this area vary seasonally, and winds and local gyres (eddies) occur, which might prevent spilled oil from dispersing and washing further out to sea. (For a detailed discussion of the possible consequences of oil and gas development, see Section F.2.b.) Presently, no administrative mechanism exists to set aside such an important area. For each sale, all tracts not already leased are reconsidered.

Discharges

Numerous laws and regulations apply to the disposal of waste in the marine environment. However, most decisions are made on a case-by-case basis, which provides less certainty of protection than would a designation of no discharge area. Certain gaps remain in the regulatory framework.

All discharges within the territorial sea are subject to EPA requirements under the Clean Water Act (CWA) (administered by the State) (or COE requirements under the River and Harbor Act (RHA) for discharges that might obstruct navigation.) The EPA requirements are designed to protect marine resources, but may not effectively prevent overboard disposal of trash from ships.

Beyond the territorial sea, EPA approval is needed for ocean dumping and for any location of a new ocean outfall. EPA regulations take the ecological productivity and sensitivity of an area into consideration; nevertheless, such regulations do not guarantee that EPA will prohibit the disposal of waste in this area, particularly given its proximity to the highly populated San Francisco Bay region. For example, EPA and COE have been considering the designation of a permanent dredged material disposal site near the San Francisco Bay area (see Section E.3.g.) While the agencies now indicate that a site outside the proposed sanctuary boundary is likely to be the preferred site, the initial plans anticipated the designation of a site within these boundaries and nearer the Farallon Islands. Furthermore, these regulations do not apply to discharges of substances that were not transported from the U.S. with the intention of dumping, i.e. casual litter. Neither the CWA nor the RHA apply to such discharges from vessels beyond the territorial sea.

Ocean dumping, municipal outfalls, and dredged material disposal can smother benthic biota and introduce substances into the marine environment, which may affect fish, bird, and mammal resources.

However, all ocean dumping must now meet the standards for implementing Title I of the MPRSA (U. S. Army Corps of Engineers, 1975.) In addition to reducing overall water quality and lessening the aesthetic appeal of the area, the discharge of litter may harm marine mammals that sometimes ingest or become entangled in such litter (Morrel, 1979, personal communication.)

Vessel Traffic and Overflights

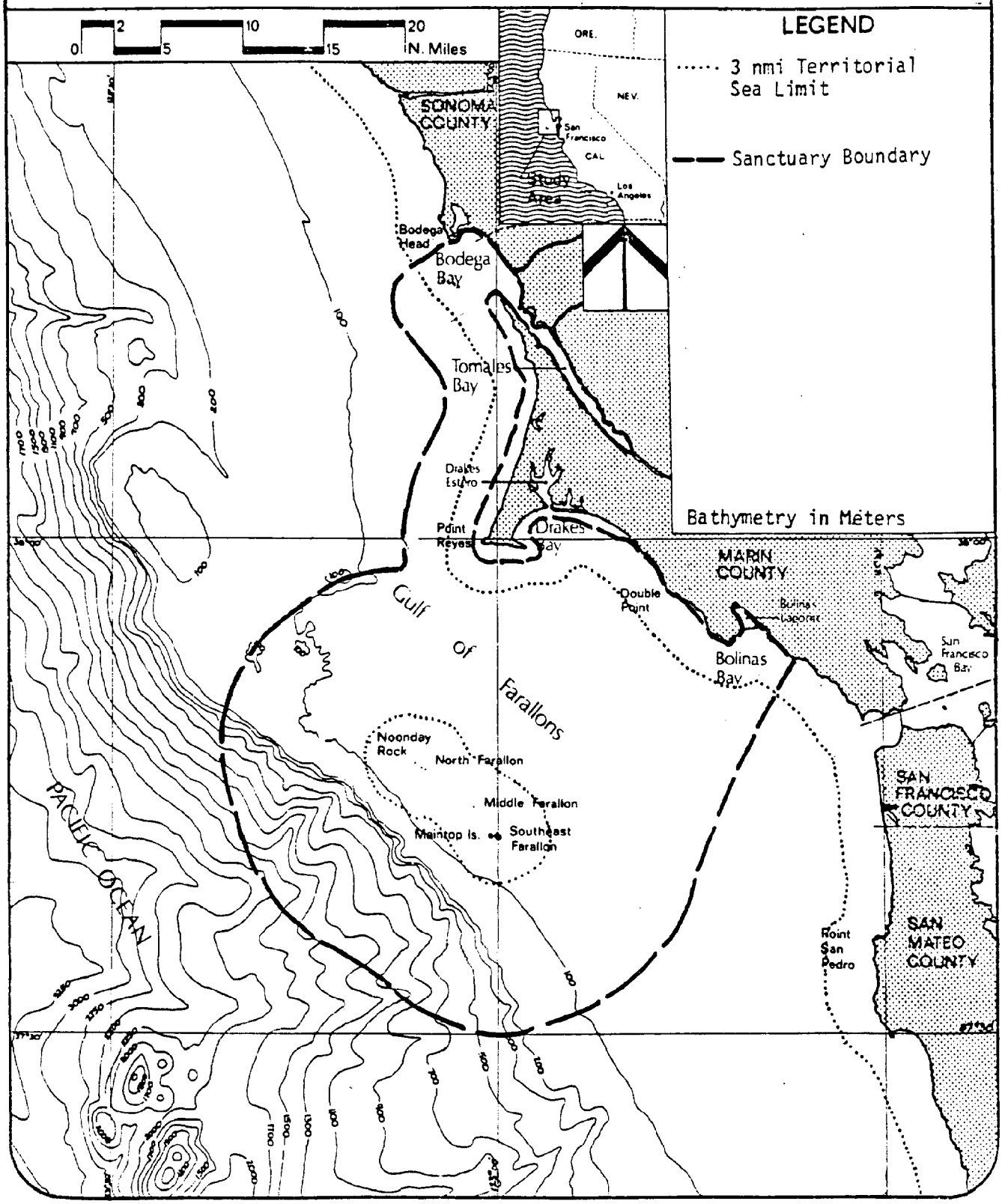
The U.S. Coast Guard voluntary vessel traffic lanes currently receive a very high level of compliance. Under the existing regulatory system commercial vessels, including tankers and other bulk carriers may transit anywhere in the proposed sanctuary, even near the very sensitive nearshore areas, where they could cause visual disturbances and create increased danger of pollution, both from operational discharges and from accidental groundings. Generally, based on good seamanship, large vessels are kept at a considerable distance from the shore. However, local vessel traffic will probably increase considerably with the development of the tracts to be leased in OCS Sale #53, and many of those vessels may be capable of navigating quite near the islands and other nearshore areas. Given this and other expected increases in vessel traffic, the risks of vessels entering such nearshore waters and disturbing marine bird and mammal populations seem likely to increase. Disturbance could result in flight or other changes in behavior. Repeated disturbance may cause mammals to temporarily or permanently abandon an area. Although the Coast Guard can create mandatory vessel lanes, such action seems unlikely in this area, and in most cases the USCG is more likely to act on the basis of vessel safety, rather than from the need for resource protection.

Aircraft overflights regularly disturb marine bird and mammal communities in Bolinas Lagoon and at the Farallon Islands (Allen, 1979, personal communication; Ainley 1979b, personal communication.) Although the Federal Aviation Administration's (FAA) charts showing the Farallon Island Fish and Game Refuge indicate that the State of California requires overflights to maintain a minimum height of 1000 feet (305 m), other sensitive habitat areas, such as Bolinas Bay and the ASBS's, are not noted on these charts and are not otherwise protected. Persistent low altitude overflights can severely disrupt various marine mammal and seabird behavior patterns, particularly those of breeding and nesting.

Historical and Cultural Resources

Existing regulatory authorities provide little protection for underwater historical or cultural resources. California can register sites as either "points or interest" or "land marks", and the latter designation provides some protection to sites in State waters. Salvage operations in State waters must also be permitted by the State Lands Commission. Registration on the National Register of Historic Sites provides protection only against Federal and not private activities. The Farallon Islands were placed on the Register in 1977.

FIGURE F-9. Alternative 2, the preferred sanctuary designation option



F.2 Alternative 2 -- the Preferred Alternative

F.2.a. Introduction

NOAA proposes the designation of a marine sanctuary to manage and preserve the special ecological, conservation, recreational and aesthetic values of the waters surrounding the Farallon Islands, and the waters along the mainland coast, north and south of Point Reyes Headlands, and between Bodega Head and Rocky Point. The proposed sanctuary extends shoreward to the mean high tide line or the seaward boundary of the Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands, the sanctuary extends seaward to 3 nautical miles (nmi), (5.6 km) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi (22.2 km) of Noonday Rock and the mean high tide line on the Farallon Islands, and the waters between the Islands and the mainland, from Point Reyes Headlands to Rocky Point (just southeast of Bolinas Lagoon). The proposed sanctuary includes Tomales Bay, the esteros north of the bay, Bolinas Bay and Lagoon, and Bodega Bay, but not Bodega Harbor (see Figure F-9). Marine areas under both State and Federal jurisdiction would be included. The geographic coordinates of the sanctuary are listed at the end of Appendix 1. The proposed sanctuary encompasses approximately 948 sq nmi (3244.53 km^2).

This isolated, rugged, and relatively undeveloped natural setting is extraordinary, considering its proximity to the San Francisco metropolitan region. Besides providing an ecologically diverse haven for so many significant concentrations of living resources, the waters also support a number of socially beneficial human activities. These range from fishing to commercial shipping, nature observation, education, scientific research, national defense, and recreation. To date, such activities have been pursued at low intensity levels. However, these and other pending human activities, e.g., oil and gas development, are clearly capable of generating conflicts which could harm the resources of this marine area. Of particular concern are potential damage to species and habitat degradation or destruction which could irreparably damage resource quality over the long term.

The proposed boundaries will integrate many important nearshore and island marine resource zones into one management regime. These zones include: the Gulf of the Farallons, the adjacent continental shelf and certain highly productive shoreline and intertidal areas, marine communities within Bodega, Tomales, and Bolinas Bay, Esteros Americano and de San Antonia, and Bolinas Lagoon, and the Pacific Ocean environments of the Farallon Islands. Also, all, or portions of, five Areas of Special Biological Significance (ASBS) established by the State of California would be included in this alternative. One of the United States' largest marine bird rookeries is incorporated, i.e. the Farallon Islands, as well as lesser (but in some cases, recolonizing) pinniped breeding populations. Many species of migratory waterfowl visit seasonally by virtue of the area's position on the Pacific Flyway. Also, gray whales regularly pass through these waters on their southward and

northward migrations. In addition, the sanctuary boundaries include the Gulf of the Farallones and waters north and west of the Farallon Islands which are rich foraging and fishing areas. In addition to unifying the rich habitat areas listed above in one management and planning unit, the proposed sanctuary, through regulations, would create a buffer area between potentially harmful activities outside the proposed sanctuary and sensitive habitat areas. In short, the marine ecosystem's diverse resource endowment and rich productivity make it an area of regional and national significance. The area deserves long-term protection and enhancement to complement the protection already provided for some of its resources onshore and for sections of the extreme nearshore zone along the Point Reyes National Seashore and around the Farallon Islands Fish and Game Refuge.

Marine sanctuary designation would allow NOAA to: (1) support research on and monitoring of the resources, (2) enhance public awareness of the value of these waters, (3) aid in coordinating actions by existing authorities, (4) formulate long-range plans and respond to currently unforeseen threats which might arise, and (5) regulate activities which either pose a risk of causing signifcant damage or may have greater impacts as use of the area increases. Formal acknowledgement of the species and habitat value of these waters should in itself focus additional attention on the resources of this area and thus encourage direct special attentions to any future development plans.

F.2.b. Management

The management of the proposed marine sanctuary would integrate and utilize all aspects of the program to provide for the preservation of the special values of this unique marine area. Research and education, coordination, long-term planning and necessary regulation will be described in a management plan (MP) to be fully developed if a sanctuary is designated. This MP will describe managment goals and objectives tailored to the specific resources and uses the area. The goals and objectives will provide all sanctuary users with a framework for conserving resources and integrating uses compatible with the goals of the of the plan. These management goals are open ended and therefore allow for alternative planning strategies. Each objective of the developed MP represents a shortterm measurable step towards achieving the management goal.

The Management Program for the proposed sanctuary will be developed and implemented by NOAA and an on-site manager and will be distributed for public review and comment before adoption. NOAA has always intended to delegate on-site management to an existing agency in order to benefit from existing expertise and personnel. The California Department of Fish and Game (DFG), the National Park Service, and perhaps other agencies, could function in this role. DFG has indicated continuing interest in this function, and is currently working on a preliminary study to begin to develop a MP for the area, should

it become a sanctuary, and to recommend certain management activities. DFG's study will also investigate any mechanisms to promote State and Federal interagency coordination and cooperation, particularly with the National Park Service and the U.S. Coast Guard. A particularly useful mechanism for coordination would be a Sanctuary Advisory Committee, including members from Federal agencies, such as the National Park Service, the U.S. Coast Guard, the National Marine Fisheries Service; State agencies such as the Coastal Commission, the Department of Parks and Recreation, the State Lands Commission, as well as commercial and private interests and the public.

Based on available information, the proposed sanctuary would have the following goals:

1. To preserve and protect for future use, a unique ecosystem of California's near and offshore marine resources, where marine life, geological formations and ocean currents are combined to produce a highly diverse assemblage of natural as well as cultural resources. To accomplish this objective the on site manager will insure that human uses and activities do not: (a) degrade intertidal habitats or foraging, nesting, migratory or open water habitat areas of value to marine birds and mammals or (b) otherwise threaten the continued health, stability, diversity or numbers of marine mammal populations using sanctuary waters.

2. To encourage scientific research consistent with Objective #1 which will contribute to understanding of ecological interrelationships and to the resolution of regulatory and management issues.

3. To provide interpretive and educational services designed to develop the public's awareness of the natural resources present within the sanctuary and of the uses which are compatible with those resources for purposes of mitigating any environmental degredation.

--Coordination

The sanctuary manager will promote coordination among all the authorities in the sanctuary and will particularly stress consideration of the special value of the marine sanctuary's living resources in the formulation of policies affecting the area. The greater understanding of sanctuary resources and the effects of human use, gained as a result of the research and monitoring will enable NOAA to provide valuable assistance to other authorities in their determinations relating to the level of protection for the natural resources of the sanctuary. Coordination may take several forms. In some cases, agencies may wish to change their regulations to conform with sanctuary provisions; alternatively, they may want to use their review and enforcement capabilities to implement NOAA regulations. Any interagency arrangements will be the subject of discussion with the agency concerned.

The sanctuary advisory committee would be an especially useful coordinating mechanism. This committee could assure an exchange of information, advise the sanctuary manager on permit applications and certifications, research priorities, amendments to the regulations, and other matters.

Education and Research

A major responsibility of the sanctuary manager is the development and enhancement of education and research efforts. As presently envisioned, the Sanctuary Information Center might also serve as the administrative headquarters for the sanctuary.

The Sanctuary Information Center would be the focus for research and education activity. The Center would collect literature and information on resources and activities in the sanctuary, and also provide visitor orientation and education materials, such as slides, brochures, and displays. The visitor information would help tourists and recreationists more fully appreciate and enjoy the resources of the sanctuary, and appraise them both of regulations and the need for protecting the marine resources. Efforts to develop the Sanctuary Information Center will be coordinated with existing agencies, particularly the National Park Service, the Point Reyes Bird Observatory, and the Oceanic Society's Farallon Research Group.

The general information collection would include both technical and non-technical reference material, and would provide as complete and detailed a description of sanctuary conditions and use over time as possible.

To further this end, the sanctuary manager would ask researchers to notify the Sanctuary Information Center of any research projects in the sanctuary and to submit reports of their research. This notification process would result in a master listing of research projects conducted from the time of designation. This listing would be continually updated and kept open for public use.

A notification procedure should ensure that research parties are not only familiar with existing regulatory controls, but also that they better understand which resources are particularly susceptible to adverse research-related impacts. In addition, the master listing could: (1) produce a record of scientific investigations which might provide important management information, (2) contribute to efforts to monitor use patterns within the sanctuary, (3) be of assistance in identifying areas of research not receiving adequate attention, and (4) ensure that sanctuary managers are aware of relevant area-specific studies and literature. Finally, this notification process would provide both sanctuary managers and researchers with a record of individuals and groups who have first-hand experience with the area's resources. This would be a valuable tool in coordinating research efforts and encouraging multi-disciplinary analyses.

The notification of research projects in the sanctuary and the submission of reports of the research to the Sanctuary Information Center would constitute a slight inconvenience for researchers. However, in turn, researchers could benefit from the resources of the Information

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Center and, unless the research would require a permit notification would not impose any delay. The compilation of technical documents in the Sanctuary Information Center will provide a baseline of site-specific information which would help longterm environmental analysis and encourage further research within sanctuary boundaries. The sanctuary manager will directly encourage research by sponsoring a monitoring program, providing partial funding for research, and encouraging researchers and funding organizations to conduct or support studies in the sanctuary. The monitoring effort will focus on the overall health of the natural resources of the area as well as the level and effects of human activities occurring nearby. The information gained from such monitoring efforts and other research projects should enable NOAA to manage and regulate the sanctuary more effectively, and to assist other applicable authorities in carrying out their responsibilities.

Another research objective of the sanctuary managers would be to map and compile a detailed inventory of historical resources. For example, many of the known wrecks (approximately 18) around the Farallon Islands have been documented (Oceanic Society, 1978).

Limited archaeological research has been conducted on the Islands themselves, e.g., Riddle, 1965, and active research into, and mapping of, possible historical artifacts in the waters surrounding the islands has reportedly just been initiated on a small scale (U. S. Bureau of Land Management, 1979a).

Enforcement

Although a detailed management plan for the sanctuary has not been developed, NOAA, at present, envisions a State-Federal cooperative enforcement system involving the California Department of Fish and Game, the U.S. Coast Guard, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the National Park Service. Since the proposed sanctuary would include both State waters and waters of the contiguous zone, close coordination between State and Federal authorities would be required.

NOAA is currently consulting with the U.S. Coast Guard and DFG concerning enforcement authority in the proposed sanctuary. NOAA plans to provide funds to allow the present management and enforcement capabilities the USCG, DFG, USFWS, NMFS, and NPS to assume any added burden of sanctuary regulation enforcement.

Oil Spill Contingency Planning

The management plan for the sanctuary will discuss the role of the sanctuary in oil spill contingency planning. At a minimum, the sanctuary manager will coordinate with existing contingency response entities, especially the U.S. Coast Guard, and analyze the need for additional deployment of staff and equipment to provide enhanced resource protection against potential spills.

The sanctuary manager will evaluate the need for special oil spill contingency measures for the sanctuary and will participate in all phases of contingency planning. Oil spill contingency plans for Lease Sale #53 have not yet been developed, and the closest oil spill containment and cleanup cooperatives are located in San Francisco Bay, and do not have open ocean cleanup capabilities. In particular, response capability to prevent oil from entering enclosed bays and estuaries is essential, given the difficulty of containing oil at sea, and the turbulent nature of the waters in the area (see Section F.2.c.1). Based on these circumstances, NOAA might request that the Department of Interior require lessees in the area to provide booms, boats and oil sorbent material to be kept at the entrance to bays and estuaries in the sanctuary.

F.2.c. Regulated Activities

To further more comprehensive protection of these resources, NOAA proposes to subject the following activities to sanctuary regulations:

1. hydrocarbon operations,
2. discharge or deposit of any substance,
3. alteration of or construction on the seabed,
4. vessel navigation (except within a VTSS or PAR) and operations (other than fishing vessels),
5. disturbing marine mammals or birds by overflights, and
6. removing or harming cultural and historic resources.

In the case of each of the above listed activities, NOAA's determination to propose regulations of particular aspects of the activity was based on an evaluation that included a review of the existence and application of current regulatory authority, the primary mission of the agencies administering such authority, and the need for any further regulation to help ensure the long-term preservation of the special resources of the proposed sanctuary. In each instance, the altenative of not proposing any additional regulation for a listed activity and of relying on the authorities as described in the status quo section was considered and rejected.

The designation specifically excludes certain activity, including the harvesting of living marine resources, from the scope of possible sanctuary regulation and leaves various other activities to be administered by existing authorities (see Section F.1). Permits, licenses, and other authorizations currently applicable in the proposed sanctuary would remain valid unless they allow an action which violates a marine sanctuary regulation. In order to prevent unnecessary and costly delays, the proposed regulations certify in advance the validity of permits and licenses which do not authorize an action violating sanctuary regulations. Permits for pipelines, municipal outfalls and disposal at the interim dredge site must be specially certified. (See Appendix 1 for the full text of the proposed Designation Document and the proposed regulations.)

F.2.c.1. Hydrocarbon Operations

> Hydrocarbon exploration and exploitation activities are prohibited anywhere in the sanctuary as is the placement of oil and gas related pipelines within 2 nmi (3.7 km) of specified ecologicaly sensitive areas (the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance designated by the State of California). Permits issued by other agencies for pipelines in the sanctuary must be certified by the Assistant Administrator for Coastal Zone Management (see Section F. 2.d.)

These proposed regulations prohibit oil and gas exploration and exploitation activities within the sanctuary and restrict pipeline placement. They are intended to protect sensitive marine resources more effectively against the risks and adverse impacts of: (1) oil spills and pipeline leaks, (2) noise and visual disturbances caused by drilling, the presence of drill rigs or platform, work crews, supply boats, and helicopters, (3) pollution associated with aquatic discharges, and (4) short-term pipeline construction upheaval. Table F-7 summarizes the known hazards to marine organisms which may result from offshore oil development; Table F-8 describes how NOAA's sanctuary provisions will help mitigate these impacts. This section analyzes the potential adverse impacts identified above, the extent to which NOAA's proposed sanctuary provisions serve to mitigate them, and the anticipated socio-economic consequences of these regulations.

By excluding hydrocarbon exploration and exploitation from sanctuary waters, the proposed regulation establishes a "time and space" buffer area between such activities and particularly sensitive island and nearshore habitat areas.

The 1978 OCS Lands Act Amendments (OCSLA) already provided include oil and gas leasing from some of the area under consideration. These amendments prohibit leasing for the purpose of oil and gas development on the Federal OCS within 15 smi (24.1 km) of the Point Reyes Wilderness (P.L. 9372, Sec. 206)(see Sect. F.1.b.ii.) The area withdrawn by the OSCLA amendments comprises a significant portion of the proposed sanctuary (Figure E.3.a.) One oil and gas industry source has estimated that the combination of the area withdrawn by the OCSLA and the area in State waters equals 75% of the proposed sanctuary, (D. T. Magee, 1980, personal communication.))

However, this prohibition is contingent upon the continued absence of oil and gas development in State waters. Although the State Lands Commission does not now foresee any action to lease tracts for hydrocarbon activities in the area in question, leasing is possible and could affect the status of Federal OCS tracts. (Sanders,1979, personal communication). Moreover, the amendments do not cover the waters south and west of the Farallon Islands (see Section E.3.b. and Figure E-8A).

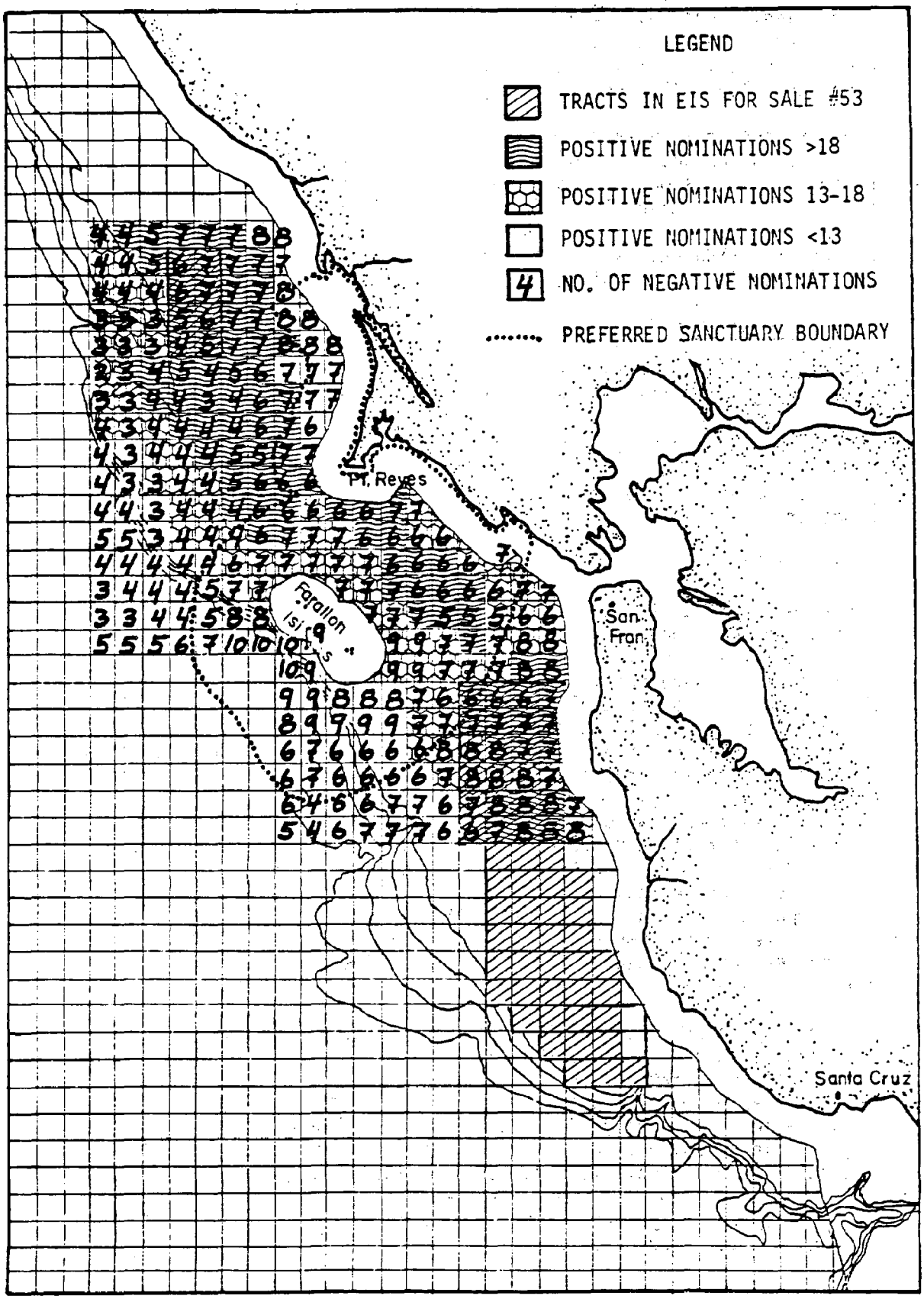
TABLE F-7 Summary of potential hazards to marine mammals, seabirds, and marine organisms resulting from offshore oil resource development and production (modified from University of California, Santa Cruz, 1976.)

Activity or Facility	Chronic Hazard	Episodic/Catastrophic Events
Exploration		
Seismic Profiling	Noise, "startle effect"	Sub-surface noise, concussion
Drilling		Siltation
Boat Traffic	Prop hits	Turbidity increase
Operation		
Offshore facilities		
Production platforms	Intrusion	
Well head	Leakage/seepage	Blow-out
Support		
Crew and supply boats	Sub-surface noise and propeller hits	
Aircraft	Noise in the air	
Transport		
Pipelines	Leakage	Rupture
Pumping buoys	Leakage	
Barges and Tankers	Bilge oil intrusion	Collision or grounding
Clean-up		
Oil on water	Intrusion	
Skimmers		
Burn-off		Pollution--air
Chemicals		Pollution--water
Grounded oil	Toxicity of chemical dispersants	Pollution--seeiments
Booms		Disturbance to sensitive bird and mammal populations on islands by human intrusion and aircraft activity
Straw		
Chemicals		
Presence of crew and equipment		Habitat destruction

Table F-8. Potential oil and gas development impacts mitigated by NOAA's preferred sanctuary alternative.

REGULATION	PROTECTION PROVIDED
1. No future hydrocarbon exploration or exploitation within the designated sanctuary.	--Creates a broader buffer area against potential oil spill threats and provides increased response time for cleanup efforts in case spills occur. --Increases distance between potential spill/pollutant discharge point (i.e. rigs, platforms and pipelines) and sensitive resources which allows natural weathering and dilution of contaminents bereaching important marine life concentration areas --Excludes noise and visual disturbances of routine operations from the vicinity of important marine life habitats. -- Reduces potential visual intrusion on aesthetic values of the Point Reyes National Seashore, the Farallon Islands, and the proposed sanctuary itself. -- Reduces potential air pollution.

FIGURE F-10. OCS exploration block priority assignment in the Point Reyes-Farallon Island vicinity (U. S. Geological Survey, 1979).



As discussed in Section E, there are currently no oil and gas activities or leased tracts within the preferred sanctuary's boundaries. Lease Sale #53, scheduled for May 1981, includes part of the area under consideration. A group of eight tracts in the Bodega Basin lie approximately 1 nmi (1.8 km) north-northwest of the Farallon Islands (Figure F-1).

Another considerably larger group of 60 tracts, the Santa Cruz Basin, is situated eastsoutheast of the Farallons; the northern portion of these tracts lies only 10 nmi (18.5 km) from the Islands. Portions of two tracts (numbers 069 and 073; Figure E-9) in the Santa Cruz block lie within the proposed sanctuary. OCS Sales #73 and 80, planned for 1983 and 1984, also may include the proposed sanctuary area (U.S. Department of the Interior, 1979).

Threats to Resources

The following discussion identifies some of the major environmental threats posed by offshore hydrocarbon activities and relates these threats specifically to significant marine resources found within the preferred sanctuary alternative. It also outlines the manner in which the proposed activity prohibition will lessen risks and promote long-term resource preservation and enhancement in the sanctuary.

--Oil Spills

The safety record of the offshore oil and gas industry in the United States has been good. During the period from 1971 through 1978, over 7,500 wells were drilled in domestic waters and less than 1,000 barrels of oil were spilled (Magee, 1980, personal communication). However, accidents, natural disasters, and human error can lead to situations which result in the release of oil into the marine environment. Spills can be caused by well blowouts, barge and tanker accidents, pipeline breaks and leaks, and equipment failures. The large majority of spills involve relatively small amounts of oil, usually less than 1000 gallons (24 barrels). There have been no projections for the numbers and size of spills which could be expected were all or a portion of the tracts within the proposed sanctuary to be leased. Statistically, some spills would be probable. For purposes of comparison, between 153 and 230 oil spills under 1,000 barrels and between 1.9 and 3.1 oil spills of 1000 barrels or greater can be expected over the life of the fields scheduled for Lease Sale #53.(U.S. Bureau of Land Management 1980).

Offshore hydrocarbon exploration and production activities, including the transshipment of oil to the mainland, may cause unforeseen and potentially substantial discharges of oil (catastrophic discharges) into the marine environment in at least three ways: (1) well "blowouts" caused by equipment failure or damage and geologic hazards, (2) pipeline breakage, and (3) vessel transshipment accidents. Normal hydrocarbon operations also result in unintentional, chronic, small oil spillages. Since the Point Reyes-Farallon Islands region has had no history of hydrocarbon production there is no direct evidence of the effects of exploration and production spills in these waters.

Estimates of behavior of spilled oil in the region are based on standard studies, although there has been no trajectory analysis for the particular area that would be withdrawn from development under the proposed sanctuary, an oil spill risk analysis was conducted by the Department of the Interior to determine the relative environmental hazards of offshore development from Lease Sale #53 (Samuels and Lanfear, 1980). The study analyzed the probability of spill occurrences, likely paths of oil slicks, and locations of resources vulnerable to spilled oil using the USGS Oil Trajectory Analysis Model. Between 1.9 and 3.1 spills of greater than 1000 barrels are expected to occur as a result of Lease Sale #53 activity, depending on how the oil is transported to shore. Conditional probabilities (expressed in percent chance) of oil from tracts in the Bodega and Santa Cruz Basins reaching the Gulf of the Farallons once a spill occurs, range from highs of 6% within 3 days to 25% within 10 days to 28% within 30 days. Conditional probabilities for spills from tankers travelling along specified routes in this area range from highs of 30% within 3 days to 35% within 10 days to 38% within 30 days. In addition, as the number of days increases, the number of routes that could potentially impact the area also increases. These conditional probabilities do not include the probability of oil spill occurrence, but rather represent the probability that, if an oil spill occurs at a given launch point, it will contact a particular target. The data seem to indicate that both development, at least in tracts considered for Lease Sale #53 and transport of oil pose certain risks to the region.

Since there is limited direct experience with spills in the area, possible impacts on resources, must be to a certain degree discussed generally. The most recent instance of severe oil pollution within the Point Reyes/Farallon Islands region occurred in 1971 when two Standard Oil tankers collided almost directly under the Golden Gate Bridge, releasing 840,000 gallons of "Bunker C" fuel -- a refined oil mixture used to fuel ships and power plant boilers, which is generally considered more toxic than crude oil. As cited in Chan (1973), California Department of Fish and Game estimated that approximately 7,000 marine birds were affected by the spill and that less than 10 per cent of these survived. Further analysis of oil pollution impacts on marine organisms along Stinson Beach and Duxbury Reef determined that smothering was the most important contributor to organism dieoff, especially in mussel beds. Followup studies of the Duxbury Reef area, however, indicated that, in terms of 5-year recruitment (1971-1976), there have been no lasting detrimental effects from the "Bunker C" oil spill on marine life in the study areas (Chan, 1977.) Existing information on the effects of oil on marine birds will be supplemented by work of the Point Reyes Bird Observatory (PRBO), funded by the U.S. Department of Energy, which is currently conducting continuous oil spill monitoring programs, studying the impacts of small oil spills from sources such as tank washings and bilge pumpings in the Point Reyes/Farallon Islands area and the coastline north of San Francisco.

Oil can directly affect living marine organisms biochemically or physically (see, for instance, Boesch et al., 1973; National Academy of Sciences, 1975, and U.S. Bureau of Land Management, 1975 and 1979.) The greatest damage to the marine environment occurs under any of the following circumstances: (1) The oil is spilled into or reaches a confined, shallow body of water, such as a small bay. Thus, the

volume of oil spilled is large with respect to the body of water being impacted. (2) The oil is a refined oil, such as home heating oil or a diesel oil. (3) Storms or heavy surf cause the oil to be churned into the bottom sediments. In many instances, it does appear that the marine ecoystem can recover from the damage occasioned by oil spills although the rate and completeness of recovery remain subject to dispute. Petroleum hydrocarbons can also have sublethal or indirectly lethal effects on marine organisms through the destruction or alteration of a food supply, through chemical interference with reproductive success, synergistic effects which may reduce resistance to disease, and other stresses which alter behavioral patterns such as feeding. The physical damage resulting from the coating of marine organisms, the feathers of marine birds, the fur of marine mammals, and the respiratory apparatus of fish with oil is well documented (see, for instance, U. S. Bureau of Land Management, (1979a.)) Certain species of marine mammals and birds are seasonally present around the Point Reyes-Farallon Islands region in numbers representing an ecologically significant percentage of their entire population (as discussed in Secton E.2.a and b.) Potential harm to pinniped and marine bird populations would be magnified if an oil spill were to occur during a period of high density or during a breeding season. For example, this seasonal susceptibility has been highlighted by the U. S. Bureau of Land Management (1979a) in regard to the marine resources surrounding the Northern Channel Islands. However, the majority of spills from off-shore production are relatively small and are unlikely to pose a significant threat to the survival of a species, even during breeding seasons. Even such small spills, in the short term, could kill a large number of individual birds or other marine organisms depending on the area where the spill impacts.

Pinnipeds

Floating oil may adversely affect pinnipeds in four ways: fouling the fur, ingestion, inhalation, and the irritation of eyes and membranes (U. S. Bureau of Land Management, 1980, Geraci and Smith, 1977). Oil contamination of fur can cause two very important physical changes--loss of buoyancy and impairment of normal thermal regulation. Of the two, impairment of the body's insulation properties is probably more damaging, particularly for fur seals and sea otters which depend primarily on their fur for insulation (U. S. Bureau of Land Management, 1980).

Although northern fur seals depend only partially on their fur for thermal protection, oiling could depress their thermoregulatory abilities, which could lead to hypothermia and death (Kooyman, et al., 1977). Studies by Kooyman, et al. (1977) indicate that among sea mammals, the most profound effects of oiling may be on the sea otter pup; its thermal conductance increased by 2.1 times after oiling, indicating a significant loss of insulation capacity. The results of Kooyman's later studies confirm that even a light oiling could have marked detrimental effects on the thermoregulatory abilities of otters. (Kooyman and Costa, 1979.)

Northern fur seals have been sighted in the vicinity of the Farallon Islands in increasing numbers in recent years; in addition, there have been sightings of sea otters along the Marin County coast. These species may be in the process of establishing breeding colonies here, a trend that could be sharply diminished by oil pollution.

In general, oil is more likely to be ingested while the animals are feeding or cleaning their coats than by absorption through the skin. The long-term effects of high concentrations of petroleum products has not yet been determined.

Cetaceans

Although the effects of oil on cetaceans have not been carefully investigated, scientists hypothesize that oil could cause short- and long-term harm (Leatherwood, 1979,personal communication). Because baleen whales are filter feeders, for example, they are susceptible to direct ingestion of oil or oil-tainted substances. Oil has been found to destroy fish eggs. A decrease in fish egg populations caused by a serous oil spill could upset the delicate balance of the food web and thereby diminish an important local food source (Storro-Patterson, 1979, personal communication.) In addition, oil effects may reduce mammals' ability to find food, to flee from predators, and to care adequately for their young (Herz, 1979, personal communication). There is no data available at present showing the bioaccumulation of oil through the food chain resulting in a biomagnification effect on cetaceans.

It is not known whether whales will avoid an oil slick; however, humpback whales have been seen feeding in an oil slick in the northern Atlantic Ocean without apparent immediate ill effects (National Oceanic and Atmospheric Administration, 1979). Although knowledge about the cumulative effects of oil on whales is scant, it is likely that oil would, at least, irritate their eyes and might even affect their breathing apparatus given prolonged exposure (Leatherwood, 1979, personal communication). The likelihood of prolonged exposure is diminished if the whales avoid the slicks, or if the whales simply move through the spill area at normal speed. On feeding grounds, prolonged exposure may be more likely. Because whales depend on blubber rather than fur for thermal regulation, oil would not affect their ability to thermoregulate. Whale reactions to an oil spill could depend on many variables including the species of whale, time of year, and severity of the oil spill.

Several endangered species of whales, including the highly endangered blue whale, occasionally appear in the study area (see Section E.2.b). The gray whale, also an endangered species, annually migrates through the area. The southern migration includes pregnant females, and the return migration to arctic waters includes young calves. Both these groups may be more susceptible to oil pollution than male adults (Herz, 1979, personal communication). A substantial proportion of the gray whale population could be affected by an oil spill in this area since thousands of animals pass through the study area twice annually.

While there has been no scientific study of the matter, the Santa Barbara spill in 1969 did not appear to have negative impacts on migratory gray whales in the area.

Marine Birds

Floating oil affects marine birds by fouling feathers and through ingestion, inhalation, and irritation of eyes and membranes. Feather contamination is the primary cause of immediate mortality because of the resulting inability to fly, avoid predators, forage underwater, and the lowering of body temperature due to loss of insulation. Birds may also ingest oil while preening or grooming contaminated feathers, which can lead to death (U. S. Bureau of Land Management, 1979.) In addition, ingestion has been linked to the production of inviable eggs under certain circumstances (Ainley, 1979b, personal communication).

A number of factors influence the vulnerability of different species of birds to contact with spilled oil. Species which have a tendency to form large, dense flocks on the water, to spend considerable time swimming on the water, to dive when alarmed, or species which exist in small, isolated populations are extremely vulnerable (U. S. Bureau of Land Management, 1980.) To some extent, all marine birds which breed in large colonies are vulnerable to contact with floating oil during the nesting season since they concentrate together for all or most of that period.

The study area is characterized by a number of marine bird breeding colonies, including some of the largest marine bird rookeries in the continental United States (see Section E.2.b and Table E-10 above). In addition, many migrating species congregate in the offshore regions throughout the year. Impacts due to oil spills and associated cleanup operations would be greatest when marine bird densities were at their peak. Such densities vary throughout the spring and summer for different species.

Under the criteria set forth above, the marine birds in the study area generally believed to be the most susceptible to oil contamination include murres, guillemots, auklets, murrelets, puffins, loons, grebes, and scoters (U. S Bureau of Land Management, 1980). Cormorant and alcid populations are also susceptible to exposure largely because of their sizable breeding colonies within the study area. Brown pelicans, observed in somewhat smaller annual populations here, are equally vulnerable due to their more restricted areal distribution, seasonally large breeding assemblages and frequent diving (U. S. Bureau of Land Management, 1979). Shearwaters, albatrosses, petrels, gulls, terns, shorebirds, and some ducks and geese are all vulnerable to oil contaminants, but in some cases less so than the diving species (Bureau of Land Management, 1980).

Marine birds are highly susceptible to the effects of oil, and catastrophic oil spills generally result in extremely high marine bird mortality e.g., the 1971 Golden Gate spill impacts. Other major oil spills occurring elsewhere, such as England's Torrey Canyon incident in 1967,have affected far larger numbers of birds than did the

Table F-9. Point Reyes Bird Observatory log information concerning marine bird and marine mammal oilings for the Farallon Islands, 1970-1978 (Kellogg, et al., 1978).

YEAR	MONTHLY FREQUENCY	INCIDENT SUMMARY
1970	February (1); August (6); November (1); December (2).	Oiled cove waters primarily; oil-spotted elephant seals, common murres and gulls; evidence of dead algae and invertebrates.
1971	January (11); February (2); March (1); December (1).	Extensive January oiling of murres (+/- 250) and gulls due to drifting slick from Golden Gate tanker collision, with some mortality (45 dead murres); spotted birds (20 percent of murres) and seals evident immediately thereafter; Fisherman's Bay pollution by tar and straw.
1972	January (2); September (3); November (1); December (1).	Ramdomly oiled murres, (3-4 birds) gulls (1), sandpipers (1), and red phalarope (1); no reported mortality.
1973	January (2); February (1); March (1); May (3); June (4); September (1); October (1); November (1); December (1).	Primarily common murre and guillemot oiling; no observed mortality; 20 percent elephant seals oiled in November along with many washed up oiled bird feathers.
1974	January (3); March (1); June (1); December (1).	Infrequent oiled murres (about 20); one bird mortality (ancient murrelet).
1975	March (1); May (1); June (2); July (2).	Oil smeared and spotted murres (10 birds, primarily; in June an estimated five percent of murre population badly oil soaked; one mortality (guillemot).
1976	February (4); May (1); April (1); August (1).	Dispersed evidence of single common murre, black kittiwake (2) and arctic loon oiling; no observed mortality.
1977	January (1); March (3); April (1); August (1).	A few common murre (2), kittiwake (1), and arctic loons (1) oiled; unknown heavy slick in March.
1978	January (5). (Jan. only)	Heavy murre oiling in January (31 birds); two reported mortalities.

Golden Gate spill and have resulted in very high bird mortality (Holmes and Cranshaw, 1977.) Attempts to clean oiled birds often prove unsuccessful and may occassionally cause even more stress than light oiling.

An oil spill in the area under consideration would be almost certain to affect large numbers of birds, particularly if it occurred between March and August. For certain species such as the ashy storm-petrel and the black brandt, nearly the entire population can be found in the study area during nesting or migration periods. For a number of other species, over half of the California population breeds at the Farallon Islands (see Section E.2.b). Clearly, an oil spill reaching, or in the vicinity of these islands, could present a serious threat to such species. Past spill incidents both near San Francisco and elsewhere around the United States and the world have induced large scale bird fatalities.

Oil pollution may pose threats to bird populations beyond immediate mortality from ingestion of oil or fouling of feathers. Because of their direct dependence on nearshore food sources, long-term contamination of foraging grounds could cause major alterations in marine reproductive capabilities (U. S. Bureau of Land Management, 1979). As with marine mammals, birds may be adversely affected by the ingestion of oiled invertebrates. The potential long-term, cumulative impacts of nearby oil and gas development on marine bird habitat areas and feeding grounds in the Point Reyes-Farallon Island area remain unknown to a major degree. Oil spill treatment and cleanup operations (including the adverse effects of human intrusion) can also have important impacts on marine birds and marine mammals. Often the emulsifiers used and the associated human activity during cleanup procedures have been more harmful than the oil (U. S. Bureau of Land Management, 1979). Because many new generation dispersants, which are supposed to be no more toxic than oil have not yet been totally evaluated, their environmental effects remain largely unknown (U. S. Bureau of Land Management, 1979). Mechanical cleanup and containment devices, such as booms, pose no toxic threat to marine birds; however, the extensive human activity associated with deployment can cause social disturbances within the marine bird and mammal populations. In addition, the effectiveness of mechanical devices is limited by sea and weather conditions. As with oil spills themselves, the impacts of cleanup operations would be particularly severe at times when marine birds and mammals were highly concentrated, e.g., during breeding or feeding activities.

A valuable record of observed oil spills around the Farallon Islands and a digest of observed impacts upon marine birds and marine mammals concentrated there is kept regularly by the Point Reyes Bird Observatory (PRBO) (see Table F-9). Most incidents involve oil-soaked birds, although occasional mammal oilings, e.g., elephant seals, are evident. Generally, oil slicks on nearshore waters or oil covered rocks on the Farallon Islands are rare (Kellogg, et al., 1978). Few open water slicks in the vicinity have ever reached the Islands with sufficient strength to cause widespread ecological damage. Among the more recent spill incidents, the 1971 Golden Gate tanker collision appears to have caused the greatest marine bird mortality observed around the Islands. These counts probably reflect only a portion of the birds affected by oil pollution, as it is likely that many contaminated bird carcasses were not found.

Fisheries

A large oil spill in, or close to, valuable fishing areas would also pose a potentially serious threat to sport and commercial fisheries, including mariculture. The precise type of impact depends largely on timing with respect to spawning season, migration patterns, on the oil type (solubility, toxicity, etc.), and prevailing weather conditions.

For example, a spill resulting in a surface slick could affect upper water biota such as the squid, northern anchovy, jack mackerel and the pelagic portion of the planktonic base of the food chain. Heavier oils that sink, on the other hand, could affect shellfish (abalone, lobster, crabs) and finfish such as the flounders and soles.

Both lethal and sublethal effects of petrochemical pollution have been noted in fish (Hawkes, 1977; Patten, 1977). Observed sublethal effects range from visible physical abnormalities to subcellular defects; some fish exhibit severe anatomical deformities such as curvature of the spine. At the tissue level, lesions may develop on the skin, gills, or intestine (Hawkes, 1977). In addition to any possible health hazards from the consumption of contaminated fish by humans, these sublethal effects are aesthetically displeasing and increase the difficulty of marketing fish for human consumption. Furthermore, Patten (1977) discusses changes in behavior, metabolism, locomotor and activity patterns, growth, feeding and reproduction. Laboratory research, for example, has demonstrated deleterious effects on the survival and growth of eggs and larvae during spawning conditions due to short, low-level hydrocarbon exposures (Whipple et al., 1978). These laboratory results do not necessarily predict the effects of open ocean exposure to hydrocarbon discharges, where levels of contaminents may differ. There are three main ways oil spills or chronic exposure can affect fisheries: loss of fishing time or gear; tainting of the fish; and direct destruction of the fishery (Michael, 1977). In the aftermath of a spill, the risk of fouling gear or of catching tainted fish is apt to reduce overall fishing effort; this reduction of effort has a substantial but probably only short-term economic impact. The most serious long-term effect is lingering tainting of stocks (Michael, 1977). Although direct toxic effects on an entire fishery of finfish whose populations cover large areas are not probable, smaller fishery segments can be seriously harmed. Generally, fisheries are most vulnerable during the reroductive and juvenile stages. Many species concentrate in small geographic areas at these times; contaminant concentrations could have serious ecological consequences (Michael, 1977).

While studies have documented deleterious effects of hydrocarbons on fish, oil and gas development and production is continuing in several marine areas without apparent widespread damage to the fishery. The Gulf of Mexico is an example of the general compatibility of oil and gas development and an on-going fishery.

Although offshore production in general may be compatible with healthy fisheries, studies following the Amoco Cadiz spill demonstrate some long-term damage from crude oil in that near shore area. Studies of

two species of flatfish, plaice and flounder, centered on breeding grounds and estuarine habitat, show 18 months after the spill, a significant reduction in recruitment into these two fisheries. Similarly, studies of the species show a significant amount of fin rot and internal organ lesions, spread across various year classes in the area. Scientists cannot predict what effect the spill will have on breeding or survivability of the fish in the impacted area (Amoco Cadiz, 1980.) Likewise, in November 1979, approximately 50% of the total oyster installations had remained closed since the spill-approximately 18 months, and no one could predict the reopening of the sites. Two issues are involved: the health risk from oysters contaminated by hydrocarbons, taken from the estuaries affected by the spill, and the risk that any new spat planted in the sites could not survive. Some sources predicted it could be 10 years until the reopening of certain areas (Amoco Cadiz, 1980.) These studie, while not completed, indicate there remain major concerns about the impacts of crude oil in certain nearshore environments, at least over a period of years.

The effects of oil and gas activities on kelp, particularly in terms of kelp's role as a habitat for fish, are also important. It is generally believed that the susceptibility of kelp and other plants to oil pollution varies with their life stage, and that the adult kelp generation has an outer mucilage covering which appears to protect it against oil toxicity (U. S. Bureau of Land Management, 1979a). While there appears to be little evidence to indicate that kelp is harmed by oil, it is an important habitat for fish and fauna which may ingest or come into contact with oil trapped in its fronds.

Drilling and production platforms do form an artificial reef environment which has short-term benefits for the fishery. The fishery habitat exists only for the life of the field and disappears once the platform is removed. This limited enhancement of the fin and shellfish habitat must be balanced against threats posed by oil and gas production.

Benthic Organisms

The intertidal area is an important breeding, spawning, and feeding ground for many marine organisms; the area also provides substrate and suitable habitat for many other species. Oil in the intertidal zone can affect the benthic biota by smothering, fouling, or directly poisoning organisms (Micheal, 1979). As a result of the 1971 Golden Gate Bridge oil tanker collision, for example, a significant amount of oil was washed up on the mussel beds and high rocks at Duxbury Reef. Although comparison of pre-oil and post-oil transects showed a significant short-term decrease in marine life after the oil spill, the visible signs of the pollution passed rather quickly, and there is no documented long-term damage (Chan, 1977.) However, oil films pervaded the upper tidepool waters almost a year later and selective evidence of marginal organisms recruitment, e.g., acorn barnacles, was observed (Chan, 1973). Generally, the more mobile forms of marine life (crabs, snails, etc.) suffered greater losses than the sessile organisms, e.g., acorn barnacles and limpets (Chan, 1973).

Table F-10. Inventory of major oil spill cleanup and containment equipment in the Point Reyes-Farallon Islands vicinity.

Entity and Location	Oil Containment Booms	Vessels	Skimmers
1). U.S. Coast Guard Pacific Strike Team Hamilton Air Force Base, Ca.	4,284 ft 13" x 32 Open water boom	1 - 21 ft 1 - 17 ft 1 - 16 ft	1 - Open Disk Skimmer 1 - Vac-u-max Skimmer 1 - Floating Saucer Skimmer 1 - MARCO Class I Oil Recovery Vessel
2). Clean Bay, Inc. Concord, Ca.	6,600 ft 16" x 12"	1 - 200 ft 9,000 BBL, Tanker	2 - 58 ft MARCO Class III Oil Recovery Vessels
	1,600 ft 12" x 24" 500 ft 12" x 24"	1 - 34 ft boat 1 - 16 ft boat	2- 34 ft MARCO Class II Oil Recovery Vessels
	1,600 ft 27" x 17"	2 - 12 ft boats	
	1,640 ft 30"	2 - 10 ft boats	4 - Mark II Skimmers with 2 - 56 ft LCM Boats
	6,500 ft 6" x 12"		
3) It, Corporation Martinez, Ca.	13,000 ft 6" + 8" x 12"	1 - 40 ft 2 - 16 ft 1 - 20 ft	5 - Floating Skimmers for use with 22 Vacuum Trucks with Total capacity of 25,700 BBL.
4) Crowley Environmental Services, Terminal Is., Ca.	6,100 ft 8" x 12" 1,200 ft 12" x 16"	1 - 60 ft Spill Container with 2,000 ft boom	1 - 28 ft MARCO Class II Oil Recovery Vessel with 2,000 ft boom 5 - Portable Skimmers
5) H&H Ship Company San Francisco, Ca.	3,000 ft 8" x 12" 4,000 ft 10" graphical boom	2 - Slop barges	3 - Skimmers and 7 - Vacuum Trucks

* Barrels

Environmental Benefits of the Proposed Regulation

The proposed regulation will prohibit activities in the sanctuary which might otherwise result in chronic discharges, catastrophic oil spills, and various other activities associated with petroleum development which may disturb wildlife within some of the the primary foraging waters surrounding the major bird and pinniped rookeries and resting places in the area. The proposed prohibitions of hydrocarbon activities will also ensure the continued prohibition of leasing of Federal OCS tracts within 12 smi (19.2 m) of the Point Reyes Wilderness Area by preventing oil and gas activities in State waters (see diccussion of 1978 OCS Lands Act Amendments above).

Spills

The proposed prohibition on oil and gas activities in the sanctuary establishes this area as a buffer between possible oil spills occurring outside the sanctuary as a result of Lease Sale #53 or future sales, and the highly sensitive island and mainland coastal and intertidal habitats. These habitats range from protected marsh areas to unprotected coastal rocks, and are vital to the rich bird, fish, marine mammal, and intertidal populations in the area (see Section E.2). The existence of a buffer zone ensures that in the event of an oil spill, the oil would have to undergo a minimum amount of weathering before reaching more sensitive nearshore and intertidal areas. The weathering process would allow the more toxic fractions of the petroleum to evaporate and would permit some natural dispersion to occur. Also, San Francisco Bay-based contingency crews would have more time to reach the spill site and deploy containment equipment either at sea or around entrances to highly vulnerable lagoons and esteros (Table F-1).

The proposed regulation will increase the likelihood of employing at-sea containment rather than onshore cleanup. Although more difficult to achieve, at-sea containment is generally preferable to nearshore or onshore cleanup or containment efforts because it is likely that cleanup crew, equipment, and associated disturbances will compound the adverse impact caused by the spill itself (U. S. Bureau of Land Management, 1979). For instance, Lindstet-Siva (1976) states that attempts to boom rookery beaches may be counter-productive since most species of pinnipeds will abandon rookeries if repeatedly disturbed. Because suitable areas for pinniped rookeries are quite limited, abandonment of a rookery in this area could have severe consequences. Even if disturbed only once, several days may be required before activity patterns return to normal on a disturbed beach. Rookeries and haulout areas that are just being established (see Section E.2.6) may be even more sensitive to disturbance than beaches of long-standing use. Because of these factors, Linstet-Siva (1976) noted that the best action (where feasible) is to mechanically contain the oil at the spill site. If oil reaches rookeries, it is probably best not to attempt cleanup since almost any method would be disturbing to these animals.

No special site protection and cleanup plan is yet available for the Point Reyes - Farallon Island region; hence, recommendations regarding the most appropriate manner in which to approach spill cleanup in sensitive nearshore habitat areas have not been established (See

Section F.2.b). A protective buffer is particularly important in relatively rough seas like those of the study area to allow for the limited success of current oil containment techniques under severe climatic conditions. Organizations in the region capable of oil spill contingency responses (Table F-10) would also gain additional mobilization and cleanup time should a catastrophic spill occur.

The Point Reyes-Farallon Islands offshore region is known for rough water conditions, strong currents, and frequent storm swells. Thus, other than within enclosed bays and estuaries, equipment deployment, access, or approach for spill control appears quite dangerous. Until more analysis can be completed, no clear picture exists of the control technology, e.g., booms vs. chemicals, most suitable for possible oil spills in or near the sanctuary (Cooke 1979, personal communication). There is speculation that spills originating from Lease Sale #53 will, due to adverse oceanic conditions, have to be combatted more with chemical agents than with mechanical recovery or diversion boom techniques (Cooke 1979, personal communication). Lindstet-Siva also recommended that human activity be kept to a minimum in nearshore waters and on beaches used by pinnipeds and that the use of chemical dispersants in the open sea be considered to mitigate the effects of the spill. Dispersants act to facilitate the incorporation of the oil into the water column and can be used when conditions prevent the deployment of containment and collection equipment. The application of dispersants is contingent for their use on permission given by the Environmental Protection Agency (CEQ, 1980). This permission is granted on a case-by-case basis depending on specific spill site conditions and is planned to result in the least overall environmental damage. Various dispersant application techniques have been evaluated (Smith, 1979). However, an insufficient amount of research, especially for newly developed dispersant chemicals, has been conducted to assess adequately their effects on the marine environment (McCarthy, 1980, personal communication). Early studies indicated that the impacts of using dispersants at times exceeded that of the oil alone (Bureau of Land Management, 1979, Dewling.)

The extent of the likely environmental benefits from the proposed regulation and the buffer it would establish are qualified by a number of factors. First, the proposed regulation cannot offer full protection from the impacts of spills, since spills resulting from activities outside the boundaries, for instance in the Bodega Basin to the north could reach the proposed sanctuary (see discussion of trajectories, supra.) Second, the spills and subsequent impacts completely eliminated are only those which could be expected to occur on leases within the boundary. There has been no separate calculation of the statistical likelihood of spills,if all or portions of the affected 50 tracts were developed, nor can NOAA presently predict the probability that all those tracts would be leased in the absence of a sanctuary restriction. Therefore, the benefit in terms of expected reduction of spills cannot be quantified.

Finally, although the buffer zone will allow a greater time margin in which to commence containment action, open ocean spill containment is not yet predictably successful in seas as dynamic as those of the

study area. The buffer would also allow time to employ dispersants if that technique is proven to be advisable. The success or failure of at-sea containment and recovery operations in the event of a spill depend heavily on the prevailing marine conditions, the amount of time before the oil will reach critical resources, and the speed of response. Theoretically, under calm sea conditions, containment and recovery equipment can function effectively. However, the effectiveness of containment booms and skimmers falls off dramatically as wave height or wind velocity increase; in fact, booms will not function well if water currents exceed one to two knots (California Office of Planning and Research, 1977). Wave period and the amount of water turbulence also affect performance. Skimming devices are likewise dependent on sea conditions. Effective skimming is unlikely when ocean conditions are not at least moderately calm (California Office of Planning and Research, 1977).

Acoustic and Visual Disturbace

Oil and gas platforms, rigs, and related activities produce both a visual intrusion on the scenic qualities of the area's seascape and disturbances due to construction activities and to the sound and movement of boats and helicopters (U. S. Bureau of Land Management, 1979). The continuous human activity associated with oil and gas development and the steady stream of crew and suply boats produce visual impacts and noise which may disturb marine birds and marine mammals, particularly during sensitive nesting, pupping, and migration seasons. If these disturbances occur very close to shore, stampeding by pinnipeds or sudden flight by nesting birds can occur (U. S. Bureau of Land Management,17). During critical breeding periods such reactions could result in increased mortality rates in young marine birds and marine mammals (U.S. Bureau of Land Management, 1979). A higher general level of human intrusion feasibly could discourage pinnipeds such as the northern fur seal from ever establishing breeding areas on the Farallons, although the likelihood of this occuring has not been scientifically substantiated. (See Sections E.2.a and E.2.b for a discussion of marine mammal and bird populations with rookeries, or in the process of establishing rookeries, on the islands which might be adversely affected by an increase in human activity).

NOAA's proposed prohibition of future oil and gas exploration and development within the sanctuary boundary would lessen the noise and human activity in nearshore waters. It would also decrease the need for additional supply boats to enter the nearshore waters or incidentally approach nesting or resting marine mammals or marine birds. In addition, the prohibition of oil and gas activities pursuant to future leases within the sanctuary would reduce the potentially adverse aesthetic impacts from oil and gas platforms, rigs, pipeline construction, and other activities, and serve to preserve the wilderness character of the Island waters. While the significance of undisturbed views and wilderness is difficult to quantify in monetary terms, their protection is nonetheless important, particularly in proximity to heavily populated urban areas such as the San Francisco Bay metropolitan region.

Discharges

A wide variety of pollutant discharges are normally associated with OCS oil and gas development: drill cuttings and muds, sewage and trash, formation waters, marine corrosion products, and air pollutants (e.g. petroleum aerosols and exhausts). While restricting hydrocarbon activities to reduce the risks from spills, the proposed regulations will, at the same time, eliminate these discharges.

The proposed regulation's prohibition of hydrocarbon activities throughout the sanctuary will prevent certain discharges of contaminants due to routine rig and platform operations, which would occur if the tracts were leased and developed. Most chemical components of drilling materials are relatively unreactive in a biological sense and disperse to background concentrations within a few thousand feet of a drilling site. This is especially true in areas where strong water currents prevail. However, the exclusion of oil and gas activities will eliminate concern for any adverse environmental impacts that may occur within the sanctuary as a result of synergistic effects of various discharges, nearness to a drilling site, or sublethal effects from low-level exposure to these waste discharges. While discharges outside the boundary may reach the proposed sanctuary, their impacts will be buffered by dispersion and dilution. While there has been no evidence showing that discharges associated with oil and gas activities will alter the balance of the ecosystem or endanger a species in the proposed sanctuary, sufficient controversy remains over the long-term effects of chronic discharges of certain substances, such as the heavy metals occurring in drill muds, that the elimination of discharges is desirable.

Air pollution discharges normally associated with hydrocarbon operations disperse rapidly into the atmosphere or ocean waters, and thus pose relatively minor threats to sanctuary resources. Prohibition of hydrocarbon activities will enhance the offshore area's aesthetic wilderness qualities as well as those of the adjacent mainland coastal region. Examples of this enhancement are the indirect benefits accruing to the Point Reyes National Seashore (a Class I area under the Clean Air Act) and the Golden Gate National Recreation Area.

Pipelines

The prohibition on the placement of pipelines within 2 nmi (3.7 km) of the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance designated by the State is designed to keep noise, sedimentation, and disturbance impacts associated with the laying of pipelines away from these sensitive areas. The requirement that the Assistant Administrator for Coastal Zone Management certify permits for the construction of pipelines in the proposed sanctuary will ensure that such permits receive careful review in light of the wealth of the living resources concentrated there and the seismic activity of the area. Due to the geological instability of this region, it appears unlikely that pipelines will be used to transport oil or gas found in tracts developed pursuant to Lease Sale #53

(Charter, 1979, personal communication). However, this situation could change as new pipeline design and construction techniques are developed.

Socioeconomic Impacts of the Proposed Regulations

The adverse economic impact of the proposed regulation depends largely on two factors: the amount of hydrocarbon reserves foregone and the estimated selling price of the affected tracts. The proposed regulation is likely to have positive economic effects in the long-run by contributing to the preservation and health of renewable sources of income, such as fishing and recreation.

The prohibition outlined above could represent a loss of potentially recoverable hydrocarbon reserves; however, all available data indicates that the resources are not significant. None of the tracts selected for consideration for Lease Sale #53 fall entirely within the proposed marine sanctuary; however, two tracts fall partially within the proposed sanctuary. Since the resources underlying these two tracts would almost certainly be at least partially recoverable by means of directional drilling, this regulation would have little impact on the amount of hydrocarbons extracted from Federal leases in the next few years. In the long run, this prohibition could affect about 50 additional tracts not presently covered by the exclusion of the 1978 OCS Lands Act Amendments. These tracts received relatively few positive nominations in the call for nominations for Sale #53 (see Figure F-10). This indicates that the resource potential of these tracts is not currently thought to be high. Previous exploration in the area did not reveal economically recoverable resources (see Section E.3.b). However, projections may be modified, based on the findings resulting from exploration pursuant to OCS Sale #53 and other factors which may make recovery more economically feasible, such as increases in the price of imported oil or prohibitive costs or environmental restrictions on alternative energy sources. Thus, reliable estimates of the amount of hydrocarbons affected are on the outer continental shelf are not available. This regulation would also affect the oil and gas and State income available from the leasing of tracts located in territorial waters. Data on State resources are not available (Moory, personal communication.)

The proposed prohibition could also reduce U. S. Treasury income from offshore leasing royalties. The industry bids on tracts affected by the prohibition will be lost in future lease sales. The total amount of lost revenue cannot be estimated at this time, since potential lease prices will depend heavily on the results of petroleum development pursuant to OCS Sale #53. Given the wealth of sensitive resources within the proposed sanctuary and the present indications of low resource potential, a restriction on hydrocarbon operations is unlikely to have significant socioeconomic impacts. If activity on tracts adjoining the area indicate substantial error in this estimate, and if technology improves to reduce risks in activities, modifications in the regulations can be considered.

The additional cost of the certification requirement for pipelines cannot be estimated presently although they are unlikely to be major. Prohibiting pipeline construction within 2 nmi (3.7 km) of sensitive areas could impose costs if the most economical route were to pass through any of the 2 nmi (3.7 km) buffer areas; but such a situation does not appear likely. While a total of 112 miles of offshore pipelines, including offshore delivery and gathering lines, are projected over the life of the entire Lease Sale #53 area, no pipelines are planned for the Bodega Bay area given the most probable resource finds (U.S. Bureau of Land Management, 1980.)

Thirty-one miles of offshore pipeline are estimated for the Santa Cruz area given the same resource assumptions, however, and in the case of high resource finds a small amount of pipeline construction could occur in the Bodega area (U.S. Bureau of Land Management, 1980). The impact of the certification requirements for pipelines at this time appears low since it is unlikely that construction will occur wihin the proposed sanctuary as a result of Lease Sale 53 activities.

F.2.c.2. Discharge of Polluting Substances

No person shall deposit or discharge any material or substance 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 disposal at the interim dumpsite and municipal sewage where certified to have no significant effects on sanctuary resources in accordance with Section 936.9.

Permits issued for municipal sewage outfalls and dredge material disposal at the interim disposal site must be certified by the Assistant Administrator for Coastal Zone Managememt.

The proposed regulation prohibiting discharging and litter within the sanctuary complements the existing regulatory system, would enhance the area's overall recreational and aesthetic appeal, and help maintain the present good water quality in the sanctuary. At present, specific discharges such as oil are regulated in order to protect the marine enviornment. In particularly sensitive offshore zones, such as those designated by the State of California as Areas

of Special Biological Significance (ASBS), harmful discharges are prohibited. This prohibition does not apply to vessels (see Section F.1.6). This regulation would ensure that solid wastes will not degrade island and mainland wildlife rookeries or the area's aesthetic appeal. It would prevent floating or submerged waste debris, e.g. non-biodegradable plastic or metal objects, from being deposited in foraging areas where animals could eat or become entangled in them, possibly leading to illness or death. Pinnipeds entangled in plastic packing material or discarded fishing lines have occasionally been seen at the Farallon Islands (Morrell, 1979, personal communication). In areas of the northern Pacific Ocean as many as 8000 fur seals become entangled in such debris annually (Haley, 1978 1978). The incidence of the mortality associated with this type of mammal disturbance remains unclear.

The prohibition would also prevent future dredged material disposal or ocean dumping in the area, except during the period prior to the designation of a permanent site when disposal at the interim site within the boundaries would be allowed if certified by the Assistant Administrator. NOAA is consulting with EPA and COE regarding the permanent dredged material disposal site in the vicinity of the proposed sanctuary. An interim dredged material disposal site is currently located within the proposed sanctuary boundaries. Tentative dredging plans for San Francisco Bay could produce 40 to 50 million cubic yards of dredged material over the next 20 to 30 years which might be scheduled for deposit at the permanent deep water site. While it is impossible to predict accurately the magnitude of the future use of the site, COE has given a range of possible uses from 300,000 cubic yards per year to 1,100,000 cubic yards per year. The COE has stated that the most probable amount of disposal is 1,000,000 cubic yards per year (Daniels, 1980, personal communication.) Part of the difficulty in establishing dredging and disposal needs arises from the requirement for Congressional approval for such projects. Proposed projects which are included in the estimates may or may not be authorized by Congress.

Disposal at the interim site prior to the designation of a permanent site is likely to minimal in amount (Brown, personal communication.) In addition, the 1977 regulations under Title I of the Marine Protection, Research and Sanctuaries Act prohibit ocean disposal of dredged material which proves to be toxic to the organisms of the disposal site. Ocean disposal of any materials dredged from a site where pollution is possible must be preceded by bioassay tests to determine the effect on aspects of the marine environment. The test results will determine whether any material from San Francisco Bay may be legally dumped at any deepwater disposal site in the area under Title I, including the interim site. The requirement of certification will assure review for possible impacts without imposing undue burdens.

However, large amounts of material which meet Title I criteria for dumping may still have significant environmental impacts. The major impact is likely to be smothering of benthic organisms. A study on the release of dredged material over a 100 fathom contour site near the Farallon Islands, found a relatively abundant but not diverse

benthic macrofauna. The study concluded that most of the dumped material went straight down and covered the bottom at an average depth of about 1 foot (0.3 m). Depending on use levels of such a disposal site, smothering and oxygen depletion could significantly harm the benthic community in the area (U.S. Army Corps of Engineers, 1975.)

In light of the possibility that very large quantities of material will be dumped at the permanent disposal site in this area (see Section E.3.g.) NOAA has recommended the evaluation of a disposal site outside the sanctuary boundaries, and EPA and the COE have cooperated with that suggestion. A likely alternate site would be located at the 100 fathom depth contour about 2 miles south of the interim site. The alternate site would be somewhat more distant from the likely projects than the interim site, therefore disposal would be somewhat more expensive. COE estimates indicate that a cost increment of 6% will be incurred to travel 3 nmi further from the project site if a hopper dredge vessel is used.

Over 20 years at what COE estimates is the most likely disposal level -1,000,000 cubic yards per year-the distance will increase costs by approximately $10,000,000 dollars if the barge haul is contracted for the work. Over 30 years, COE estimates a cost increase of $20,000,000 dollars (Daniels, 1980, personal communication.) The environmental and socioeconomic impacts of the choice of a site will be fully explored in the environmental impacts statements on the project.

The prohibition of dredged material disposal in the proposed marine sanctuary may affect disposal of dredge from projects planned for Bodega Harbor. (see Section E.3.). The planned construction of a marina at Spud Point in Bodega Bay will generate dredged material. The DEIS prepared by Sonoma County on the project recommended land disposal for the dredged material. However, in response to comments on the DEIS, Sonoma County now plans to evaluate offshore disposal of dredged material. The proposed regulation on discharges would prohibit ocean disposal of dredged material south and west of Bodega Bay. However, this regulation is unlikely in itself to have a major impact on the proposed marina, due to a number of factors. First, acceptable land disposal sites do exist, as indicated by the DEIS (U.S. Corps of Engineers, 1980). Second, the sanctuary's northern boundary is at Bodega Head, so the sanctuary would not affect ocean disposal to the north, or more than 6 nmi from shore. Finally, because dredged material disposal in shallow, nearshore waters is more likely to conflict with fishing and the marine environment than deepwater disposal, it is likely that a site outside of the proposed sanctuary would be chosen in any case.

The requirement of sanctuary certification of permits for municipal sewage outfalls will ensure sactuary review of potential impacts on sensitive marine resources. The NOAA certification process will be coordinated with EPA and the State and Regional Water Quality Control Boards. Unless the Assistant Administrator determines otherwise within 60 days of receiving notice of the proposed permit, certification

shall be presumed to have been made. Initial criteria and procedure for certification appear in the proposed regulations. Procedures to assure efficient administration of sanctuary certification will be established if a sanctuary is designated (see Section F.2.e. below.)

The impact of this regulation on most sanctuary users is expected to be minor; non-biodegradable and potentially harmful trash will have to be kept on boats and disposed of at proper facilities, most likely on the mainland. The exceptions to this regulation are designed to insure continued use of the sanctuary by vessels. Fish parts, waste and bait, exhaust, vessel cooling waters, marine sanitation wastes, and biodegradable wastes, such as those from small craft galleys, are exempted specifically from the prohibition. The regulation may impose additional costs by requiring the use of more expensive dredge disposal or dumping sites or methods as discussed above. The certification requirement could also result in additional costs if the Assistant Administrator were to determine that a higher level of treatment or other, more expensive sewage disposal methods were preferable to disposal in the sanctuary. However, the Assistant Administrator will take economic considerations into account in NOAA's review. It is difficult to predict accurately the economic impact of this regulation without analyzing specific proposals.

F.2.c.3. Alteration of or Construction on the Seabed

No person shall:

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

(B) Drill through the seabed,

(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, navigation, ecological maintenance, mariculture, the construction of piers and docks in Tomales Bay, and in connection with the construction of a municipal outfall or laying of pipeline if certified by the Assistant Administrator.

Dredging activities are not extensive within the preferred alternative's proposed sanctuary boundary (see Section E.3.g); nevertheless, unrestricted alteration of or construction on the seabed represents a potential threat to particularly sensitive marine resources. Foremost among these adverse impacts would be increased turbidity levels, disruption or displacement of benthic and intertidal communities, and human intrusions near marine bird and marine mammal concentrations. The suggested regulatory restriction above will allow limited and ecologically sound dredging (particularly along the mainland) at levels fairly certain not to harm breeding grounds, haul out areas,

and foraging areas. Dredging for pipeline construction (i.e., for oil, water, and gas) is allowed subject to permitting by the California Coastal Commission, all other regulating agencies, and any sanctuary requirements on location and certification (see Section F.2.a).

This regulation will enhance resource protection by reducing the presence and operation of large, and often noisy, dredging machinery. Thus, both over the short- and long-term, human intrusion upon marine wildlife, along with potentially adverse impacts on their food supplies, e.g. benthic and pelagic fish resources, will be minimized. No severe economic imacts upon commercial firms are expected. Dredging exceptions would allow for navigational projects, the maintenance of existing facilities, mariculture, and a possible U.S. Army Corps of Engineers project for selective dredging in Bolinas Lagoon to help restore its natural ecology, which may be threatened by increased sedimentation due to development further inland (Perry 1979, personal communication.) The regulation of projects for docks and piers in the nearshore area will remain the responsibility of the existing regulatory authorities. Activities for the construction in and placement of pipelines certified by the Assistant Administrator are allowed.

The activities exempted from this regulation will be monitored by the sanctuary manager, based on information supplied by the Corps and the Coastal Commission. If the data collected demonstrate that a greater degree of sanctuary oversight is appropriate, amendments to the regulations instituting sanctuary certification procedures could be proposed.

F.2.c.4. Vessel Navigation and Operations

> 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 established by the State of California prior to sanctuary designation, 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.

To the extent consistent with international law, within 2 nmi (3.6 km) of certain sensative areas, NOAA would prohibit all other cargo vessel operations, except those necessary for access to the islands or mainland coast. Fishing, research, enforcement and recreational vessels are guaranteed access to all parts of the sanctuary and are exempted from the regulation.

This regulation will reduce certain environmental impacts within 2 nmi (3.6 km) from large commercial vessels, including:

1. Possible accidents involving groundings or collisions with nearshore vessels,

2. Illegal routine or accidental discharge of pollutants (from ballast discharge, tank washing, and bilge pumping) directly into important nearshore habitats, and

3. Visual and acoustic disruption of hauled out seals and sea lions and nesting marine birds.

The proposed regulation will reduce human intrusion into sensitive areas. Although it is difficult to predict what levels of human intrusion will disturb marine mammals and birds, unnecessary approaches to rookeries should be avoided. Frequently, birds will act as sentinels; warning signals by birds will cause hauled-out pinnipeds to flee. Shyness varies according to species, time of year, location of the animals, and nature of the disturbance, among other factors (Beach 1979, personal communication).

DeLong (1975) reported that the mere sight of a passing vessel off crowded pinniped haul-out areas has been sufficient to cause a stampede into the ocean. If pups are in the hauled-out herd, larger seals or sea lions may trample, kill, or injure smaller animals in their rush to the sea. Stampedes may also cause permanent separation of pups from their parents as a result of the confusion. Similarly, a ship approaching the shore may frighten nesting birds, thereby leaving chicks and eggs unprotected. However, other reports indicate that, on occasion, pinnipeds show relative indifference to small vessels as long as they do not land or make considerable noise (Beach 1979, personal communication). The situations surrounding observed disturbances vary widely.

Harbor seal assemblages along the mainland coast at Double Point and Bolinas Lagoon have been observed to be easily disturbed by small boats approaching close to haul-out areas (Allen 1979, personal communication). Larger commercial vessels rarely, if ever, pass close to shore here.

The buffer zone also reduces the risk that vessels will collide with the smaller recreational, fishing, or other boats. The nearshore area around the Islands, and along the mainland, is trecherous to navigate due to shallow rocky areas. Prohibiting nearshore navigation by larger vessels would thus reduce both near-island and mainland spill potentials and pollution resulting either from collisions or from accidental grounding. The buffer zone is particularly important in light of potential increases in vessel transport of oil through the proposed sanctuary. Tankers and barges now transit the Gulf to an unknown degree. Lease Sale #53's eventual oil production will likely be tug-barged from Bodega Basin tracts through sanctuary waters to San Francisco Bay refineries (Emrick 1979, personal communication). Transportation of Alaska oil may also increase. In light of this trend and of the potential need to have some buffer between any spill resulting from vessel accidents, a 2 nmi zone appears appropriate, even though a smaller area might be sufficient to prevent most visual and acoustic disturbances to wildlife.

Exclusion of certain commercial vessels from the 2 nmi (3.6 km) buffer areas described above will not result in extended travel times to port, or other major impacts on commercial shipping, because the Vessel Traffic Separation Scheme (VTSS), which lies outside this buffer area, is the most direct route for transitting the region. Compliance has been good to date (Emerson 1979, personal communication). Because the lanes appear to be a desirable safety device, NOAA considered requiring most commercial vessel traffic to adhere to the VTSS to the extent consistent with international law. However, since voluntary compliance is already universal and since mandatory conformance to the VTSS would impose substantial enforcement costs, such regulation appears unnecessary (Emerson 1979, personal communication). In addition, the on-going Coast Guard study of navigation lanes in this area made independent NOAA action inadvisable. See Section F.4 below for a more detailed discussion of this regulatory option.

NOAA has considered and rejected at this time the possible exclusion of vessels transporting oil and hazardous substances from the sanctuary, as well as the possibility of imposing special design requirements, such as double hulls, for petroleum transport vessels in the sanctuary. U.S. Coast Guard current and proposed regulations also address construction standards for vessels as well as officer competency and bridge organization; these problems are more effectively dealt with on a nationwide basis. Given the difficulty in regulating manning and construction standards for vessels in discrete areas, the on-going USCG study of traffic lanes, and the speculative nature of the projected vessel traffic increase associated with OCS Sale #53, it seems premature to propose marine sanctuary regulations to deal with these issues. NOAA will consult with DOI and USCG as studies continue and data becomes available and may propose action in the future for public review.

F.2.c.5. Disturbing Marine Mammals and Birds

> No person shall disturb marine birds and marine mammals by flying any motorized aircraft at less than 1000 feet over the waters within one nautical mile of the Farallon Islands, Bolinas Lagoon, or any Area of Special Biological Significance designated by the State of California except to transport persons or supplies to or from the Island or for enforcement.

As noted for vessels, the area-specific prohibition on overflights below 1000 feet (305 m) is designed to limit potential noise impacts, particularly those that might startle hauled-out seals and sea lions or birds nesting along the shoreline margins of the sanctuary. Intrusive overflights during sensitive biological periods would thus be minimized. The regulation would complement existing California Fish and Game overflight restrictions (see Section F.1), and those negotiated informally by the U.S. Fish and Wildlife Service, the USCG, and the Point Reyes Bird Observatory for certain portions of the Farallon Islands. In particular, adjacent water areas where marine animals forage would receive additional protection from

potentially disruptive overflights. The 1000 ft (305 m) minimum height parallels the National Marine Fisheries Service's selective prohibition of overflights under 1000 ft (305 m) in areas where marine wildlife harassment is likely. Private recreational overflights, which occur regularly but almost entirely along the mainland coast, e.g., for whale migration watching, would be affected. There are no commercial charters operating here.

NOAA has received reports of low-level military overflights over Bolinas Lagoon and other sensitive areas. However, after extensive investigation, NOAA has not been able to identify any department in the Department of Defense which currently conducts overflights below 3000 feet (915 m) in the areas where low-level overflights are prohibited. If such overflights continue to occur after sanctuary designation, NOAA will identify and consult with the responsible department as provided for in Article 5, Section 2 of the draft Designation.

This regulation will contribute to the protection of natural undisturbed behavior patterns of marine mammals and marine birds concentrating and breeding along island and mainland shorelines. Necessary and reasonable uses of the area's air space, such as Coast Guard search and rescue operations and helicopter landings on Southeast Farallon, would be exempted. Because no commercial airlines fly regular routes over the Islands at these low altitudes, this regulation should pose no burden on other commercial airline carriers. Private planes will still be able to enjoy general scenic and whale observation opportunities, albeit from altitudes of 1000 feet (305 m) or above.

F.2.c.6. Removing or Damaging Historical or Cultural Resources.

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

This regulation is aimed at protecting archaeological or paleontological resources from damage and/or removal. NOAA will also seek National Register listing of identified resources located in the sanctuary under the National Historic Preservation Act, in addition to listings now existing for the Farallon Islands. Listing would make available grant and survey funds from the Secretary of the Interior (Heritage Conservation and Recreation Service) to be used to identify resource distributions and assess their significance. Placement on the National Register also insures careful review of proposed Federal activities which could adversely affect identified resources. However, listing does not prevent removal or damage of the resource by non-Federal entities. The proposed regulation should not significantly affect activities within the sanctuary.

F.2.d. Certification of Other Permits

Except as otherwise provided, 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 sanctuary regulations.

No permit, license, or other authorization allowing the discharge of municipal sewage, the laying of any pipeline, or the discharge of dredged material at the interim dredge disposal site shall be valid unless certified by the Assistant Administrator of OCZM as consistent with the purposes of the sanctuary.

The requirement for sanctuary certification of permits for municipal outfall and pipeline placement will ensure that these potentially harmful activities receive special consideration from the sanctuary viewpoint. However, where it can be demonstrated that these activities will not conflict with the purposes of the sanctuary, they may be allowed, thus possibly preventing adverse economic impacts. The certification of permits for dredge disposal at the interim site will allow disposal in the unlikely event that such action is necessary prior to designation of a permanent site. (see Section F.2.c. for discussion). The automatic certification of other permits that do not conflict with sanctuary regulations will prevent delays and inconvenience to the permit applicant.

F.2.e. Other Activities

Permits for certain activities

Permits to conduct specific activities which are otherwise prohibited by sanctuary regulations may be issued by the Assistant Administrator of the Office of Coastal Zone Management if the activity is: (1) research related to the resources of the sanctuary (2) to further the sanctuary's education value, or (3) for salvage or recovery operations.

A permit system would allow activities which would otherwise be prohibited by sanctuary reulations. For instance, a study of the effects of the introduction of pollutants could be permitted if it would contribute toward increased understanding of the sanctuary area and its resources and would not cause substantial harm. The primary advantages of the permits would be to allow research projects which could not be allowed on an uncontrolled basis, and to enable more effective management of the resources. OCZM will coordinate the permit process together with those of existing systems, as under the Marine Mammal Protection Act and the Endangered Species Act.

Defense Activities

> The regulations shall not prohibit any activity conducted by the Department of Defense that is essential for national defense or because of emergency. Such activities shall be conducted consistently with the sanctuary regulations to the maximum extent practicable.

NOAA has no information to indicate that military operations as currently conducted in sanctuary waters harm the sanctuary's marine

mammal, marine bird, fish, or intertidal marine life. The U. S. Navy's curtailment of flash-bombing runs and low overflights near the Farallon Islands indicates a willingness to consider the interests of marine resources protection. Interaction with the U.S. Fish and Wildlife Service and PRBO scientists is maintained informally in this regard.

Nevertheless, further NOAA/Navy consultation efforts might enhance protection of marine life in the area. Increased protection might be realized through regular monitoring, and through studies which would coordinate military operations and provide guidance to assure minimum interference with critical life stage periods and habitat areas of significant marine life. Since military operations necessary for national defense or emergency will not be prohibited, the sanctuary will not significantly inhibit military activities.

Fishing, Mariculture, and Plant Harvesting

> Fishing, mariculture, plant harvesting and hunting are not subject to sanctuary regulation.

In its decision advising NOAA to proceed with the preparation of a Draft Environmental Impact Statement for the proposed marine sanctuary, the California Coastal Commission (CCC) also recommended that the management of certain living resources remain under the jurisdiction of the California Department of Fish and Game (DFG) and the Pacific Fisheries Management Council (PFMC). In its evaluation of this issue, NOAA considered whether, under the present regulatory structure, sufficient protection for sanctuary resources existed.

NOAA did evaluate the possibility of proposing some sanctuary management of this activity. However, the existing management authorities, the California DFG within State waters and the PFMC beyond State waters, have comprehensive management authority over these resources. Moreover, the long-term interests of these agencies parallel those of the marine sanctuary: ensuring healthy stocks and protecting important habitats. Therefore, no significant advantage would be gained by adding the additional perspective of the sanctuary managers to decisions on management of these stocks and, by relying on the existing arrangements, NOAA will avoid duplication of regulations and programs. In addition, the close coordination and consultation which has already been initiated between the DFG and NOAA and which will be expanded to include the PFMC, indicates that sanctuary concerns, if any, will be fully communicated to the authorities dealing with these on-going management issues.

NOAA will consider the possibility of making funds available for technical assistance for studying the area's marine finfish, shellfish, and plant resources and for strengthening the present enforcement capabilities of the DFG and other enforcement entities including the National Park Service and the Coast Guard.

F.3. Alternatives 3a and 3b

Alternative 3a

Boundaries

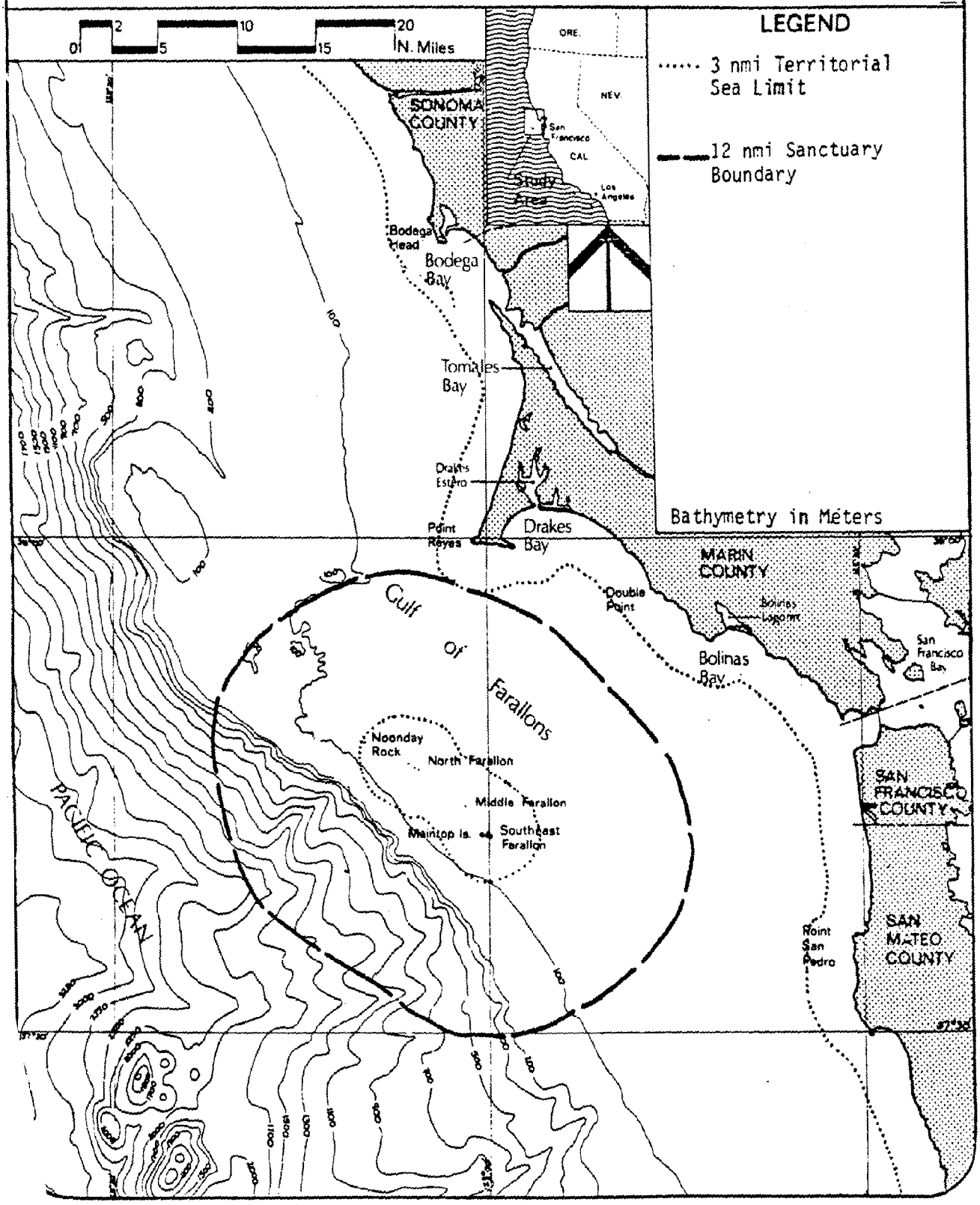
Alternative 3a is one of two options considered by NOAA that include waters only around the Farallon Islands. The sanctuary would include only the waters within 12 nmi (22.2 km) around the Farallon Islands, beginning at the mean high tide line and including State waters (Figure F-11). Because it includes only island waters, the alternative excludes the marine life and habitat areas along the mainland coast. Consequently, it fails to integrate nearshore and island ecosystems into one sanctuary management entity, and the non-regulatory aspect of assessment, education, long-term planning and coordination-would not extend to the important issues raised by such integration.

Regulated Activities

The provisions for management and for protection with respect to discharges, vessel traffic, disturbing marine mammals and birds, fishing and plant harvesting, military activities, and research and education are the same as those in the preferred alternative, except that they would apply to a smaller area. Seabed alteration and construction prohibitions are similar to those of the preferred alternative, except that the exemptions for maintenance, construction and navigational dredging are unnecessary for an Islands-only sanctuary. This alternative includes no provisions protecting historical resources. Alternative 3a would prohibit oil and gas activities within 6 nmi (11.1 km) of the Farallon Islands. Petroleum operations in the sanctuary between 6 and 12 nmi (11.1 and 22.2 km) from the Islands would have to meet certain on-site oil spill contingency requirements, to be determined by NOAA in consultation with the Department of the Interior and the State of California and any other applicable authorities. Pipeline placement would be allowed subject to existing controls.

As noted in Section F.2, while oil and gas development here is not planned for the near future (with the exception of two tracts from OCS Sale 53, which lie partially in this boundary alternative), it could still occur, particularly beyond the 15 smi (24 km) excluded from leasing by the 1978 OCS Lands Act Amendments. If oil and gas activities were to proliferate within the sanctuary's outermost 6 to 12 nmi (11.1 to 22.2 km) band, the overall level of protection guaranteed in waters around the Farallon Islands would diminish. The management provisions for alternative 3a would probably closely resemble those for the preferred alternative. NOAA would continue to seek cooperative agreements with approriate State and Federal agencies to ensure that protective provisions applied in the sanctuary compliment and further those in adjacent waters along the mainland coast. These arrangements would be designed to coordinate sanctuary decision-making with that of other Federal entities so as to minimize opportunities for conflict or mutually exclusive resource policies and objectives.

FIGURE F-11. Alternative 3a.



Comparison with the preferred alternative

Alternative 3a focuses on a discrete habitat area, unlike the preferred alternative, which incorporates several different species and habitat types. In addition, this alternative would impose a smaller burden in terms of management. However, this alternative has been rejected in favor of the preferred alternative for the following reasons. First, the boundary does not encompass nearshore marine life and habitat of regional significance. Second, its 6 nmi (11.1 km) buffer would provide substantially less protection against potential adverse oil and gas activity impacts on marine bird populations and rookeries. This provision, furthermore, would not prevent OCS development in State waters along the mainland and thus does not support the 1978 OCS Lands Act Amendments, which prohibit Federal oil and gas leasing off Point Reyes only as long as no oil and gas development occurs in the adjacent State waters (see Sections F.1.b and F.2). Since there is no prohibition on pipeline placement near the Islands, rookeries and haul-out areas could be affected by disturbances associated with the laying of pipelines. Third, while adverse sea and weather conditions already make underwater archaeology an extremely difficult exercise in Island waters, the lack of protection could lessen the sanctuary's historical research and education value. Finally, research and public awareness would suffer from access problems. Designation of a sanctuary out of reach for most of the general public, combined with no consideration for other nearby valuable resource zones that are more accessible, would undermine many of the management objecties identified under alterative 2.

NOAA also considered the possibility of a marine sanctuary extending only 6 nmi (11.1 km) around the Farallons. While this alternative would reduce the management burden considerably, it would also greatly decrease the level of protection afforded. Such an alternative not only suffers from the drawbacks of alternative 3a discussed above, but would provide a less substantial buffer against the impacts of oil and gas activities.

Alternative 3b

Boundaries

This alternative sanctuary would consist of the waters between 3 and 12 nmi (5.5 and 22.2 km) around the islands, thus excluding State waters (see Figure F-12).

Like alternative 3a, this alternative orients its boundary and regulatory provisions to the Farallon Islands rather than the broader study area. However, it would exclude State waters from sanctuary designation, creating separate units for management delineated by the limits of the territorial sea. Many of the most important habitats of valuable marine resources that concentrate around the Farallon Islands and along the mainland coast would not be included in the sanctuary. This exclusion, even if cooperative agreements were executed between

NOAA and the State, renders long-term planning, research, and educational programs less significant because they would not address fully the most important resource areas. This failure to include important natural resource areas within the boundary compromises the potential for the sanctuary designation to assure long-term preservation of the critical resources.

Provisions to establish: (1) a Sanctuary Information Center, (2) a registry of research projects, (3) a monitoring program for human uses and sanctuary resources, and (4) an effort to encourage non-consumptive research would be similar to those described under the preferred alternative, except they would apply to a smaller geographic area of less direct resource significance. In terms of research, the exclusion of State waters will significantly lower the number of research projects subject to sanctuary management because: (1) the inshore waters (where marine life tends to concentrate) are attractive to a variety and number of research projects, and (2) the geographic area is significantly smaller. Since the sanctuary boundaries under this alternative almost exclusively include deeper waters where the likelihood of finding archeological resources is remote, initiation of a cultural resources inventory is not considered appropriate. NOAA would seek cooperative agreements with appropriate State agencies to ensure that protective provisions applied in the sanctuary complement and further the resource protection objectives of the adjacent State waters. These agreements would be designed to coordinate State and sanctuary decision making and to reduce the potential that actions by either party would negate resource protection policies and objectives of the other.

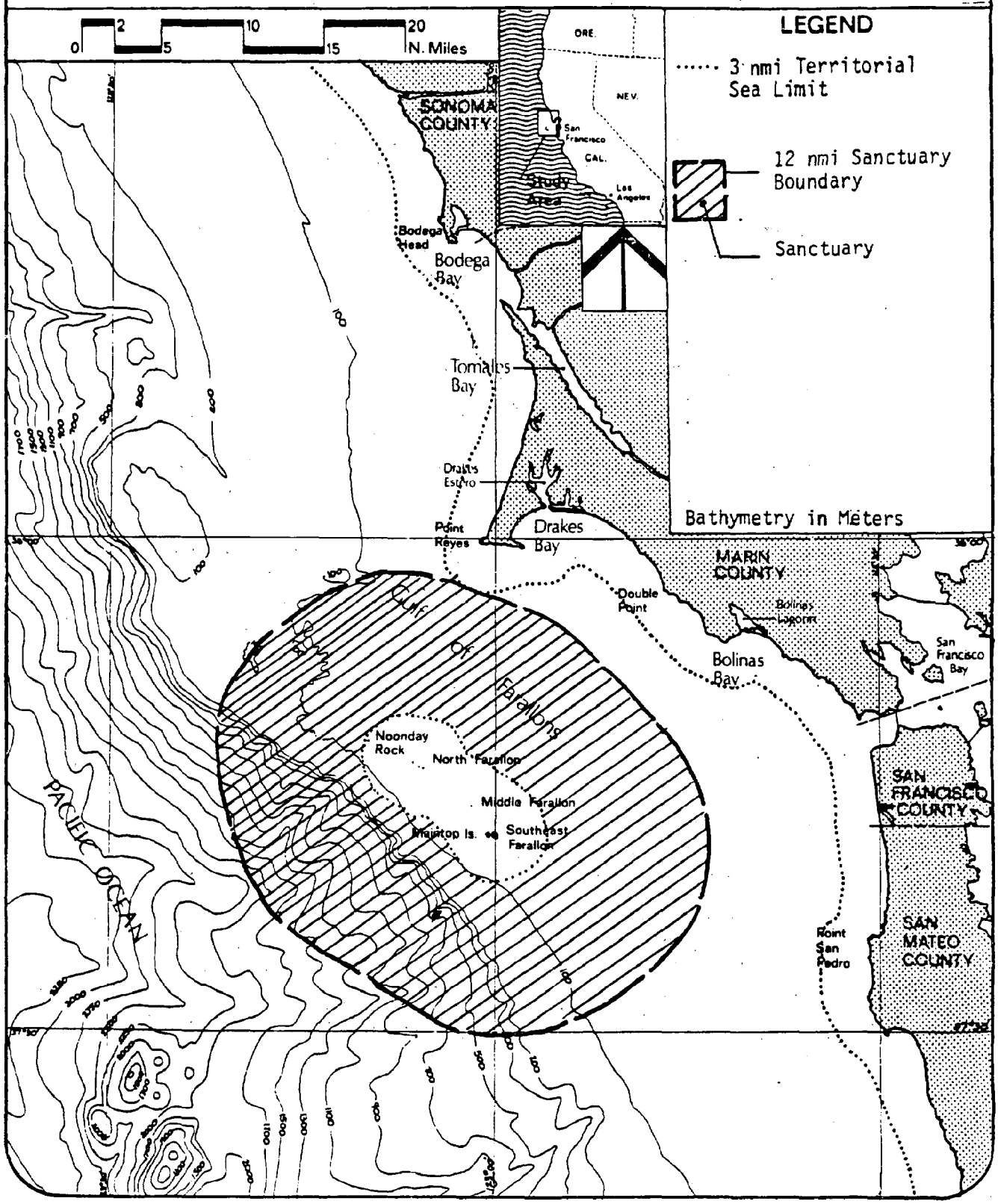
Regulated activities

Under this sanctuary alternative, provisions for hydrocarbon operations, discharges, fishing and plant harvesting, military activities, research and education, and management are similar to the preferred alternative, except that they apply to a smaller area. Restrictions on seabed alteration and construction parallel those for alternative 3a, except that they do not affect territorial waters. No regulations are proposed for vessel traffic, disturbing marine birds or mammals, or historic resources, because exclusion of State waters eliminates those areas where controls would be most warranted.

Comparison with the preferred alternative

This alternative has been rejected in favor of the preferred alternative for several reasons. First, it suffers many of the same disadvantages as alternative 3a, through its exclusion of the study area's mainland coastal zone. In addition, because marine birds and marine mammals and other important resources concentrate immediately around the Islands, the exclusion of State waters would impede coordinated management of the interrelated marine resources which move between the territorial sea and waters further offshore. The exclusion of State waters limits the potential of the proposed sanctuary to achieve long-term protection and management of important resources.

FIGURE F-12. Alternative 3b.



Omission of State waters from prohibitions on hydrocarbon operations and discharges could decrease marine bird and marine mammal protection. Although it is not likely in the foreseeable future, California might pursue OCS exploration in these waters, as there is no legal constraint on such an action. Unlike the preferred alternative, Alternative 3b would open the possibility that occasional, and perhaps cumulatively harmful degredation might damage marine resource quality within, as well as beyond, the territorial sea.

Alternative 3b cannot monitor or control vessel traffic and disturbances due to overflights very close to the Farallon Islands and accidental and intentional intrusions near marine bird or marine mammal breeding or haul-out zones could increase. Although adverse weather conditions and concern for navigational safety discourage vessel traffic near the Islands, if the territorial sea is excluded from sanctuary protection, the risk of groundings and associated ecological damage, e.g., oil pollution, would remain a concern lying outside the scope of sanctuary regulation.

In terms of management, even with cooperative agreements with other agencies and the other sanctuary provisions relating to the information center, promoting awareness of sanctuary resources, the failure to include the most important natural resource areas within the sanctuary boundary compromises and restricts the likelihood that sanctuary designation will achieve long-term protection of critical resources.

Management of a "donut" sanctuary designation emphasizes Federal implementation and excludes the adjacent State system. Coordination is likely to be more difficult because of the peripheral involvement of State agencies in decision-making and implementation of sanctuary regulations. Other disadvantages of alterative 3b are outlined above under alternative 3a.

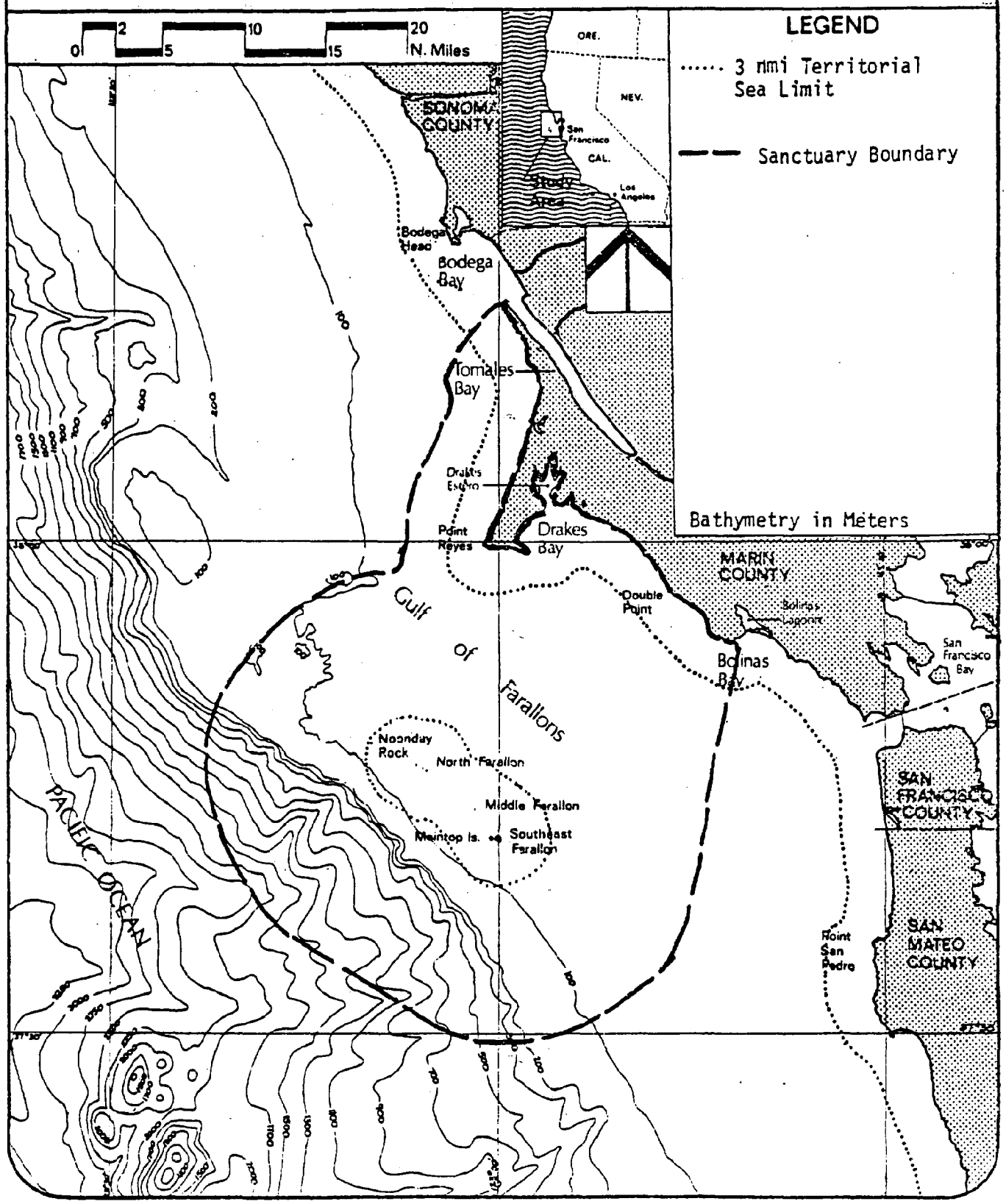
F.4. Alternative 4

Boundaries

The sanctuary consists of waters 12 nmi (22.2 km) around the Farallon Islands, waters 6 nmi (11.1 km) seaward of the mean high tide line on the mainland coast between Tomales Point and Bolinas Head and all intervening waters between the Farallon Islands and Figure F-1.

This boundary alternative differs from the preferred alternative in two ways. First, it does not include the waters extending offshore between Tomales Point and Bodega Head and between Bolinas Head and Rocky Point. Second, it extends all the way to the mean high tide line along the mainland coast rather than stopping at the boundary of the Point Reyes National Seashore (PRNS) which extends 0.25 nmi (0.46km) offshore.

FIGURE F-13. Alternative 4.



The provisions regarding oil and gas activities, historical resources, fishing, military activities, and research and education are identical to those of the preferred alternative, except that they apply to a smaller area. The regulations on discharges and seabed alteration and construction are similar to those in the preferred alternative, except that municipal outfalls would not be allowed. Under this alternative, to the extent consistent with international law, commercial vessels travelling parallel to established shipping lanes would be required to stay in the lanes while transitting sanctuary waters, although certain vessels, such as fishing vessels would be exempt. The prohibition against disturbing marine mammals and birds would extend the prohibition on low aircraft overflights to a 2 nmi (3.7 km) zone around the Islands, Bolinas Lagoon, and Areas of Special Biological Significance. Airplanes would have to maintain a minimum elevation of 3000 ft (915 m) above these waters, except to transport persons or supplies to or from the Islands or for enforcement. Finally, alternative 4 would prohibit the use of firearms throughout the sanctuary.

Comparison with the preferred alternative

The non-regulatory management of this alternative sanctuary would parallel that proposed for the preferred alternative. However, the boundaries of alternative 4 omit significant habitat areas, including Bodega Bay, Tomales Bay, Bolinas Lagoon, Estero Americano, and Estero de San Antonio. These areas support major fish, shellfish, intertidal, and bird populations (see Section E). In addition, by extending to the mean high tide line on the mainland, the sanctuary will overlap with the Point Reyes National Seashore, which already enjoys protected status and is administered by the National Park Service. NOAA, after consultation with the Park Service, determined that no significant advantage would be gained by including the quarter mile of Point Reyes National Seashore in the sanctuary. In general, NOAA has determined that the level of protection provided in the preferred alternative is appropriate and that the more restrictive provisions evaluated in alternative 4 are not necessary to preserve the resources of the sanctuary. For instance, under alternative 4, municipal outfalls are completely prohibited, rather than allowed if certified by the Assistant Administrator. Since this smaller alternative borders on the Point Reyes National Seashore along its mainland boundary, it appears unlikely that development would bring about a need to allow municipal waste outfalls in this area. Thus, while this greater restrictiveness is unlikely to create major costs, it does eliminate flexibility which may be desirable in the long term. The preferred alternative retains enough flexibility to protect a larger area while still guarding against unnecessary or harmful discharges.

The expansion of the 1 nmi (1.8 km) zone around the Farallon Islands and sensitive areas (from which overflights below 1000 ft (305 m) are excluded) to a 2 nmi (3.7 km) zone as suggested in this alternative, seems unwarranted. Overflights beyond 1 nmi (1.8km) are less likely to disturb marine mammals or birds on or near land, which is where they are most vulnerable to disturbance, particularly during the breeding and nesting period. Raising the minimum height of overflights

to 3000 ft (915 m) would reduce the noise level on the ground. However, this height would exceed the generally applied standards of 1000 ft imposed by DFG, USFWS, and NMFS to protect wildlife from harassment. The 1000 ft (305m) level also lends itself to enforcement, since below that height an observer from the ground can read the identifying wing numbers on the low flying airplanes.

The possibility of requiring adherence to shipping lanes has been rejected for a number of reasons. First, U.S. Coast Guard records show that voluntary compliance with the VTSS is virtually complete and an additional regulation requiring compliance does not seem necessary. Furthermore, such a requirement could be applied to foreign flag vessels only to the extent consistent with international law, which may limit its impacts in any event. Most importantly, the U.S. Coast Guard has authority to designate mandatory port access routes (PAR) and has an ongoing study to determine the desirability of a range of measures to increase navigational safety, including relocation of the shipping lanes, in the area of the proposed sanctuary. In light of this study, the consideration that the Coast Guard will give to other uses and resources of the area, including a possible marine sanctuary, and the likely increase in monitoring and enforcement costs, imposing mandatory shipping lanes through sanctuary regulations is not advisable.

Finally, a prohibition on the use of firearms appears unnecessary in light of DFG regulations prohibiting the use of firearms within 1 nmi (1.8km) of the Farallon Islands, and regulating their use elsewhere. Federal regulations currently prohibit the taking of marine mammals and non-game migratory birds. A prohibition on the use of firearms would prevent the hunting which occurs in portions of the proposed sanctuary, as allowed and managed by DFG. While enforcement might be simplified under a prohibition, this benefit does not appear sufficient to justify a complete elimination of controlled hunting. In sum, the possible advantages of this alternative do not appear sufficient to warrant its selection over alternative 2.

G. Literature and Personal Communications Cited

(a) General Reference

Ainley, D. G. 1976. The occurrence of marine birds in the coastal region of California. Western Birds, Vol. 7, No. 2, pp. 33-68.

Ainley, D. G., H. R. Huber, R. P. Henderson and T. J. Lewis. 1977a. Studies of marine mammals at the Farallon Islands, California, 1970-1975. Final Report to U. S. Marine Mammal Commission, November 1977. 42 p.

Ainley, D. G., H. R. Huber, R. P. Henderson, T. J. Lewis and S. H. Morrell. 1977b. Studies of marine mammals at the Farallon Islands, California, 1975-1976. Supplements 1974-1970 Report. 32 p.

Amoco Cadiz. 1980. Fate and Effects of the Oil Spill. Proceedings of November 1979 Conference. Brest, France (forthcoming January, 1980).

Association of Monterey Bay Area Governments. 1978. A matter of values. Nominations and comments on leasing on the outer continental shelf, Central and Northern California. Monterey, CA. 60 p.

Bean, M. 1977. The evolution of national wildlife law. Council on Environmental Quality.

Boesch, D. F., et al. 1973. Oil Spills and The Marine Environment.

Bolin, R. L. 1975. Phylum Chordata: Intertidal fishes. Intertidal Invertebrates of the Central California Coast. 34th Edition. U. C. Press, Los Angeles. pp. 656-668.

Burge, J. R. and S. A. Schultz. 1973. The marine environment in the vicinity of Diablo Cove with special reference to abalone and bony fishes. California Department of Fish and Game. Marine Resources Technical Report 19:433.

California Coastal Zone Conservation Commission. 1975. California coastal plan.

California Department of Fish and Game (DFG). 1979a. Marine life refuges and reserves of California. 53 p.

California Department of Fish and Game. 1979b. Living marine resources of the proposed Point Reyes-Farallon Islands Marine Sanctuary. Prepared by The Resources Agency. Sacramento, California. 31 p.

California Department of Fish and Game and Department of Commerce. 1978. Cooperative Agreement on Fishing (December 3, 1978).

California Department of Parks and Recreation. 1979. Underwater parks master plan. Preliminary Draft. Sacramento, California. 67 p.

California Fish and Game Commission. 1978. Orders, rules, and regulations for 1978. Title 14, California Administrative Code--Natural Resources; Divisions 1-7.

California Office of Planning and Research. 1978. Staff analysis for the State's response to the call for nominations and comments for Outer Continental Shelf (OCS) Lease Sale #53 (Central and Northern California). Memorandum, July 3, 1978.

California Resources Agency. 1970. The offshore petroleum resources. Sacramento, CA. California State Lands Commission. 1976. Hydrocarbon Potential of California offshore lands and San Pablo Bay.

California State Lands Division. 1978. State response to proposed Lease Sale #53. (Memorandum to California Office of Planning and Research, July 3, 1978).

California Water Resources Control Board. 1976a. Water quality control plan for ocean waters of California.

California Water Resources Control Board. 1976b. Areas of special biological significance. 55 p.

California Water Resources Control Board 1978. Annual Report.

Chan, G. L. 1973. A study of the effects of the San Francisco oil spill on marine organisms. In Proceedings of a Joint Conference on Prevention and Control of Oil Spills. Washington, D. C. March 10-15, 1970. pp. 739-781.

Chan, G. L. 1977. The Five Year Recruitment of Marine Life After the 1971 San Francisco Oil Spill. Proceedings of the 1977 Joint Conference on Prevention and Control of Oil Spills. New Orleans, Louisiana. March, 1977.

Chan, G. L. 1979. Reconnaissance survey of Double Point, Point Reyes Headlands, and Bird Rock ASBS. Three ASBS reports. California Department of Fish and Game. State Water Resources Control Board. June, 1979.

Clendenning, K. A. 1960. Physiology of giant kelp. Quarterly Progress Report, Jan. 1-31. March 1960. Kelp Investigation Program. University of California Institute of Marine Research. IMR Ref. 60-8:9-13.

Cooper, A. W. 1974. Salt marshes in coastal ecosystems of the United States. Volume II. Conservation Foundation. Washington D. C. pp. 55-98.

Dalby, B. 1979. "San Francisco Beach Diving." Skin Diver. June, 1979. pp. 48-53.

Daugherty, A.E. 1965. Marine Mammals of California 1972 Revision. California Department of Fish and Game. Sacramento, CA. 91 p.

DeLong, R. L. 1975. San Miguel Island Management Plan for the Marine Mammal Commission. Washington, D. C. 1975. 38 p.

Emery, K. O. 1960. The sea off southern California. John Wiley and Sons. New York, N. Y.

Frey, H. W. (Ed.) 1971. California's living marine resources and their utilization. State of California. The Resources Agency. Department of Fish and Game. 148 p.

Geraci, J.R. and T.G. Smith. 1977. Consequences of Oil Fouling on Marine Mammals. In. D.C. Malins (ed.) Effects of Petroleum on Arctic and Subarctic Marine Environments and Organisms. Volume II. Biological Effects. Academic Press. New York, NY. pp. 399-409.

Gerard, U. A. 1976. Some aspects of material dynamics and energy flow in a kelp forest in Monterey Bay, California. Ph.D. Dissertation. University of California, Santa Cruz.

Giguere, P. E. 1970. The natural resources of Bolinas Lagoon: Their status and future. State of California. Department of Fish and Game. 107 p.

Gracey, Admiral J.S. 1979. Commander Coast Guard Pacific Area and Twelfth Coast Guard District. Comments before the House Select Committee on the Offshore Continental Shelf. August 29, 1979.

Haley, D. (Ed.). 1978. Marine mammals. Pacific Search Press. Seattle, WA. 250 p.

Hawkes, J. 1977. Morphological abnormalities produced by hydrocarbon exposure. In D. A. Wolfe (Ed.). Fate and Effects of Petroleum Hydrocarbon in Marine Ecosystems and Organisms. Pergamon Press. New York, NY.

Holmes, W. N. and J. Cronshaw. 1977. Biological Effects of Petroleum on Marine Birds. In D. C. Malins (Ed.). Effects of Petroleum on Arctic and Subarctic Marine Environments and Organisms. Volume II. Biological Effects. Academic Press. New York, NY. pp. 359-398.

Kellogg, M. G., B. E. Bowman, C. Chaffee, D. Drake, E. Fogarine, S. Gray, S. Sturgle, B. Weitbrecht, and M. J. Herz. 1978. Reconnaissance survey of the Farallon Islands Area of Special Biological Significance. Farallon Research Group. Oceanic Society, San Francisco, CA. 148 p.

Kooyman, G. L., R. W. Davis, and M. A. Castellini. 1977. Thermal conductance of immersed pinniped and sea otter pelts before and after oiling with Prudhoe Bay crude. In D. A. Wolfe (Ed.). Fate and Effects of Petroleum Hydrocarbons in Marine Ecosystems and Organisms. Pergamon Press. New York, NY. pp. 151-157.

Kooyman, G. L. and D. P. Costa. 1979. Effects of Oiling and Temperature Regulation in Sea Otters. 1979.

Lindstet-Siva, J. 1976. Oil Spill Response Planning for Biologically Sensitive Areas of the Santa Barbara Channel. Atlantic Richfield Co., Los Angeles, California. 31 p.

MacGinitie, G. E. 1935. Ecological aspects of a California marine estuary. American Midland Naturalist 16:629-795.

Magee, D. T., 1980 Chevron U.S.A. Inc. San Francisco, Ca. May 14, 1980

Mc Auliffe, C.D. "The Environmental Impact of an Offshore Oil Spill", report from Workshop on "Impacts, Fates and the Effects of Petroleum in the Marine Environment", Ocean Affairs Board, National Academy of Sciences, Washington, D.C. 1973 pp. 224-279.

McLean. 1962. Sublittoral ecology of kelp bed of the open coastal areas near Carmel, California. Biology Bulletin. Volume 122, pp. 95-114.

Michael, A. D. 1977. The Effects of Petroleum Hydrocarbons on Marine Populations and Communities. In D. Wolfe (Ed.). Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems. Pergamon Press. New York, NY. pp. 129-237.

Miller, D. J. and R. N. Lea. 1972. Guide to the coastal marine fishes of California. California Department of Fish and Game. Fish Bulletin 157. 235 p.

Minder, C. S. III. 1971. Sublittoral ecology of the kelp beds off Del-Monte Beach, Monterey, California. Unpublished MS thesis. USN Post-graduate school, Monteray, Ca.

National Academy of Sciences. 1975. Petroleum in the marine environment. Report of the U. S. National Academy of Sciences. Washington, D. C.

National Marine Fisheries Service. 1978. The Marine Mammal Protection Act of 1972 Annual Report. U.S. Department of Commerce. National Oceanic and Atmospheric Administration. U.S. Government Printing Office. #0-261-238/190. Washington, D.C. 183 p.

National Oceanic and Atmospheric Administration. 1976. Nautical chart No. 18645.

National Oceanic and Atmospheric Administration. 1979. Georges Bank Marine Sanctuary Issue Paper. Office of Coastal Zone Management. Washington, D. C. July 27, 1979.

National Park Service (U.S. Department of the Interior). 1976. Natural resources management plan and environmental assessment. Point Reyes National Seashore. 87 p.

National Park Service. 1978. Statement for management. Point Reyes National Seashore. 61 p.

North, W. J. and C. L. Hubbs (Eds.) 1968. Utilization of kelp bed resources in Southern California. California Department of Fish and Game. Fish Bulletin 139. 264 p.

Noshkin, V. E., K.M. Wong, T.A. Jokela, R.J. Eagle, and J.L. Brunk. 1978. Radionuclides in the Marine Environment near the Farallon Islands. Lawrence Livermore Laboratory. University of California. Livermore, California. 17 p.

Oceanic Society. 1978. Farallon Research Group. Reconnaissance Survey of the Farallon Islands Area of Special Biological Significance. Prepared for the California Department of Fish and Game. 153 p.

Oil and Gas Journal. 1977. (8/22/77).

Osborne, T. O. and J.G. Reynolds. 1971. California marine bird breeding ground survey, 1969-1970. California Department of Fish and Game. Wildlife Management Branch Administrative Report 71-3. 9 p.

Pacific Fishery Management Council. 1978a. Final Environmental Impact Statement and fishery management plan for the northern anchovy fishery. Prepared by the Pacific Council and NMFS, Terminal Island, California. 131 p.

Pacific Fishery Management Council. 1978b. Final Environmental Impact Statement and fishery management plan for commercial and recreational salmon fishery. Prepared by the Pacific Council and NMFS, Portland, Oregon. 156 p.

Pacific Fishery Management Council. 1978c. Draft Environmental Impact Statement and fishery management plan for the California, Oregon, and Washington groundfish fishery. Prepared by the Pacific Council and NMFS, Seattle, Washington. 165 p.

Pacific Fishery Management Council. 1979. Draft fishery management plan for the jack mackerel fishery. Prepared by the Pacific Council and NMFS, Terminal Island, California. 90 p.

Patten, B.G. 1977. Sublethal Biological Effects of Petroleum Hydrocarbon Exposures: Fish. In D. C. Malins (Ed.) Effects of Petroleum on Arctic and Subarctic Marine Environments and Organisms. Academic Press. New York, NY. pp. 319-332.

Pearse, J.S. 1971. A kelp bed as a classroom. Unpublished manuscript prepared by J.S. Pearse and 16 students on file in the Hopkins Marine Station, Pacific Grove.

Phillips, R. C. 1974a. Kelp beds. In Coastal Ecosystems of the United States. Volume II. Edited by H. T. Odum, B.J. Copeland, and E. A. McMahan. Conservation Foundation. Washington, D.C. pp 442-298.

Phillips, R.C. 1074b. Temperate grass flats. In Coastal Ecosystems of the United States. Edited by H.T. Odum, B.J. Copeland, and E.A. McMahan. Conservation Foundation. Washington, D.C. pp. 244-299.

Pinkas, L. 1977. California marine fish landings for 1975. The Resources Agency. Department of Fish and Game. 55 p.

Point Reyes Bird Observatory. 1978. Annual report. Stinson Beach, California. 16 p.

Quast, J.C. 1968. Fish fauna of the rocky inshore zone. In Utilization of Kelp-bed Resources in Southern California. W. J. North and C.L. Hubbs, editors. California Department of Fish and Game. Fish Bulletin 139:35-55

Rice, D. W. and A.A. Wolman. 1971. The life history and ecology of the gray whale (Eschrichtius robustus). Amer. Soc. Mammal. Spec. Pub. No.A.

Riddle, F.A. 1955. Archeological Excavations on the Farallon Islands, California. U.S. Archeolegical Survey, AR 32:1-18.

Samuels, W. B. and K. J. Lanfear. 1980 An oil spill risk analysis for central and northern California (proposed OCS Sale #53) outer continental shelf lease area. U.S. Geological Survey. Open File Report #80-211.

Smith, E. J., Jr., O. H. Fry, Jr., H. W. Frey, J. Speth, A. Rutsch, and L. Fisk. 1976. Coastal county fish and wildlife resources and their utilization. University of California Sea Grant Marine Advisory Program in cooperation with the California Department of Fish and Game. 258 p.

Smith, W.G. and A. Wells. 1977. Biological and fisheries data on striped bass, Morone saxatilis (Walbaum). National Marine Fisheries Service, Sandy Hook, N.J. Technical Series Report No. 4. 42 p.

Squire, J.L., Jr. and S.E. Smith. 1977. Anglers' guide to the United States Pacific Coast: Marine fish, fishing grounds, and facilities. U.S. Department of Commerce, NOAA, NMFS. 139 p.

Standing, J., B. Browning, and J.W. Speth. 1975. The natural resources of Bodega Harbor. State of California. Department of Fish and Game. 183 p.

U.S. Army Corps of Engineers. 1976. Water-borne commerce of the United States.

U.S. Army Corps of Engineers. 1975. Dredge Disposal Study, San Francisco Bay and Estuary. Appendix L, Ocean Disposal. September, 1975.

U. S. Bureau of Land Management. 1980. Draft environmental impact statement OCS Sale #53. Volumes 1 & 2. U.S. Department of the Interior. April 1980

U.S. Bureau of Land Management (BLM). Final Environmental Impact tr Statement of OCS Sale 35. Volumes 1-5. U.S. Department of the Interior. Pacific OCS Office. Los Angeles, CA.

U. S. Bureau of Land Management. 1978a. Environmental statement tract selection, proposed Lease Sale #53. Pacific Offshore Continental Shelf Office, Los Angeles, California.

U.S. Bureau of Land Management (BLM). 1978b. Department of the Interior News Release (October 11, 1978) and accompanying tract list for OCS Lease Sale 53.

U.S. Bureau of Land Management. 1978c. Northern California OCS environmental studies plan, fiscal year 1979. Pacific OCS Office, Bureau of Land Management, Los Angeles, California.

U.S. Bureau of Land Management. 1979a. Final environmental statement OCS Sale No. 48. Volumes 1-5. U.S. Department of the Interior. Bureau of Land Management. Pacific OCS Office. Los Angeles, California.

U.S. Bureau of Land Management. 1979b. Unit resource material. Unpublished background data for proposed OCS Lease Sale #53.

U.S. Bureau of Land Management. 1979c. Historic resource surveys in the Lease Sale #53 OCS area. (Unpublished Report).

U.S. Congress. Conference Report 95-1474, 95th Cong. 2nd Session.

U.S. Department of the Interior. 1979. Proposed 5-year OCS Lease schedule. June, 1979.

U.S. Department of the Interior. 1980. Final environmental impact statement on proposed five year OCS oil and gas lease sale schedule March 1980-February 1985. January, 1980.

U.S. Departments of the Interior and Transportation. 1971. Memorandum of Understanding (August 16, 1971).

U.S. Fish and Wildlife Service. 1979. Farallon wilderness proposal. 10 p.

U.S. Fish and Wildlife Service. 1976. Final Environmental Impact Statement. Operation of the National Wildlife Refuge System. November, 1976.

U.S. Geological Survey. 1977. A summary on the regional geology, petroleum potential, and environmental gelogy of the southern proposed Lease Sale #53, Central and Northern California OCS. File report 77-593.

U.S. Geological Survey. 1979. Map of Lease Sale 53 Nominations.

Winzler and Kelly. 1977. Summary of knowledge of Central and Northern California coastal zone and offshore areas. Volume I: Physical conditions (1979a). Volume II: Biological conditions (1977b). Volume III: Socio-economic conditions (1977c). Prepared for the U.S. Bureau of Land Management, NTIS #PB-274210 to Pb 274218. Washington D.C.

Whipple, J.A., T. Yocum, D.R. Smart and M. Cohen. 1978. Effects of chronic concentrations of petroleum hydorcarbons on gonadal maturation in starry flounder. Proceedings of Conference on Assessment of Ecological Impacts of Oil Spills, June 14-17, 1978. Keystone, Colorado, A.I.B.S. pp. 756-806.

Woodhouse, C. R.K. Cowin, and L.R. Wilcoxon. 1977. A Summary of knowledge of the Sea Otter, Enhudra Lutris, L., in California and an appraisal of the completeness of biological understanding of the species. Prepared for the Marine Mammal Commission by the Santa Barbara Museum of Natural History. National Technical Information Service. NTIS #PB-270374. 71p.

(b) Statutory and Administrative References

State

California Fish and Game Code.

California General Laws.

California Harbors and Navigation Code.

California Health and Safety Code.

California Public Resources Code.

California Water Code.

California Administrative Code.

Federal

Clean Air Act. 42 USC §§ 7401 et seq.

Clean Water Act. 33 USC §§ 1251 et seq.

Coastal Zone Management Act. 16 USC §§ 1451 et seq.

Endangered Species Act. 16 USC §§ 1531 et seq.

Federal Aviation Act. 49 USC §§ 1301 et seq.

Fishery Conservation and Management Act. 16 USC §§ 1801 et seq.

Marine Mammal Protection Act. 16 USC §§ 1361 et seq.

Marine Protection, Research and Sanctuaries Act. 33 USC §§ 1401 et seq.

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

National Historic Preservation Act. 16 USC §§ 470 et seq.

Outer Continental Shelf Lands Act. 43 USC §§ 1331 et seq.

Oil Pollution Act. 33 USC §§ 1001 et seq.

Ports and Waterways Safety Act. 33 USC §§ 1221 et seq.

Code of Federal Regulations

Federal Register

(c) PERSONAL COMMUNICATIONS CITED

(L) Letter (T) Telephone (V) Visit

Adsit, J.M. 1979. Colonel, San Francisco District, Corps of Engineers. San Francisco, CA. December 28, 1979. (L).

Ainley, D.G. 1979a. Point Reyes Bird Observatory. Stinson Beach, CA. June 11, 1979 (T).

Ainley, D.G. 1979b. Point Reyes Bird Observatory. Stinson Beach, CA. November, 1979 (L).

Allen, S. 1979. Biologist. Point Reyes Bird Observatory. Stinson Beach, CA. August 31, 1979 (T).

Batchell, G. Col. United States Coast Guard, May 27, 1980. San Francisco, California.

Baxter, J. 1979. California Department of Fish and Game. Menlo Park, CA. June 1, 1979 (T).

Beach, D. 1979. National Marine Fisheries Service. Washington, DC. September 4, 1979 (T).

Benech, S. 1979. Associate Scientist. ECOMAR, Inc. Goleta, CA. July 2, 1979 (T).

Betchart, M. 1979. Associate Director, Nature Expeditions. Palo Alto, CA. June 14, 1979 (T).

Boness, D. 1979. Curator of Aquatic Animals. National Zoological Park. Washingtun, D.C. June 13, 1979 (T).

Bromback, D. 1979. Program Coordinator. San Francisco Bay Chapter of the Oceanic Society. San Francisco, CA. June 7, 1979 (T).

Brown, R. 1979. North Central Region Coastal Commission. San Rafael, CA. June 6, 1979 (T).

Brown, Murray. 1980 U.S. Corps of Engineers, Vicksburg, Miss. (T).

Burger, Frank. U.S. Army Corps of Engineers, San Francisco, California June 5, 1980. (T)

Charter, R. 1979. CEIP coordinator for the Pacific States Regional Technical Working Group on OCS lease sales. Public meeting comment. Point Reyes Station, CA. November 5, 1979 (V).

Connors, P. 1979. Assistant Director. Bodega Bay Marine Laboratory. Bodega Bay, CA. June 7, 1979 (T).

Cooke, T. 1979. Environmental Impact Section. Bureau of Land Management. Pacific Office. Los Angeles, CA. August 16, 1979 (T).

Crabb, B. 1979. U.S. Fish and Wildlife Service. San Francisco Bay Refuge Office. San Francisco, CA. June 27, 1979 (T).

Daniels,K. 1980. U.S. Corps of Engineers. San Francisco,Ca. August 9, 1980. (T).

Dupuy, Dr. J. R. International Shellfish Enterprizes, Inc. (T)

Emerson, N.H. Regional Representative Federal Region IX. Secretary of Transportation. San Francisco, CA. December 18, 1979 (L).

Emmrich, H. 1979. Environmental Impact Section. Bureau of Land Management. Pacific Office. Los Angeles, CA. September 2, 1979 (T).

Feldman, L. 1979. Water Quality Planner. California Water Quality Control Board, Region 2. San Francisco, CA. June 7, 1979 (T); August 21, 1979 (T).

Fliakas, P.J. 1979. Deputy Assistant Secretary of Defense, (installations and housing). Department of Defense. Washington, D.C. December 10, 1979. (L).

Fowler, R. 1979. Planner. U.S. Fish and Wildlife Service. Washington, D.C. June 11, 1979. (T).

Gercky, H. 1979. Chief of Enforcement. Point Reyes National Seashore. Point Reyes, CA. June 27, 1979 (T); August 7, 1979 (T).

Grimm, Martha. National Resource Defense Council, San Francisco, Ca. April 8, 1980. (T).

Heneman, B. Point Reyes Bird Observatory. San Francisco, Ca. May 23, 1980. (T).

Herz, M. 1979. Executive Vice President. The Oceanic Society. San Francisco, CA. November 14, 1979 (L).

Hudson. April 1979. California Department of Fish and Game

Kern, J. Col. U.S. Army, San Francisco, Ca. May 30, 1980. (T).

King, C. 1979. National Marine Fisheries Service. Washington, D.C. June 11, 1979 (T).

Leatherwood, S. 1979. Senior Research Biologist. Hubbs Sea World Research Institute. San Diego, CA. June 19, 1979 (T).

Lebovich, W. 1979. Office of the National Register, Heritage Conservation and Recreation Service. Washington, D.C. May 4, 1979 (T).

Leitzell, T. 1979. Assistant Administrator for Fisheries. National Marine Fisheries Service. Washington, D.C. January 11, 1980. (L).

Lott, M. 1979. U.S. Coast Guard Air Station. San Francisco, CA. June 11, 1979 (T).

Louks. 1980. U.S. Coast Guard, 12th District, San Francisco, CA. (T)

Magee, D. T. 1980. Vice President Western Region, Chevron, U.S.A., Inc. San Francisco, CA. May 14, 1980 (L)

Moory, R. 1979. California State Lands Commission. Sacramento, CA. June 6, 1979 (T); October 4, 1979 (T).

Morrell, S. 1979. Wildlife Biologist. San Francisco, CA. November 4, 1979 (V).

Musser, William. 1980. U.S. Environmental Protection Agency, Washington, D. C.

O'Connor, Harold. Acting Associate Director, U.S. Fish and Wildlife Service, Department of Interior, Washington, D.C. June 27, 1980.

Perry. 1979. US Army Corps of Engineers. San Francisco, CA.

Pillsbury, C. 1979. Marine Resources Coordinator. California Coastal Commission. San Francisco, CA. June 1979 (V).

Pope, W. Pacific Fisheries Management Council, San Francisco, Ca. June 1980. (T).

Rasmussen, Paul, W. Acting Regional Representative, U.S. Department of Transportation. San Francisco, California. May 22, 1980. (L)

Reiterman, L. 1979. Coastal Planner. North Central Region Coastal Commission. San Rafael, CA. June 5, 1979 (T).

Rolf, D. 1979. Planner. Sonoma County Department of Parks and Recreation. Sonoma, CA. June 8, 1979 (T).

Sanders, D. 1979. Chief, Planning and Environmental Coordination Unit. California State Lands Commission. Sacramento, CA. June 27, 1979 (T).

Saratopulos, M. 1980. U.S. Department of Transportation. San Francisco, CA.

Schlorff, R. 1979. Non-Game Division, California Department of Fish and Game. Sacramento, CA. September 14, 1979 (T).

Scruggs, R. 1979. Captain, U.S. Navy. Naval Operations. Washington, D.C. September 12, 1979 (T).

Shepherd, J. 1979. Office of Endangered Species, U.S. Fish and Wildlife Service. Department of the Interior. Washington, D.C. September 14, 1979 (T).

Skaer J. and Barbara Alban, Coordinators, Stinson Beach Village Association. Stinson Beach, Ca. May 26, 1980. (L).

Smith, D. 1979. Director, Pacific Marine Laboratory. Dillon Beach, CA. June 7, 1979 (T).

Smith, E. 1979. California Department of Fish and Game. Sacramento, CA. June 1, 1979 (T); June 5, 1979 (T).

Stamey, T. 1979. California Air Resources Control Board. Sacramento, CA. May 3, 1979 (T).

Storro-Hatterson, R. 1979. Director. Whale Center. Oakland, CA. November 27, 1979 (T).

Studdart, Robert, F.

Swehla, K. 1979. Tides Wharf Marina. Bodega Bay, CA. June 6, 1979 (T).

Tomasevich, L. 1979. Planner. Marin County Planning Commission. San Rafael, CA. June 14, 1979 (T).

Tong, L. June 5, 1980. U.S. Corps of Engineers. San Francisco, CA.

Trout, J.F. 1979. Assistant Executive Officer. California State Lands Commission. Sacramento, CA. November 16, 1979 (L).

Vais, C. 1979-80. U.S. Environmental Protection Agency, Region 9. San Francisco, CA. May 24, 1979 (T).

Webb. 1980. Deputy Assistant Secretary, Fish and Wildlife and Parks. U.S. Department of the Interior, Washington, D. C. (L)

Webber, M. 1979. California Marine Mammal Commission. San Francisco, CA. September 25, 1979 (T).

Wright, H. 1979. Manager, Offshore Operations, Western Oil and Gas Association. Los Angeles, CA. August 14, 1979 (T); August 17, 1979 (T).

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Section I.

LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS RECEIVING COPIES OF THE FEIS

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
Department of the Army, Corps of Engineers, San Francisco District
Department of Commerce
Department of Defense
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
Department of Justice
Department of Labor
Department of Transportation
Environmental Protection Agency
Federal Energy Regulatory Commission
General Services Administration
Marine Mammal Commission
Nuclear Regulatory Commission

Elected Officials

Honorable S.I. Hayakawa, United States Senate
Honorable Gerald E. Studds, U.S. House of Representatives

State Government and Agencies

The Board of Supervisors of Marin County
Sonoma County Board of Supervisors
California Coastal Commission
The Resources Agency of California
Sonoma County Regional Parks
Sonoma County Department of Planning

National and Local Interest Groups

Associacao Guacha de Protecao aos Animal:
Allstate Realtors
The American Cetacean Society
Atlantic Richfield Company
Burrough and Bloom, Attorneys at Law
California Seafood Institute
Carmel Insurance Agency
The Center for Environmental Education
Center for Law and Social Policy
Chevron USA, Inc.
Contra Costa Hills
Defenders of Wildlife
Environmental Defense Fund
Exxon Company, Inc.
Friends of the Earth
Friends of the Coast
Friends of the Sea Otter

People for a Golden Gate National Recreation Area
The Greenpeace Foundation
Inverness Association
Madrone Audubon Society
Marine Mammal Commission
The Marine Wilderness Society
National Fisheries Institute, Inc.
Natural Resource Defense Council
The Northern California Ports and Terminal Bureau, Inc.
Pacific Coast Federation of Fisherman's Associations, Inc.
Pacific Merchant Shipping Association
Point Reyes Bird Observatory
San Francisco Police Fishing Program
Sonoma State University
Marine Sciences Research Center, State University of New York
Stinson Beach Village Association
Sundance Sportfishing
Tomales Bay Association
The Whale Center
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APPENDIX I

Designation Document

Designation Of The Point Reyes/Farallon Islands 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 or 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.

936.10. 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 I.

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 Section 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, Section 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 Section 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, 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 1000 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.

(b) 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.

(c) 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 Coastal Zone Management, Attn: Office of Sanctuary Programs, Division of Operations and Enforcement, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, 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) below 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 Section 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 Section 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 Section 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 Section 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 Section 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.

APPENDIX 2: Brief Review of the Outer Continental Shelf (OCS) Oil and Gas Development Process

In virtually all instances, the pattern of OCS oil and gas development follows the same basic steps: 1) pre-exploration, 2) leasing 3) exploratory drilling, 4) development drilling, 5) production, and 6) completion. During pre-exploration activity, oil companies send research vessels to conduct seismic surveys of an area to determine the geologic structure and location of potential petroleum bearing strata. Since OCS lands are Federally owned, oil companies must first secure the right to drill and exploit the natural resources before any drillings can be conducted. Drilling rights on the OCS are obtained by leasing areas (called blocks or tracts) from the responsible Federal agent -- the Bureau of Land Management (BLM). The oil companies nominate for lease sale those tracts which they view as promising and bid on those tracts in a competitive bid lease sale. BLM reviews the highest bids and may accept or reject them. If the high bids are deemed commensurate with the resource potential, the company is granted a lease to drill and develop the block.

Upon award of a lease, exploratory drilling from a drilling "rig" may be conducted to determine the precise location, extent, and quantity of oil and gas resources. This involves drilling an average of about four exploratory wells per tract from a movable, temporary rig. If an exploratory well indicates the presence of petroleum hydrocarbons, additional wells are drilled to determine the areal extent of the reservoir(s) and to aid in locating the optimal site for production platforms. After exloration is complete, but before commercial production can begin, a development

plan must be prepared by the developer and submitted for approval of the U.S. Geological Survey (USGS). The USGS reviews this plan to insure that safety and environmental standards are met.

After approval of the development plan, production "platforms" are installed on the tract and development wells are drilled. A tract with a high resource potential might include two platforms and approximately 40 wells. Production "platforms" are more permanent structures than drilling "rigs" since they must serve throughout the production life of the field (which may be 10 to 40 years) and withstand the rigors of even the most severe ocean storms. In addition to platforms, production facilities normally include transportation systems to shore, and onshore processing and storage plants. After all recoverable oil and gas resources have been exploited, the well is closed below the sea floor and the platform and pipelines are removed.

APPENDIX 3: Summary of USGS Pacific OCS Orders and Notices to Lessees (U.S. Bureau of Land Management, 1979).

Pacific Area OCS Order No. 1

This Order requires all platforms, drilling rigs, drilling ships, and wells to have standard signs identifying the operator, the specific lease block of operation, and well number.

Pacific Area OCS Order No. 2

Order No. 2 concerns procedures for drilling of wells. It requires the operators to file an application for drilling which includes information on the drilling platforms or vessel, casing program, blowout prevention equipment, well control training and safety training of operators' personnel, and a list or description of critical drilling operations.

Pacific Area OCS Order No.3

This Order is established to provide regulation of plugging and abandonment of wells which have been drilled for oil and gas. For permanent abandonment of wells, cement plugs must be placed so as to extend 30 m (100 ft.) above the top and 30 m (100 feet) below the bottom of fresh water, oil, and gas zones to prevent those fluids from escaping into other strata. Portions of a well in which abnormal pressures are encountered are also required te be isolated with cement plugs. Plugs are required at the bottom of the deepest casing below which an open hole exists. Plugs or cement retainers are required to be placed 30 m (100 ft.) above the top and 30 m (100 ft.) below any perforation interval of the well hole used for production of oil and gas.

Pacific Area OCS Order No. 4.

An OCS lease provides for its extension beyond its primary term for as long as oil or gas may be produced in paying quantities, provided the operator has met the requirements for diligent development. If these circumstances should occur, the lease can be extended beyond its initial term, pursuant to Section 8(b)(2) of the OCS Lands Act and Title 30, CFR 200.11 and 250.12(d)(1). In addition, an OCS lease may be maintained beyond the primary term, in the absence of actual production, when a suspension of production has been approved by the Supervisor. Order No. 4 defines the conditions and suspensions for such requirements.

Pacific Area OCS Order No. 5.

This Order sets regulations for the installation, design, testing, operation, and removal of subsurface safety devices.

Pacific Area OCS Order No. 6.

This Order pertains to procedures for completion of oil and gas wells. Wellhead equipment such as casing-heads, wellhead fittings, valves, and connections are specified and rating requirements are noted here. Testing procedures for wells and subsurface safety devices are also specified in the Order, along with methods for multiple or tubingless completions.

Pacific Area OCS Order No. 7.

Order No. 7 concerns the control of pollution to the marine environment and provides regulations for the disposal of waste materials generated as a result of offshore operations.

Pacific Area OCS Order No. 8.

This Order requires that platforms, fixed structures, and artificial islands be designed with consideration for geological, geographical, environmental and operational conditions. Prior to structural approval by the Supervisor, detailed design and stress load data must be submitted to the USGS. Certification of structural adequacy by a registered professional engineer is required by the Order.

Pacific Area OCS Order No. 9.

OCS Order No. 9 provides approval procedures for oil and gas pipelines on the OCS. All pipelines and related equipment must be designed and maintained with high-low pressure sensors, automatic shut-in valves, checkflow valves (to control backflow), and metering systems to detect input/output variances (leakage). The Order also requires adequate provisions for cathodic corrosion protection, trawling compatibility, hydrostatic testing, storm scour and other environmental stress in OCS pipelines. Procedures and schedules for regular inspection of pipelines along with recording of such inspections are stipulated.

Pacific Area OCS Order No. 10.

OCS Order No. 10 provides for drilling twin core-holes located adjacent to core holes drilled on the OCS under earlier California State authorization. Such holes were drilled prior to the establishment of Federal authority beyond the 3-mile limit.

Pacific Area OCS Order No. 11.

This Order provides for prevention of waste, conservation of oil and gas resources, and protection of correlative rights by defining and setting standards for rates of production, production testing procedures, and joint production requirements.

Pacific Area OCS Order No. 12.

The purpose of this Order is to make the records of the Department of the Interior available to the public to the greatest extent possible.

Notice to Lessees No. 77-1. "Applications for exploratory operations"
This NTL summarizes the requirements and instructions relative to the approval of applications for a permit to drill exploratory wells.

Notice to Lessees No. 77-2. "Minimum requirements for shallow drilling hazard surveys"
Minimum requirements of geologic hazard surveys, which must be conducted pursuant to 30 CFR 200.34(a), are described.

Notice to Lessees No. 77-3. "Minimum cultural survey requirements"
This NTL describes necessary measures to be taken to identify and preserve all Federally-owned sites, structures, and objects of historic, architectural, or archaeological significance as directed by Executive Order No. 11503.

Notice to Lessees No. 77-4. "Minimum requirements for biological surveys"
This NTL requires a plan for a survey to identify significant biological communities.

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