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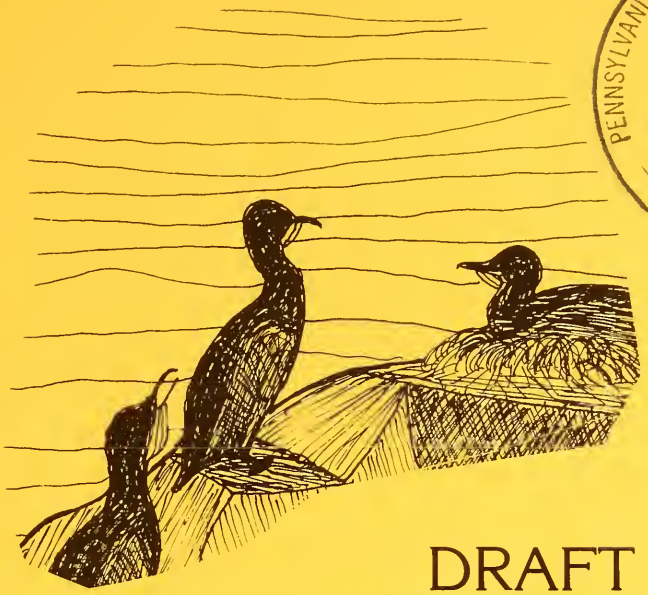

DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE PROPOSED POINT REYES-FARALLON ISLANDS MARINE SANCTUARY

MARCH 1980

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

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DRAFT ENVIRONMENTAL IMPACT STATEMENT

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

Depository Copy

DESIGNATION: DRAFT ENVIRONMENTAL IMPACT STATEMENT

TITLE: Proposed Point Reyes/Farallon Islands Marine Sanctuary

ABSTRACT: The National Oceanic and 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.

Specific regulations are proposed which would apply only within the sanctuary boundaries. The proposed regulations prohibit hydrocarbon exploration and exploitation and require sanctuary review and certification for the laying of pipelines. The proposed regulations prohibit discharges except for marine sanitation device effluents, vessel cooling waters, fish cleaning wastes, and chumming material (bait) and require sanctuary review and certification for the location of municipal outfalls. The proposed regulations prohibit construction on or alteration of the seabed except for certain specified dredging and construction activities. The proposed regulations prohibit the unnecessary operation of vessels within 1 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 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.

LEAD AGENCY: U.S. DEPARTMENT OF COMMERCE
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Office of Coastal Zone Management

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B. NOTE TO THE READER

The two major segments of this DEIS 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 and 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. Certain additional documentation is appended. Particular attention should be paid to the draft Designation Document and the draft Proposed Regulations presented in Appendix 1.

Citations are referenced in the text by the name of the author or source in parentheses. Section G, 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) authorized 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.

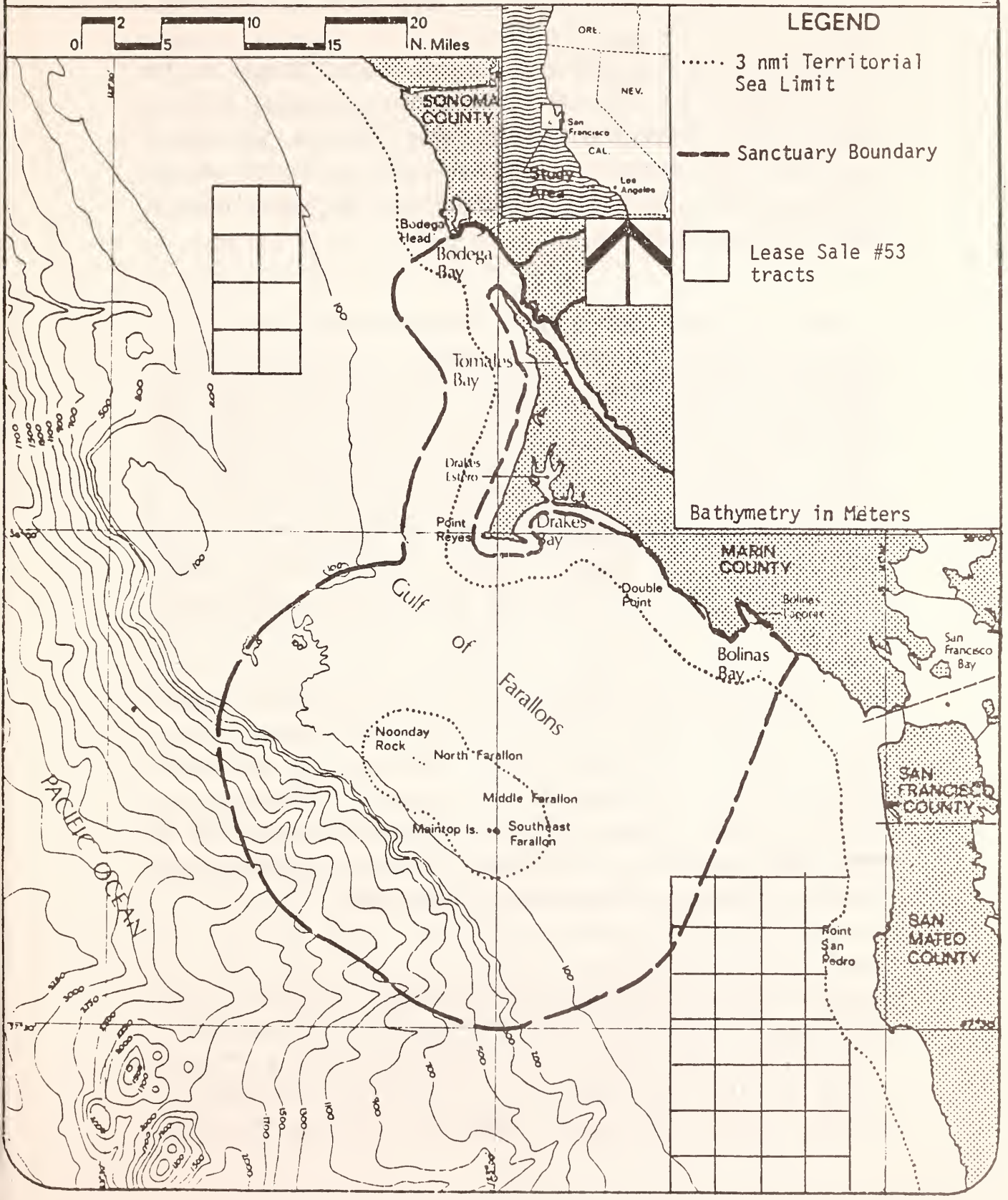
This draft environmental impact statement (DEIS) proposes the creation of a marine sanctuary in the waters extending shoreward to the mean high tide line or the seaward boundary of the Point Reyes National Seashore. Between Bodega Head and Point Reyes Headlands the sanctuary extends seaward to 3 nautical miles (nmi) (5.6 kilometers (km)) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi (22.2km) 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). These waters contain marine and shoreline 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.

Human use of these waters includes fishing, recreation, shipping, research, and military operations. Leasing for oil and gas exploration and exploitation is planned offshore of northern California in May 1981. Congress has prohibited oil and gas leasing in part of this area, but two of the tracts to be leased fall partially in the proposed sanctuary. Future sales could offer additional tracts within this highly sensitive area. (See Sections E.2. and E.3. for a description of these resources and activities).

The protection afforded the shoreline by the Point Reyes National Seashore and the Farallon Islands by their State and national refuge status has so far sufficed to protect the resources in the area, since, until recently, the major threats to bird and mammal habitat came from land. In addition, several Federal and State agencies have authority to regulate specific threats or control individual resources. However, human activity in the ocean is increasing, and the existing controls may not ensure adequate protection for the unusually rich assemblage of natural resources in this area.

FIGURE C-1. The preferred marine sanctuary.



To determine the desirability and feasibility of proceeding with the designation of this area as a marine sanctuary, 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 this DEIS which describes the proposed alternative of sanctuary designation and includes 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 proposed designation and regulations do not represent a final decision; they are presented and evaluated in this DEIS to facilitate review. NOAA has analyzed alternatives to this proposal, including that of taking no action, all of which are discussed in Section F. NOAA will receive comments on this DEIS, hold public

hearings in the Point Reyes area in California, and respond to all comments received in a Final Environmental Impact Statement (FEIS). After review of comments and final consultation with Federal agencies, if a decision is made to proceed with the designation, NOAA must seek Presidential approval of the proposed marine sanctuary designation. Within 60 days of a designation the Governor of California may stop the inclusion of State waters in the proposed marine sanctuary by declaring the designation unacceptable in whole or in part.

A draft Designation Document and a set of draft proposed regulations appear in Appendix 1. These documents describe the preferred alternative and will be published as a proposed rulemaking in the Federal Register concurrently with the distribution of this DEIS. Following publication, comments will be received for 60 days. If a sanctuary is to be designated, final regulations will then be published in the Federal Register to be effective upon designation, and an FEIS will be issued.

Proposal to Designate the Point Reyes-Farallon 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 (5.6km) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi (22.2km) 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 will be included in the FEIS.

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 draft Designation). It establishes the boundary and purposes of the sanctuary, identifies the types of activities that may be subject to regulations, and specifies the extent to which other regulatory programs will continue to be effective within the sanctuary. 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, only the following activities will be subject to reasonable and necessary regulations:

a. Hydrocarbon operations,
b. Discharging or depositing any materials or substances,
c. Dredging or alteration of or construction on the seabed,
d. Navigation and operation of vessels (other than fishing vessels),
e. Disturbing marine birds and marine mammals,
f. Removing or otherwise harming historic resources.

The proposed restrictions on these activities are set forth in the draft 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 draft Designation specifically exempts fishing activities from sanctuary regulation, except that fishing vessels may be regulated with respect to discharges.

Proposed regulations

The proposed sanctuary, described in detail in Section F.2 and summarized here, would subject the above listed activities to sanctuary regulations.

Specific regulations are proposed as reasonable and necessary for the protection of the natural resources. They are not intended to duplicate existing regulations. To the extent possible, the sanctuary manager will coordinate with existing authorities in both the administration and enforcement of the regulations. This coordination may be accomplished in several ways. Agencies may wish to alter their regulations in this area to conform with sanctuary regulations, or they may want to use their review and enforcement capabilities to implement NOAA provisions. Other interagency arrangements to facilitate coordination are possible. Each such step will be the subject of discussion with the individual agency concerned. If no specific arrangements are agreed upon, and the two sets of regulations affecting certain activities are in effect, all regulations will apply and the most stringent restrictions must be met. The marine sanctuary regulations will apply only within the sanctuary boundaries. The certification

procedures proposed for pipeline and outfall location are another important mechanism for coordinating with existing authorities. The regulations are summarized below and the full text of the proposed regulations as they will appear in the Federal Register is presented in Appendix 1.

--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 (3.7km) 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 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 and the U.S. Geological Survey 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. Pipeline location, design, and safety features are subject to various regulations issued by the Department of Transportation, 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.

--Discharges

Discharges of any material or substance would be prohibited with the exception of fish wastes and chumming materials (bait), effluents from marine sanitation devices, and non-polluting vessel cooling waters. Municipal sewage outfalls 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 intended only to allow those activities deemed consistent with the goals of the sanctuary.

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. Solid waste overboard discharges from vessels are not currently regulated. Existing regulations do not prohibit discharges from tankers and other vessels smaller than 150 gross tons and 500 gross tons, respectively, which might occur beyond the territorial zone (3 nmi

(5.4km)). 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.

--Seabed alteration and construction

Dredging, drilling, and construction on, or altering of, the seabed within the sanctuary would be prohibited except for routine navigational and marina maintenance dredging, new marina construction, ecological maintenance, mariculture, residential units in Tomales Bay permitted by the California Coastal Commission, and oil, water, or gas pipeline placement under a certified permit. 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 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.

--Vessel traffic

Passage of vessels within 1 nmi (1.8km) of the Farallon Islands, Bolinas Lagoon, or any State designated Area of Special Biological Significance would be prohibited. An exemption would apply only to vessels transporting personnel or supplies to or from the islands, and vessels used for fishing, research, recreation, law

enforcement, national defense, and sea rescue. The prohibition would not apply in emergencies and would apply only as consistent with international law. This regulation is in part intended to protect sensitive areas from disturbance and possible oil spills or discharges resulting from groundings, collisions, or normal commercial shipping operations. The 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 (305m) would be prohibited within 1 nmi (1.8km) 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 from the concerned agency that pilots maintain a certain altitude. However, the FAA issues regulations for the safety of air traffic, and has not closed this area in consideration for potentially adverse impacts on ecosystems, species, or habitat. The California Department of Fish and Game controls overflights in the portion of the proposed sanctuary which is the 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 archaeological 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 does not regulate activities potentially harmful to these resources.

--Certification of permits

No permit, license, or other authorization allowing 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

Research activities otherwise prohibited by any 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.

Management

Management of the marine sanctuary will be designed to preserve the resources of the waters in and around the Point Reyes-Farallon Island offshore region in their present, relatively undisturbed, state. By integrating education, environmental monitoring, and compatible use regulations into a coordinated management strategy, NOAA will try to ensure that the public can derive maximum benefit from the marine sanctuary with a minimum of environmental damage. As previously noted, a detailed management plan outlining coordination and implementation will be developed following designation of the sanctuary.

NOAA is investigating the possibility of forming a Sanctuary Advisory Committee, to consist of representatives from interested and experienced Federal and State agencies and local interest groups. This committee would advise the sanctuary manager on permit applications and certifications, e.g., for research, municipal outfalls, pipelines, 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. NOAA is exploring various means of providing enforcement and surveillance; the National Marine Fisheries Service, the U.S. Coast Guard, the National Park Service, and the California Department of Fish and Game (DFG) have experience in such operations, and NOAA will explore further the possibility of cooperative arrangements with each or among all of these agencies. The participation of any enforcement agent will, of course,

be subject to continuing discussions 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.

NOAA will establish a Sanctuary Information Center to maintain a current catalogue of sanctuary research and research results, and to promote the public's awareness of sanctuary resources through educational materials and other techniques. Researchers will be encouraged to notify the Sanctuary Information Center of intended activities and to file reports and results with the Information Center. The list of research projects will not only help improve the data base on area resources and stimulate information exchange, but also may help eliminate duplication of research and identify data gaps. Finally, both resource quality and effects of human activities in the sanctuary will be monitored. The information from these monitoring efforts should aid in further refining the management system whenever necessary.

Environmental and Socioeconomic Consequences of the Proposed Action

The regulations will provide increased protection for the natural and historical resources around the islands, particularly marine birds and mammals, and will also ensure the long-term continuation of existing safeguards, as described below. At the same time, the regulations attempt to minimize potentially adverse economic impacts.

The prohibition of petroleum operations within the sanctuary's boundaries will establish a buffer between the potentially adverse effects of petroleum development and both nearshore and offshore marine resources. Sanctuary resources which are particularly vulnerable to spilled oil, and to other human activities normally associated with offshore petroleum operations, transport, or oil spill containment and cleanup will thereby be protected.

The prohibition of pipeline placement within 2 nmi (3.7km) 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 from as 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 liklihood of rupture or spills, and other potential threats to sanctuary resources.

The socioeconomic impact of the prohibition on 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, oil underlying 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. These tracts drew relatively few nominations for Lease Sale #53, thus indicating generally low estimates of resource potential. Such projections might, of course, change based on new information gathered from potential 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 socioeconomic impacts can be projected or assessed with certainty.

The prohibition of discharges will protect the water quality in the proposed sanctuary by preventing the use of this area for ocean dumping or dredge spoil disposal and the discharge of substances other than oil. It will also enhance the area's aesthetic features by lessening levels of litter thrown overboard, and will reduce the threat of entanglement with, or the ingestion of, potentially harmful trash materials by marine mammals or birds in the sanctuary. The economic impact of this regulation on most sanctuary users is minor since they will simply be required to retain their trash for proper disposal on land. No ocean dumping is currently planned for the area.

The certification of permits for municipal sewage outfalls will provide the opportunity for special review of this important decision, which could be especially significant for the protection of sanctuary resources. The review 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 certain kinds of vessel traffic within 1 nmi (1.8km) of the Farallon Islands, Bolinas Lagoon, and Areas of Biological Significance will reduce the likelihood of a number of potentially adverse environmental impacts. These include:

1) possible groundings or collisions,
2) pollution from accidental and illegal discharges, such as ballast discharge and tank washing, and
3) visual and acoustical disturbances to marine mammal and seabird populations from nearshore vessel passage.

These requirements will be imposed only to the extent consistent with international law, and should not significantly affect shipping costs or travel times because most commercial vessels already comply with the Vessel Traffic Separation Scheme (VTSS).

The prohibition of disturbing marine birds and marine mammals by overflights below 1,000 ft (305m) in these sensitive areas would provide additional protection from visual or acoustical disturbances of marine mammal and seabird communities. The economic impact would be slight as commercial air carriers do not fly over these areas at low altitudes. Recreational observations of these communities from private planes flying below 1000 ft (305m) would be prohibited.

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

The requirement that research activities otherwise in violation of sanctuary regulations must obtain a permit will ensure that such activities do not unnecessarily threaten the resources of the sanctuary. At the same time, it provides a mechanism for allowing research and education activities to continue, even if they violate sanctuary regulations.

This requirement may impose minor costs and delays on certain research projects, but the sanctuary manager will seek to minimize inconveniences to the permit applicant.

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.

A large and varied marine mammal population (some 23 species) has been sighted in the Point Reyes-Farallon Islands vicinity. The cetaceans (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. The

fur seal, a recently reappearing species, is a transient.

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 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 development. Although various agencies exercise regulatory authority over specific uses of the waters, no permanent management and coordination system geared to area-wide marine resource protection exists. Recent and future trends in human development pressures

could render the reliance on geographic remoteness and existing institutional arrangements inadequate for the effective monitoring of activities and the prevention of ecological harm to this rich marine ecosystem.

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. Thus, oil and gas development appears imminent in this offshore area where human intrusion is now rather minimal.

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.

There are preliminary indications, for example, that tug barging will be utilized to transship crude oil to refineries on the mainland. Supply and maintenance vessel traffic servicing offshore platforms is also likely to increase, at least for the duration of 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.

Many agencies currently regulate or have authority over one element or another of the specific activities and particular natural resources of the study area; however, no single authority is charged with preserving the ecological and biological value of the entire ecosystem.

No agency, for example, attempts to coordinate the diverse permitting and regulatory authorities of the many agencies which have some responsibility in the area. Consequently, the impacts of each activity which might affect the resource tend to be evaluated separately, and cumulative impacts may be overlooked. No authority attempts to monitor the response of the system to these diverse impacts as a marine sanctuary would. In addition, certain existing authorities have limited resources for enforcement. Marine sanctuary designation could supplement the administration of current safeguards by establishing a mechanism for coordinating the various agencies and providing additional resources for enforcement.

Furthermore, the waters of the Point Reyes-Farallon Islands region are not now formally recognized as an area of special environmental value. Although, in some cases, the general public interest may be served by allowing activities which may pose threats to the environment to continue, such decisions must be balanced against this region's important and unique resources. Formal recognition would increase the likelihood that existing authorities will fully consider the particular value and vulnerability of

this vital habitat area over the long term.

The designation of a marine sanctuary in these waters would create a system for assessing the overall impacts of activities in the area. Formal acknowledgment of special resource values would insure that it is given special protection and would encourage particularly careful review of any proposals for future siting of potentially harmful activities. Finally, 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.

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

1. To insure that human uses and activities within the proposed sanctuary boundaries do not (a) degrade intertidal habitat 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 significant resources of the area which will contribute to the understanding of ecologic relationships and to the resolution of management and regulatory issues.

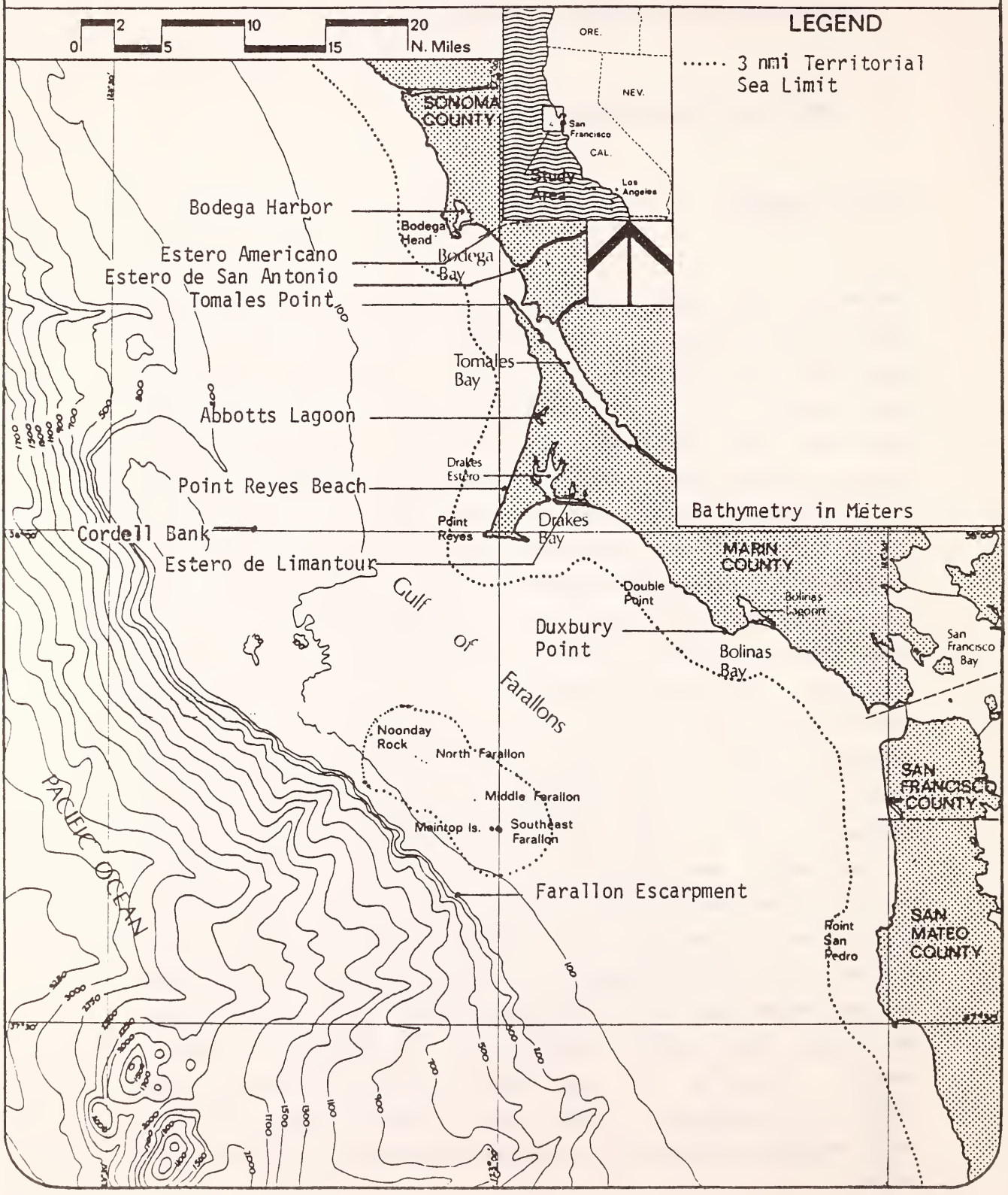
E. DESCRIPTION OF THE AFFECTED ENVIRONMENT

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 (59km) 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, Drakes Estero, Limantour Estero, Bolinas Lagoon, and Bodega Bay, which provide protected habitats benefitting 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; 2) marine mammals; 3) marine flora (particularly kelp, salt marsh vegetation, and eelgrass); 4) fish; and 5) benthic fauna. Each of these resource categories is discussed separately in Section E.2 below.

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



E.1.b. Environmental Setting

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

First, concerning the region's submarine topography, 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 (48km). It provides an especially large, relatively shallow foraging and habitat area for coastal and oceanic seabirds, marine mammals, and fish. Second, the area includes the only islands (the Farallon Islands) off the west coast of the contiguous U. S. north of the Channel Islands which are located more than 1 to 2 nmi (2 to 3km) offshore.

The Farallon Islands lie along the outer edge of the continental shelf, between 13 and 19 nmi (24 and 35km) southwest of Point Reyes and roughly 26 nmi (48km) due west of San Francisco. The islands are located on part of a larger shore submarine ridge and extend for a distance of approximately 16 nmi (30km) 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, and Tomales Bay, are located nearshore. Bolinas, Drakes, and Bodega Bays 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, a virtually landlocked body, 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, one flowing southward and another northward, and a number of local eddy current dynamics. The California Current and the Davidson Current, representing significant components of the northeast Pacific's general circulation pattern, are the dominant systems. Each of these currents has a distinct oceanographic phase, i.e., the oceanic and counter current period, respectively. A third period, known for the phenomenon of cold water nutrient "upwelling", is also evident. 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 (200m). 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 (80km). 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 are the tides, which tend to be mixed and predominantly semi-diurnal in form (Winzler and Kelly, 1977). Bolinas Bay's patterns are similar to Tomales Bay, except that 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 the study area. The winter storm season usually stretches from December to early March (Association of 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.

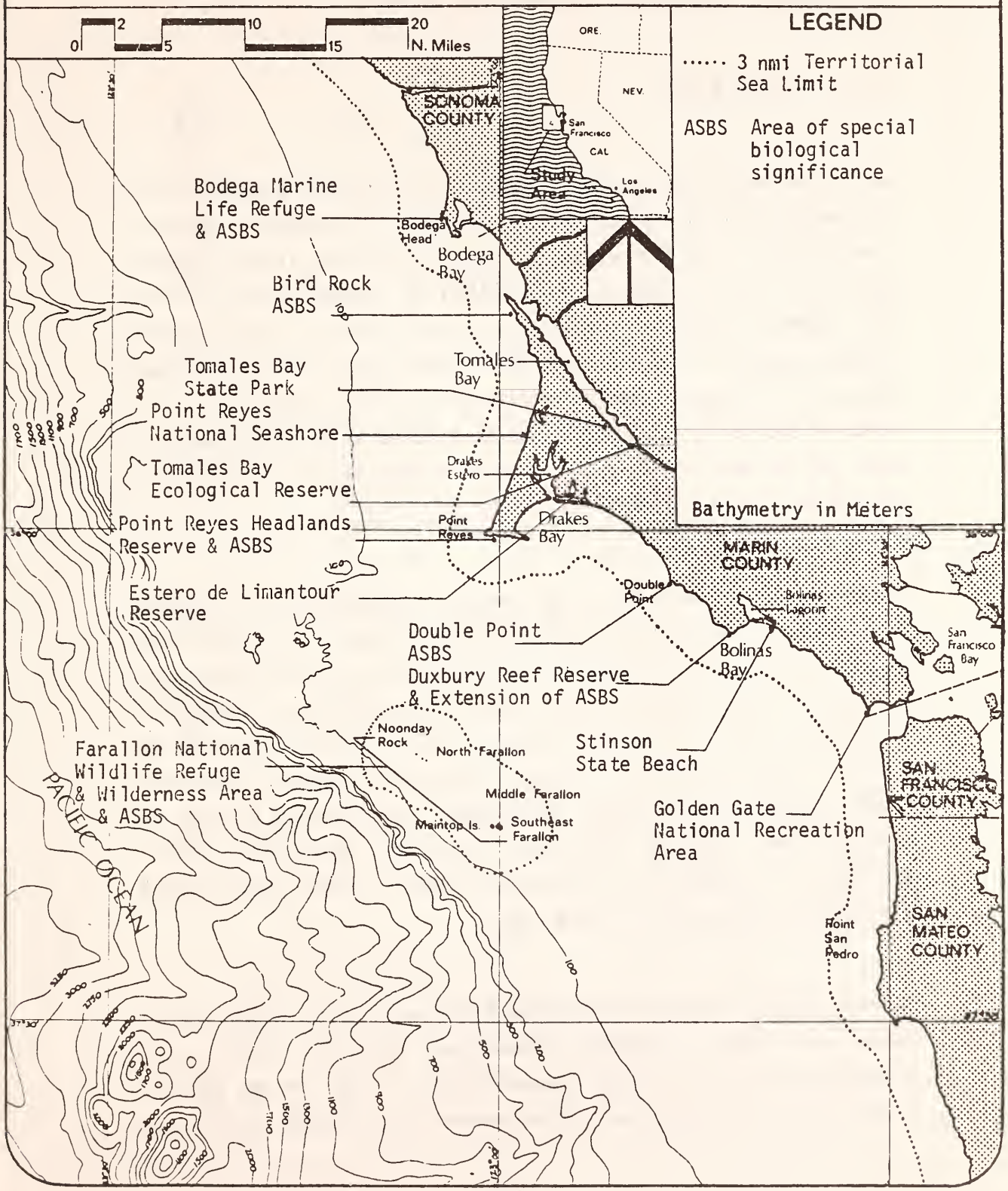
Differences between air and water temperatures, particularly during the summer, often produce dense fogs. Subject to salinity and the effects of upwelling, water temperatures at the surface are usually in the low 50's F (about $10^{o}C$) during winter and upper 50's F (about $13^{o}C$) during summer. 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 area 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 readily accessible. Most important of these are the Farallon Islands and their associated ecosystems.

Because of the rich diversity of area marine life, 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).

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



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 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 on the west coast, 12 species have been known to nest in the study area (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

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)							SPECIES TOTAL
	Farallon Islands	Double Point	Bear Valley	Pt. Reyes Headland	Bird Rock	Tomales Point	Bodega Rock	
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).

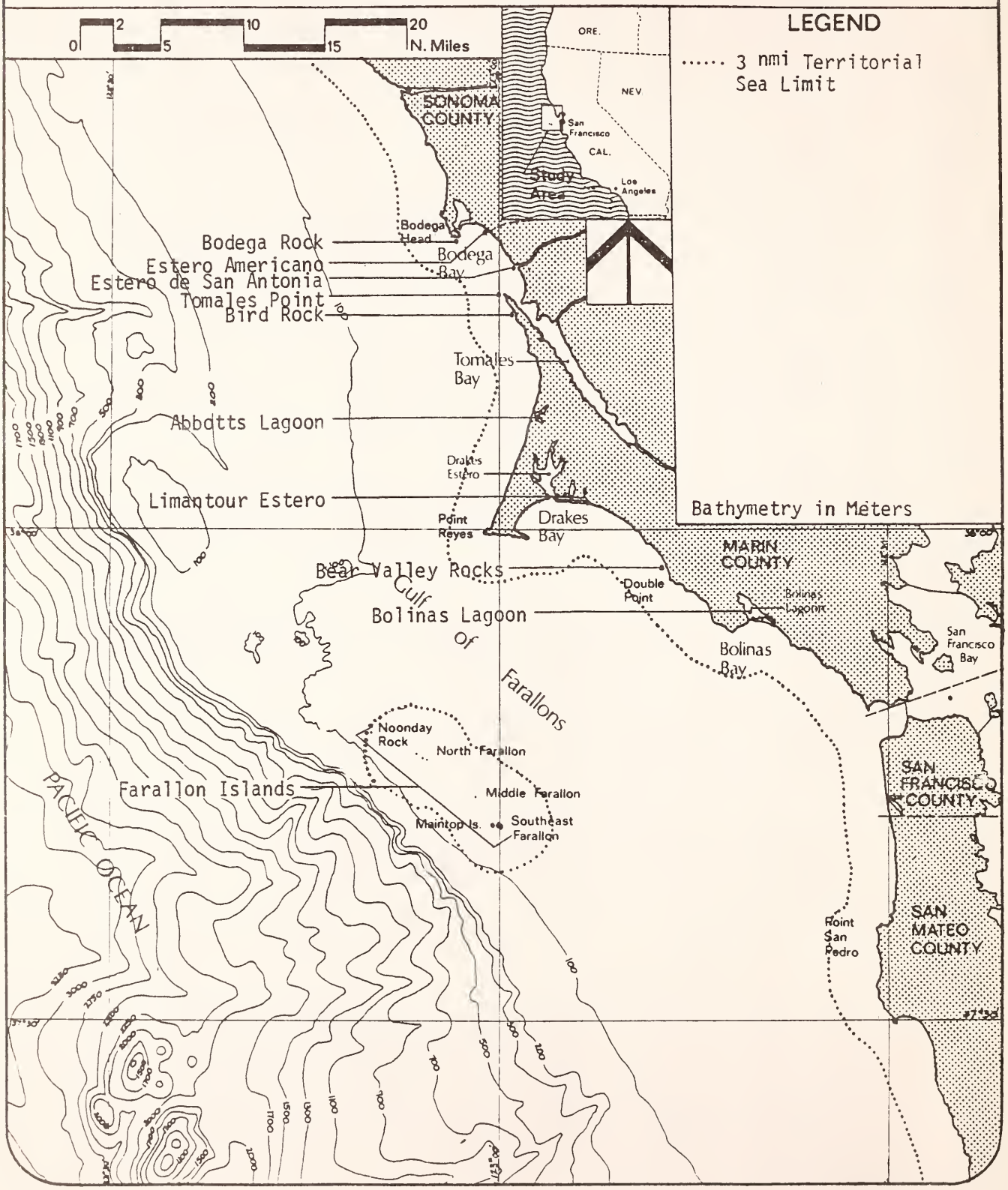


Table E-2. Ecological information for nesting seabirds found in the Point Reyes/Farallon Islands marine sanctuary study area (developed from Winzler and Kelly, 1977).

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; Carlifornia 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 has been affected adversely by oil pollution and possibly by reduction of sardines from over-fishing; 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.

clapper rail, brown pelican, and California least tern (Shepherd, 1979, personal communication). Those on California's list also include the pelican and least tern (Schlorff, 1979, 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 seabirds 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 cormorant), 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 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 the 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 8km) out to sea, those preferring offshore habitats from 3 to 4 nmi (6 to 8km) 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, Limantour Estero, Drakes Estero, 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 Limantour Estero, are vital links in the west coast chain of black

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 sandpiper
black-bellied plover	spotted sandpiper	herring gull

Sandy beaches:

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

Inshore ocean waters:

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

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

Cassin's auklet	western gull	ashy storm-petrel
common murre	Bonaparte'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	

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 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).

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)	seasonal
Steller sea lion	(Eumatopias jubata)	seasonal
Harbor seals	(Phoca vitulina)	seasonal
Northern elephant seal	(Mirounga anguestirostris)	seasonal
Alaskan fur seal	(Callorphinus ursinus)	transient
Fissiped:		
Sea otter	(Enhydra lutris)	occasional visitor
Cetaceans:		
Blue whale	(Balaenoptera musculus)	transient
Sei whale	(Balaenoptera borealis)	transient
California gray whale	(Eschrichtius gibbosus)	transient
Finback whale	(Balaenoptera physalus)	transient
Humpback whale	(Megaptera novaeangliae)	transient
Pacific pilot whale	(Globicephala macrorhynca)	transient

TABLE E-4 (cont'd)

Common Name	Genus/Species	Status
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
Baird's dolphin	(Delphinus delphis bairdi)	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)	transient
Dall porpoise	(Phocoenoides dalli)	transient

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).

Sea otter (*Enhydra lutris*)	Range extends from Russia and Alaska to Central California. The Central California population is a discrete breeding population geographically separated from more northern populations in Alaska and Russia. After severe exploitation in 18th and 19th centuries, the populations are now expanding from central California. Breeding females tend to stay in the central part of range, from Monterey 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 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 500 individuals in California in 1972; 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 molluscs.
Northern fur seal (*Callorhinus ursinus*)	Highly exploited in the 18th and 19th centuries; range from the Bering Sea to Mexico; abundant in northern part of range but very scarce in southern; tend to stay 10 to 100 miles out to sea, although near-shore sightings have been reported; feed primarily on anchoives, 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.

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 one to 104. A few harbor seals and California sea 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 sizeable 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).

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).

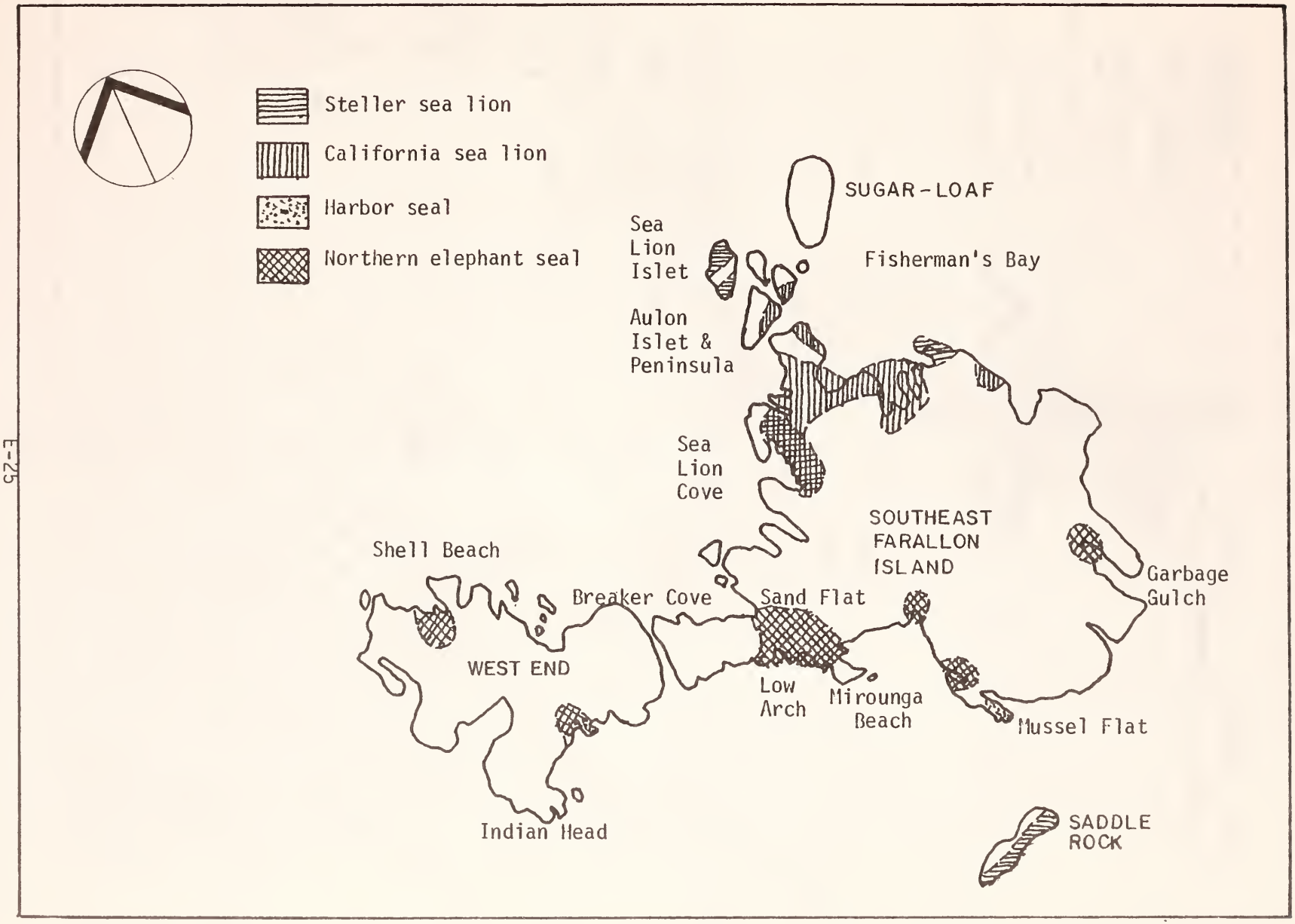
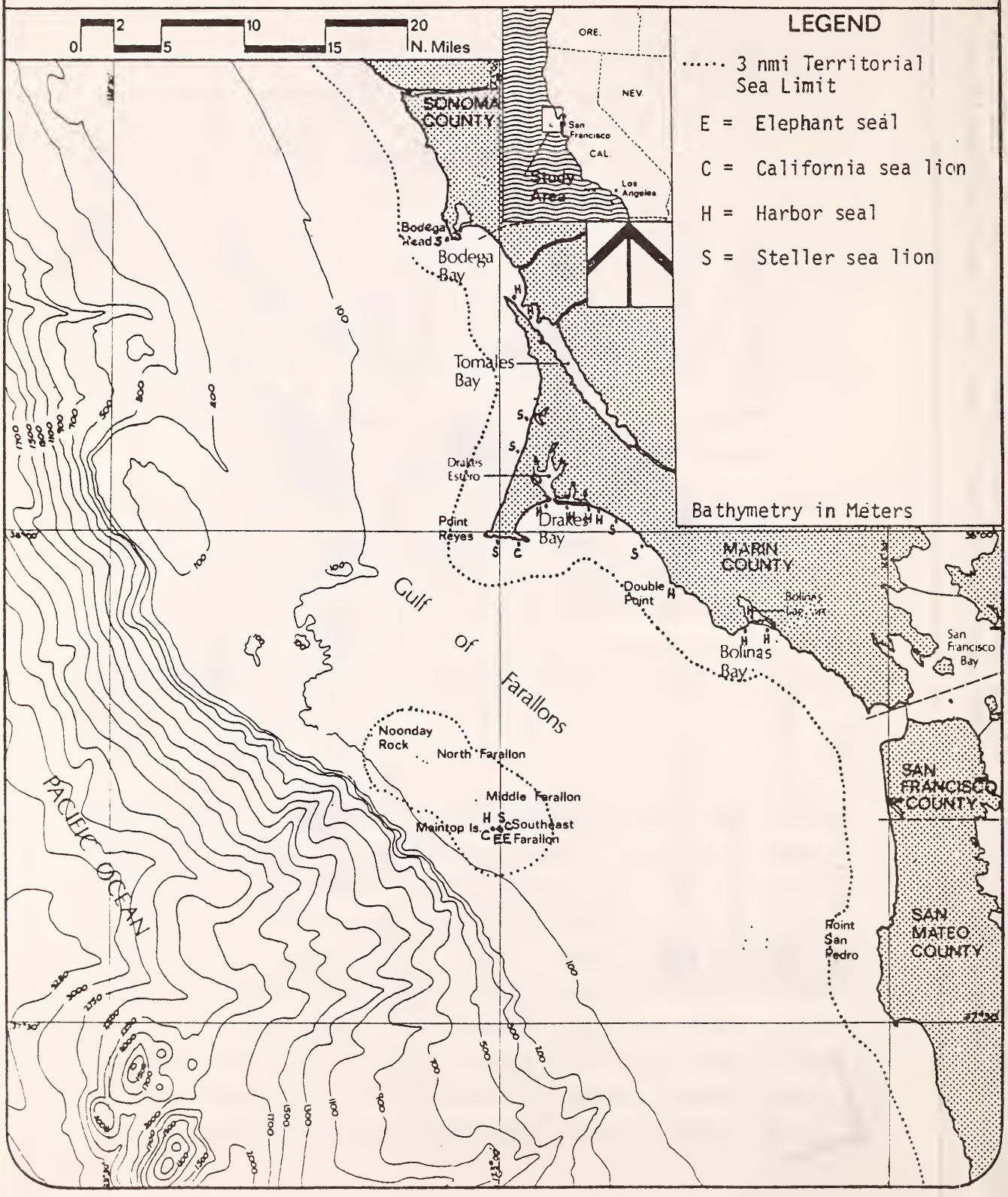


FIGURE E-5. Marine mammal haulout areas throughout the study area (California Department of Fish and Game, 1979).



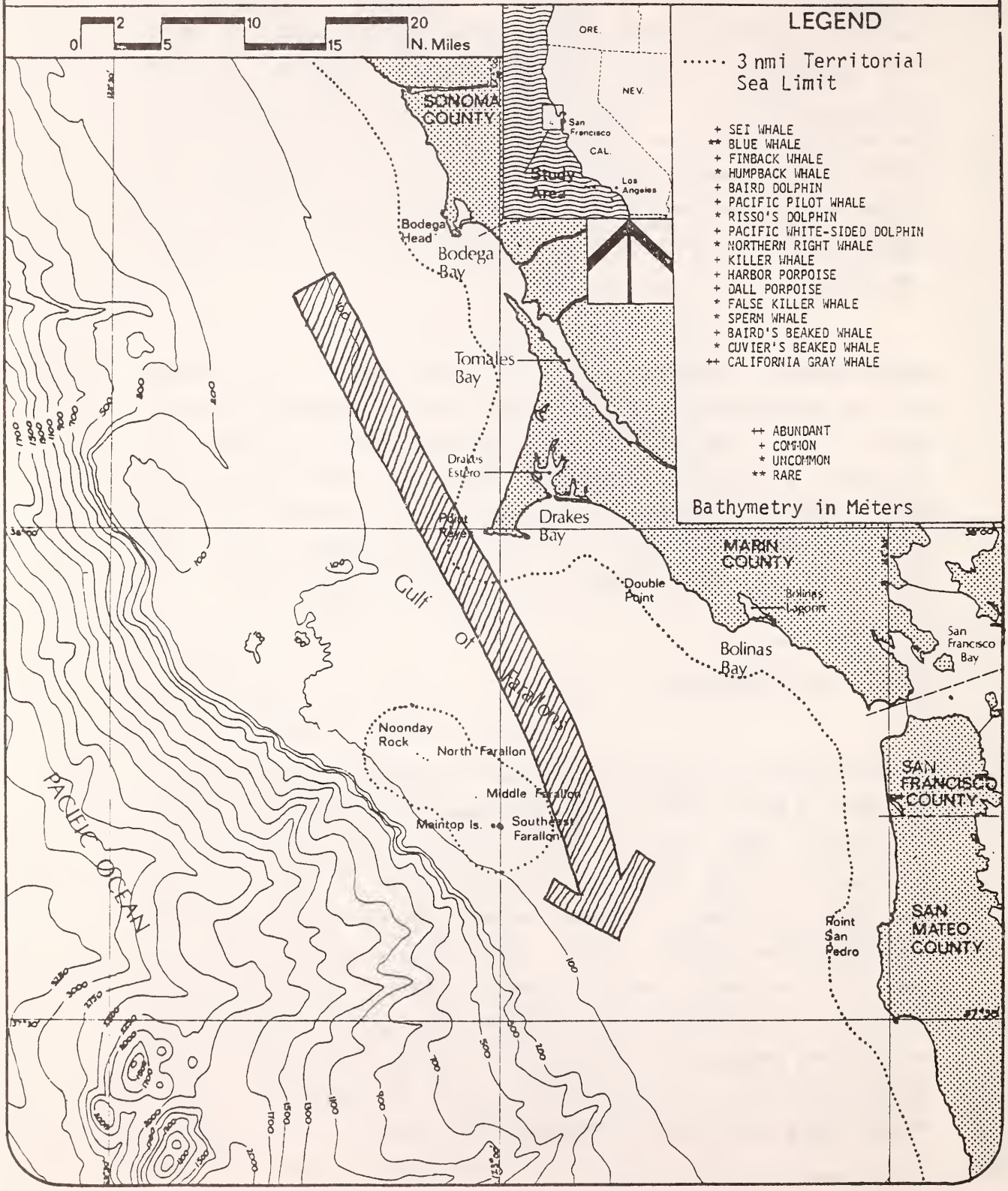
Seventeen species of cetaceans have been recorded within the study area (Figure E-6). Among these are the blue, humpback, and sperm whales, as well as the more common California gray whales which are observed each year from late November until June or July during their annual migrations (Figure E-6). Observing gray whales during 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 ensuring continuance of the stocks. The Farallon Islands act as an offshore mecca for shallow and intertidal fishes which further enhance finfish stocks.

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).



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 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 (55m) 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 meso-pelagic 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 eelgress 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.

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 (31m), 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-

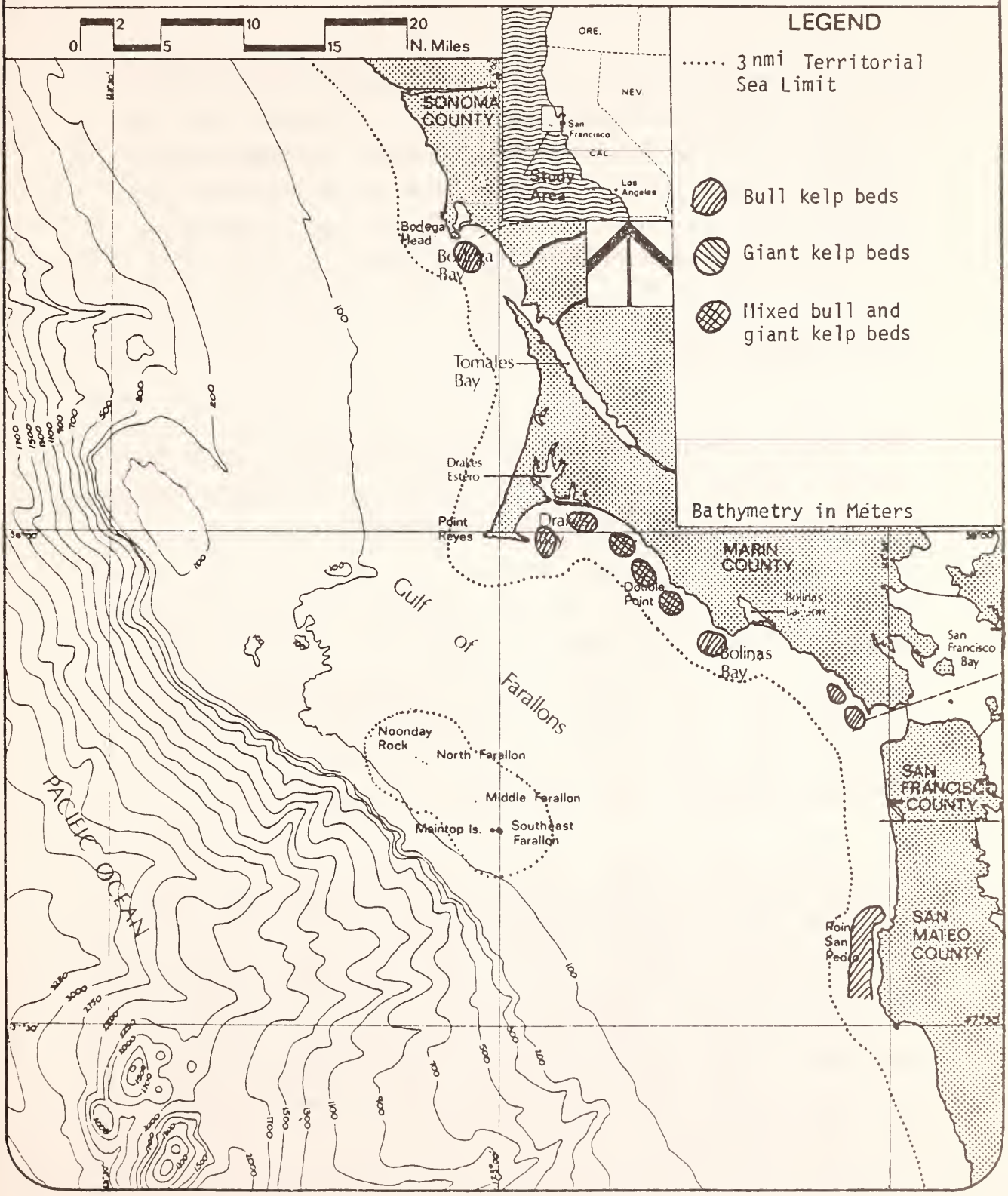
water habitat.

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 (5.6km) 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, Limintour Estero, 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).

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



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

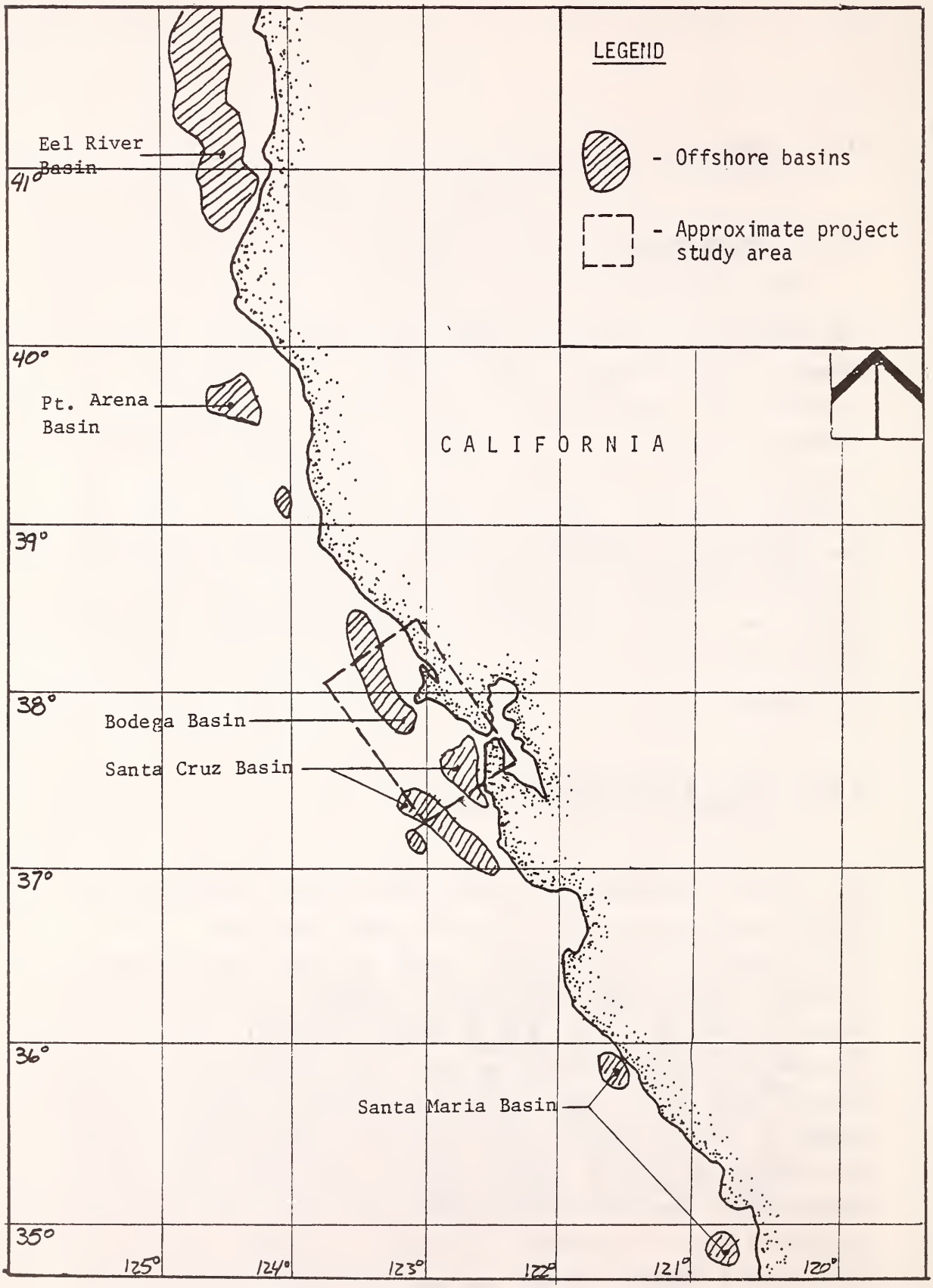
E.3.a. Introduction

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 sportfishing), 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 six offshore basins of central and northern California were leased, including 27 between Russian River and Bolinas (3 to 21 nmi or 5.6 to 38.9km offshore), one 11 nmi (20.4km) off Pescadero Point, and one 6 nmi (11.2km) off Ano Nuevo Point (Figure E-8). There has been no offshore leasing in State waters of central and northern California. Since State oil and gas sanctuaries are no longer intact in the study area, it is possible that leasing in State waters could occur. As discussed in Section F.1.b., provisions of the Outer Continental Shelf Lands Act prohibit leasing for oil and gas development outside State

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



waters but within 15 statute miles (smi) (24.1km) of the Point Reyes wilderness area unless the State leases relevant State waters for oil and gas development. However, several tracts just outside the exclusion area have been tentatively selected for bidding in Lease Sale #53, offshore of the Marin County-Sonoma County line and west 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 next major steps are the release of a draft environmental statement (DEIS) in April, 1980, and a final environmental statement (FES) 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 otherwise, i.e., 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

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).

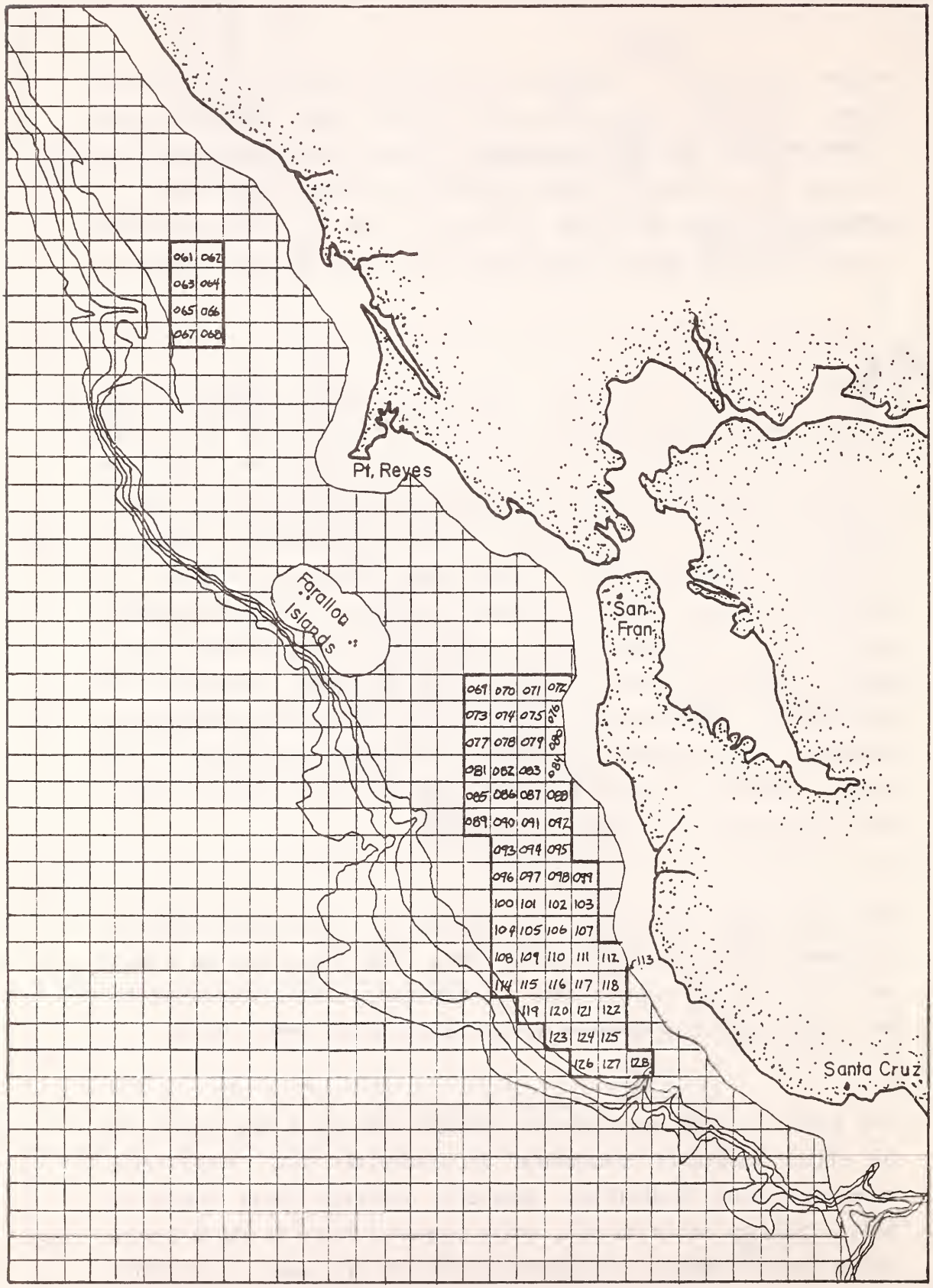
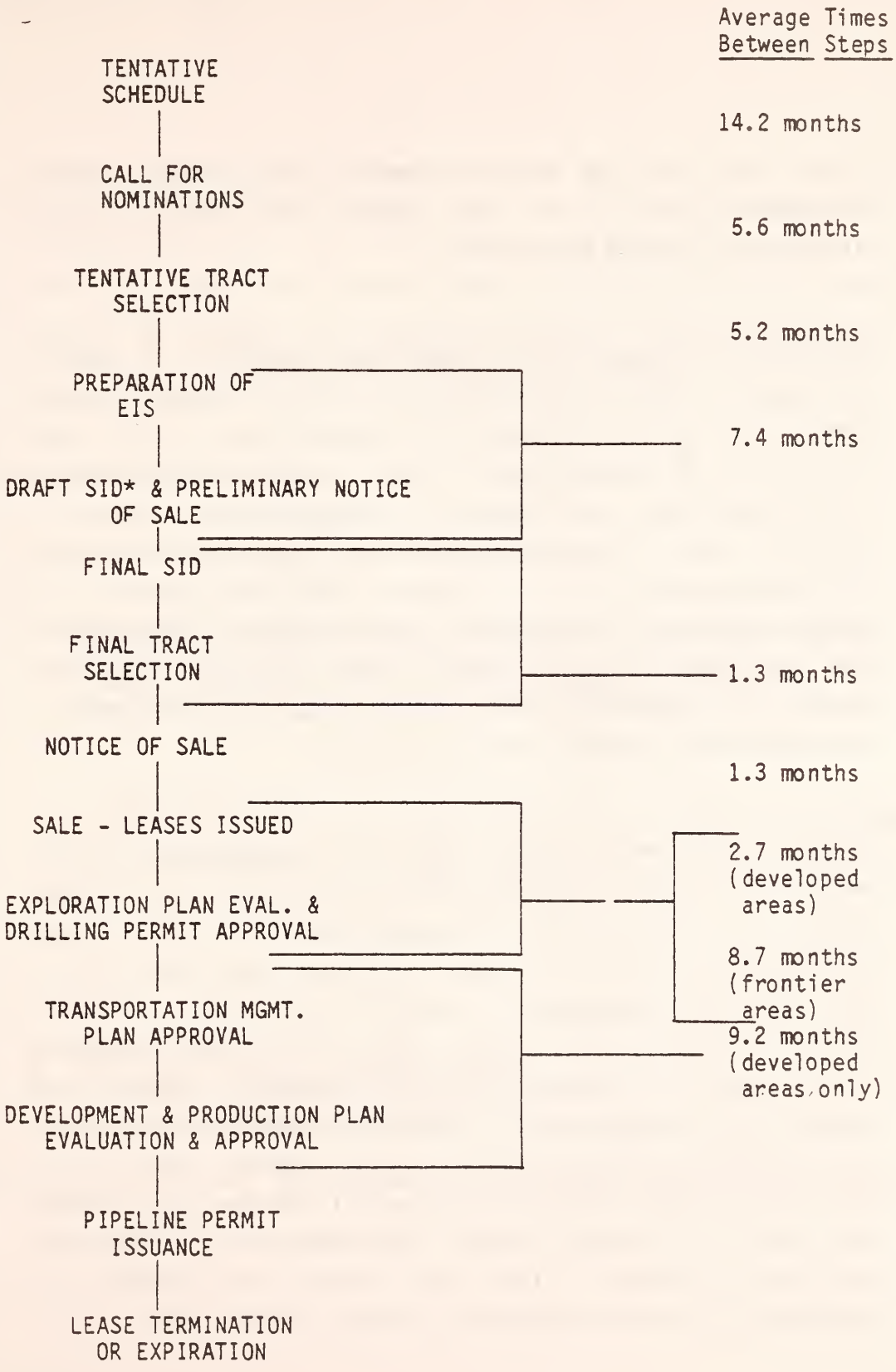


Table E-6. Steps in the OCS decision-making process.



* Secretarial Issue Document

groups and State and local governments have generated comments recommending 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 (Figure E-8) 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.

In 1974, a petroleum industry ranking resource potential (conducted at the request of the Department of 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 area off Oregon and Washington was ranked less desirable (California Office of Planning and Research, 1978). A more recent nationwide survey ranking of petroleum industry interest in offshore areas (compiled by the Department of Interior) rated central and northern California as 11th out of 18 potential interest areas (Oil and Gas Journal, 1977). Given the substantial and persistent increases in world oil prices, however, the potential for economically recoverable reserves in these low priority areas appears to be improving and may alter industry interests in the future.

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

A. 320 million barrels[1]

B. 112 million barrels[2]

C. The USGS[3] (in a preliminary report for Sale #53) included the Bodega Basins 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	53 million barrels	13 million barrels

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

E.3.c Commercial 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 effort 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: bottom-fishing, 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,

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	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 lbs.	Landings kg.	Value ($)
Bodega Bay	4,603,542	2,092,519	1,485,660
Point Reyes	274,851	124,932	354,450
Tomales Bay	782,826	355,830	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

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 (Leitzell 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.

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 (31 percent), English sole (55.3 percent), dover sole (5.8 percent), and bocaccio and chilipepper rockfish (21 percent).

Crab fishing (market crab and and several bait species) by pot or trap centers upon a coastal strip stretching between the 30 and 300 ft (9 and 90m) isobaths running south of the Point Reyes Headlands. The fishery is most intense between November and June (the open season), especially during the initial 2-3 month interval. Approximately 43.1 percent of the San Francisco region's crab landings were harvested from study area waters in 1975 (Pinkas, 1977).

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

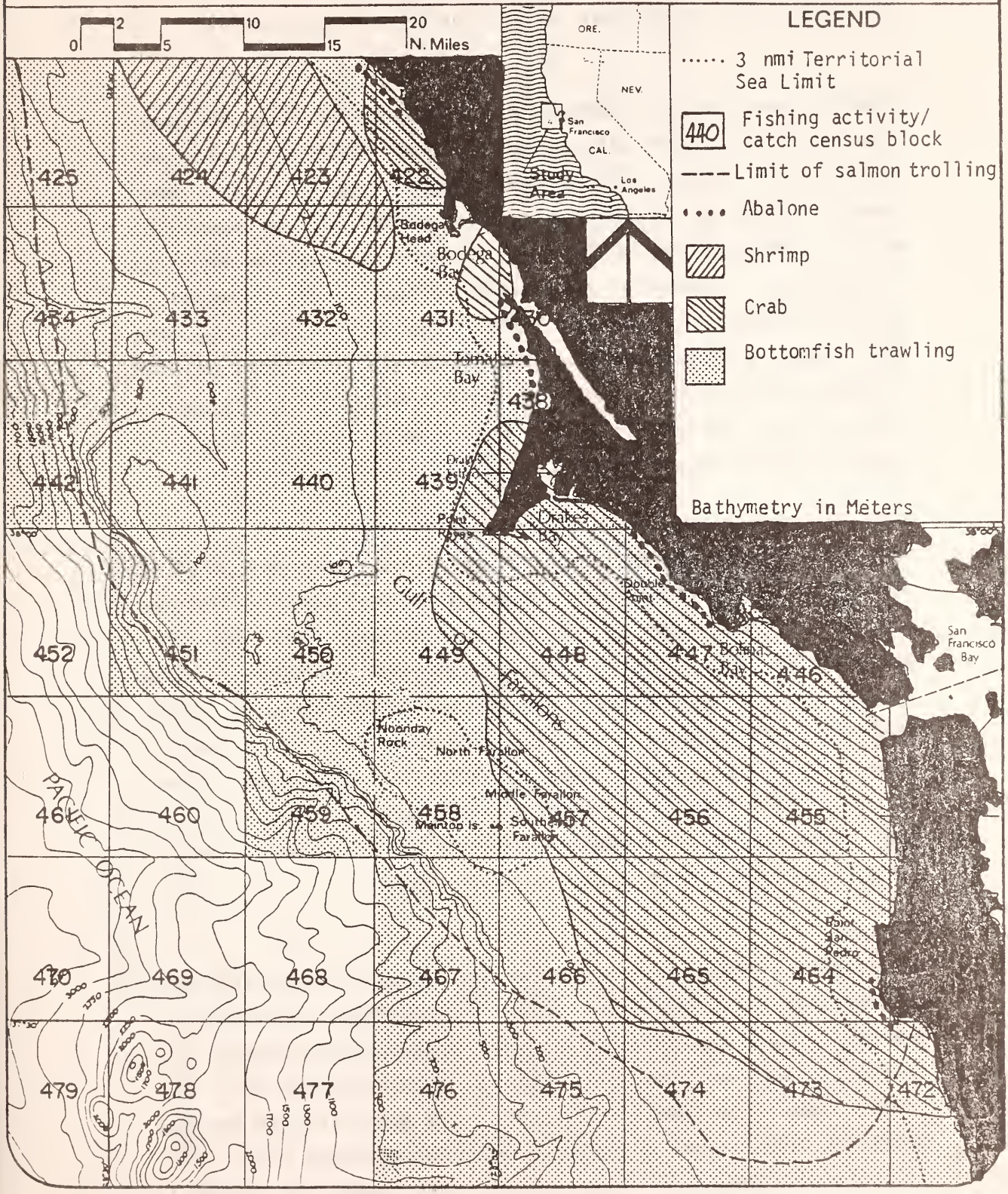
* These catch totals represent data summed from 18 statistical blocks (Figure E-10) selected from the larger San Francisco statistical area.

The study area crab fishery represents one of California's prime market production zones. Over 400 nmi^2 (1370km^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 delimited 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 (46km) offshore, but the Gulf of the Farallons is reportedly the region's major salmon trolling ground (California Department 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, 1978). 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

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



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, shrimps, and abalone. According to Pinkas (1977), crab ranked fifth in value among species landed at Bodega Bay ports. Squid are processed for export, shrimp primarily for bait; and crab and abalone 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).

Typically, oyster mariculture in Drakes Estero generates about 15 percent of California's entire commercial crop (40,000 gallons or 150,000 liters valued at $200,000). Between 1973 and 1977, productivity (in weight of meats) expanded 87 percent, from 128,035 lbs to 239,011 lbs (58,198 to 108,641kg)(Smith, 1979, personal communication). The firm responsible for this growth is Johnson Oyster Co., whose lease with DFG for 1,060 acres (425ha) is valid until 2015 (U. S. National Park Service, 1976). Most of their production is from giant Pacific oysters cultured in "racks" (trays) suspended in the water column by wires.

Mariculture ventures within Tomales Bay operate on a considerably smaller scale. In 1977, only 30,589 lbs (13,904kg) 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 (120ha)(American Shellfish Corporation) to 10 acres (4ha) of submerged State lands; in three instances, privately-owned tidal zones are leased in

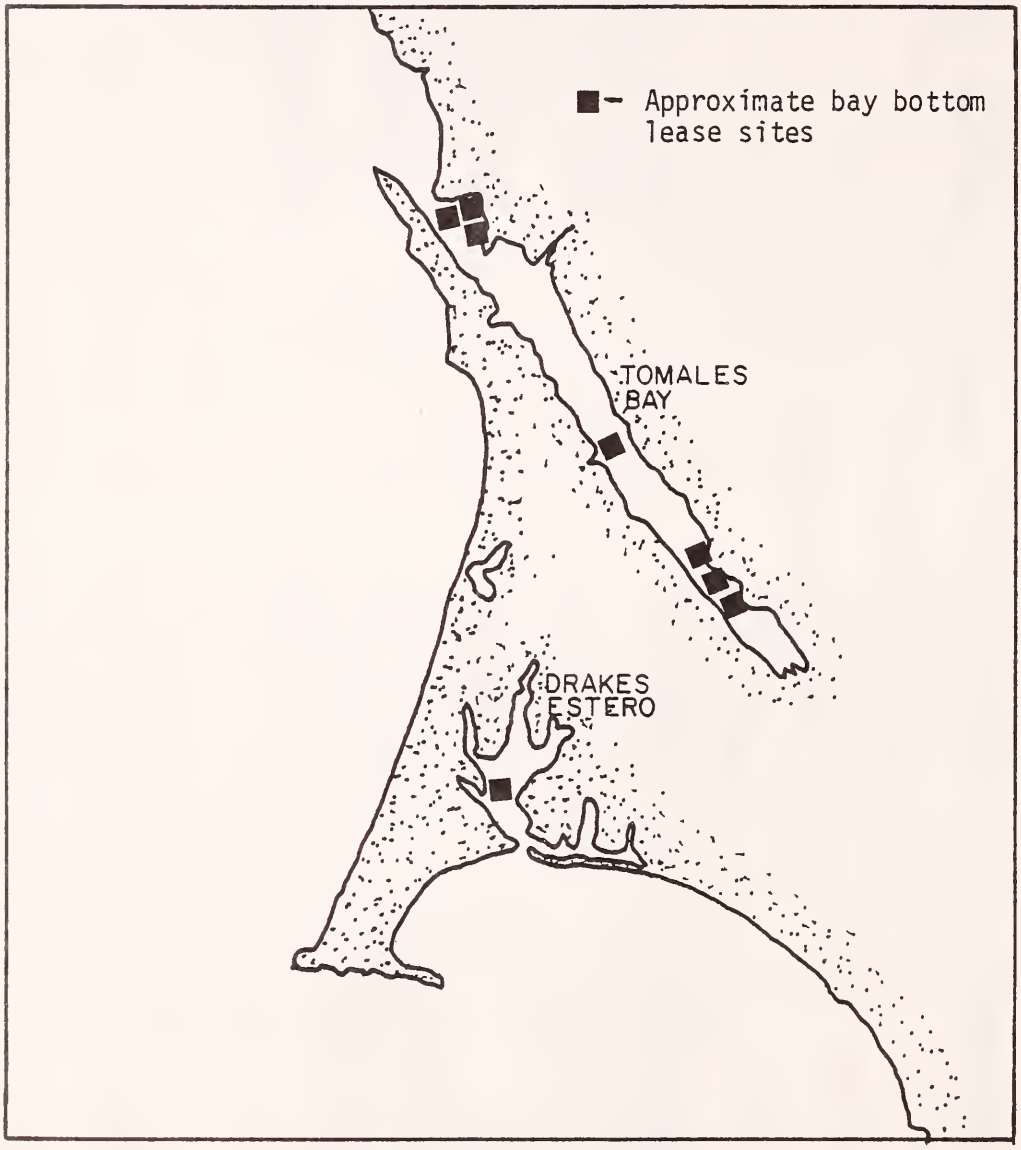
Table E-11. Commercial mariculture licensees in Tomales Bay as of January 1, 1979 (Smith, personal communication, 1979).

ORGANIZATION/PARENT COMPANY	AREA OF OPERATION	COMMERCIAL SPECIES
1. Johnson Oyster Co.*	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 Co.	Tomales Bay (260 acres state)	Giant Pacific oysters
4. International Shellfish Enterprises, Inc.	Tomales Bay (159 acres leased from state)	American and Olympic oysters & 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 Co. **	Tomales Bay (10 acres state)	"Relay" of various oyster species (unspecified) from San Francisco Bay.

* Major producer

** In start up phase

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



tandem with public areas. All but one company raise oysters explicitly for market. The exception, Morgan Oyster Co., "relays" grown oysters from private lands within San Francisco Bay to Tomales Bay for natural pollution cleansing (depuration).

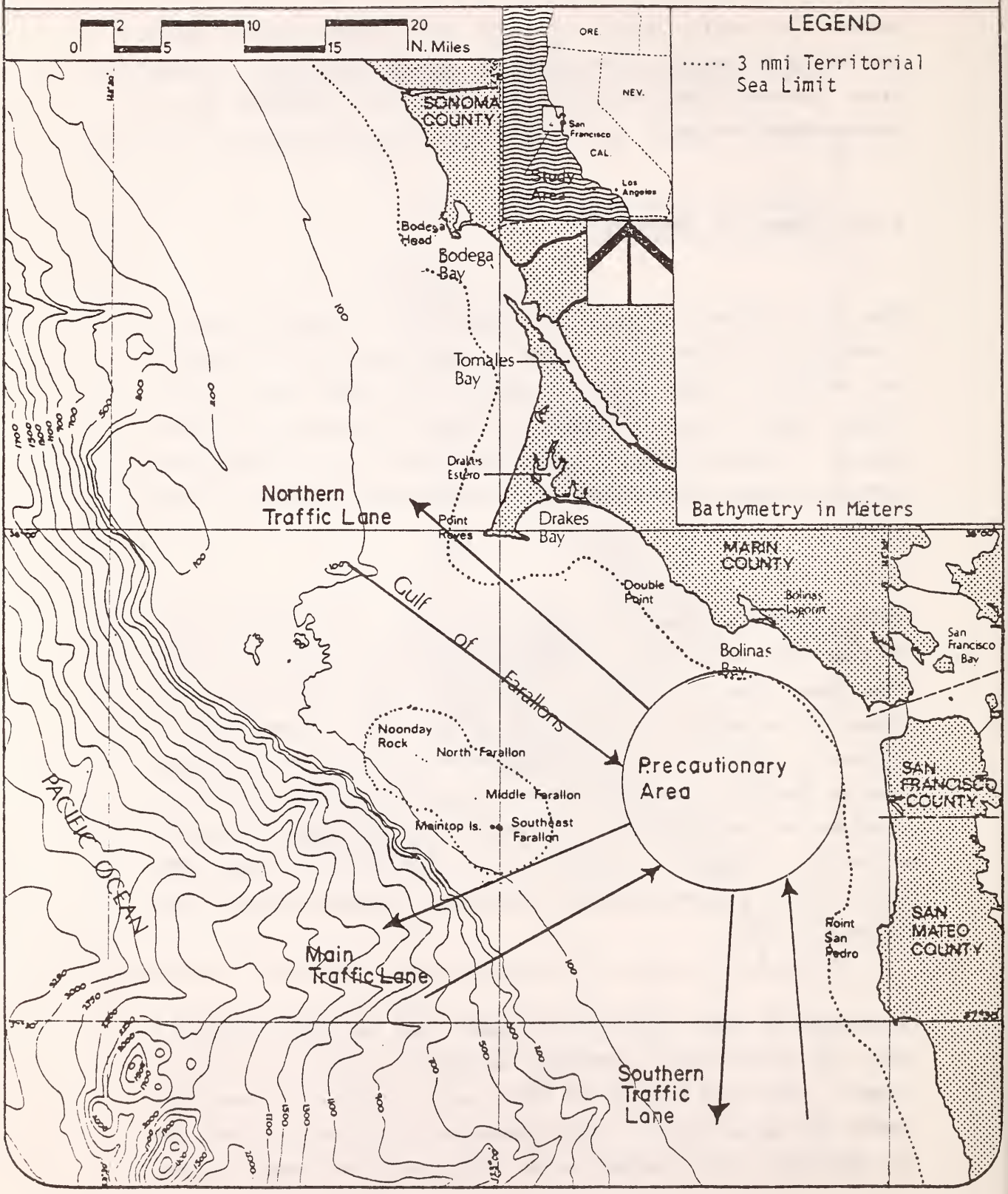
E.3.d Commercial Shipping

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 the primary destinations (and ultimately, origins) of commercial vessels transitting these lanes. In 1976, the Bay entrance accounted for a total commodity throughput of 48,390,345 short tons (U. S. Army Corps of Engineers, 1976). Roughly 48 percent of this volume was classified as foreign (77 percent inward; 23 percent outward), while the remainder was domestically oriented (55 percent inward; 45 percent outward). Following a general lag in traffic in 1974 and 1975, these levels reapproached San Francisco's tonnage record established in 1973.

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

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



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. Some parties have reported that 40 percent of all traffic utilizes the northern lanes, 20 percent, the main lanes, and 40 percent, the southern lanes during San Francisco Bay approaches and departures (Emerson 1979, personal communication), while others have witnessed a considerably 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 13, 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 companies' tankers entering San Francisco Bay normally adhere to the main (western) traffic lane upon approach (Wright, 1979, personal communication).

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

The U. S. Coast Guard is considering a new 576 smi (500nmi) Traffic Separation Scheme (TSS) for California which would parallel the mainland coast from Point Conception (in Santa Barbara County) to the California-Oregon border (Gracey, 1979). San Francisco Bay would be one of three points of access to this TSS. If this opton is approved, the existing San Francisco TSS framework (outlined above) would be altered through the deletion of both the northern and southern lanes; the western (main) lane would be extended seaward to intersect with the new California TSS just southwest of the Farallon Islands (Emerson 1979, personal communication). Thus, under this proposal, the western shipping lane would become an even greater focal point for vessels entering into and exiting from San Francisco Bay.

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's 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 (26,125ha) 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 (66.8km) 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).

Several other public scenic and recreational facilities are located along the coast 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 and Stinson State Beach are 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).

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

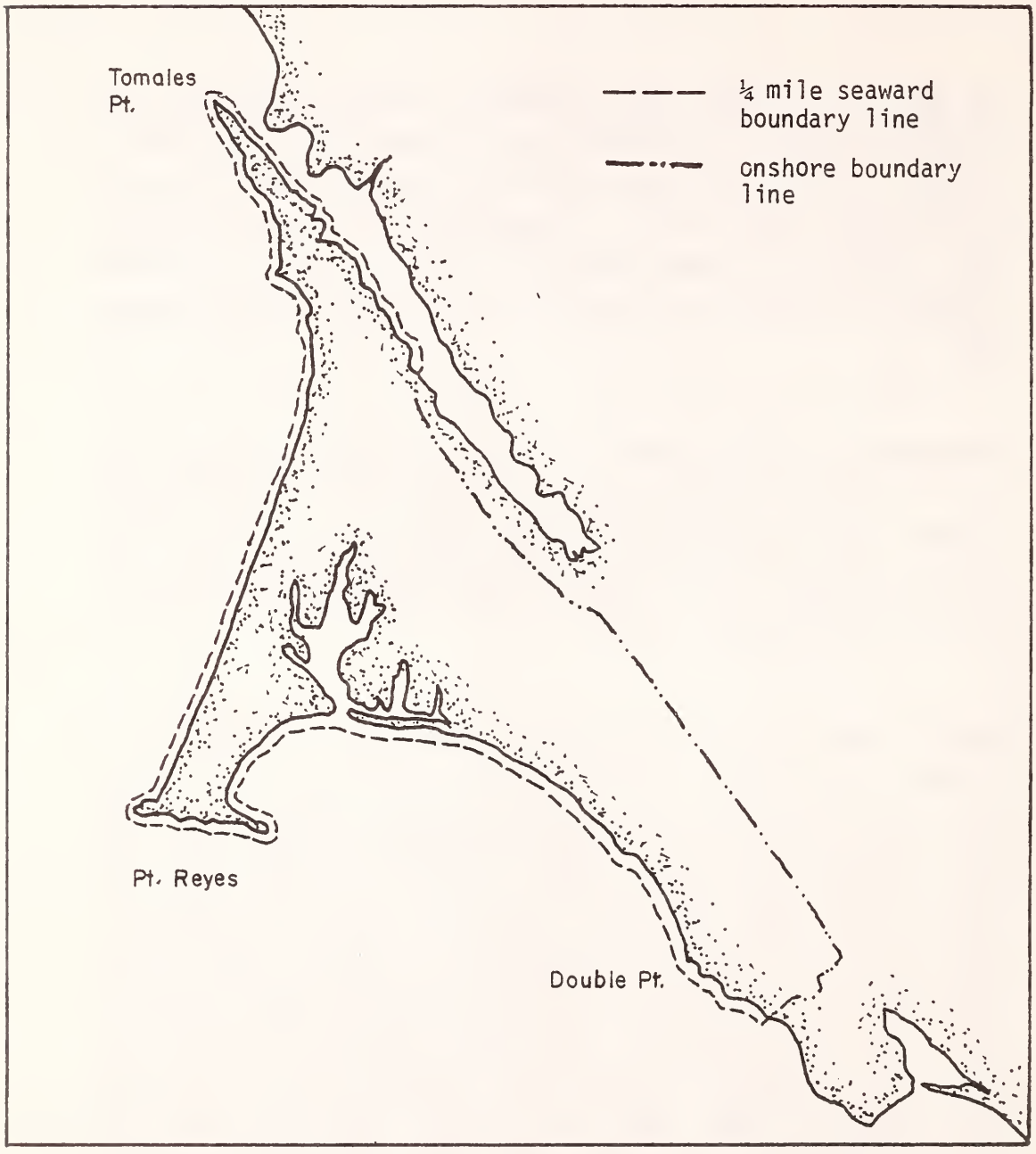


FIGURE E-14. Recreation facilities in the Point Reyes area (from California Department of Parks and Recreation files and maps).

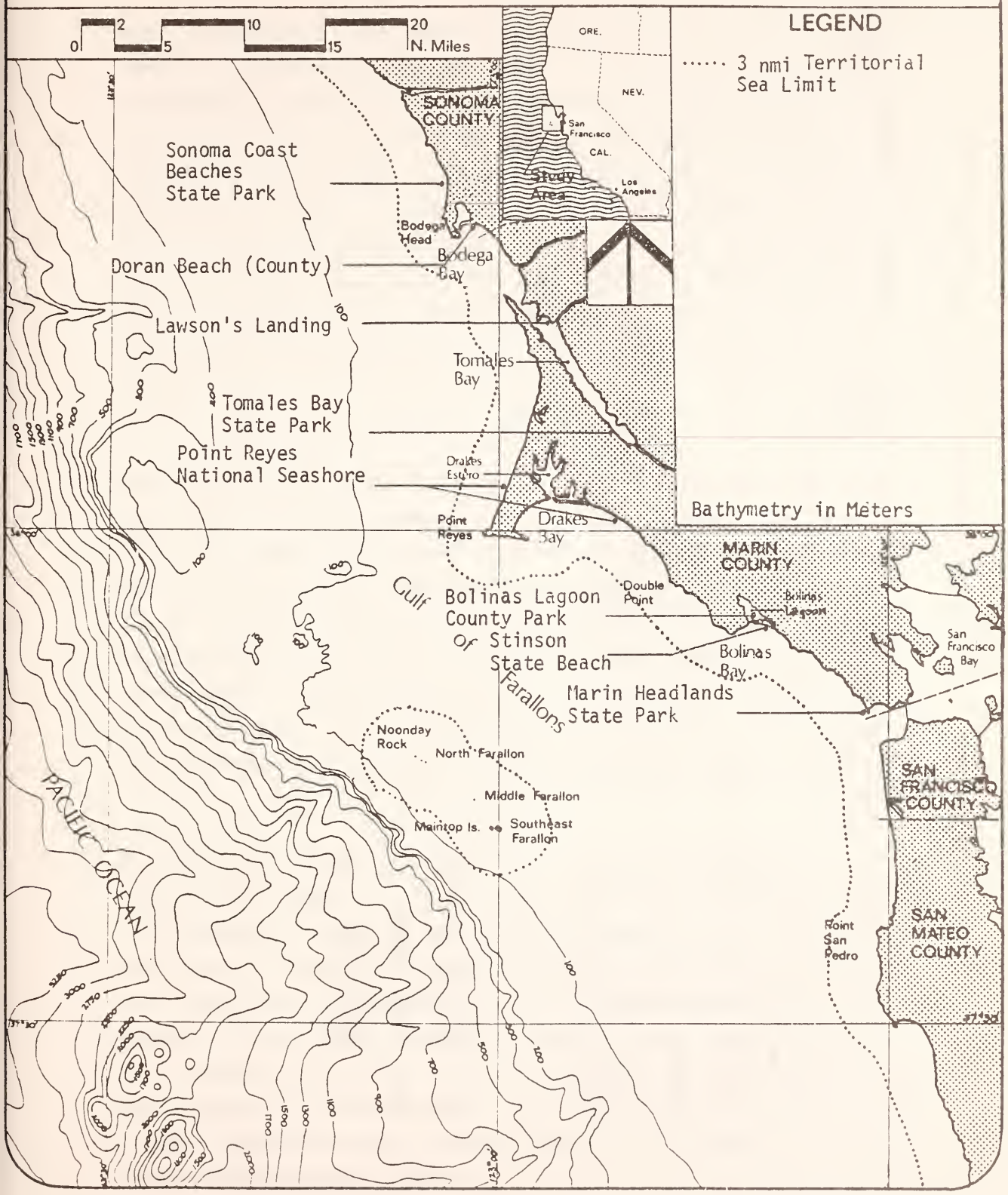


Table E-12. Public recreational facilities and activities (Winzler and Kelly, 1977).

UNIT	SIZE (ac)	ANNUAL VISITATION (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
Tomales Bay SP	1,018	0.06	X	X			X		X
Stinson SB	51	0.4	X				X		X
Mt. Tamalpais SP	6,233	1.2	X		X	X	X	X	X
Sonoma County SB	2,806	1.4	X	X		X	X		X

NS National Seashore

SB State Beach

SP State Park

Over 50 percent of the PRNS (32,073 acres or 12,829ha) is designated as wilderness (25,370 acres or 10,148ha) or potential wilderness (8,003 acres or 2,681ha)(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-13, 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 70,000 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 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).

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

REGION	CHARACTERISTICS
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 mudflats 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. Washington and gaper clams are dug on mudflats and in Bay waters from a special clammers barge operating 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 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 water-based 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. 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, 1977).

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 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

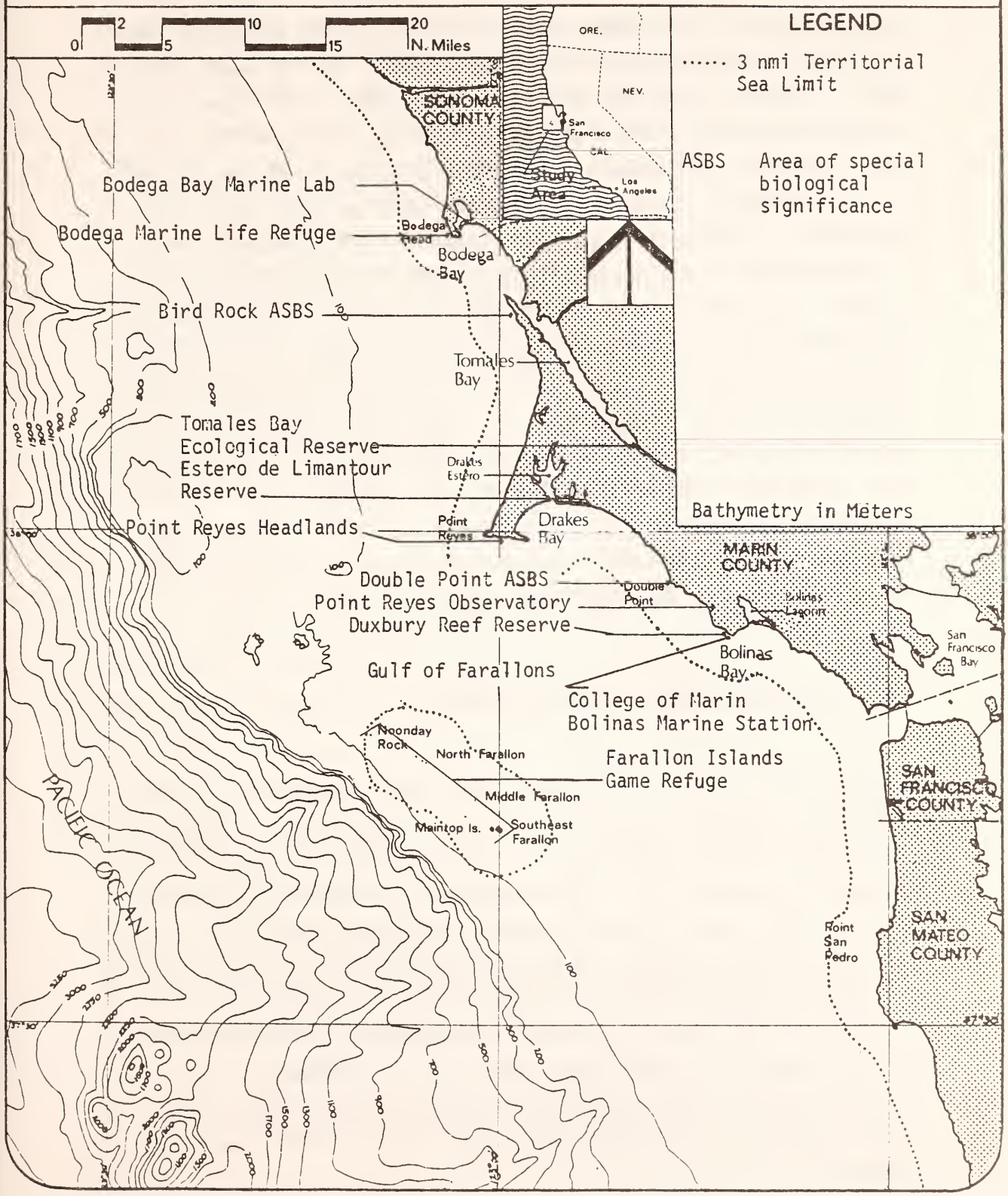
The diversity of physical and biological habitats throughout the Point Reyes-Farallon Island area offers an outstanding opportunity for scientific research on both marine and estuarine ecosystems. Marine research activities focus primarily on seabirds and mammals which use the Farallon Islands for breeding 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 contiguous 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 lifeform 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 ASBSs 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-15). 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.)

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).



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 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 County which discharge wastewater effluent directly into the study area (Feldman, 1979, personal communication). All wastes are disposed via septic systems. One ocean outfall in the Bodega Bay vicinity is among the disposal alternatives now being evaluated to service the city of Santa Rosa's wastewater management needs. However, project planning is still at a preliminary stage and no preferred coastal disposal route has been identified. An Environmental Impact Review assessing both on-land and coastal discharge options is expected to be completed by fall, 1979 (Feldman, 1979, 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 offshore spoils deposition (Rolf, 1979, personal communication). A Draft Environmental Impact Report on this project has just recently been completed (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 spoil disposal site in the proposed sanctuary (Adsit, 1979, personal communication). This site, located about 10 nmi (18.5km) south of Southeast Farallon Island, has a radius of approximately 1000 yards (920m) and, on the average, has received annual waste loads of 50,000 cubic yards (38,000m^3) in recent years (Vais, 1979, personal communication). The COE and EPA are currently evaluating this dumping ground with regard to potential adverse environmental impacts. A DEIS is scheduled for release in April, 1982 (45 Federal Register 3051 et seq., February 16, 1980). Preliminary indications are that this disposal activity will be moved to the San Francisco Bar Site, a larger area located just off Point Lobos, about 7 nmi (13km) west of the Golden Gate.

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 24km) 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 radio-nuclides and mixed fission products (derived in large part from research laboratories) comprised the predominant waste elements. As discussed in Section F.1.b., long-term biological effects of marine resource exposure to radioactive materials are (since 1972) being monitored by the EPA on a regular basis.

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 more infrequent 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

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

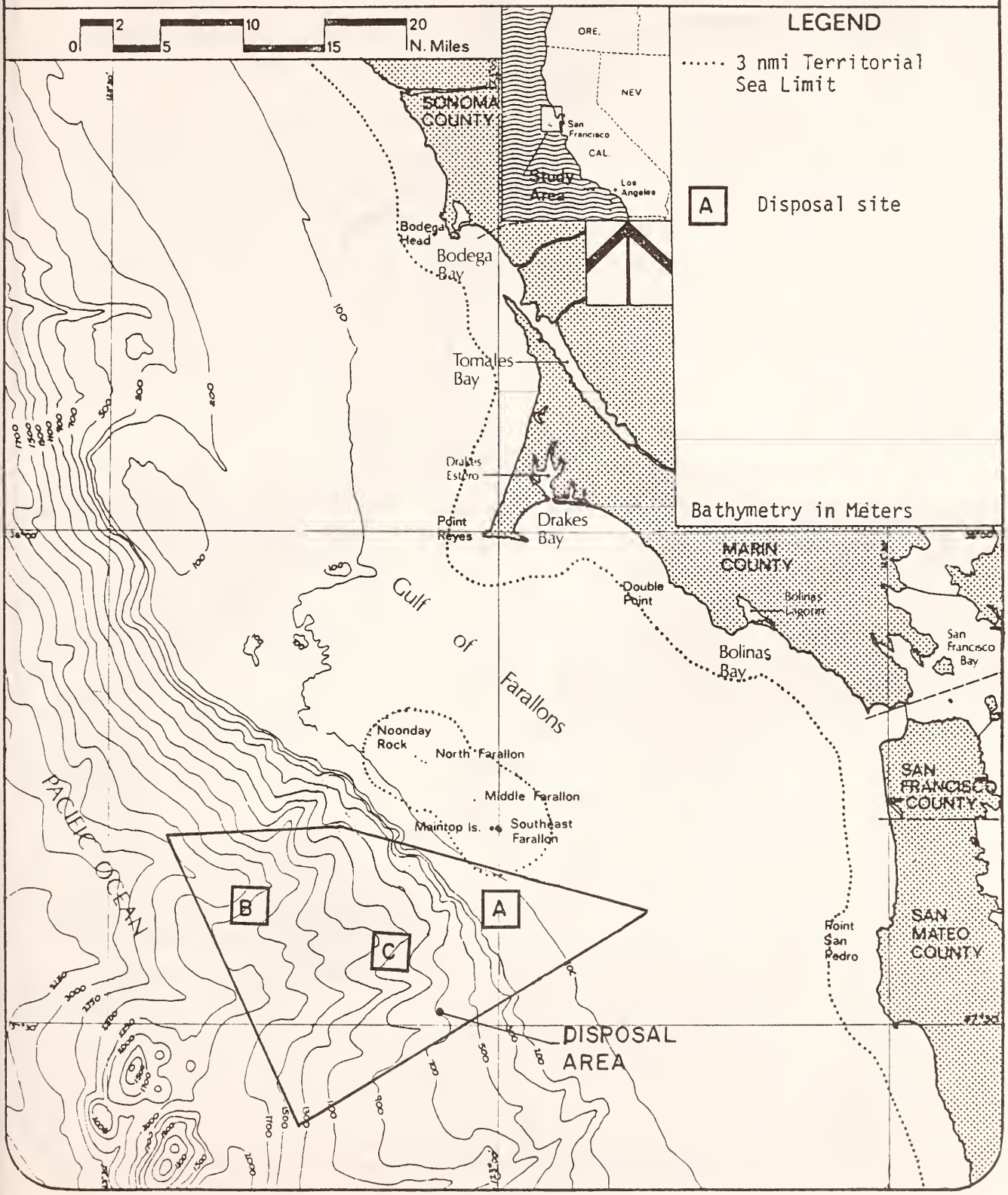
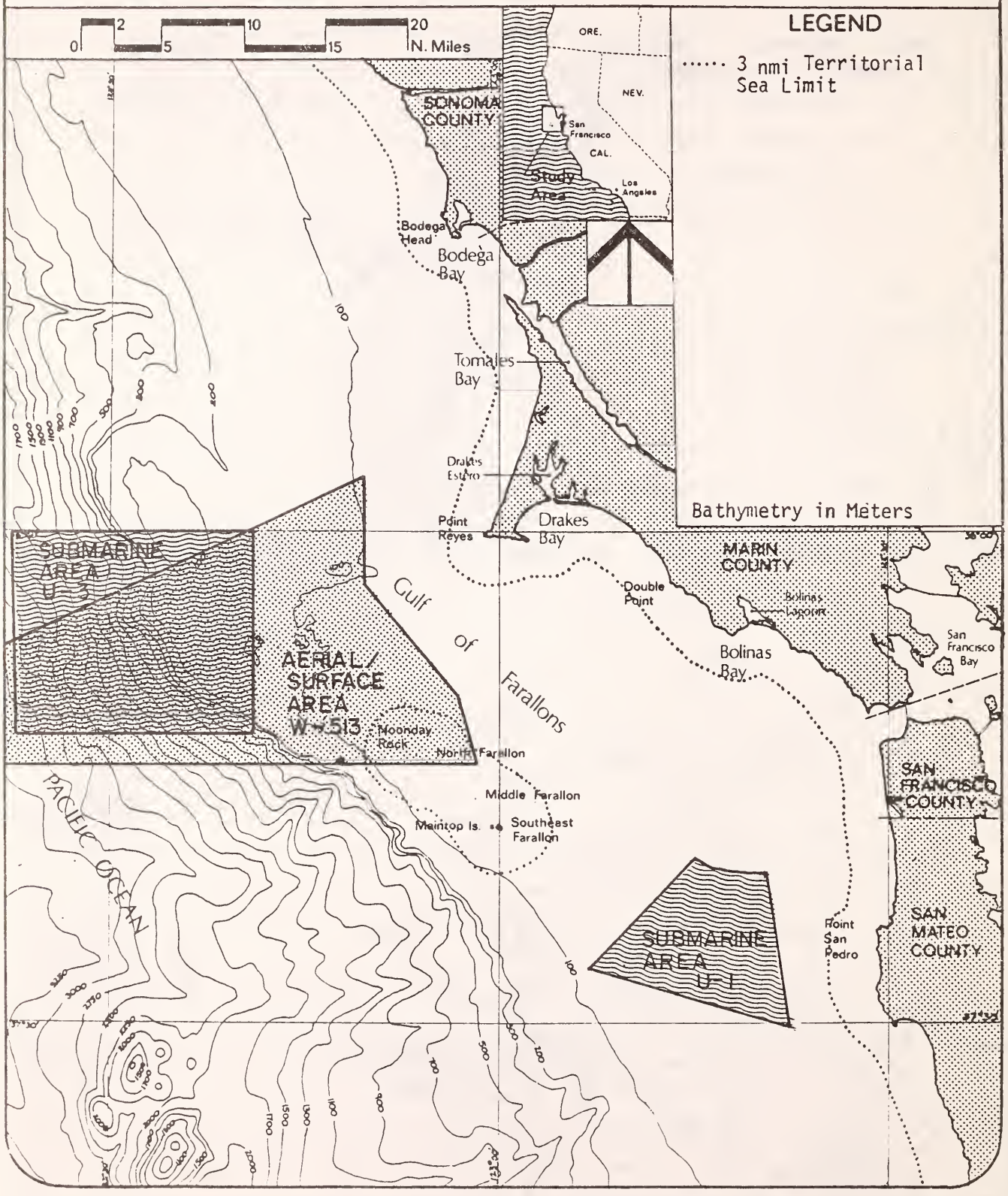


FIGURE E-17. Naval operation zones within or near to the marine sanctuary study area (Scruggs, 1979, personal communication).



to, and departure from, San Francisco Bay.

The USN's two submarine operations areas are located some 8 nmi (14.8km) southeast and 9 nmi (16.7km) northwest of the Farallon Islands, respectively. Area U-1 is reportedly not being 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 trial diving exercises and various equipment checkouts normally following vessel refittings or overhauls.

A third, but considerably larger, USN offshore operations zone (W-513) lies partly within the sanctuary study area, approximately 10 nmi (18.5km) southwest of the Point Reyes Headlands. This area encompasses 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 warfare training throughout the area, including all-weather missions, air intercepts, surface vessel coordination, and the dropping of inert ordnance (Scruggs, 1979, personal communication). Surface operations primarily involve naval reserve vessel and other auxiliary training maneuvers by San Francisco Bay Port-based crews and equipment. Taken together, these activities occur at a reportedly "moderate" level which, at times, may total 15 use days 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 (SRMs) to a variety of destinations located elsewhere along the coast. Many of these SRMs (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.

F. ALTERNATIVES

Introduction

Section F discusses five alternative actions for NOAA to take regarding the Point Reyes-Farallon Islands area. The first alternative presented is the possibility of not designating a sanctuary but instead relying on the existing system of controls. Alternative 2 is NOAA'a preferred alternative, namely, the designation of a marine sanctuary with the boundaries and controls set forth in the draft Designation Document and proposed regulations in Appendix 1. Alternatives 3a, 3b and 4, including different regulatory and boundary options, are discussed in comparison to the preferred alternative. Table F-1 summarizes the boundaries and controls considered for designation alternatives 2 through 4.

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

F.1. Status Quo Alternative

F.1.a. Introduction

An alternative to designating a marine sanctuary is to rely solely on existing State and Federal authorities. This section sets forth the existing controls for the area under consideration and the environmental consequences of relying only on current con-

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 3a	ALTERNATIVE 3b	ALTERNATIVE 4
Boundaries	From the mean high tide line or the seaward boundary of the Nat'l. Seashore between Bodega Head & Rocky Point to 3 nautical miles beyond State waters; 12 nmi around the Farallon Is. and Noonday Rock; & the intervening waters.	12 nmi around the Farallon Islands.	Between 3 & 12 nmi seaward of the Farallon Islands (excluding State waters).	12 nmi around the Farallon Islands & the waters between the Islands & the mean high tide line on the mainland between Tomales Pt. & Bolinas Head.
Oil and Gas Activities	Prohibit exploration & exploitation in the sanctuary. Allow placement of pipelines certified by the Asst. Administrator for CZM except within 2 nmi of sensitive areas.*	Prohibit within 6 nmi of the Farallon Is. Require special oil spill containment equipment beyond 6 nmi. Allow pipeline placement.	Prohibit exploration and exploitation in the sanctuary. Allow placement of pipelines certified by the Asst. Administrator.	Same as alternative 2.
Discharges	Prohibit except for vessel cooling waters, marine sanitary device effluents, indigenous fish wastes, & chumming material. Permit municipal outfalls if certified by Asst. Administrator.	Prohibit except for vessel cooling waters, marine sanitary device effluents, indigenous fish wastes, & chumming material.	Same as alternative 3a.	Same as alternative 3a.

TABLE F-1, cont.

	ALTERNATIVE 2 preferred alternative	ALTERNATIVE 3a	ALTERNATIVE 3b	ALTERNATIVE 4
Seabed Alteration and Construction	Prohibit, except for routine navigational & marina maintenance dredging, new marina construction, ecological maintenance, allowed pipeline placement, mariculture, & residences in Tomales Bay.	Prohibit, except for pipeline placement.	Same as Alternative 3a.	Prohibit, except for routine navigation & marina maintenance dredging, pipeline placement, & ecological maintenance.
Vessel Traffic	To the extent consistent with international law, prohibit vessels except for fishing, recreational, research & enforcement vessels from the waters within 1 nmi of sensitive areas* except to land on the Farallon Islands.	Prohibit vessels within 1 nmi of the Farallon Islands, as specified in Alternative 2.	----	Require vessels to stay in the Vessel Traffic Separation Scheme lanes. Prohibit vessels within 2 nmi of the Islands. Fishing, research, recreational, & enforcement vessels would be exempt, as would vessels transporting persons or supplies to or from the Islands.
Disturbing Marine Mammals & Birds	Prohibit overflights below 1000 ft. 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 3000 ft. in the sanctuary within 2 nmi of sensitive areas*, except to land on the Farallon Islands.
Historical Resources	Prohibit removal & damage within the sanctuary.	----	----	Same as Alternative 2.

TABLE F-1, cont.

	ALTERNATIVE 2 preferred alternative	ALTERNATIVE 3a	ALTERNATIVE 3b	ALTERNATIVE 4
Firearms	----	----	----	Prohibit use within the sanctuary.
Fishing	Rely on the California Dept. of Fish & Game & the Pacific Fishery Management Council.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Military Activities	Allow military activities necessary for nat'l. defense or emergency. NOAA will consult with DOD on specified activities.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Research/ Education	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 & interested Federal agencies.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

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

trols. The following section (F.1.b., State Refuges and Reserves) includes a brief description of each of the authorities now in effect in the study area. Some readers may prefer to review Tables F-2 and F-3 which provide an overview of the authorities in the area 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 (5.6km) 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. 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

Managed Resources and Activities	Management Authorities																				
	State Authorities									Federal Authorities											
	AQCA	ASBS	CAA	ER, CR, MLR	FOC	HCRPA	OCS	UP	WQCA	CAA	CWA	ESA	FCMA	FWCA	MBTA	MMPA	MPRSA	NHPA	OCSLA	OPA	PRMC	PWSA
Resource Protection																					
1. Marine Mammals				DFG	DFG							FWS NMFS		FWS		NMFS FWS						
2. Marine Birds				DFG	DFG							FWS		FWS	FWS							
3. Fish/Shellfish				DFG	DFG PFMC								NMFS PFMC									
4. Research		WRCB										NMFS		FWS		NMFS					NPS	
5. Recreation			COC					DPR													NPS	USCG
6. Historic/Cultural				DFG		HRC												NPS HCRS			NPS	
Activity Management																						
1. Oil and Gas Development																						
--Exploration and Development			COC				SLC			EPA	COE EPA								BLM USGS			
--Platform Placement			COC				SLC												BLM USGS COE			
--Pipelines			COC																BLM USGS COE			
--Water Discharges		WRCB							WRCB		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 management authorities as they relate to resources and activities. See TABLE F-3 for definition of abbreviations.

TABLE F-3. Abbreviations of State, 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; 33 USC §§1221-1227

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; Joint Federal-State
USCG	-	United States Coast Guard - Department of Transportation
USGS	-	United States Geological Survey - Department of the Interior

all offshore islands, and extending inland generally 1,000 yds (900m) from the mean high tide line. In significant estuarine, habitat, and recreational areas, it extends inland to the first major ridgeline or 5 smi (8km) from mean high tide, whichever is less.

Activities in State waters must comply with the policies established by the CCA. 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 protect marine resources of the study area.

The CCA establishes 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 I has already been

prepared; the program for Unit II 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 effecting agreement with the consistency determinations for Federal developments and activities (including Department 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 CCC 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 (5.6km) 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) 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.

In two areas within the proposed marine sanctuary, the Bolinas Harbor District 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.

The CCC also has jurisdiction over petroleum activities within State waters, especially regarding the assignment of exploration and production permit conditions. For example, to facilitate early containment of an oil spill, the Commission has required one lease holder 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 (455m) 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 (500m) 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).

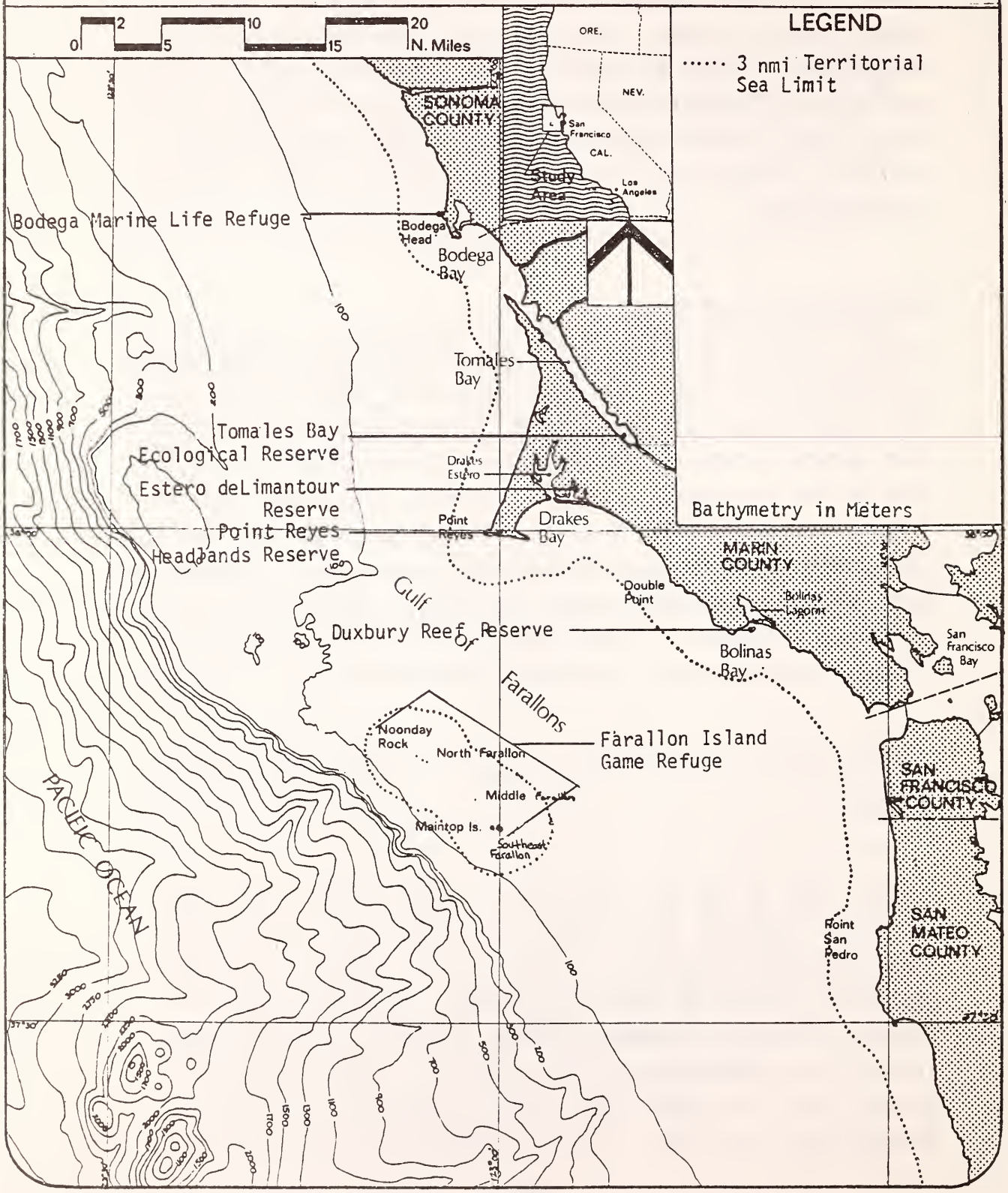
State Refuges and Reserves

Several refuges and reserves for the protection of marine life have been established in the study area by the California Department of Fish and Game (see Figure F-1). These areas fall into four general categories which provide different types of protection to the resources: 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.

--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 protection. 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 public 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 or nest, or

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



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.

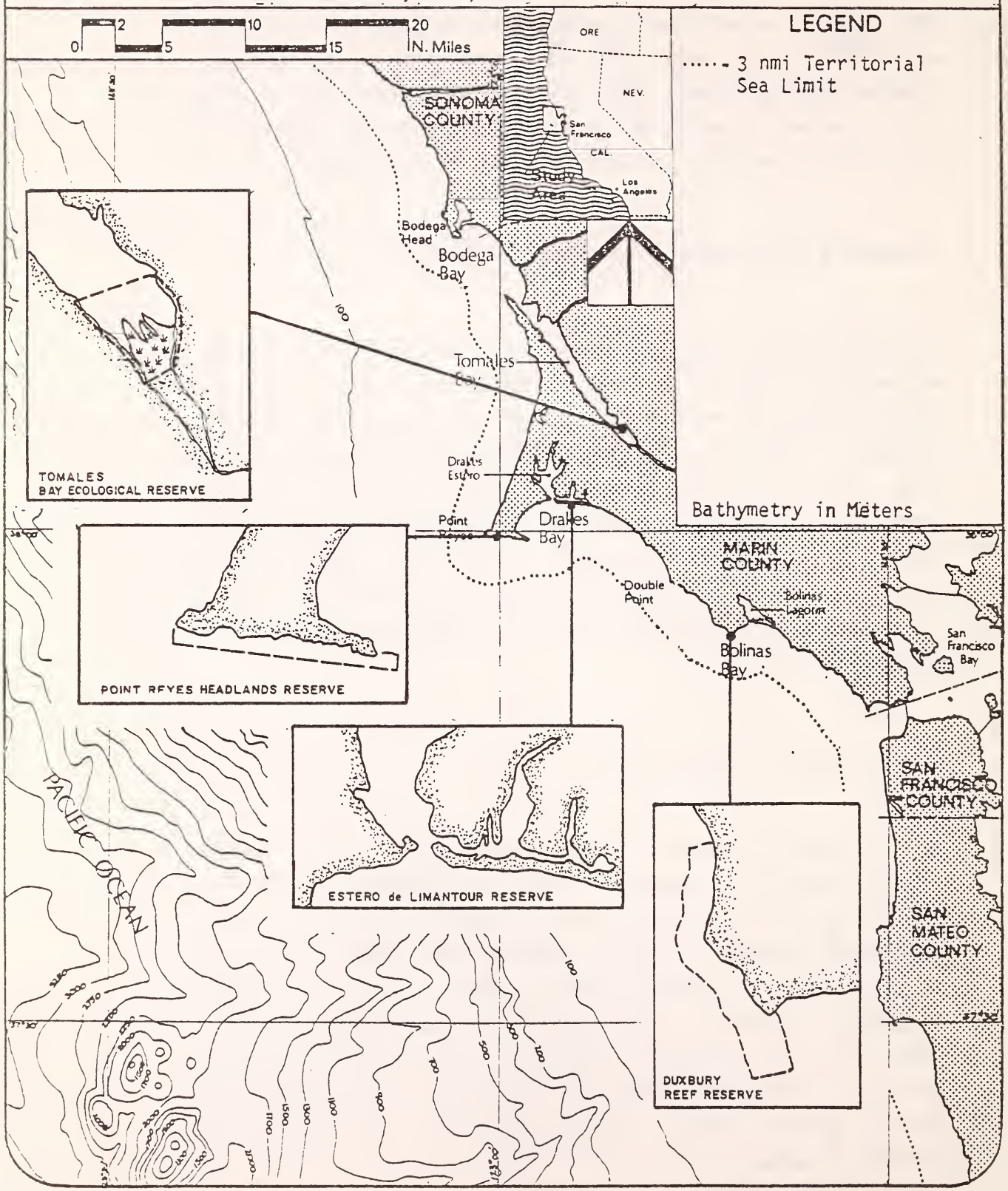
--Tomales Bay Ecological Reserve (see Figure F-2)

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 all 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.

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).



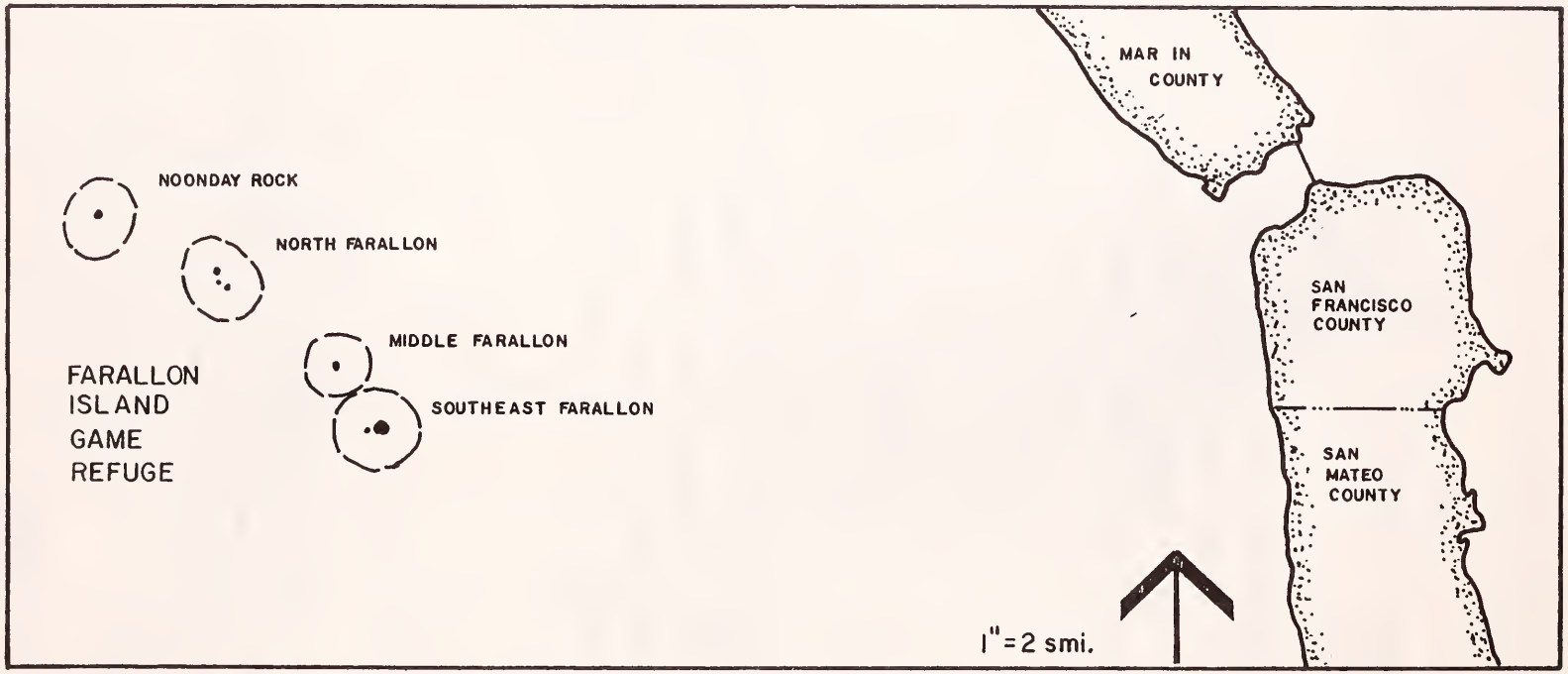
--Farallon Islands Game Refuge

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 (1.8km) 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 waters of the refuge, notwithstanding general game refuge regulations (CFGC §10843). Finally, no aircraft may fly less than 1000 ft (300m) 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 §10500(f)). All other provisions are specific to particular refuges.

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



--Bodega Marine Life Refuge

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 (300m) 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.

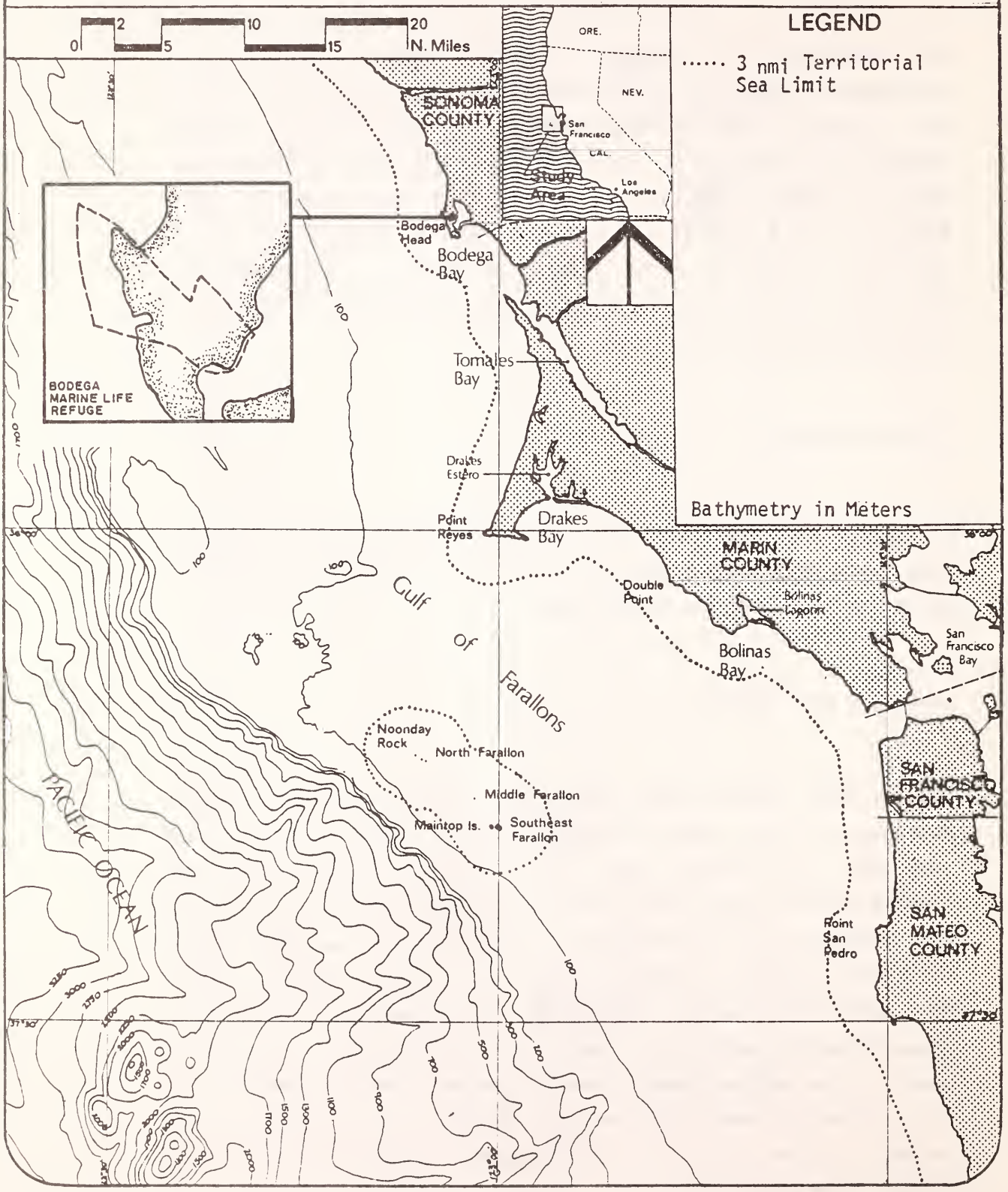
--Marine Reserves

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 (300m) 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 (300m) 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 set 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. This is accomplished, i.e., administered, by Regional Water Quality Control Boards (RWQCBs) which, via a permit procedure, set 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.

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 restriction. 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.

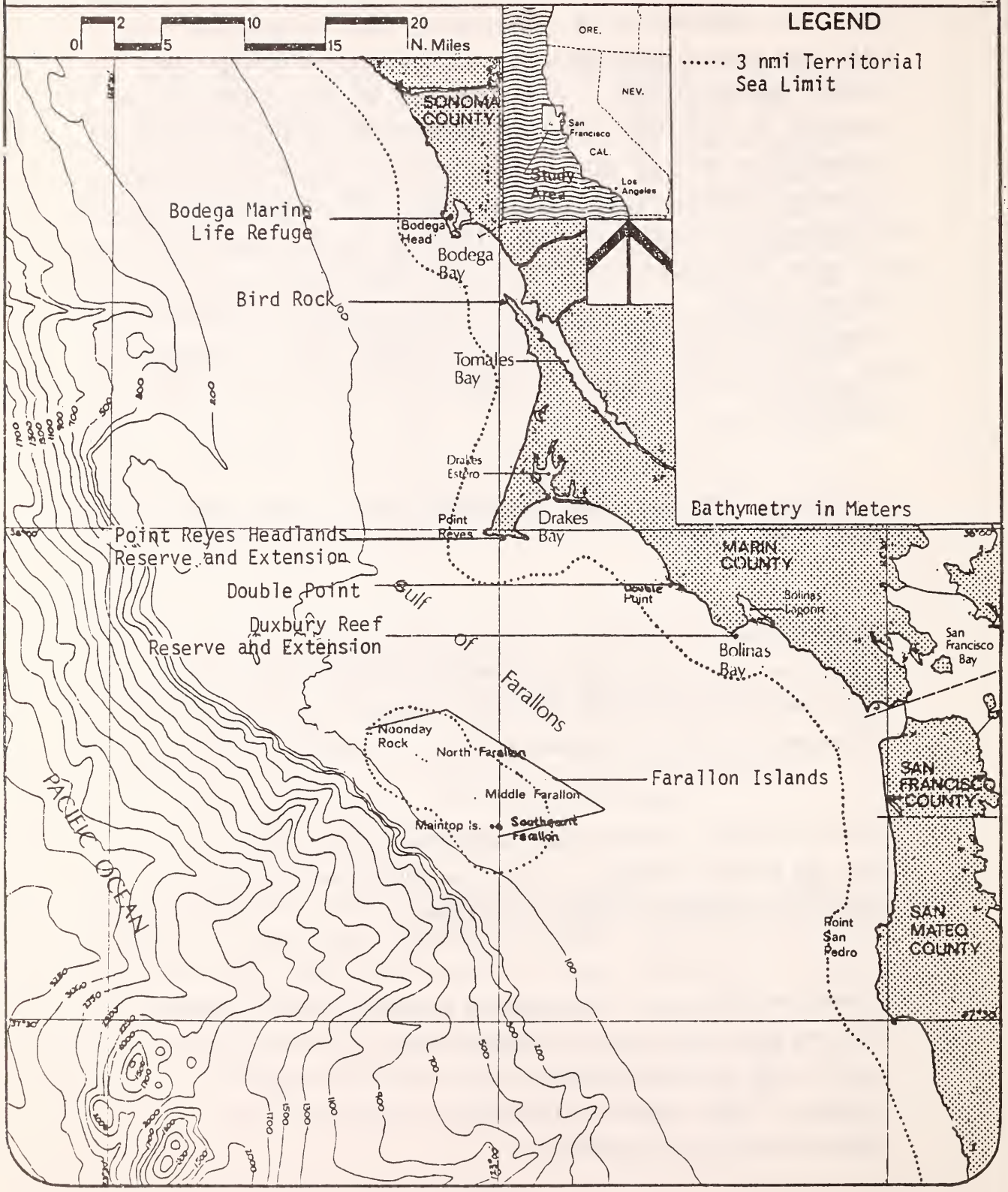
The following ASBSs have been designated within the study area (Figure F-5):

- Bodega Marine Life Refuge -- ocean waters extending 1000 ft (300m) 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 (1.8km) from the Farallon Islands. These boundaries correspond to those of the Farallon Island Game Refuge.

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

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



- Point Reyes Headland Reserve -- ocean waters extending 2000 ft (600m) 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 (12.2m) isobath from the mean high tide line, including the northern and southern points along 6,568 ft (2000m) 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 (300m) in all directions from the principal rocks which are located approximately 1000 ft (300m) offshore of Tomales Point and approximately 90 ft (27m) 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. (13m) patrol boats stationed in San Francisco for patrolling the Point Reyes-Farallon Islands area. Both areas are patrolled by four rangers 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.

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 written permit from DFG to take in State marine life refuges and other special closures.
ghost shrimp	--must have written permit 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 written permit from DFG to take in State marine life refuges, parks, beaches, recreation areas, underwater parks, and national monuments 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 according to the PFMC plan.
Lobster	Fishery open between the first Wednesday in October and the first Wednesday after March 15 (§8251). Lobster permit required (§8254.7). Size restrictions exist (§8252).
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 1/2 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).
Mackerel	Catch limited until stock is enhanced (§8388.3).
California Halibut	May be taken at any time (§8391).

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 (CFGC §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, and in what locations, additional leases for mariculture should be issued.

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).

--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 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 prohibits overflights within 1000 ft (300m) of 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 (5.6km) from the mean high tide line. Administration of State lands includes leasing of those lands for various legislatively author-

ized 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).

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

The California Harbors and Navigation Code generally applies to the activities of vessels operating in State waters. One of its purposes is to prevent the activities of vessels from adversely affecting the marine environment. To achieve this purpose, the discharge of oil from any vessel in the State's navigable waters is prohibited except in cases of "unavoidable accident, collision, or stranding" (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 APCD 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 (California 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.

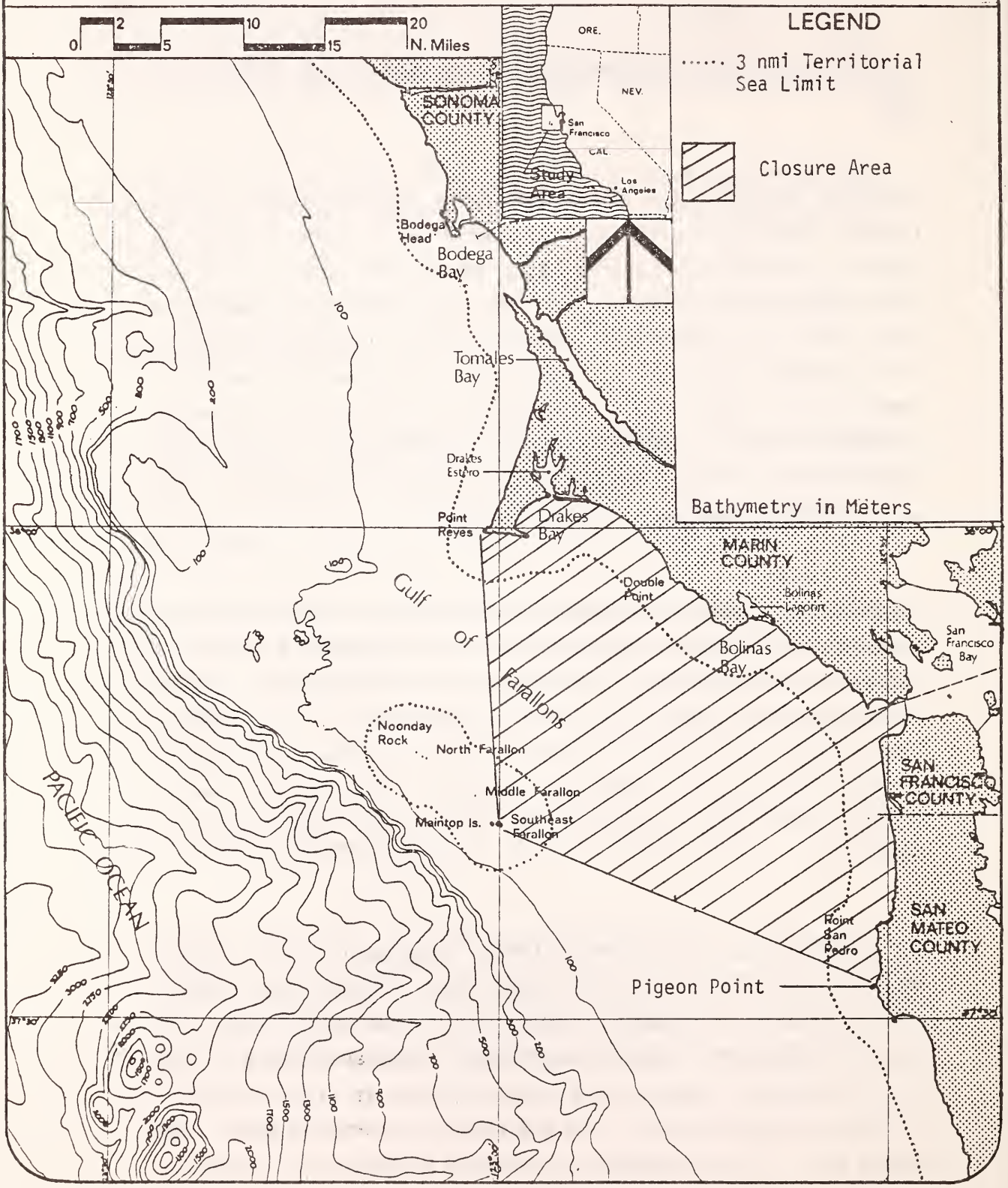
Fishery Conservation and Management Act (FCMA) (16 USC §§1801 et seq.)

The FCMA provides for the conservation and management of all fishery resources in the zone between 3 and 200 nmi (5.6-370km) 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 optimum yield of each fishery. In the Point Reyes-Farallon Islands area, this authority is vested in the Pacific Fishery Management Council (PFMC).

The PFMC 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, 5.6-370km) 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

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



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 (USGS) 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, PFMC fishery plan enforcement personnel can now enforce State law within 3 nmi (5.6km) and State officers can enforce Federal laws between 3 and 200 nmi (5.6 and 370km).

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 for the indirect protection of endangered species and their habitat. 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 these responsibilities 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-Paterson 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. 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.

Provisions of the MMPA are 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. 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 protection of populations determined to be "depleted."

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 MBTA, 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 dredge spoil. 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.

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 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

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

Pollutant parameter waste source	Effluent Limitations Oil and Grease: Maximum for any 1 d, milligram per liter	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/1 and maintained as close to this concentration as possible.
[3]There shall be no floating solids as a result of the discharge 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).

authority to institute measures to abate the source of pollution (United States Departments 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 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 can hire private organizations.

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 (5.6km) 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 Harbors 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).

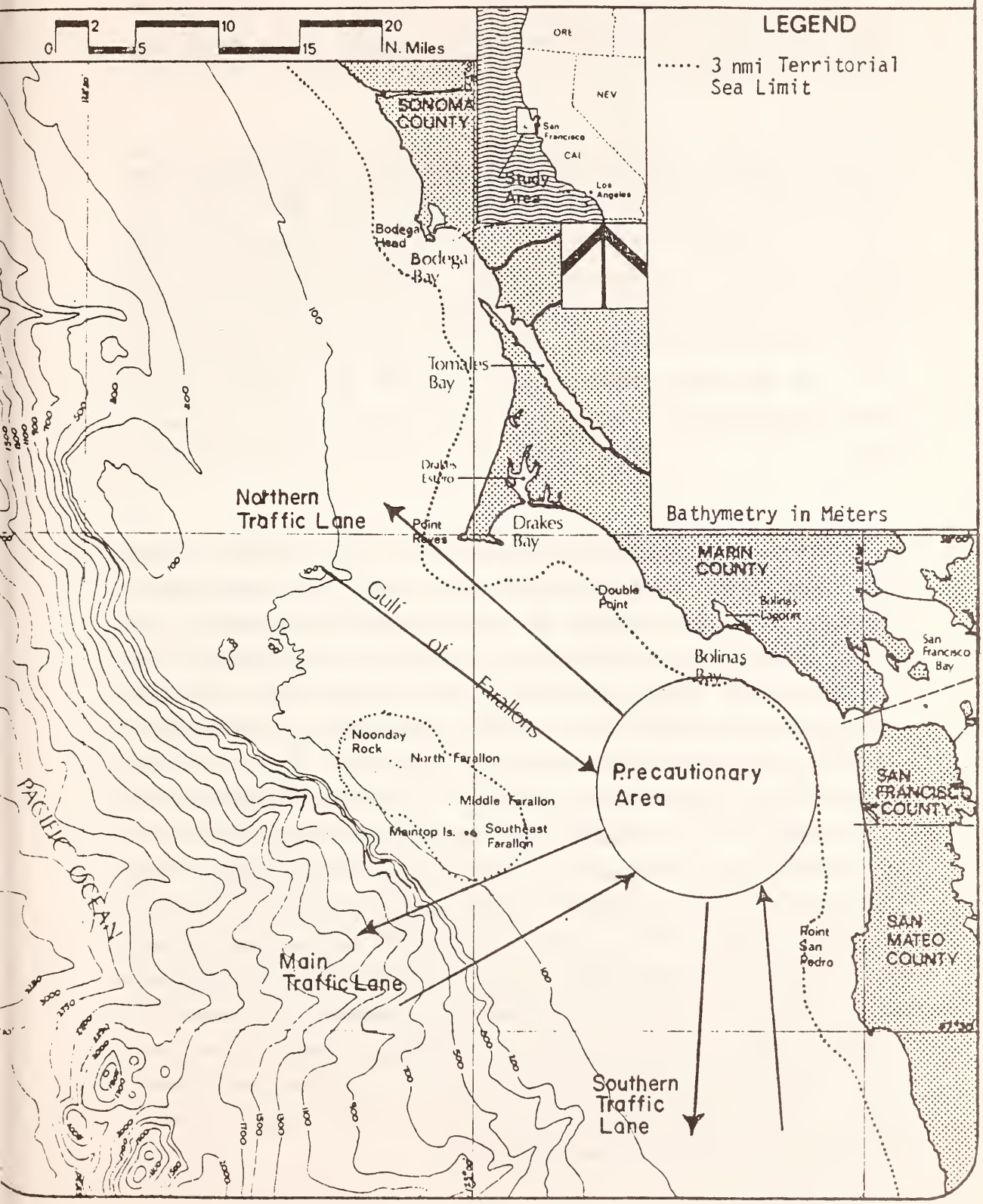
Section 13 (33 USC §407) prohibits the discharge of refuse and other substances into navigable waters, but has been largely superseded by the CWA, discussed above. In effect, such discharges are regulated under this section only insofar as they affect navigation or anchoring.

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 applies both in State and Federal waters out to 200 nmi (370km).

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 Traffic Separation Schemes (TSSs), guiding San Francisco Bay approaches and departures, traverse the study area: the Northern and Main (western) Traffic Lanes. A third route, the Southern Traffic Lane is situated south of the study area (see Figure F-7). The TSSs 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 the 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 TSSs have been officially recognized

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



by the Intergovernmental Maritime Consultative Organization (IMCO), and appear as recommended traffic routes on all navigation charts of the area.

The TSS, 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 (5.6km) 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 for the Prevention of Pollution from Ships, 1973, and 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.

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

The Federal Aviation Act of 1958 establishes the Federal Aviation Administration 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.

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 (93km) 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 tankers, 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.

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.

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 (5.6km), 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 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 February 1981, covers an area from 3 to 70 nmi (5.6 to 130km) offshore central and northern California, including the ocean region off Sonoma and Marin counties (U. S. Bureau of Land Management, 1977). A group of eight tracts located north of the study area were selected by the Secretary of Interior (October 10, 1978) for further study. These tracts are located approximately 15 nmi (28km) off the Sonoma-Marin County line and 60 tracts 3 to 20 nmi (5.6 to 37km)

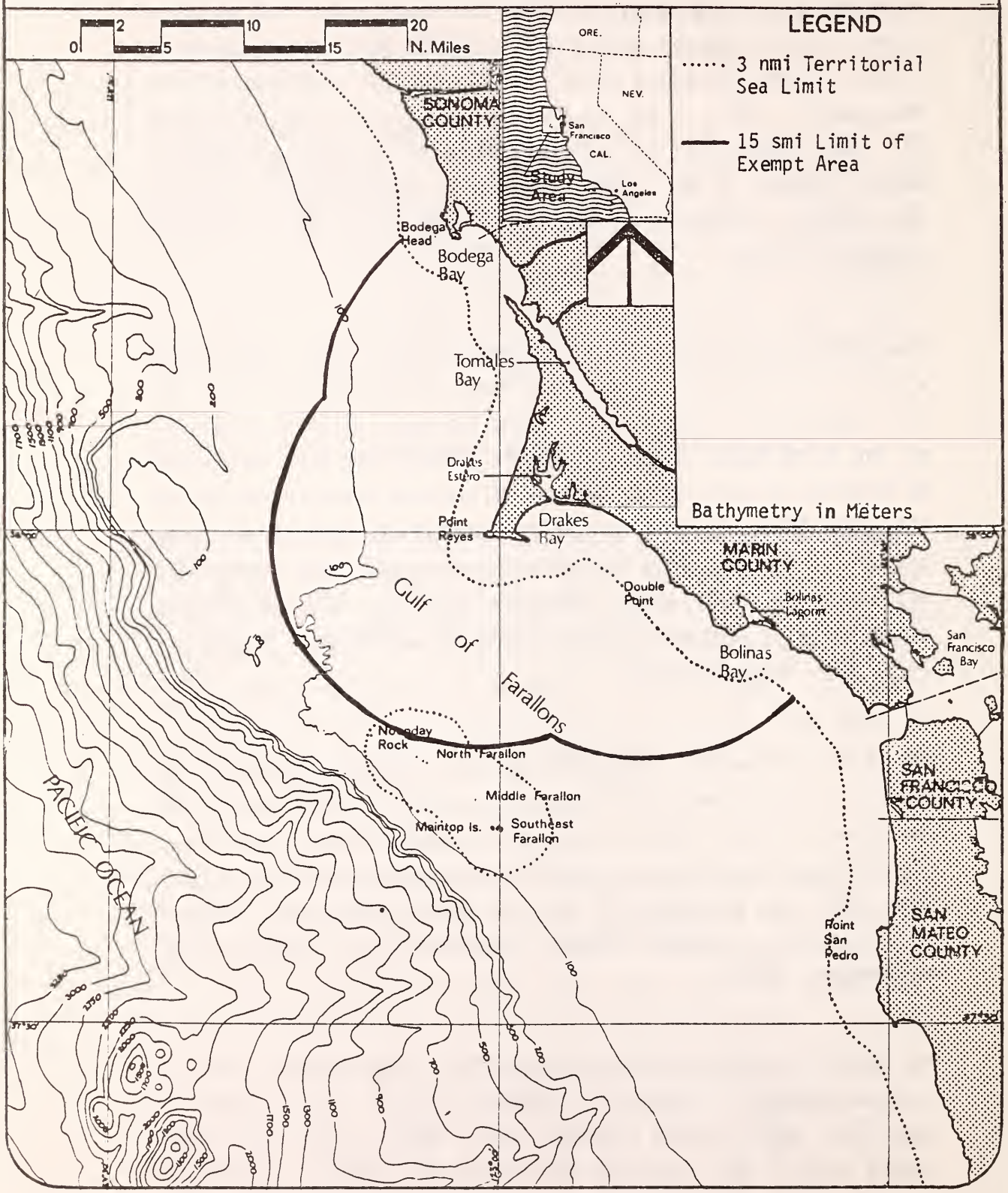
seaward of San Mateo County south of the study area. The northern eight tracts encompass 34,560 acres (13,824 ha); the southern 60 tracts include 329,052.5 acres (131,621 ha) (U. S. Bureau of Land Management, 1978b). The next major step in the leasing process for these tracts will be the preparation of a series of environmental studies of the areas, leading to the release of a Draft Environmental Statement in September, 1980 (U. S. Bureau of Land Management, 1978).

The OCSLA Amendments of 1978 exclude from any lease sale tracts within 15 smi (24km) 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. 2d Sess.).

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

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



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 USFS 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 limited 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 semi-submersibles 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.

No dredge material disposal sites are currently in operation within the study area. Routine navigational and marine-related dredging activities currently being carried out by the COE in Bodega Harbor, and any 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 (84-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 (400m) 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)).

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, and

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 life-forms 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).

F.1.c. Environmental Consequences

The many authorities described above provide a considerable degree of protection for marine resources in general; the national seashore, refuge, and reserve designations provide protection for the resources of the Point Reyes/Farallon Islands region in particular. NOAA's review indicates, however, that the extraordinary diversity of natural resources concentrated in the study

area may warrant further consideration and protection. The existing regulations aim to prevent the destruction of sensitive marine resources in general, but do not focus on the preservation of particularly rich areas, such as the waters offshore Point Reyes and the Farallon Islands. Nor do existing regulations address the possibility of restoration and enhancement. Although the national seashore designation for Point Reyes, and the national wildlife and fish and game refuge status for the Farallon Islands provide just such area-specific protection, it is aimed primarily at the land area. The Farallon Islands Fish and Game Refuge extends 1 nmi (1.8km) seaward, and the Point Reyes National Seashore extends a quarter of a mile offshore. Other reserve and refuge designations in the area also only include the extreme nearshore waters. Although these distances provide some protection from human intrusion in and around critical marine life habitat areas, they are not large enough to guard against pollution, and do not include important foraging areas and other vital habitat. Also, the provision of additional enforcement resources would raise the level of protection. Increased protection is particularly important considering the intensive use of the area. Some existing and potential problems in the protection of the wealth of resources associated with this area are discussed below.

Petroleum development could pose a threat to various marine resources, particularly the marine birds and mammals found offshore Point Reyes and the Farallon Islands. A major portion of the proposed sanctuary is protected from oil and gas development by the 1978 OCS Lands Act Amendments, which forbid the leasing of tracts on the Federal OCS within 15 smi (24km) of the Point Reyes Wilderness. If, however, the State of California decides to permit oil and gas exploration or exploitation in the submerged lands next to the area affected by the 1978 OCS Lands Act Amendments, i.e., within the territorial sea's 3 nmi (5.6km) limit, the

prohibition becomes void. Moreover, the Amendments do not apply to the waters south and west of the Farallon Islands, thus leaving an important area in this region open to potentially adverse impacts of oil and gas development. The Bureau of Land Management selects the tracts to be leased in an OCS Sale and places stipulations on individual tracts to protect certain natural resources. Industry interest, however, is a primary determinant in tract selection, and under the existing leasing process, no mechanism exists to permanently set aside areas in the Federal OCS where no leasing shall occur. For each sale, all the tracts not already leased are reconsidered.

Although the stipulations on oil and gas leases imposed by BLM in environmentally sensitive areas can give some protection, 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 seems desirable in the vicinity of the Farallon Islands and Point Reyes. 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 discussion of the possible consequences of oil and gas development see Secion F.2.b.

Numerous laws and regulations apply to the disposal of waste in the marine environment. However, many decisions are made on a case-by-case basis, which provides less certainty of protection than would a designation of no discharge areas. Certain gaps remain in the regulatory framework. Generally, the discharge of oil and listed hazardous substances is prohibited, but, at present, tank washing and bilge pumping are permitted beyond 3 nmi (5.6km) from shore for tankers of less than 150 deadweight tons (dwt) and other vessels of less than 500 dwt.

The discharge of solid wastes within the territorial sea is subject to EPA requirements (administered by the State), or COE requirements under the River and Harbors Act for discharges that might obstruct navigation. The EPA requirements are designed to protect marine resources, but neither authority effectively prevents overboard disposal of trash from ships and similar problems.

Beyond the territorial sea, EPA approval is needed for ocean dumping. 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. 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. The CWA does not apply to such discharges beyond the territorial sea.

Ocean dumping, municipal outfalls, and dredge spoil disposal can adversely affect benthic biota and introduce toxic substances into the marine environment which may have sublethal effects on fish, bird, and mammal resources. 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 (Morrell, 1979, personal communication).

The U. S. Coast Guard voluntary vessel traffic lanes currently receive a very high level of complicance. However, local vessel traffic will probably increase considerably with the development of the tracts to be leased in OCS Sale #53. At present there is no guarantee that, given this and other expected increases in vessel traffic, ships will not enter areas close to the Island and ASBS's and disturb marine bird and mammal populations. Disturbance could result in flight or other changes in behavior. Repeated disturbance may cause mammals to temporarily or permanently abandon an area. The Coast Guard can create mandatory vessel lanes, but is more likely to do so if necessary from the standpoint of vessel safety, rather than from the need for resource protection.

Aircraft overflights regularly disturb marine bird and mammal communities in Bolinas Lagoon at the Farallon Islands (Allen 1979, personal communication; Ainley 1979b, personal communication). The Federal Aviation Administration's (FAA) charts showing the Farallon Islands Fish and Game refuge indicate that the State of California requires overflights to maintain a minimum height of 1000 feet. Other sensitive habitat areas, such as Bolinas Bay and the ASBS's, have no protection at all from low level overflights at present.

The protection available for any historical resources in the study area only applies to Federal actions. Even if a site is listed on the National Register of Historic Sites (the Farallon Islands are), private removal or damage of historical resources would not be affected.

The administration of existing safeguards is limited by the resources available for enforcement. The California DFG has only two 40 ft (13m) patrol boats (stationed in San Francisco) for patrolling the entire Point Reyes-Farallon Islands area. Both Point Reyes and the Farallons are patrolled weekly, as weather permits (Hudson, 1979, personal communication). Reserves and refuges adjacent to accessible land areas are also patrolled from land. The DFG has cooperative agreements with the National Park Service and the National Marine Fisheries Service to help with enforcement; however, NPS has no offshore enforcement capability, and NMFS enforcement is largely confined to its own statutory responsibilities (Wood, 1979, personal communication).

Under the status quo, each agency reviews only the impact that an activity under its jurisdiction will have. Thus, the cumulative impact of a number of different uses of the area may not fully be taken into consideration, and the various authorities may occasionally act at cross purposes. Thirteen Federal, seven State, and a multitude of regional and local government agencies are vested with some regulatory authority over certain activities within the area. No one entity has management authority to govern resource use and conservation comprehensively. Each has jurisdiction over only a specific resource, region, or activity. As a consequence, occasional jurisdictional gaps arise, and planning for the area is done piecemeal.

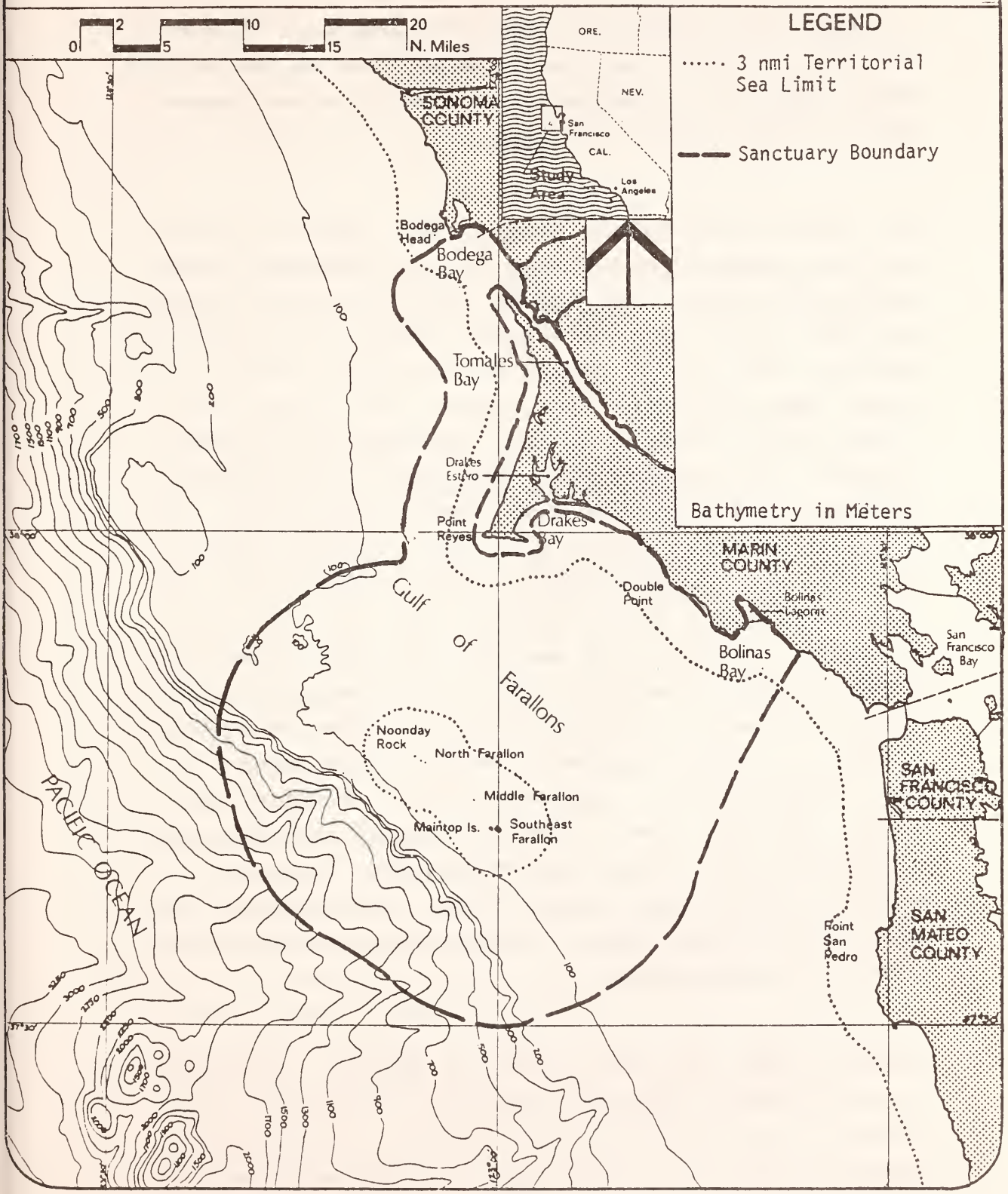
F.2 Alternative 2 -- the Preferred Alternative

F.2.a. Introduction

NOAA proposes the designation of a marine sanctuary to preserve the special ecological, conservation, 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) (5.6km) beyond territorial waters. The proposed sanctuary also includes the waters within 12 nmi (22.2km) 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 the esteros north of Tomales Bay, Bolinas Bay, 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 will be included in the final environmental impact statement.

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 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

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



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 Bays, and Bolinas Lagoon, and the Pacific Ocean environs of the Farallon Islands. Also, all, or portions of, five Areas of Biological Significance (ASBSs) established by the State of California would be included in this sanctuary alternative. One of the United States' largest marine bird rookeries is incorporated, e.g. 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 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) regulate activities which may damage the resources of the area, (2) support research on and monitoring of the resources, (3) enhance public awareness of the value of these waters, (4) coordinate potentially

conflicting authorities, and (5) respond to currently unforeseen threats which might arise. 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 accentuate the need for cautious pre-development planning and impact assessment.

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

1. hydrocarbon operations,
2. discharges or deposits of any substance,
3. alteration of or construction on the seabed,
4. vessel navigation and operations (other than fishing vessels),
5. disturbing marine mammals or birds, and
6. removing or harming cultural and historic resources.

The designation specifically excludes the harvesting of certain living marine resources, e.g., finfish, shellfish, and invertebrates, 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, other than those for pipelines or municipal outfalls, issued via other agencies which do not conflict with marine sanctuary regulations. (See Appendix 1 for the full text of the draft designation document and the proposed regulations.)

F.2.b. Regulated Activities

F.2.b.1. Hydrocarbon Operations

> All hydrocarbon exploration and exploitation activities pursuant to leases executed on or after the effective date of these regulations are prohibited, as is the placement of oil and gas related pipelines within 2 nmi (3.7km) of specified ecologically 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.c below).

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 platforms, work crews, supply boats, and helicopters, (3) pollution associated with aquatic (and aerial) discharges, and (4) short-term pipeline construction upheaval. Table F-7 summarizes the known hazards to marine mammals, marine birds, and other marine organisms which may result from offshore oil development; Table F-8 describes how NOAA's sanctuary provisons 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 socioeconomic consequences of these regulations.

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 Hazards	Episodic/Catastrophic Events
Exploration		
Seismic Profiling	Noise, "startle" effects	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 air	
Transport		
Pipelines	Leakage	Rupture
Pumping buoys	Leakage	
Barges and Tankers	Bilge Oil Intrusion	Collision or grounding
Clean-up		
Oil on water	Intrusion	
Skimmers		Pollution--air
Burn-off		Pollution--water
Chemicals	Toxicity of chemical dispersants	Pollution--sediments
Grounded oil		Disturbance to sensitive bird and mammal populations on islands by human intrusion and aircraft activity
Booms		
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.

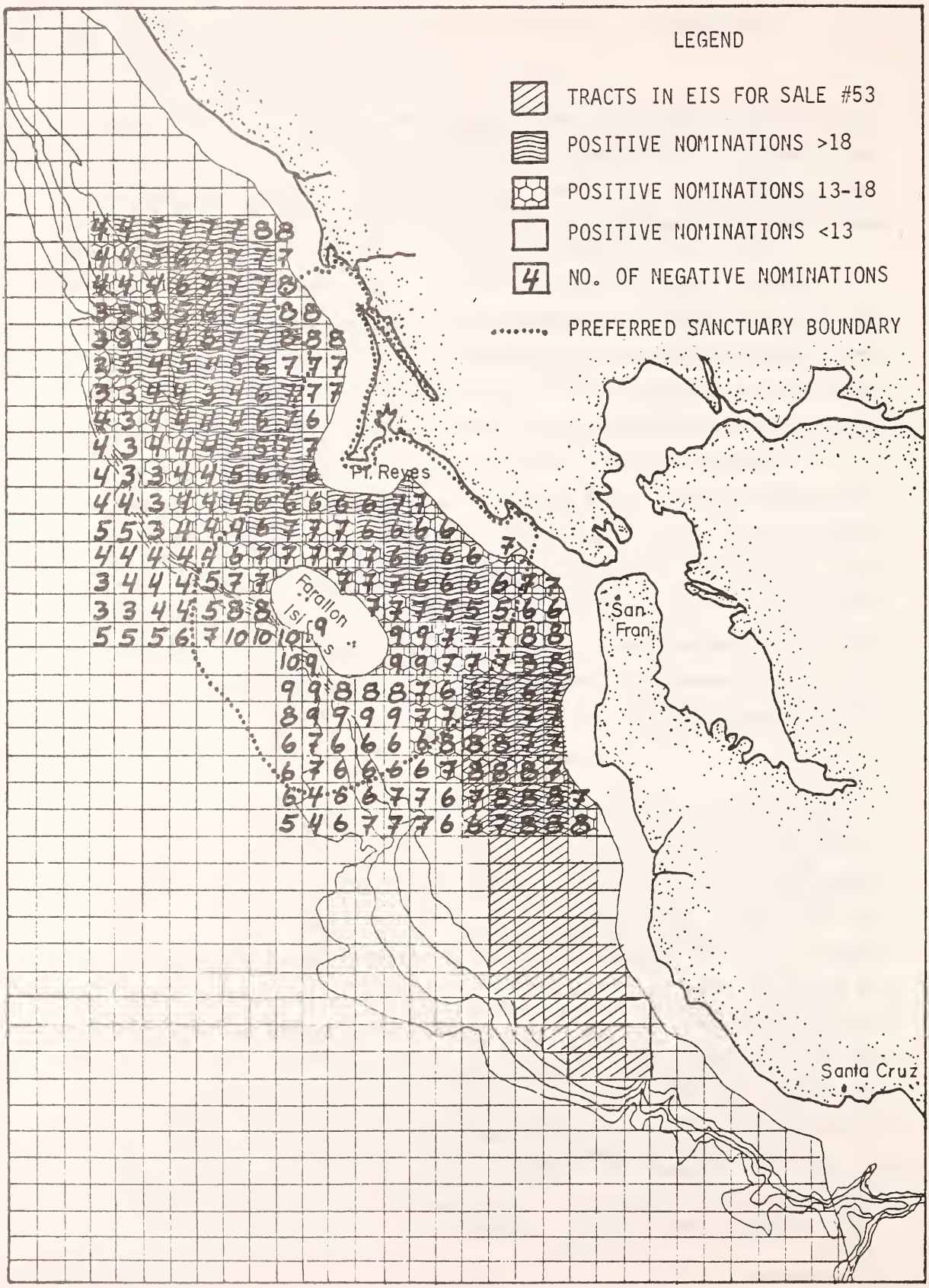
REGULATION	PROTECTION PROVIDED
1. No future hydrocarbon exploration or exploitation within the designated sanctuary.	--Creates a broader buffer area against potential oil spill threats and provides increased response time for cleanup efforts in case spills occur. --Increases distance between potential spill/pollutant discharge point (i.e., Lease Sale 53 rigs, platforms and pipelines) and sensitive resources which allows natural weathering and dilution of contaminants before reaching important marine life concentration areas. --Excludes routine operations, noise, and visual disturbances 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.

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 already provide protection to much of the area under consideration. These amendments prohibit leasing for the purpose of oil and gas development on the Federal OCS within 15 smi (24km) of the Point Reyes Wilderness (P.L. 95-372, Sec. 206). 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, no formal protection from oil and gas development now exists for those waters (Sanders, 1979, personal communication). Moreover, the amendments do not cover the waters south and west of the Farallon Islands.

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 1981, includes part of the area under consideration. A group of eight tracts in the Bodega Basin lie approximately 17 nmi (31.5km) north-northwest of the Farallon Islands (Figure F-10). Another considerably larger group of 60 tracts, the Santa Cruz Basin, is situated east-southeast of the Farallons; the northern portion of these tracts lies only 10 nmi (18.5km) from the Islands. Portions of two tracts 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).

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

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, but routine, small oil spillages. Since the Point Reyes-Farallon Island region has had no history of hydrocarbon production there is no documentation of spill incidents from these sources. A preliminary environmental assessment of hypothetical Lease Sale #53 oil spill impacts, e.g., trajectories and magnitudes, is not yet available (Cooke, 1979, personal communication). Nonetheless, threats to acknowledged marine resources can be discussed generally, utilizing spill experiences from other activity contexts and the scientific literature on ecological effects of oil exposure from non-hydrocarbon activity sources.

The most recent instance of severe oil pollution within the Point Reyes-Farallon Island 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 heavy oil mixture used to fuel ships and power plant boilers. Subsequent tidal action washed the asphalt-like oil onto the intertidal shore zones both north and south of San Francisco. As cited in Chan (1973), the California Department of Fish and Game estimated that approximately 7,000 marine birds were affected by the spill and that less than ten percent 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 die-off, especially in mussel beds, and to adverse ecological repercussions affecting the reef's complex food web. The PRBO, funded by the U. S. Department of Energy, is currently conducting follow-up studies in this subject area (Ainley, 1979b, personal communication).

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). Petroleum hydrocarbons can also have sublethal or indirectly lethal effects on marine organisms through the destruction or alteration of a species' 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, 1979). With the exceptional abundance of marine mammals and marine birds--certain species of which may be 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 (1979) in regards to the marine resources surrounding the Northern Channel Islands.

--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, 1979; 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, 1979).

Although northern fur seals depend only partially on their fur for thermal protection, oiling could depress their thermoregulatory abilities, which could lead to hypothermia (overexposure) 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 studies indicate that even a light oiling could have marked detrimental effects on the thermoregulatory abilities of otters.

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, scientist 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, which are an important source of food for whales and other marine organisms. 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 food source (Storro-Patterson, 1979, personal communication). In addition, oil effects may reduce mammals' ability to find food, to flee from predators, and to adequately care for their young (Herz, 1979, personal communication).

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). 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.

--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, 1979). To some extent, all marine birds which breed in large colonies are vulnerable to contact with floating oil during the nesting season since they are concentrated 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 U. S. (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 cause the greatest damage 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, 1979). 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 Managment, 1979).

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 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 occasionally even cause 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 are still unknown, however.

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, mechanical devices can only be used during very calm 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 could not be 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

TABLE F-9. Point Reyes Bird Observatory log information concerning marine bird and marine mammal oilings for the Farallon Islands, 1970-78 (Kellogg, et al., 1978).

YEAR	MONTHLY FREQUENCY	INCIDENTS 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).	Randomly 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 guillemots 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); November (2).	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 artic loons (1) oiled; unknown heavy slick in March.
1978 (Jan. only)	January (5).	Heavy murre oiling in January (31 birds); two reported mortalities.

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).

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 reproductive and juvenile stages. Many species concentrate in

small geographic areas at these times; contaminant concentrations could have serious ecological consequences (Michael, 1977).

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, 1979). 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.

--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, 1977). As a result of the 1972 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. 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).

--Proposed Protection

The proposed regulation will prevent both chronic and catastrophic oil spills associated with petroleum development within some of the primary foraging waters surrounding the major bird and pinniped rookeries and resting places in the area.

The proposed marine sanctuary cannot offer full protection against oil spills, since, at present, oil spill containment and cleanup is not very successful in the open ocean. Also, in the marine environment, oil can travel great distances. However, 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 fragments 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-10). However, open ocean oil spill containment is not yet successful in seas as dynamic as those of the study area.

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" 1,600 ft 12" x 24" 500 ft 12" x 12" 1,600 ft 27" x 17" 1,640 ft 30" 6,500 ft 6" x 12"	1 - 200 ft - 9,000 BBL.* Tanker 1 - 34 ft boat 1 - 16 ft boat 2 - 12 ft boats 2 - 10 ft boats	2 - 58 ft MARCO Class III Oil Recovery Vessels 2 - 34 ft MARCO Class II Oil Recovery Vessels 4 - Mark II Skimmers with 2 - 56 ft LCM Boats
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 Island, CA	6,100 ft 8" x 12" 1,200 ft 12" x 16"	1 - 60 ft Spill Container with 2,000 ft boom 4 - 16 ft boats 5 - 12 ft boats 4 - 10 ft boats	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

The success or failure of at-sea containment and recovery operations in the event of a spill depend heavily on three factors: prevailing marine conditions, the amount of time before the oil will reach critical resources, and the speed of response. Theoretically, under calm ocean 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).

The Point Reyes - Farallon Island 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). Preliminary trajectory scenarios for hypothetical Lease Sale 53 oil spills are scheduled to be completed by the U. S. BLM early in 1980 (Cooke 1979, personal communication).

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. Because of these factors, Lindstet-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.d). 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.

--Acoustic and Visual Disturbance

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 supply boats produce visual impacts and noise which may disturb marine birds and marine mammals, particulary 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, 1979). 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 nearshore waters or incidently 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 will reduce the potentially adverse aesthetic impact of oil and gas platforms, rigs, pipeline construction, and other activities. It also serves to preserve the wilderness character of the Island waters from industrial oil and gas development. 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, and air pollutants (e.g., petroleum aerosols and engine exhausts).

The proposed regulation's prohibition of hydrocarbon activities throughout the sanctuary will prevent certain potential sources of toxic contaminants due to routine rig and platform discharges from endangering living marine resources. Most chemical components of drilling materials are relatively unreactive in a biologic 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. The exclusion of oil and gas activities will eliminate concern for adverse environmental impacts within the sanctuary due to these waste discharges. The sanctuary will also serve to buffer, through dispersion and dilution, the undesirable effects of discharges from oil and gas

activities situated elsewhere.

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 not only minimize such threats, but also enhance the offshore area's aesthetic qualities, as well as that 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.

The proposed prohibition of hydrocarbon activities will ensure the continued prohibition of leasing of Federal OCS tracts within 15 smi (24km) of the Point Reyes Wilderness Area by preventing oil and gas activities in State waters (see discussion of 1978 OCS Lands Act Amendments above).

--Pipelines

The prohibition on the placement of pipelines within 2 nmi (3.7km) 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 sanctuary will ensure that such permits receive careful review in light of both the wealth of living resources concentrated here and the seismic activity of this 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).

--Socioeconomic Impacts of the Proposed Regulation

The economic impact of the proposed regulation depends largely on two factors: the amount of hydorcarbon reserves foregone and the estimated selling price of the affected tracts.

The prohibition outlined above could represent a loss of potential recoverable hydrocarbon reserves. None of the tracts selected for consideration for Lease Sale 53 fall entirely within the proposed 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 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 change significantly, based on the findings resulting from exploration pursuant to OCS Sale #53. Thus, reliable estimates of the amount of hydrocarbons affected are not yet available.

The proposed prohibition could also reduce U. S. Treasury income from offshore leasing royalties. It is unlikely that the industry will bid on tracts affected by the prohibition if those tracts are offered 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.

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 1979, personal communication).

The certification requirement for pipelines will not impose significant costs since NOAA will cooperate with the existing permit authorities as much as possible and so avoid additional effort from the permit applicant. Prohibiting pipeline construction within 2 nmi (3.7km) of sensitive areas could impose costs if the most economical route were to pass through any of the 2 nmi (3.7km) buffer areas. At present, the development scenarios for petroleum extraction and transportation pursuant to OCS Sale #53 do not project the use of pipelines (Charter 1979, personal communication).

F.2.b.2. Discharge of Polluting Substances

> No person shall deposit or discharge any material or substance of any kind except:

(A) indigenous fish or parts and chumming materials (bait),
(B) effluents from marine sanitation devices,
(C) non-polluted cooling waters from ocean vessels.

Permits issued for municipal sewage outfalls must be certified by the Assistant Administrator for Coastal Zone Management.

The proposed regulation prohibiting discharging and littering within the sanctuary complements the existing regulatory system, and would enhance the area's overall recreational and aesthetic appeal. This regulation would ensure that solid wastes will not degrade island and mainland wildlife rookeries or otherwise alter 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. Under current human activity levels, littering is not a severe problem. However, pinnipeds do occasionally become entangled in plastic packing material or discarded fishing lines (Morrell 1979, personal communication). In areas of the Northern Pacific Ocean, for example, as many as 8000 fur seals are estimated annually to endure such entanglement (Haley, 1978). The incidence of mortality associated with this type of mammal disturbance remains unclear. NOAA's regulation would ensure that unforeseen activity level increases do not lead to substantial degradation. The prohibition would also prevent future dredge disposal or ocean dumping in the area. NOAA is consulting with EPA and COE regarding the interim dredge spoil disposal site 10 nmi (18.5km) south of the Farallon Islands.

The requirement of sanctuary certification of permits for municipal sewage outfalls will ensure sanctuary 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. Administration of sanctuary certification will be outlined in detail upon sanctuary designation (see also Section F.2.e and Appendix 1, Section 935.9 below).

The impacts of this regulation on sanctuary users is expected to be minor; trash will have to be kept on boats and disposed of at proper facilities, most likely on the mainland. The regulation may impose additional costs by requiring the use of more expensive dredge spoil disposal or dumping sites or methods. 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.b.3. Alteration of or Construction on the Seabed

No person shall:

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

(B) Drill through the seabed,

(C) Dredge or otherwise alter the seabed in any way, except for routine maintenance and navigation, mariculture, and as necessary for the construction of residences in Tomales Bay and new marinas as permitted by the California Coastal Commission.

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 impacts upon commercial firms are expected. Dredging exceptions would permit U. S. Army

Corps of Engineers investigations into the need for select 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).

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

> Except for enforcement purposes, emergency sea and air rescue, or to transport persons or supplies to or from Southeast Farallon Island, no person shall, within 1 nmi of (1.8km) the Farallon Islands, Noonday Rock, Bolinas Lagoon, or Areas of Special Biological Significance designated by the State of California, operate any vessel unless engaging in activities directly associated with the resources of the area including but not limited to fishing, research, or recreational activities, and the primary purpose of the vessel is to engage in such activities.

To the extent consistent with international law, within 1 nmi (1.8km), NOAA would allow vessel traffic by fishing, research, enforcement, and recreational vessels, but prohibit all other vessel operations, except those necessary for access to the islands or mainland coast.

This regulation will reduce certain environmental impacts within 1 nmi (1.8km) 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 bunkering) directly into important nearshore habitats, and

3. Visual and acoustic disruption of hauled out seals and sea lions and nesting marine birds due to intrusive vessel approaches.

It is difficult to predict what levels of human intrusion will disturb marine mammals and birds. 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.

As noted in Section E, the traffic lanes which traverse the Point Reyes - Farallon Island region are heavily utilized by large commercial vessels entering and leaving San Francisco Bay. The main (western) lane running south of the Farallon Islands is reportedly the most heavily travelled shipping route for both freighters and tankers (Wright 1979, personal communication). Shipping statistic trends indicate generally increased traffic levels, the majority of which will probably adhere to the main lane. The remaining traffic will be divided between the northern lane, which runs between the Farallon Islands and Point Reyes Headlands, and the southern lane lying outside the proposed sanctuary boundary. A USCG study is underway, examining the possibility of eliminating the northern and southern lanes here as part of a proposed California Traffic Separation Scheme (TSS) between Point Conception and the California/Oregon border (Gracey, 1979). This option would extend the main (western) approach to San Francisco seaward, until intersecting with a TSS running along the California Coast west of the Farallon Islands. If the Coast Guard adopts this option, vessels approaching San Francisco Bay through the Gulf of the Farallons would no longer have a recommended TSS to guide their movements.

Finally, the restriction zone 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 treacherous 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. This is important considering the likelihood that Lease Sale #53's eventual oil production will be tug-barged from Bodega Basin tracts through sanctuary waters to San Francisco Bay refineries (Emrick

1979, personal communication). Exclusion of certain vessels from the 1 nmi (1.8km) 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) is the most direct route for transitting the region. Compliance has been good to date (Emerson 1979, personal communication). 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 a regulation appears unnecessary (Emerson 1979, personal communication). See Section F.4 below for a more detailed discussion of this regulatory option.

The issue of regulating the increases in vessel traffic likely to result from development pursuant to OCS Sale #53 has also been raised. Supply vessels and barges carrying the oil produced at the wells through the Gulf of the Farallons between San Francisco Bay and the Bodega Basin tracts could substantially increase the possibility of a collision and resulting oil spill. Possible regulations to address this problem include the prohibition of tug-barge and supply vessel traffic or petroleum transporting vessels within the sanctuary, except in the main (western) TSS, and the requirement of special design standards for petroleum transport vessels in the sanctuary, such as double hulls.

However, 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 probably more effectively dealt with on a nationwide basis. Given the difficulty in regulating manning and construction standards for vessels in discrete areas, and further given the fact that the

plans for vessel traffic associated with OCS Sale #53 have not yet been developed, it seems premature to propose marine sanctuary regulations to deal with this potential problem. NOAA will consult with the DOI and USCG and other applicable authorities should the occasion for regulating this vessel traffic arise.

F.2.b.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 Islands or for enforcement.

As noted for vessels, the area-specific prohibition on overflights below 1000 feet (305m) 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 (305m) minimum height parallels the National Marine Fisheries Service's selective prohibition of overflights under 1000 ft (305m) 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.

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 (305m) or above.

F.2.b.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.c. 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 or the laying of any pipeline 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 automatic certification of other permits that do not conflict with sanctuary regulations will prevent delays and inconvenience to the permit applicant.

F.2.d. Other Activities

-- Permits for certain research activities

> Permits to conduct specific research activities which are otherwise prohibited by sanctuary regulations may be issued by the Assistant Administrator of the Office of Coastal Zone Management if such research is: (1) directly 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 research activities which would otherwise be prohibited by sanctuary regulations. 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. All other activities of the Department of Defense are subject to regulation.

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 fact that around the Farallon Islands, the U. S. Navy has curtailed flash-bombing runs and low overflights 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 and plant harvesting are not subject to sanctuary regulation (except with respect to discharges).

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 living marine resources remain under the jurisdiction of the California Department of Fish and Game

(DFG) and the Pacific Fisheries Management Council (PFMC).

NOAA's analysis of living marine resources and the existing State and Federal management system, i.e., California DFG and the PFMC in Section E has shown that these authorities can protect acknowledged resources. By relying on the existing arrangements, NOAA aims to avoid unnecessary duplication of regulations and programs.

NOAA will consider the possibility of making funds available for technical assistance in 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 (see Management, below).

F.2.e. Management

While the preceding regulations provide the most direct form of protection for the resources of the proposed marine sanctuary, an equally important and beneficial element of marine sanctuary designation will be on-site management. The sanctuary manager will have two types of responsibilities: (1) the enforcement of the regulations, and (2) the administration of policies and programs to maximize the area's beneficial use in a non-regulatory manner.

Under the proposed action the sanctuary manager will:

- Enforce the regulations in cooperation with the U.S. Coast Guard and other agencies,
- Establish a Sanctuary Information Center,
- Promote awareness of sanctuary resources,
- Maintain a register of research projects with the Sanctuary Information Center,
- Monitor the resources and the effects of human activities in the sanctuary,
- Encourage research and evaluate permit requests for research and educational activities otherwise in violation of sanctuary regulations,
- Develop an oil spill contingency plan,
- Compile a detailed inventory and map of historical resources, and
- Maintain a consultative liaison with relevant Federal, State, and local government agencies, academic institutions, research groups, and other interested persons, possibly through the formation of a sanctuary management advisory committee.

NOAA plans to delegate the on-site management lead to an existing authority in order to benefit from the expertise of agencies familiar with the area, and to minimize the proliferation of new authorities. For example, NOAA is now involved in discussions with the California Department of Fish and Game (DFG) concerning the possibility of assuming coordination responsibilities. DFG has had considerable experience managing the resources, activities, and problems occurring in and around the proposed marine sanctuary area, and has indicated interest in assuming the role of on-site manager should a sanctuary be designated (California Department of Fish and Game, 1979).

--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. As noted under the discussion of living marine resources in Section E.2, NOAA could provide funds to allow the present management and enforcement capabilities of the USCG, DFG, USFWS, NMFS, and NPS to assume the added burden of sanctuary regulation enforcement.

--Education and Research

A major responsibility of the sanctuary manager is to enhance education and research efforts. An integral component of that effort would be the establishment of the Sanctuary Information Center, which would also serve as administrative headquarters for the sanctuary. The Sanctuary Information Center would be primarily a research and education facility, intended to serve as a repository for scientific literature and information on resources and activities in the sanctuary, as well as for 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; at the same time, it would apprise them both of regulations and the need for protecting marine resources. Efforts to

develop the Sanctuary Information Center will be coordinated with existing systems, particularly that developed for the Point Reyes National Seashore by the National Park Service, the Point Reyes Bird Observatory, and the Oceanic Society's Farallon Research Group. The Information Center could be affiliated with the facilities of any one or all three of these entities. This matter will be subject to further discussion. 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 sanctuary use over time as possible. To further this end, the sanctuary managers would ask researchers to notify the Sanctuary Information Center of 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 Center and, unless the research would require a permit (see above in this section), 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 long-term 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 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, 1955, 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).

--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 described above will enable NOAA to provide valuable assistance to other area authorities in their determinations of the best 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.

NOAA is investigating the possibility of forming a Sanctuary Advisory Committee consisting of representatives from interested Federal and State agencies and local interest groups. This committee would provide a mechanism for coordination, and also would advise the sanctuary manager on permit applications and certifications (see Section F.2.d above), research priorities, amendments to the regulations, and other matters.

--Oil Spill Contingency Planning

Any plan will stress coordination 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.

Oil spill contingency plans for Lease Sale 53 have not yet been developed. The closest existing oil spill containment and cleanup cooperatives are located in San Francisco Bay (see Table F-9). The sanctuary manager may initiate a special oil spill contingency plan for the sanctuary if the plans developed for Lease Sale 53 do not offer maximum protection for sanctuary resources. In particular, response capability to prevent oil from entering enclosed bays and estuaries may be necessary, given the difficulty of containing oil at sea, and the turbulent nature of the waters in the area (see Section F.2.b.1, above).

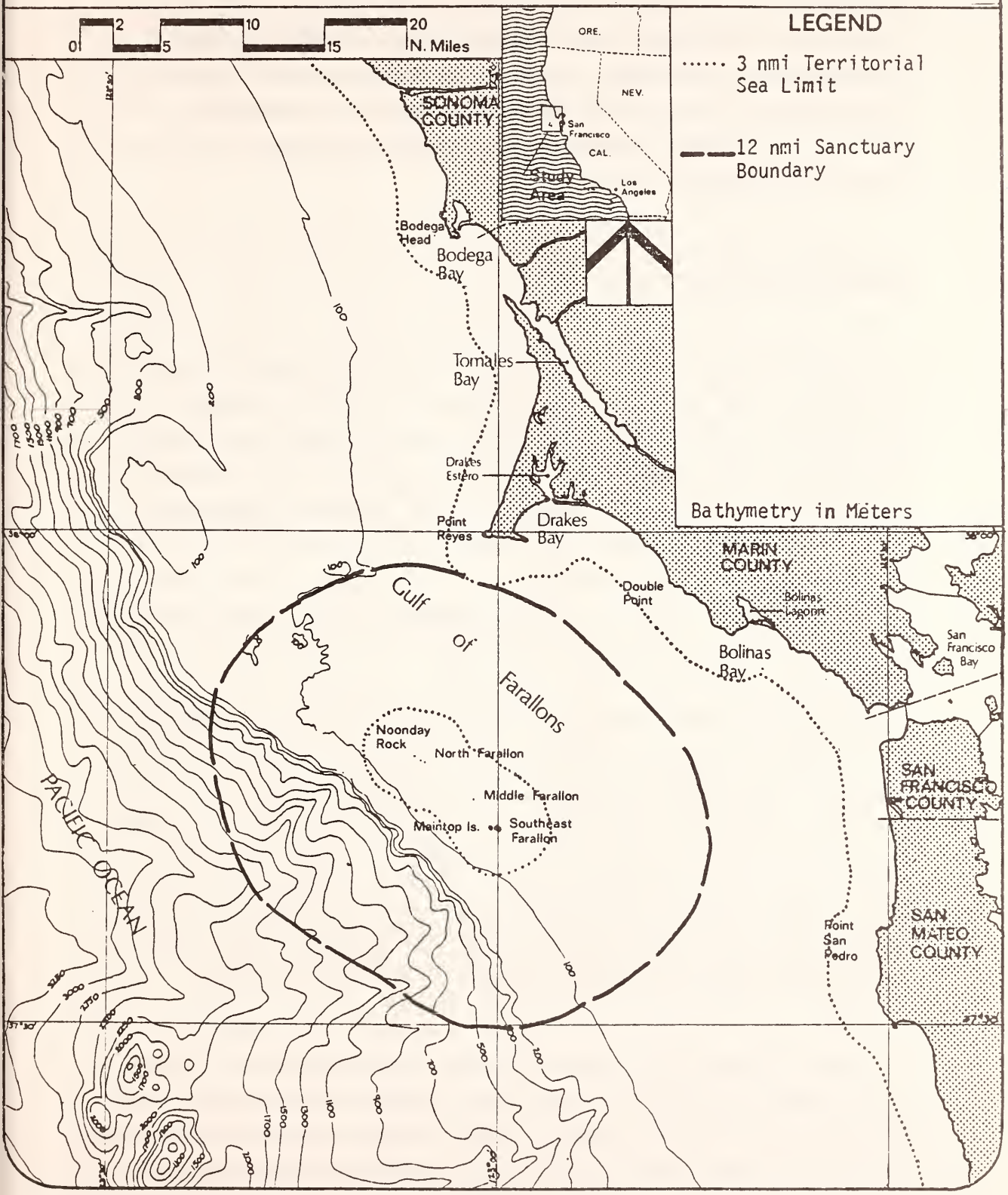
F.3. Alternatives 3a and b

Alternative 3a

Boundaries

The proposed sanctuary consists of the waters 12 nmi (22.2km) around the Farallon Islands, beginning at the mean high tide line and including 3 nmi (5.6km) of waters under State jurisdiction (see Figure F-11).

FIGURE F-11. Alternative 3a.



Alternative 3a is one of two options considered by NOAA which include only the waters around the Farallon Islands. Because it includes only island waters, this 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.

Regulated Activities

This alternative is the least restrictive designation option discussed. The provisions for alternative 3a 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 (11.1km) of the Farallon Islands. Petroleum operations in the sanctuary between 6 and 12 nmi (11.1 and 22.2km) 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 (24km) affected

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 22.2km]) 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 appropriate State and Federal agencies to ensure that protective provisions applied in the sanctuary complement 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 to minimize opportunities for conflicting or mutually exclusive resource policies and objectives.

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 (11.1km) 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 objectives identified under alternative 2.

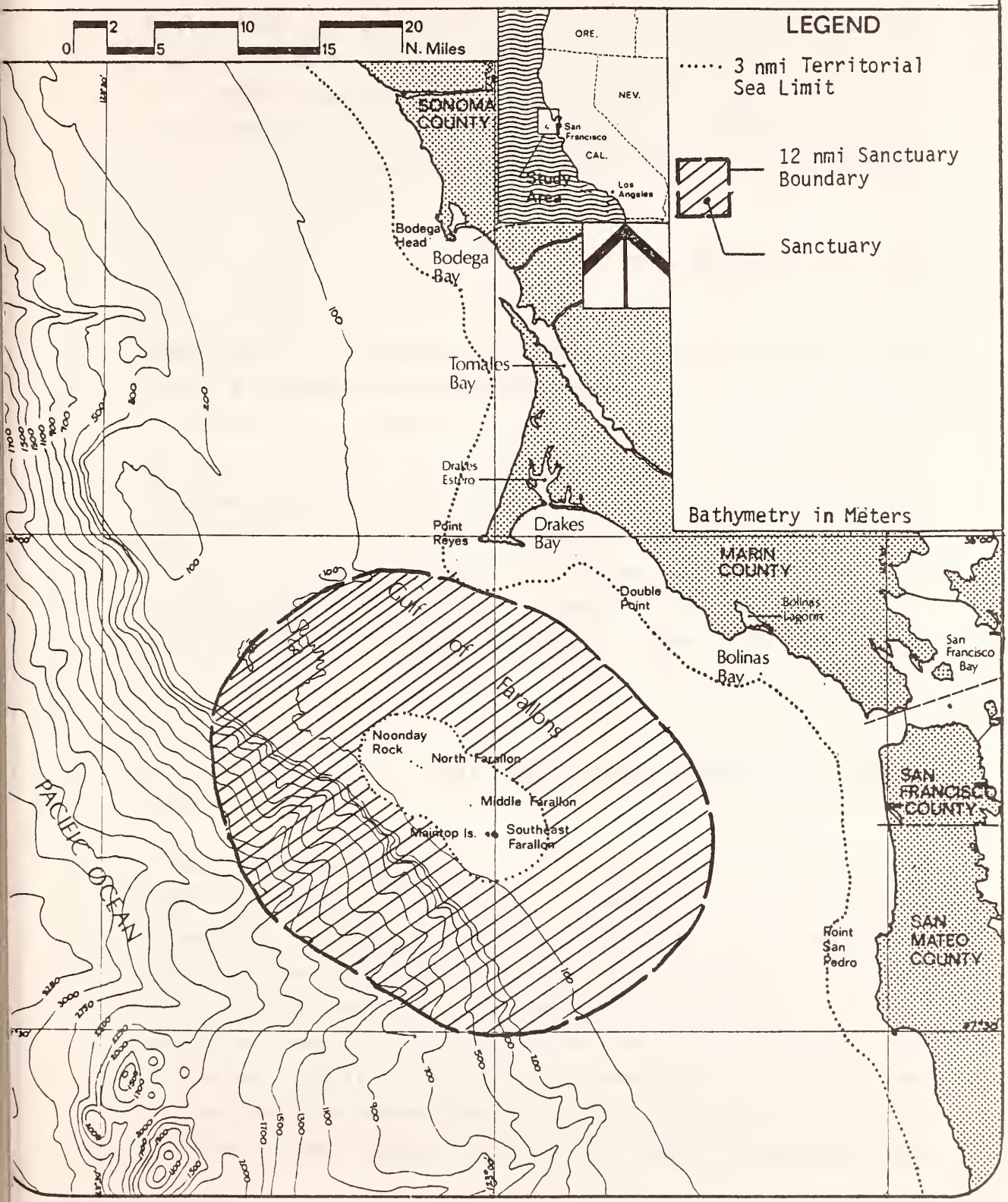
NOAA also considered the possibility of a marine sanctuary extending only 6 nmi (11.1km) around the Farallons. While this alternative would reduce the management burden considerably, it would also greatly decrease the level of protection afforded. Such an alternative not only suffers from the drawbacks of alternative 3a discussed above, but would provide even less protection against a possible oil spill, as oil and gas activities between 6 and 12 nmi (11.1 and 22.2km) from the Islands would not have to meet any restrictions or standards beyond those imposed by existing authorities.

Alternative 3b

Boundaries

The proposed sanctuary consists of the waters between 3 and 12 nmi (5.5 and 22.2km) around the Islands, thus excluding State waters (see Figure F-12).

FIGURE F-12. Alternative 3b.



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 a break in resource protection and management at the limit of the territorial sea.

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

Alternative 3b avoids jurisdictional overlap between the State of California and NOAA. However, it suffers many of the same disadvantages as alternative 3a, and appears to be an undesirable sanctuary designation alternative for a number of reasons beyond its failure to embrace the study area's mainland coastal zone. 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. 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 not prevent OCS exploration within 3 nmi (5.5km) of the Islands. Discharges are, at present, not a major threat to the Island waters; however, exclusion of the territorial sea leaves open the possibility that occasional, and perhaps cumulatively harmful, degredation might damage marine resource quality within, as well as beyond, the territorial sea.

The inability under Alternative 3b to control vessel traffic and disturbances due to overflights very close to the Farallon Islands means that both accidental and intentional intrusions near marine bird or marine mammal breeding or haul-out zones might arise. Adverse weather conditions and concern for navigational safety discourage vessel traffic near the Islands. However, 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.

Management under a "donut" sanctuary designation approach places the primary implementation emphasis upon Federal entities, while excluding the adjacent State system. Coordination is likely to be more difficult because of the peripheral involvement of State entities in decision-making and implementation of sanctuary regulations. Conversely, Federal groups might miss the benefits of consultations with State colleagues, given their indirect management participation. Other disadvantages of alternative 3b

are outlined above under alternative 3a.

F.4. Alternative 4

Boundaries

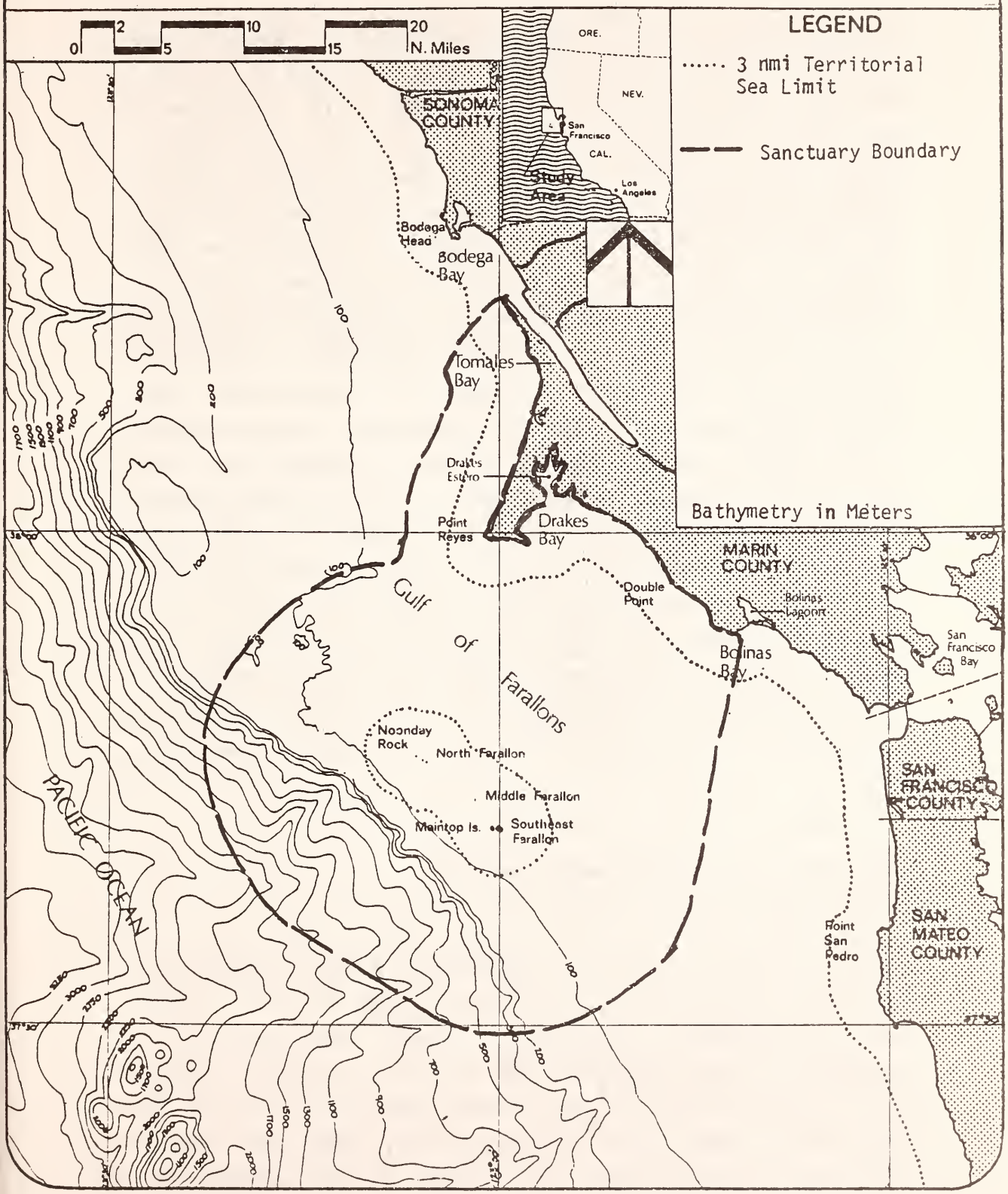
The sanctuary consists of waters 12 nmi (22.2km) around the Farallon Islands, waters 6 nmi (11.1km) seaward of the mean high tide line on the mainland coast between Tomales Point and Bolinas Head and all intervening waters between the Farallon Islands and the Marin County Coast south of the Point Reyes Headlands (see Figure F-13).

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.

Regualted activities

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 are similar to those in the preferred alternative, except that municipal outfalls would not be allowed. The regulations for seabed alteration and construction differ from the preferred alternative only in that no dredging for new marina construction

FIGURE F-13. Alternative 4.



would be allowed in the sanctuary; maintenance, navigational, and ecological dredging and mariculture would be allowed as in alternative 2. The regulations on vessel traffic differ from those of the preferred alternative in that the zone around the Farallon Islands, Bolinas Lagoon, and Areas of Special Biological Significance from which most commercial vessel traffic and overflights below 1000 feet (305m) are prohibited would be extended from 1 nmi (1.8km) to 2 nmi (3.7km). Vessels whose primary purpose is related to the resources of the sanctuary, or which are intending to land would be excluded from this regulation. Under this alternative, to the extent consistent with international law, vessels travelling parallel to the VTSS would be required to stay in the shipping lanes. Vessels related to sanctuary resources 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 (3.7km) zone around the Islands, Bolinas Lagoon, and Areas of Special Biological Significance. Airplanes would have to maintain a minimum elevation of 3000 ft (915m) 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

Within its area of protection, alternative 4 would impose more restrictive regulations and consequently might provide a higher level of environmental protection. 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. While some of the regulations for alternative 4 would be slightly more restrictive than those for the preferred alternative, the added protection appears to be minor and may be outweighed by the added inconvenience.

Under alternative 4, no provision is made for allowing municipal outfalls, even with sanctuary review. Since this smaller alternative borders on the Point Reyes National Seashore along its mainland boundary, it is unlikely that development would bring about a need to allow municipal waste outfalls in this area. Thus, this greater restriction is unlikely to create major costs; however, such a lack of flexibility could have an adverse impact in a larger sanctuary. The preferred alternative retains enough flexibility to protect a larger area while still guarding against unnecessary or harmful discharges. Alternative 4 would also prohibit any dredging for the construction of new marinas. While this prohibition would increase the overall level of protection for benthic communities in intertidal areas, it might restrict the use of this area for recreation and fishing or impose additional costs on such users. There are relatively few areas suitable for marina construction in this alternative.

The expansion of the 1 nmi (1.8km) zone around the Farallon Islands and sensitive areas from which some vessel traffic and overflights below 1000 ft (305m) are excluded to 2 nmi (3.7km) in this alternative appears unwarranted. Vessel traffic or over-

flights beyond 1 nmi (1.8km) are not likely to disturb marine mammals or birds on land, which is where they are most vulnerable to disturbance. Marine mammals and birds are most concentrated and most susceptible to disturbance when on land and in the nearshore zone, particularly during the breeding period. Beyond 1 nmi (1.8km) from sensitive areas, overflights are less likely to seriously disrupt significant numbers of marine mammals and birds. Raising the minimum height of overflights to 3000 ft (915m) would reduce the noise level on the ground, however, this height would be inconsistent with standards 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 regulation making compliance with the VTSS mandatory for commercial vessels travelling parallel to the shipping lanes also appears superfluous, since U.S. Coast Guard records show that voluntary compliance with the VTSS is already at 100 percent. Furthermore, the Coast Guard can institute a mandatory VTSS if necessary. However, monitoring and enforcement costs would probably be considerably higher with a mandatory VTSS (Emerson 1979, personal communication).

Finally, a prohibition on the use of firearms may be unnecessary in light of DFG regulations prohibiting the possession or use of firearms within 1 nmi (1.8km) of the Farallon Islands, and regulating their use elsewhere. Federal regulations 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 managed by DFG. The major benefit of prohibiting the use of firearms would be that it might

be easier to enforce than the more complex system of regulation now in effect. This benefit does not appear sufficient to justify a complete prohibition on the use of firearms, however. 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 References

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 1974-1975 Report. 32 p.

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. In Light 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 of Prevention and Control of Oil Spills. Washington, D. C. March 13-15, 1973. pp. 739-781.

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.

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.

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.

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 Postgraduate School, Monterey.

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. GOP #0-261-238/190. Washington, D.C. 183 p.

National Oceanic and Atmospheric Association. 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. 442-498.

Phillips, R.C. 1974b. 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. Publ. No. 3.

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

Smith, E. J., Jr., D. 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. Bureau of Land Management (BLM). Final Environmental Impact 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 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 and Transportation. 1971. Memorandum of Understanding (August 16, 1971).

U.S. Fish and Wildlife Service. 1970. 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 geology 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 (1977a). 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 hydrocarbons 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, Enhydra 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. 71 p.

(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).

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

Beach, D. 1979. National Marine Fisheries Service. Washington, D.C. 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. Washington, 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).

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).

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).

Herz, M. 1979. Executive Vice President. The Oceanic Society. San Francisco, CA. November 14, 1979 (L).

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).

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).

Pillsbury, C. 1979. Marine Resources Coordinator. California Coastal Commission. San Francisco, CA. June 1979 (V).

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).

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).

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-Patterson, R. 1979. Director. Whale Center. Oakland, CA. November 27, 1979 (T).

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).

Trout, J.F. 1979. Assistanct Executive Officer. California State Lands Commission. Sacramento, CA. November 16, 1979 (L).

Vais, C. 1979. U.S. Environmental Protection Agency, Region 9. San Francisco, CA. May 24, 1979 (T).

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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APPENDICES

APPENDIX 1

TITLE 15 - COMMERCE AND FOREIGN TRADE

CHAPTER IX - NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PART 935 - THE POINT REYES/FARALLON ISLANDS MARINE SANCTUARY

AGENCY: National Oceanic and Atmospheric Administration (NOAA), Department of Commerce

ACTION: Proposed Rule

SUMMARY: These regulatiions define permissible activities within the Point Reyes/Farallon Islands Marine Sanctuary, the procedures by which persons may obtain permits for prohibited activities, and the penalties for committing prohibited acts without a permit.

DATE: Comments due 60 days after publication in the Federal Register

ADDRESS: Send Comments to: Director, Sanctuary Programs Office, Office of Coastal Zone Management, NOAA, 3300 Whitehaven Street, N. W., Washington, D. C. 20235.

PERSON TO CONTACT FOR FURTHER INFORMATION: JoAnn Chandler, Acting Director, Sanctuary Programs Office, Office of Coastal Zone Management, NOAA, 3300 Whitehaven St., N. W., Washington, D. C. 20235. 202/634-4236.

SUPPLEMENTARY INFORMATION:

Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, 16 U.S.C. §§ 1431-1434 (the Act), authorized the Secretary of Commerce, with Presidential approval, to designate ocean waters as far seaward as the outer edge of the Continental Shelf as marine sanctuaries to preserve or restore distinctive conservation, recreational, ecological, or aesthetic values. Section 302(f) of the Act directs the Secretary to issue necessary and reasonable regulations to control any activities permitted within a designated marine sanctuary. The authority of the Secretary to administer the provisions of the Act has been delegated to the Assistant Administrator for Coastal Zone Management within the National Oceanic and Atmospheric Administration, U. S. Department of Commerce (the Assistant Administrator).

The Office of Coastal Zone Management proposes to designate as a marine sanctuary an area of the waters off the Coast of California, adjacent to Point Reyes and the Farallon Islands. Significant numbers of marine birds flourish here, including twelve (12) of the sixteen (16) marine bird species known to breed on the west coast, and probably over half of the nesting marine bird pairs in California. Twenty-three (23) species of marine mammals have been seen in this area, and abundant commercially and recreationally valuable fish are caught in these waters. These resources depend on the high primary productivity of this area, which is reflected in a rich plant and intertidal life, as well as in the diverse fauna at the top of the food chain.

In 1977, NOAA received several recommendations for sanctuaries of varying dimensions to be established in the general area. NOAA held a public meeting in April, 1978 to discuss these recommendations, and prepared and issued an Issue Paper in December, 1978, outlining alternatives for public review. Based on the responses to this Paper and consultation with other Federal agencies, the Pacific Regional Fishery Management Council, State and local governments, and interest groups, NOAA prepared a draft environmental impact statement (DEIS) which is being published concurrently with these regulations. (A copy can be obtained by writing to the contact identified above).

The rationale for designation and for the proposed regulatory system, as well as for alternative approaches, both regulatory and nonregulatory, are more fully set forth in the DEIS. OCZM will receive public comments on the proposal, hold public hearings in San Francisco and Point Reyes Station, California and prepare a final EIS and regulations which incorporate and respond to the comments received. Only after final consultation with Federal agencies, and with Presidential approval, can the Secretary designate the sanctuary and promulgate the regulations.

NOAA policy and its general Marine Sanctuary regulations (15 CFR Part 922, 44 F. Reg. 44831, July 31, 1979) provide that the regulatory system for a marine sanctuary will be established by two documents, a Designation document, and the regulations issued pursuant to Section 302(f) of the Act. The Designation will serve as a constitution for the Sanctuary, establishing among other things the purposes of the Sanctuary, the types of activities that may be subject to regulation within it, and the extent to which other regulatory programs will continue to be effective.

As proposed, Point Reyes/Farallon Islands Marine Sanctuary Designation Document would provide as follows:

Draft 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, extending seaward to a distance of 6 nautical miles (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. Special Characteristics of the Area

The Sanctuary includes rookeries for probably over half of California's nesting marine birds. At least 12 of the 16 west coast nesting marine bird species nest here. In addition, 23 species of marine mammals have been sighted in this area, and abundant fish and shellfish are harvested in the Sanctuary.

Article 4. Scope of Regulation

Section 1. Activities Subject to Regulation. To ensure the protection and preservation of the Sanctuary's marine features and the ecological, recreational, and aesthetic value of the area, the following activities within the Sanctuary may be regulated to the extent necessary:

a. Hydrocarbon operations,

b. Discharging or depositing any substance or object,

c. Dredging or alteration of, or construction on, the seabed,

d. Navigation and operation of vessels other than fishing vessels,

e. Disturbing marine mammals and birds,

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. The regulation of fishing, including fishing for shellfish and invertebrates, is not authorized under Article 4. However, fishing vessels may be regulated with respect to discharges in accordance with Article 4, paragraph (b). All regulatory programs pertaining to fishing, 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 inconsistent with any regulation implementing Article 4.

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. All other activities of the Department of Defense are subject to Article 4.

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 inconsistent with 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.

(End of Draft Document)

Only those activities listed in Article 4 are subject to regulation in the Sanctuary. Before any additional activities may be regulated, the Designation must be amended through the entire designation procedure, including public hearing and approval by the President.

The primary purpose of the proposed regulations is to protect and to preserve the marine birds and mammals, as well as their habitat and other natural resources of the waters surrounding the Farallon Islands and Point Reyes. The Farallon Islands support some of the largest marine bird rookeries in the contiguous United States, and the surrounding waters act as foraging areas for these birds, as well as for the five species of pinnipeds that are seen in the Sanctuary. Activities which pose a significant threat to the special marine features of these waters are prohibited. Such activities include: hydrocarbon exploration and exploitation and the laying of pipelines within 2 nmi of the Islands, Bolinas Lagoon, and Areas of Special Biological Significance (ASBS) designated by the State of California (Sec. 935.7(A)(1)); discharges except for marine sanitation effluents, vessel cooling waters, fish cleaning wastes and chumming materials (bait), and municipal waste outfalls with a certified permit (Sec. 935.7(a)(2)); construction on or alteration of the seabed except for certain specified dredging and construction activities and pipelines as certified by the Assistant Administrator (Sec. 935.7(a)(3)); the unnecessary operation of vessels in the vicinity of important habitats--within 1 nmi of the Islands, Bolinas Lagoon, and ASBSs (Sec. 935.7(a)(4)); disturbing marine mammals and birds by overflights below 1000 ft. in the vicinity of important habitats (Sec. 935.7(a)(5)); and removing or harming of historical or cultural resources (Sec. 935.7(a)(6)). All prohibitions must be applied consistent with recognized principles of international law.

The regulation of fishing in the waters proposed for the Sanctuary will remain the responsibility of the California Department of Fish and Game, the Pacific Regional Fishery Management Council, and the National Marine Fishery Service pursuant to the Fishery

Conservation and Management Act of 1976, 16 U.S.C. §§ 1801 et seq. (See Article 5, Section 1 of the Designation). No additional regulation of fishing has been proposed by OCZM. However, fishing vessels are subject to the same discharge regulations as other vessels (Sec. 935.7(a)(2)).

PUBLIC REVIEW AND COMMENT:

NOAA invites public review and comment on these proposed regulations. Written comments should be submitted to: JoAnn Chandler, Acting Director, Sanctuary Programs Office, Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, N. W., Washington, D. C. 20235, on or before_____.

Accordingly, Part 935 is proposed as follows:

PART 935 - THE POINT REYES/FARALLON ISLANDS MARINE SANCTUARY REGULATIONS

935.1. Authority.

935.2. Purpose.

935.3. Boundaries.

935.4. Definitions.

935.5. Allowed Activities.

935.6. Prohibited Activities.

935.7. Penalties for Commission of Prohibited Acts.

935.8. Permit Procedures and Criteria.

935.9. Certification of Other Permits.

935.10. Appeals of Administrative Action.

935.1. 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.

935.2. Purpose

The purpose of designating the Sanctuary is to protect and preserve the extraordinary ecosystem, including marine birds and 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.

935.3. 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).

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.

935.4. Definitions

(a) "Administrator" refers to the Administrator of the National Oceanic and Atmospheric Administration.

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

(c) "Person" is 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.

935.5. Allowed Activities

All activities except those specifically prohibited by Section 935.6 may be carried on in the Sanctuary subject to all prohibitions, restrictions, and conditions imposed by any other authority.

935.6. 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 935.9 or 935.10:

(1) Hydrocarbon operations.

Hydrocarbon exploration and exploitation activities 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 935.9.

(2) Discharge of polluting substances.

No person shall deposit or discharge any materials or substances of any kind except:

(A) Indigenous fish or parts and chumming materials (bait),
(B) Effluents from marine sanitation devices,
(C) Non-polluted cooling waters from vessels, and
(D) Municipal sewage where certified to have no significant effect on sanctuary resources in accordance with Section 935.9.

(3) Alteration of or construction on the seabed.

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 except for routine maintenance and navigation, mariculture, and as necessary for the construction of residences in Tomales Bay and new marinas as permitted by the California Coastal Commission.

(4) Operations of vessels.

Except to transport persons or supplies to or from an island, or for enforcement purposes, no person shall operate any vessel within one nautical mile of the Farallon Islands, Bolinas Lagoon, or within any Area of Special Biological Significance designated by the State of California unless engaging in activities directly associated with the resources of the area, including, but not limited to, commercial or recreational fishing (in accordance with Article 5, Section 1 of the Designation), research, sightseeing, and diving or other recreational activities, and the primary purpose of such vessel is to engage in such activities.

(5) Disturbing marine mammals and birds.

No person shall disturb seabirds or 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 Islands or for enforcement.

(6) Removing or damaging historical or cultural resources.

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

Activities essential to the national defense are not subject to these prohibitions. NOAA will consult with the Department of Defense to encourage restrictions on military activities in the Sanctuary which could adversely affect the resources of the Sanctuary unnecessarily.

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.

935.7. 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.

935.8. 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, including any activity specifically prohibited under Section 935.6, if such 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 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 permit granted under paragraph (e) may not be transferred.

(g) 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 935.11.

935.9. Certification of Other Permits.

(a) Except as otherwise provided in this section, 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 935.6. Any interested person may request that the Assistant Administrator offer an opinion on whether an activity is prohibited by these regulations.

(b) No permit, license, or other authorization allowing the discharge of municipal sewage or the laying of any pipeline shall be valid unless certified by the Assistant Administrator as consistent with the purposes of the Sanctuary and these regulations. 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 to have been made 60 days from the date that the Assistant Administrator receives notice of the proposed permit and the necessary supporting data unless otherwise determined.

(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. Either the Holder or the issuing agency may appeal the action as provided for in Section 934.10.

935.10. Appeals of Administrative Action

(a) Any interested person (the Appellant) may appeal the granting, denial, or conditioning of any permit under Section 935.9 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 935.9(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 Mangement (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 exploration is complete, but before commercial production can begin, a development plan must be prepared by the developer and submitted for approval to 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 15 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 30m (100 feet) above the top and 30m (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 to 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 30m (100 feet) above the top and 30m (100 feet) 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 250.11 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 requirements for such suspensions.

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 or 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 struc-

tural 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 250.34(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 archeological significance as directed by Executive Order No. 11593.

Notice to Lessees No. 77-4. "Minimum requirements for biological surveys"

This NTL requires a plan of survey to identify significant biological communities.

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