Monterey Bay National Marine Sanctuary

Draft Environmental Impact Statement/ Management Plan

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National Oceanic and Atmospheric Administration

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UNITED STATES DEPARTMENT OF COMMERCE

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND MANAGEMENT PLAN FOR THE PROPOSED MONTEREY BAY NATIONAL MARINE SANCTUARY

August, 1990

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Draft Environmental Impact Statement and Management Plan for the Proposed Monterey Bay National Marine Sanctuary

Abstract

The National Oceanic and Atmospheric Administration proposes to designate Monterey Bay and its adjacent waters, and the submerged lands thereunder, off central California as a National Marine Sanctuary.

The proposed Sanctuary boundaries encompass an area of approximately 2,200 square nautical miles in and surrounding Monterey Bay, off the central coast of California. The proposed Sanctuary boundaries include the coastal and ocean waters over, and the submerged lands under, the entire Monterey Canyon between the northern boundary of Pescadero Marsh and the southern boundary of Julia Pfeiffer Burns Underwater Park and Area of Special Biological Significance (ASBS), 2.5 nautical miles southeast from Partington Point, and extending from the mean high tide line from these sites seaward approximately 18 nautical miles on a southwesterly heading of 240°. These southern and northern boundaries are joined by an arc drawn from Moss Landing, with a radius of 46 nautical miles, over the entire Monterey Canyon complex out to the abyssal plain at 1500 fathoms (approx. 3000 meters). Santa Cruz, Moss Landing and Monterey Harbors are all excluded from the Sanctuary boundaries.

The designation of the Monterey Bay area as a National Marine Sanctuary would provide an integrated program of resource protection, research and education to assist in the long-term management and protection of its resources. Resource protection will involve cooperation with other agencies in formulating resource protection policies and procedures.

Seven regulations are proposed governing: hydrocarbon activities; discharges and deposits (both from within and outside of Sanctuary boundaries); overflights; alteration of or construction on the seabed; historical resources; and marine mammals and seabirds. Two other activities are potentially subject to regulations: commercial (other than fishing) vessel traffic and operation of "thrill craft". Alternatives to the proposed action include the status quo, larger and smaller boundary options and a non-regulatory option.

Research will include baseline studies, monitoring, and analysis and prediction projects to provide information needed in resolving management issues. Education programs will be directed to improving public awareness of the Sanctuary's resources and the need to use them wisely to ensure their viability.

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DRAFT ENVIRONMENTAL IMPACT STATEMENT AND MANAGEMENT PLAN
FOR THE PROPOSED MONTEREY BAY NATIONAL MARINE SANCTUARY

TABLE OF CONTENTS

PAGE

LIST OF FIGURES.....ix

LIST OF TABLES.....x

Note to Reader.....xi

EXECUTIVE SUMMARY.....xiv

PART I: INTRODUCTION 1

A. Authority for Designation.....2

B. Goals of the National Marine Sanctuary Program.....2

C. Terms of the Designation.....3

D. Status of the National Marine Sanctuary Program.....3

E. History of the Proposal.....6

F. Purpose and Need for Designation.....8

G. The Plan for Managing the Sanctuary.....15

PART II: SANCTUARY MANAGEMENT PLAN 17

Section I: A Management Plan for the Proposed Monterey Bay National Marine Sanctuary..... 18

A. Introduction..... 18

B. Sanctuary Goals and Objectives..... 19

1. Resource Protection..... 19

2. Research..... 20

3. Education..... 21

4. Visitor Use..... 22

Section II: The Sanctuary Setting..... 23

A. The Regional Context..... 23

1. Sanctuary Location..... 23

2. Regional Access..... 25

B. Sanctuary Resources..... 26

1. Environmental Conditions..... 26

a. Geology..... 26

b. Meteorology..... 30

c. Waves and Currents..... 31

d. Water Quality..... 36

e. Habitat Types..... 36

2. Natural Resources..... 43

a. Plankton..... 44

b. Algae..... 45

c. Invertebrates..... 47

d. Fish..... 50

e. Seabirds..... 53

f. Marine Mammals..... 58

3. Historical and Cultural Resources..... 68

C. Human Activities..... 70

1. Fishing..... 70

2. Oil and Gas Activities..... 75

3. Commercial Shipping..... 77

4. Military Activity..... 80

5. Research and Education..... 82

6. Agriculture..... 86

7. Ocean Waste Disposal..... 88

a. Point Source Discharges..... 88

b. Non-Point Source Discharges..... 91

8. Dredging and Sand Mining..... 95

9. Recreational Activities and Tourism..... 97

Section III: Action Plan..... 106

A. Overall Management and Development Concept..... 106

B. Resource Protection..... 109

1. General Context in Management..... 109

2. Designation Document and Sanctuary Regulations..... 110

3. Contingency Plans for Major Emergencies..... 123

4. Encouraging Compatible Use of the Sanctuary..... 127

5. Surveillance and Enforcement..... 128

a. Public Education and Information..... 129

b. Planning and Coordination..... 130

C. Research..... 130

1. General Context in Management..... 130

2. Framework for Research..... 132

a. Baseline Studies..... 132

b. Monitoring..... 135

c. Predictive Studies..... 138

3. Selection and Management of Research Projects..... 139

a. Preparing an Annual Plan..... 139

b. Monitoring Progress..... 141

4. Information Exchange..... 141

D. Education..... 141

1. General Context in Management..... 141

2. Educational Opportunities..... 142

3. Educational Programs..... 144

a. Site Visitor Programs..... 144

b. Information Center Programs..... 145

c. Outreach Programs..... 147

Section IV: Administration..... 149

A. Administrative Framework..... 149

1. Marine and Estuarine Management Division..... 149

2. Sanctuary Advisory Committee..... 150

3. Federal Agencies..... 151

4. State, Regional and Local Agencies..... 152

B. Resource Protection: Roles and Responsibilities..... 153

1. Marine and Estuarine Management Division..... 153

2. Sanctuary Manager..... 154

3. Sanctuary Advisory Committee..... 154

4. Federal Agencies..... 154

5. State, Regional and Local Agencies..... 155

C. Research: Roles and Responsibilities..... 156

1. Marine and Estuarine Management Division..... 156

2. Sanctuary Manager..... 156

3. Sanctuary Advisory Committee..... 157

D. Education: Roles and Responsibilities..... 158

1. Marine and Estuarine Management Division..... 158

2. Sanctuary Manager..... 158

3. Sanctuary Advisory Committee..... 159

E. General Administration: Roles and Responsibilities..... 159

1. Marine and Estuarine Management Division..... 159

2. Sanctuary Manager..... 160

3. Federal, State, Regional and Local Agencies..... 161

4. Sanctuary Advisory Committee..... 161

F. Staffing Levels..... 161

G. Headquarters and Visitor Center Facilities..... 162

PART III: ALTERNATIVES INCLUDING THE PREFERRED ALTERNATIVE 163

Section I: Status Quo Alternative..... 164

A. Existing Resource Protection Regime..... 165

1. Federal Authorities..... 171

2. State Authorities..... 173

Section II: Designation as a National Marine Sanctuary..... 176

A. Boundary Alternatives..... 177

1. Boundary Alternative 1..... 177

2. Boundary Alternative 2..... 179

3. Boundary Alternative 3..... 179

4. Boundary Alternative 4..... 182

5. Boundary Alternative 5..... 182

6. Boundary Alternative 6..... 185

7. Boundary Alternative 7..... 185

B. Management Alternatives..... 188

1. Management Alternative 1..... 188

2. Management Alternative 2..... 189

C. Regulatory Alternatives..... 190

1. Oil, Gas and Mineral Activities..... 190

2. Discharges or Deposits..... 193

3. Moving, Injuring or Possessing Historical Resources.. 195

4. Alteration of or Construction on the Seabed..... 196

5. Taking Marine Mammals and Seabirds..... 197

6. Overflights..... 198

7. Operation of Commercial Vessels..... 198

8. Operation of Thrill Craft..... 200

PART IV: ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES 202

Section I: Status Quo Alternative..... 203

A. Resource Protection Regime..... 206

1. Oil, Gas and Mineral Activities..... 206

2. Discharges or Deposits..... 209

3. Moving, Injuring or Possessing Historical Resources. 213

4. Alteration of or Construction on the Seabed..... 214

5. Taking Marine Mammals and Seabirds..... 215

6. Overflights..... 217

7. Operation of Commercial Vessels..... 218

8. Operation of Thrill Craft..... 220

9. Military Activities..... 221

10. Fishing Activities..... 221

11. Enforcement..... 225

B. Research and Education..... 227

C. Management..... 228

Section II: Sanctuary Designation-The Preferred Alternative.. 229

A. Resource Protection Regime..... 231

1. Oil, Gas and Mineral Activities..... 232

a. Oil Spills..... 238

i. Sources of Oil Spills..... 242

- Offshore Platforms and Well Blowouts... 244

- Pipelines..... 247

- Tankers (Associated with Central California OCS Oil and Gas Activities). 249

ii. Effects of Oil on the Marine Environment . 249 (Regardless of Source)

b. Discharges..... 270

c. Acoustic and Visual Disturbance..... 272

d. Socioeconomic Effects..... 274

2. Discharges or Deposits..... 279

3. Moving, Injuring of Possessing Historical Resources. 288

4. Alteration of or Construction on the Seabed..... 290

5. Taking Marine Mammals and Seabirds..... 293

6. Overflights..... 295

7. Operation of Commercial Vessels..... 297

8. Operation of Thrill Craft..... 301

9. Military Activities..... 302

10. Fishing Activities..... 302

11. Enforcement..... 305

B. Research and Education..... 306

C. Boundary Alternatives..... 310

1. Boundary Alternative 1..... 310

2. Boundary Alternative 2..... 313

3. Boundary Alternative 3..... 319

4. Boundary Alternative 4..... 321

5. Boundary Alternative 5..... 322

6. Boundary Alternative 6..... 322

7. Boundary Alternative 7 325

D. Management Alternatives 328

Section III: Unavoidable Adverse Environmental or Socio-Economic Effects 330

Section IV: Relationship Between the Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity 332

PART V: LIST OF PREPARERS AND ACKNOWLEDGMENTS 333

PART VI: LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS RECEIVING COPIES 335

PART VII: REFERENCES 339

PART VIII: APPENDICES 354

1. Designation Document and Proposed Regulations 355

2. Existing State and Federal Authorities Relevant to Monterey Bay 390

3. Abbreviations 437

LIST OF FIGURES

Figure	Title	Page
1	National Marine Sanctuary System	4
2	Proposed Monterey Bay Sanctuary Study Area Map	9
3	Regional Context of Monterey Bay	24
4	Monterey Bay Area Sediment Types	29
5	Surface Ocean Currents in Monterey Bay Area	33
6	Types of Habitat within the Monterey Bay Area	38
7	Location of Important Seabird Nesting Areas	56
8	Principal Sea Otter and Pinniped Areas of Concentration	60
9	Rate of Range Expansion (1914-1984) of the California Sea Otter Population	67
10	Locations of Primary Commercial Fishing Areas	73
11	Potential Oil and Gas Development in the Vicinity of Monterey Bay	76
12	Lease Sale #119 Schedule	78
13	Nearshore Military Activity Areas in Monterey Bay	81
14	Research and Education Programs in the Monterey Bay Area	83
15	Ocean Discharge and Dredged Material Disposal Sites	89
16	Location of Primary Sport and Commercial Fishing	101
17	Boundary Alternative #1	178
18	Boundary Alternative #2, Preferred	180
19	Boundary Alternative #3	181
20	Boundary Alternative #4	183
21	Boundary Alternative #5	184
22	Boundary Alternative #6	186
23	Boundary Alternative #7	187

LIST OF TABLES

Tables	Title	Page
1	Representative Algae Associated with the Diverse Habitats of the Monterey Bay Area	46
2	Representative Invertebrates Associated with the Diverse Habitats	49
3	Representative Fishes Associated with the Diverse Habitats	52
4	Representative Seabirds and their Seasonal Status in the Monterey Bay Area	55
5	Marine Mammals Found in the Monterey Bay Area	59
6	Summary of Poundage and Value (over $20,000 only) of Fisheries Data for 1986 for the Ports of Santa Cruz, Moss Landing and Monterey-Salinas	71
7	Major Agricultural Crops Produced in Monterey and Santa Cruz County	87
8	Summary of Present Discharges into Monterey and Carmel Bays	90
9	Units of the California State Parks, Beaches, Refuges and Reserves within the Proposed Boundary	99
10	Major Species of Fish Caught from Private or Rental Boats, Beaches, Piers and Jetties	102
11	Fish Caught by Commercial Party Boat Fleet for the Ports of Santa Cruz, Monterey and Moss Landing	103
12	State and Federal Management Authorities and Regulations Relevant to the Resources and Activities of the Proposed Sanctuary Area	166
13	Summary of Threats to Sanctuary Resources from Oil and Gas Activities	235
14	Potential Oil and Gas Impacts Mitigated by NOAA's Preferred Alternative	236
15	Restrictions on the Recreational Taking of Invertebrates in Tide Pools or Other Areas Between the High Tide Mark	407
16	Catch Restrictions for Species of Commercial Fisheries in the Monterey Bay Area	408

Note to Reader:

A. National Environmental Policy Act (NEPA):

This document is both a draft environmental impact statement and management plan for the proposed Monterey Bay National Marine Sanctuary. Some of the section headings, and their order, are different from those frequently found in other environmental impact statements. To assist NEPA reviewers, the following table has been developed. Under the heading "NEPA Requirements" are listed those topics normally discussed in an EIS. The corresponding section of this document and the page numbers are provided in the other two columns.

NEPA Requirement	Management Plan	Page
Purpose and Need for Action	Part I: Introduction	8
Alternatives		
Preferred Alternative	Part III, Section II	177
Preferred Boundary Alternatives	Part III, Section II	179
Other Alternatives	Part III, Section II	176-185
Affected Environment	Part III, Section II	23
Environmental Consequences		
A. General and Specific Impacts	Part IV, Section I	202
B. Unavoidable Adverse Environmental or Socioeconomic Effects	Part IV, Section II	330
C. Relationships between Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity	Part IV, Section III	332
D. Possible Conflicts between the Proposed Action and the Objectives of Federal, State, Regional and Local Land Use Plans, Policies and Contacts for the Area Concerned	Part II, Section III	106

NEPA Requirement	Management Plan	Page
List of Preparers	Part V	333
List of Agencies, Organizations, and Persons Receiving Copies of the DEIS/MP	Part VI	335

B. Endangered Species Act (ESA):

Pursuant to Section 7 of the ESA, the U.S. Fish and Wildlife Service of the Department of the Interior, and the National Marine Fisheries Service of the Department of Commerce, were consulted in the performance of the biological assessment of possible impacts on threatened or endangered species that might result from the designation of a National Marine Sanctuary at Monterey Bay. The consultation confirmed that some 18 Endangered (E) and three Threatened (T) species are known to occur in the area and that Sanctuary designation was not likely to adversely affect these species. The species identified are:

1.	California brown pelican	*Pelicanus occidentalis calif.*	E
2.	Short-tailed albatross	*Diomedea albatrus*	E
3.	American peregrine falcon	*Falco peregrinus anatum*	E
4.	California least tern	*Sterna antillarum browni*	E
5.	Gray whale	*Eschrichtius robustus*	E
6.	Right whale	*Eubalaena glacialis*	E
7.	Blue whale	*Balaenoptera musculus*	E
8.	Fin whale	*B. physalus*	E
9.	Sei whale	*B. borealis*	E
10.	Humpback whale	*Megaptera novaeangliae*	E
11.	Sperm whale	*Physeter catodon*	E
12.	Green sea turtle	*Chelonia mydas*	E
13.	Leatherback sea turtle	*Dermochelys coriacea*	E
14.	Pacific Ridley sea turtle	*Lepidochelys olivacea*	E
15.	Loggerhead sea turtle	*Caretta caretta*	T
16.	Guadalupe fur seal	*Arctocephalus townsendi*	T
17.	Stellar sea lion	*Eumatopias jubatus**	T
18.	Southern sea otter	*Enhydra lutris nereis*	T
19.	Santa Cruz long-toed salamander	*Ambystoma macro. croceum*	E
20.	San Francisco garter snake	*Thamnophis sirt. tetrataenia*	E
21.	Smith's blue butterfly	*Euphilotes enoptes smithi*	E
22.	Santa Cruz cypress	*Cupressus abramsiana*	E

* Listed as threatened for an eight month interim period pursuant to an emergency rule published April 5, 1990.

C. Resource Assessment:

The Marine Protection, Research, and Sanctuaries Act, as amended, requires a resource assessment report documenting present and potential uses of the proposed Sanctuary area, including uses subject to the primary jurisdiction of the Department of the Interior. This requirement has been met in consultation with the Department of the Interior and the assessment report is contained in Part II, Section II.

D. Federal Consistency Determination:

Section 307 of the Coastal Zone Management Act of 1972, as amended, requires that each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner that is, to the maximum extent practicable, consistent with approved state management programs. This requirement has been met through a Federal Consistency Determination made by NOAA to the California Coastal Commission that the designation of Monterey Bay as a National Marine Sanctuary is consistent, to the maximum extent practicable, with California's Coastal Management Plan.

EXECUTIVE SUMMARY

Monterey Bay is located on the coast of central California, approximately 50 miles south of San Francisco. In accordance with Title III of the Marine Protection, Research, and Sanctuaries Act, as amended, 16 U.S.C. §§ 1431 et seq., this draft Environmental Impact Statement and Management Plan proposes the establishment of a National Marine Sanctuary centered on Monterey Bay to facilitate the long-term management and protection of its resources. Part I of this report reviews the authority for Sanctuary designation, the goals of the National Marine Sanctuary Program, the development of this proposal, and the purpose of designating a National Marine Sanctuary at Monterey Bay.

Part II, Section I, outlines Sanctuary management goals and objectives in resource protection, research, education, interpretation and visitor use. The area recommended for the proposed Sanctuary, about 2,200 square nautical miles, provides the habitat and setting for a distinctive assortment of living and non-living marine resources. The Monterey Bay area is characterized by a combination of oceanic conditions and undersea topography that provides for a highly productive ecosystem and a wide variety of marine habitats. The area is characterized by a narrow continental shelf fringed by a variety of coastal types. The Monterey Submarine Canyon is unique in its size, configuration and proximity to shore that provides for strong seasonal upwelling. The high productivity of the area supports the most diverse algal community in the Nation. Bay waters are also inhabited by large numbers of pinnipeds, whales, fish stocks, otters and seabirds that are often visible from the shore. The abundant fish stocks support a valuable commercial and recreational fishery. The high water quality and the resulting variety of biota and their proximity to shore is one of the prime reasons for the international renown of the area as a prime tourist location. The quality and abundance of the natural resources has attracted man from the earliest prehistoric times to the present and as a result the area contains significant archeological and paleontological resources. The Monterey Bay environment, its living resources, and human activities in the area are described in Part II, Section II.

The plan for managing the proposed Sanctuary is provided in Part II, Section III. This plan contains guidelines to ensure that all management actions undertaken in the first five years after designation are directed to resolving important issues as a means of meeting Sanctuary objectives. Management actions are considered in three program categories: resource protection, research, and education. Resource protection will involve cooperation with other agencies in formulating policies and procedures including the enforcement of regulations for visitor use. Research will include baseline studies, monitoring, and predictive studies to provide information needed in resolving management issues. Education programs will be directed to improving public awareness of the

Sanctuary's resources and the need to use them wisely to ensure their viability.

The management plan calls for the promulgation of seven new regulations when the Sanctuary is designated. These regulations cover hydrocarbon activities; discharges; overflights; alteration of or construction on the seabed; historical resources; and marine mammals and seabirds. Two other activities are potentially subject to regulations; commercial (other than fishing) vessel traffic and operation of "thrill craft".

The administrative framework for managing the proposed Sanctuary (Part II, Section IV) recognizes the need for cooperation and coordination among all participants in Sanctuary management and delineates the roles of the National Oceanic and Atmospheric Administration's Marine and Estuarine Management Division, the State of California, the U.S. Coast Guard, the Sanctuary Manager and staff, and a Sanctuary Advisory Committee in resource protection, research, education, and general administration.

Alternatives in developing the proposal to designate a National Marine Sanctuary at Monterey Bay were considered in terms of achieving optimum protection for the ecosystem, improving scientific knowledge of the area, and promoting public understanding of the value of Bay area resources (Part III). Based on these criteria, Sanctuary designation was preferred to the alternative of no action, and preferred boundary, management, and regulatory alternatives were selected. The environmental consequences of each of these alternatives are described in Part IV.

The emergence of new issues and other unforeseeable factors may affect specific aspects of Sanctuary management as described in this plan. However, the overall goals, management objectives and general guidelines will continue to be relevant. Once the Sanctuary is designated, the aim is carefully to adjust the plan to changing circumstances in light of the experience gained in actual management.

Introduction

PART I: INTRODUCTION

A. Authority for Designation

Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 16 U.S.C. §§ 1431 *et seq.*, (MPRSA) authorizes the Secretary of Commerce to designate discrete areas of the marine environment of special national significance as National Marine Sanctuaries to ensure comprehensive management and protection of their conservation, recreational, ecological, historical, research, educational, or aesthetic resources and qualities. Selection of a site as an Active Candidate for designation as a National Marine Sanctuary formally begins the National Environmental Policy Act (NEPA) environmental impact analysis process. The U.S. Congress directed the National Oceanic and Atmospheric Administration (NOAA) (P.L. 100-627, section 205) to designate Monterey Bay as a National Marine Sanctuary by December 31, 1989. This directive by Congress automatically advances Monterey Bay to Active Candidate status. NOAA manages the program through the Marine and Estuarine Management Division (MEMD) in the Office of Ocean and Coastal Resource Management.

B. Goals of the National Marine Sanctuary Program

Consistent with the mission of developing a system of National Marine Sanctuaries for the purpose of serving the long-term benefit of the public, the following goals were established for the Program:

1. Enhance resource protection, through comprehensive and coordinated conservation and management tailored to the specific resources, that complements existing regulatory authorities;

2. Support, promote and coordinate scientific research on, and monitoring of, the site-specific marine resources to improve management decision-making in National Marine Sanctuaries;

3. Enhance public awareness, understanding, and wise use of the marine environment through public interpretive and recreational programs; and

4. Facilitate, to the extent compatible with the primary objective of resource protection, multiple use of these marine areas not prohibited pursuant to other authorities.

C. Terms of the Designation

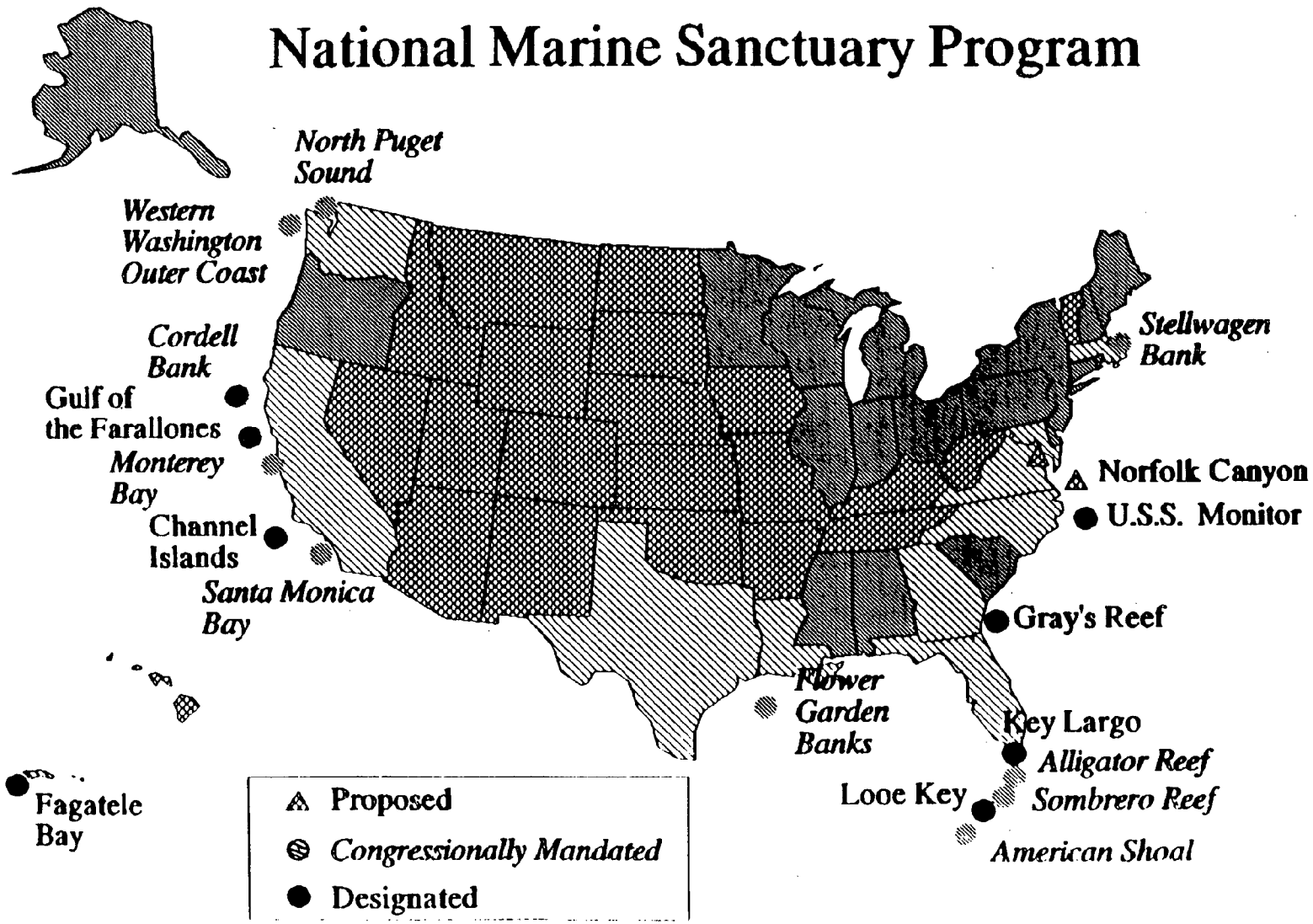
Section 304(a)(4), 16 U.S.C. § 1434(a)(4), of the MPRSA provides that as a condition of establishing a National Marine Sanctuary, the Secretary of Commerce must set forth the terms of the designation. The terms must include: (a) the geographic area included within the Sanctuary; (b) the characteristics of the area that give it conservation, recreational, ecological, historical, research, educational or aesthetic value; and (c) the types of activities that will be subject to regulation in order to protect those characteristics. The terms of the designation may be modified only by the same procedures through which the original designation was made.

D. Status of the National Marine Sanctuary Program

Eight National Marine Sanctuaries have been established since the Program's inception in 1972 (Figure 1):

FIGURE 1

National Marine Sanctuary Program



- The Monitor National Marine Sanctuary serves to protect the wreck of the Civil War ironclad, U.S.S. MONITOR. It was designated in January 1975 and is an area one mile in diameter, 16 miles southeast of Cape Hatteras, North Carolina.

- The Key Largo National Marine Sanctuary, designated in December 1975, provides protection and management of a 100 square mile coral reef area south of Miami, Florida.

- The Channel Islands National Marine Sanctuary, designated in September 1980, consists of an area of approximately 1,252 square nautical miles off the coast of California adjacent to the northern Channel Islands and Santa Barbara Island. The sanctuary ensures that valuable habitats for marine mammals, including extensive pinniped assemblages and seabirds, are protected.

- The Looe Key National Marine Sanctuary, designated in January 1981, consists of a submerged section of the Florida reef southwest of Big Pine Key. The site, five square nautical miles in size, includes a beautiful "spur and groove" coral formation supporting a diverse marine community and a wide variety of human uses.

- The Gray's Reef National Marine Sanctuary, designated in January 1981, is a submerged live bottom area located on the South Atlantic continental shelf due east of Sapelo Island, Georgia. The sanctuary, which encompasses about 17 square nautical miles protects a highly productive and unusual habitat for a wide variety of species including corals, tropical fish, and sea turtles.

- The Gulf of the Farallones National Marine Sanctuary, designated in January 1981, is a 948 square nautical mile area off the California coast north of San Francisco. It provides a habitat for a diverse array of marine mammals and birds as well as pelagic fish, plants, and benthic biota.

- The Fagatele Bay National Marine Sanctuary in American Samoa was designated in August 1986. The 163-acre bay contains deepwater coral terrace formations that are unique to the high islands of the tropical Pacific. It serves as habitat for a diverse array of marine flora and fauna included the endangered hawksbill turtle and the threatened green sea turtle.

- The Cordell Bank National Marine Sanctuary, designated in May, 1989, is a 397 square nautical mile area off the central California coast and contiguous with the northern boundary of the Gulf of the Farallones National Marine Sanctuary.

> Cordell Bank and its surrounding waters, because of a rare combination of oceanic conditions and undersea topography, provide a highly productive marine environment for a rich variety of benthic organisms as well as fish, marine mammals and seabirds in a discrete well defined area.

In addition the Marine and Estuarine Management Division is in the process of studying, or preparing draft or final designation documents for, ten additional proposed Sanctuaries around the coast of the United States. These proposed Sanctuaries are in North Puget Sound and Western Washington Outer Coast, Washington; Santa Monica Bay, California; Stellwagen Bank, Massachusetts; CMDR Barney's Flotilla, Maryland; Norfolk Canyon, Virginia; Alligator Reef, Sombrero Reef and American Shoal, Florida; and Flower Garden Banks, Texas (Figure 1).

E. History of the Proposal

The State of California nominated the Monterey Bay area in 1977, along with nine other marine areas offshore for consideration as National Marine Sanctuaries. In response to these nominations, NOAA selected three sites for further consideration: Channel Islands, Point Reyes-Farallon Islands, and the Monterey Bay area. In December 1978, NOAA released an Issue Paper on these three sites, presenting several boundary and regulatory options for each proposal. Public hearings on the Issue Paper were held and, based on the responses, NOAA declared all three sites as Active Candidates on August 10, 1979.

This process led to the designation of the Channel Islands National Marine Sanctuary on September 21, 1980 and the Point Reyes-Farallon Islands National Marine Sanctuary (later renamed the Gulf of the Farallones National Marine Sanctuary) on January 16, 1981. In 1980, NOAA determined that work on the proposed Monterey Bay Sanctuary would be delayed due to the complex analyses and corresponding staff time required for the other two California sites.

On December 14, 1983 NOAA announced in the Federal Register (48 FR 56253) that it had removed Monterey Bay from the list of active candidates for three reasons: (1) the existence of two other National Marine Sanctuaries in California (Channel Islands and Gulf of the Farallones) that protect similar marine resources and the Program's policy, established in 1980, to consider a diverse array of sites and resources; (2) the proposed area's relatively large size and the surveillance and enforcement burdens this would impose on NOAA; and (3) the wealth of existing marine conservation programs already in place in the Sanctuary area.

In 1988, when Congress reauthorized and amended Title III of the MPRSA, it specified in Section 205 of P.L. 100-627 that NOAA designate Monterey Bay as a National Marine Sanctuary by December 31, 1989. This statutory requirement reinstated Monterey Bay as an Active Candidate for Sanctuary status.

NOAA held two scoping meetings in the Monterey Bay area during January, 1989, to solicit public comments on the proposed Sanctuary. Notice of the scoping meetings was published in the

following four newspapers: the Monterey Peninsula Herald, Salinas Californian, Watsonville Register-Pajaronian and Santa Cruz Sentinel. The first meeting was held on January 25, 1989 from 6:30 to 10:00 pm in the Monterey Conference Center, City of Monterey, Monterey County, and the second scoping meeting was held on January 26, 1989 from 6:30 to 10:00 pm in the Chambers of the Santa Cruz County Board of Supervisors, in Santa Cruz City, Santa Cruz County. All interested persons were invited to attend. Those attending the meeting were asked to comment on readily identifiable issues, to suggest additional issues for examination, and to provide information useful in evaluating the site's potential as a Sanctuary. A figure of a study area was presented as an example of the area under consideration for ultimate designation as National Marine Sanctuary (Figure 2). The response was overwhelmingly favorable to proceeding with the evaluation.

F. Purpose and Need for Designation

The proposed Monterey Bay National Marine Sanctuary meets all of the site identification criteria developed by the Marine and Estuarine Management Division (NOAA, 1983). Typical of the Oregonian province, the Bay is strongly influenced by cool, relatively clear waters dominated by the California current. The Monterey Submarine Canyon results in a strong upwelling of nutrient-rich water. Consequently, the nearshore waters and diversity of habitats are highly productive and support exceptionally rich and abundant floral and faunal communities that

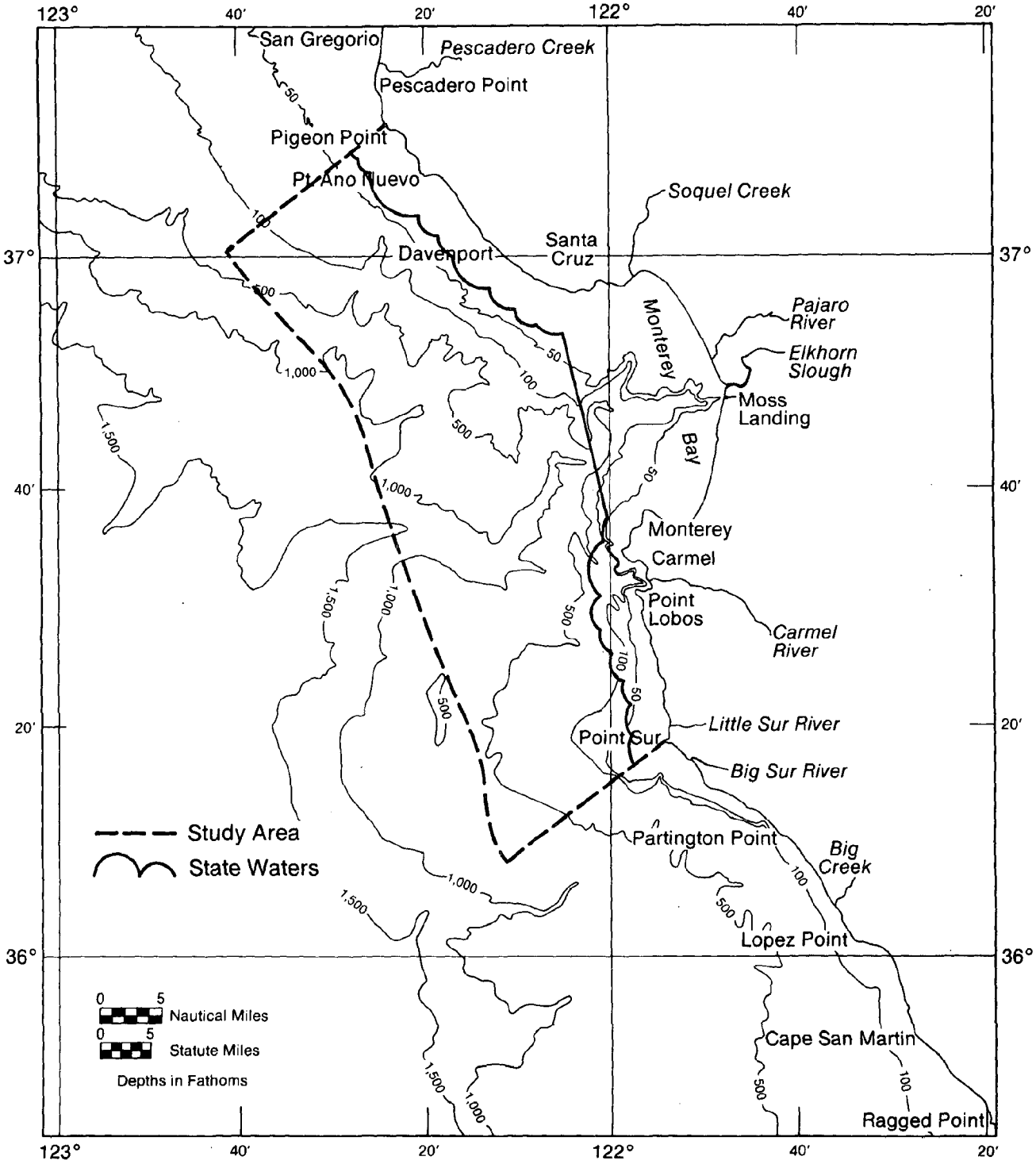


Figure 2. Proposed Monterey Bay Sanctuary Study Area.

are very important in central and northern California. The variety of habitat assemblages is one of the major determinants of the rich intertidal and subtidal communities and represents the range of habitats to be found in the Oregonian province. The high density of habitat types and community assemblages provides an excellent environment for a wide variety of research projects and educational opportunities.

While there are submarine canyons elsewhere in the Oregonian province, the Monterey Submarine Canyon is unique in its size, configuration, and proximity to shore. This canyon, along with adjacent submarine canyons, enriches local water through strong seasonal upwellings, modifies currents and provides habitat for pelagic communities. The proximity of the canyon to the shore also provides a unique opportunity to the scientific community for deep-sea research. Monterey Bay itself is a rare geological feature as it is one of the few large bays along the Pacific coast. This fact lends additional importance to this area as a resting and staging area for migrating birds.

The area also supports one of the greatest diversities of marine mammals in the world. Among these are several endangered species, including the California gray whale (*Eschrichtius robustus*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter catodon*), and the threatened California sea otter (*Enhydra lutris*).

All species of pinnipeds commonly found off the central and northern California coast are found in the Monterey Bay area. Año

Nuevo State Reserve and has been cited as the most important pinniped rookery and resting area in central and northern California.

The proposed Sanctuary area also encompasses approximately one-third of the entire Southern sea otter range in California. However, the majority of otters (females and pups) are found south of the Monterey Peninsula. The official northern limit to their distribution is at Pigeon Point.

Monterey Bay plays a major role for avifauna as a staging habitat during migrations, and as wintering and summer habitat. Bird species diversity is very high. Birds are attracted to the area due to the nutrient rich waters and resulting food resources, the protected bay environment, and location along the Pacific flyway. Breeding populations are generally small and scattered. The entire world population of the Ashy Storm-Petrel (*Oceanodroma homochroa*) (5000-10,000) can be found feeding in the area immediately above the Monterey canyon from August to November.

The wide variety and abundance of these natural resources are of outstanding value to the local, state, regional, national and international community. Questions have been raised about whether the existing regulatory regime adequately protects Monterey Bay resources from the increasing pressure of human activities. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service, for example, share authority to protect many individual species but neither protects the species habitat or considers, under a holistic management structure, the interactions and

potential threats of man's activities on the natural resources. The designation of Monterey Bay as a National Marine Sanctuary would provide the means for addressing such deficiencies and provide additional protection and coordination where needed.

A unique feature of the Monterey Bay area is the combination of biological and physical characteristics in the area that provide outstanding opportunities for scientific research on many aspects of marine ecosystems. The diverse habitats are readily accessible to researchers. Six major research facilities are found in the area. These institutions have a long history of research and large databases possessing a considerable amount of baseline information on the Bay area and its resources. However, there has been a lack of coordination among the different research institutions resulting in some apparent overlap of research effort and lack of comprehensive oceanographic and ecological studies. The planned management program will work with the existing infrastructure of research and educational programs to coordinate studies and efforts that increase our understanding of ocean and atmospheric processes.

The Marine and Estuarine Management Division is already responsible for the management of the Elkhorn Slough National Estuarine Research Reserve in cooperation with the State of California, Department of Fish and Game. The proposed Monterey Bay Sanctuary designation would provide a unique opportunity for the establishment of coordinated coastal zone management and research effort through the integration of the facilities and resources and programs of the Reserve and the Sanctuary. This type of program,

emphasizing land-sea interactions, could then serve as an innovative model for other coastal areas of the United States where local land issues and coastal zone problems have traditionally been separated from offshore, marine issues in terms of jurisdiction and research effort.

The diverse resources of the Monterey Bay area are enjoyed by the residents of this area as well as the numerous visitors. The population of Monterey and Santa Cruz counties was 544,000 in 1985 and is projected to increase to 755,000 by 2005. The projected growth is based in large part on the attractiveness of the area's natural beauty. The area also supports several economic activities. The most important activity directly dependent on the resources is commercial fishing, which played an important role in the history of Monterey Bay and continues to be a very important activity vital to the region's economy.

Related to fisheries are several aquaculture operations within the Monterey Bay area, which are dependent in large part on a clean source of ocean waters. Some operations collect organisms directly from the Bay while others grow and produce their own stocks through captive breeding.

While Monterey Bay has thus far enjoyed the reputation as an internationally renowned scenic area with good water quality, such success can not realistically be expected in the future without deliberate protection.

So far the variety of human uses has not dramatically altered or damaged the resources of Monterey Bay. However, many people are

concerned about the potential conflicts and cumulative effects as the area becomes more heavily populated and visited by increasing numbers of tourists. In addition to tourism and recreational increases, business, commercial and industrial uses of the area are also increasing. Oil and gas exploration, development and production in the northern Bay area is being considered with proposed Lease Sale #119, although the schedule for the Lease Sale process has been deferred. It should be noted that at this time Lease Sale #119 is currently on hold in an early phase of the presale process. Thus far, only the "Call for Information" has been completed and no further activities are being carried out.

The Bay area also is a place for dredge and waste disposal. Two sites off Moss Landing are used for discharging dredge spoils. Point source pollution from municipal and industrial wastes is dumped into the waters at various outfalls and municipal plans for additional outfalls and discharges into Monterey bay are being considered. Non-point agricultural runoff also enters the Bay primarily from the major agricultural areas of the Salinas and Pajaro Valleys. To a large extent these activities are presently regulated by existing management authorities; however, Sanctuary designation can provide additional legal authority, research, monitoring, and management coordination to ensure that these activities continue in a way that protects the resources of Monterey Bay.

Making a more indirect use of the area are the commercial ships that regularly traverse the outer reaches of the area as part

of the route from San Francisco to Los Angeles, with infrequent vessel traffic to Moss Landing, Santa Cruz, or Monterey. Although this traffic is not yet a major concern, contingency plans designed to react to oil spills resulting from tanker accidents are being formulated and can be coordinated with Sanctuary designation.

Existing programs to protect significant resources within the Monterey Bay area and to provide recreational and interpretive opportunities have placed considerable emphasis on the protection of coastal resources but have not given the same attention to marine resources. Such critical marine areas as the waters around Año Nuevo Island and over the Monterey Submarine Canyon receive no special attention by resource managers. The waters of the Big Sur and San Mateo coastline receive limited protection but lack a mechanism to establish research priorities and coordination and develop Emergency Response plans for potential accidents such as groundings and/or oil spills. With current resources of existing programs being limited, the coordination of resource protection and management programs is essential. The Monterey Bay Sanctuary could provide an important role in such coordination.

G. The Plan for Managing the Sanctuary

The remainder of this document consists of a draft management plan and draft environmental impact statement for the proposed Monterey Bay National Marine Sanctuary. The plan provides information on the resources and uses of the proposed Sanctuary, as well as Sanctuary goals and objectives. Programs (Resource

Protection, Research, and Education) for implementing the goals and objectives are described. The plan proposes actions for resolving immediate management concerns and formulates guidelines for continuing long-term management.

PART II: SANCTUARY MANAGEMENT PLAN

Section I: A Management Plan for the Proposed Monterey Bay National Marine Sanctuary

A. Introduction

National Marine Sanctuaries are designated in areas of the marine environment selected for their conservation, recreational, ecological, historical, research, educational, or aesthetic resources and qualities. The Marine Protection, Research, and Sanctuaries Act of 1972, as amended, and its implementing regulations (15 CFR Part 922) require that a management plan be prepared for each proposed Sanctuary. Once the Sanctuary is designated, the plan will be implemented. In general, management plans focus on Sanctuary goals and objectives, management responsibilities, research and education programs, and policies to guide plan implementation.

The plan establishes an administrative framework in recognition of the need for cooperation and coordination to ensure effective management. The Marine and Estuarine Management Division (MEMD), National Oceanic and Atmospheric Administration (NOAA), is responsible for management of the site.

Variable funding for staff and program development over the next several years may affect specific aspects of Sanctuary management described in this plan. Modifications to the scope and scale of the programs may have to be made because of such unforeseeable changes in the level of funding. The goals and objectives of the plan will, however, remain unchanged.

B. Sanctuary Goals and Objectives

Sanctuary goals and objectives provide the framework for developing the management strategies. The goals and objectives direct Sanctuary activities towards the dual purposes of public use and resource conservation and are consistent with the intent of the National program.

The management strategies planned for the proposed Monterey Bay National Marine Sanctuary (MBNMS) are directed to the goals and objectives outlined below. It should be noted that, although the Sanctuary goals are listed discretely, they are actually overlapping. For instance, the research and education efforts both contribute to resource protection and to enhancing public use of the Sanctuary.

1. Resource Protection

The goal assigned the highest priority for management is to protect the marine environment, resources and qualities of the MBNMS. Many of the activities that affect the marine environment are presently governed by existing State and Federal regulations under the jurisdiction of many different agencies. A National Marine Sanctuary may serve the function of coordinating the activities of these management and regulatory agencies. The specific objectives of resource protection efforts are to:

- Coordinate policies and procedures among the agencies sharing responsibility for protection and management of resources;

- Encourage participation by interested agencies and organizations in the development of procedures to address specific management concerns (e.g., monitoring and emergency-response programs);

- Develop an effective and coordinated program for the enforcement of Sanctuary regulations;

- Enforce Sanctuary regulations in addition to other regulations already in place;

- Promote public awareness of, and voluntary compliance with, Sanctuary regulations and objectives, through an educational/interpretive program stressing resource sensitivity and wise use;

- Ensure that the water quality of Monterey Bay is maintained at a level consonant with Sanctuary designation;

- Establish memoranda of agreement and other mechanisms for coordination among all the agencies participating in Sanctuary management;

- Ensure that the appropriate management agency incorporates research results and scientific data into effective resource protection strategies;

- Reduce threats to Sanctuary resources.

2. Research

The purpose of Sanctuary research activities is to improve understanding of the Monterey Bay environment, resources and qualities, to resolve specific management problems, and to coordinate and facilitate information flow between the various research institutions, agencies and organizations. A major emphasis of the research program will be to encourage studies that investigate the natural processes at the land-sea interface. For example, studies that integrate the facilities of the Elkhorn Slough National Estuarine Research Reserve with deep sea and/or coastal research will help increase our understanding of the role of estuaries in coastal productivity. Research results will be

used in education programs for visitors and others interested in the Sanctuary, as well as for resource protection. The strategies to be employed in the research program are to:

- Establish a framework and procedures for administering research to ensure that research projects are responsive to management concerns and that results contribute to improved management of the Sanctuary;
- Incorporate research results into the interpretive/education program in a format useful for the general public;
- Focus and coordinate data collection efforts on the physical, chemical, geological and biological oceanography of the Sanctuary;
- Encourage studies that integrate research from the variety of coastal habitats with nearshore and open ocean processes;
- Initiate a monitoring program to assess environmental changes as they occur due to natural and human processes;
- Identify the range of effects on the environment that would result from predicted changes in human activity or natural phenomena;
- Encourage information exchange among all the organizations and agencies undertaking management-related research in the Sanctuary to promote more informed management.

3. Education

The education program should be directed to improving public awareness and understanding of the significance of the Sanctuary and the need to protect its resources and qualities. The management objectives designed to meet this goal are to:

- Provide the public with information on the Sanctuary and its goals and objectives, with an emphasis on the need to use these resources wisely to ensure their long-term viability;
- Broaden support for the Sanctuary and Sanctuary management by offering programs suited to visitors with a range of diverse interests;
- Provide for public involvement by encouraging feedback on the effectiveness of education programs and collaborate with other

organizations to provide interpretive services, including extension and outreach programs and other volunteer projects, complementary to the Sanctuary program; and

- Collaboration with Sanctuary management staff in extension and outreach programs, and participation in other volunteer programs.

4. Visitor Use

The Sanctuary goal for visitor management is to facilitate, to the extent compatible with the primary objective of resource protection, public and private uses of the resources of the Sanctuary not prohibited pursuant to other authorities. Specific management objectives are to:

- Encourage the public who use the Sanctuary to respect sensitive Sanctuary resources and qualities.
- Provide relevant information about Sanctuary regulations and use policies;
- Collaborate with public and private organizations in promoting compatible use of the Sanctuary; and
- Monitor and assess the levels of use to identify and control potential degradation of resources and minimize potential user conflicts.

Section II: The Sanctuary Setting

A. The Regional Context

1. Sanctuary Location

Monterey Bay is located along the central California coast about 50 miles (80 km) south of San Francisco (Figure 3). It is California's second largest bay and one of the few major bays along the entire Pacific Coast of the United States. Perhaps its most significant feature is also its least obvious: it possesses the deepest and largest submarine canyon along the west coast of North America.

The bay is an open embayment approximately 20 nautical miles (nmi) (37 km) long, north to south, and up to 9 nmi (16 km) wide in an east-west direction. It is symmetrical in shape with bights in the extreme northern and southern ends. It covers an area of approximately 160 nmi^2 (550 km^2) (Breaker and Broenkow, 1989). Monterey Canyon, equivalent in size to the Grand Canyon, divides the bay into two more-or-less equal northern and southern parts.

The proposed Sanctuary area includes both Monterey Bay itself and the adjacent coastline to the north and south. Specifically, it includes a Sanctuary area of approximately 2,200 square nautical miles and includes the coastal and ocean waters over, and submerged lands under the entire Monterey Canyon between the northern boundary of Pescadero Marsh, 2.0 nmi north of Pescadero Point, and the southern boundary of Julia Pfeiffer Burns Underwater Park and Area of Special Biological Significance (ASBS), 2.5 nmi south of Partington Point, and extending from these sites seaward

Regional Context

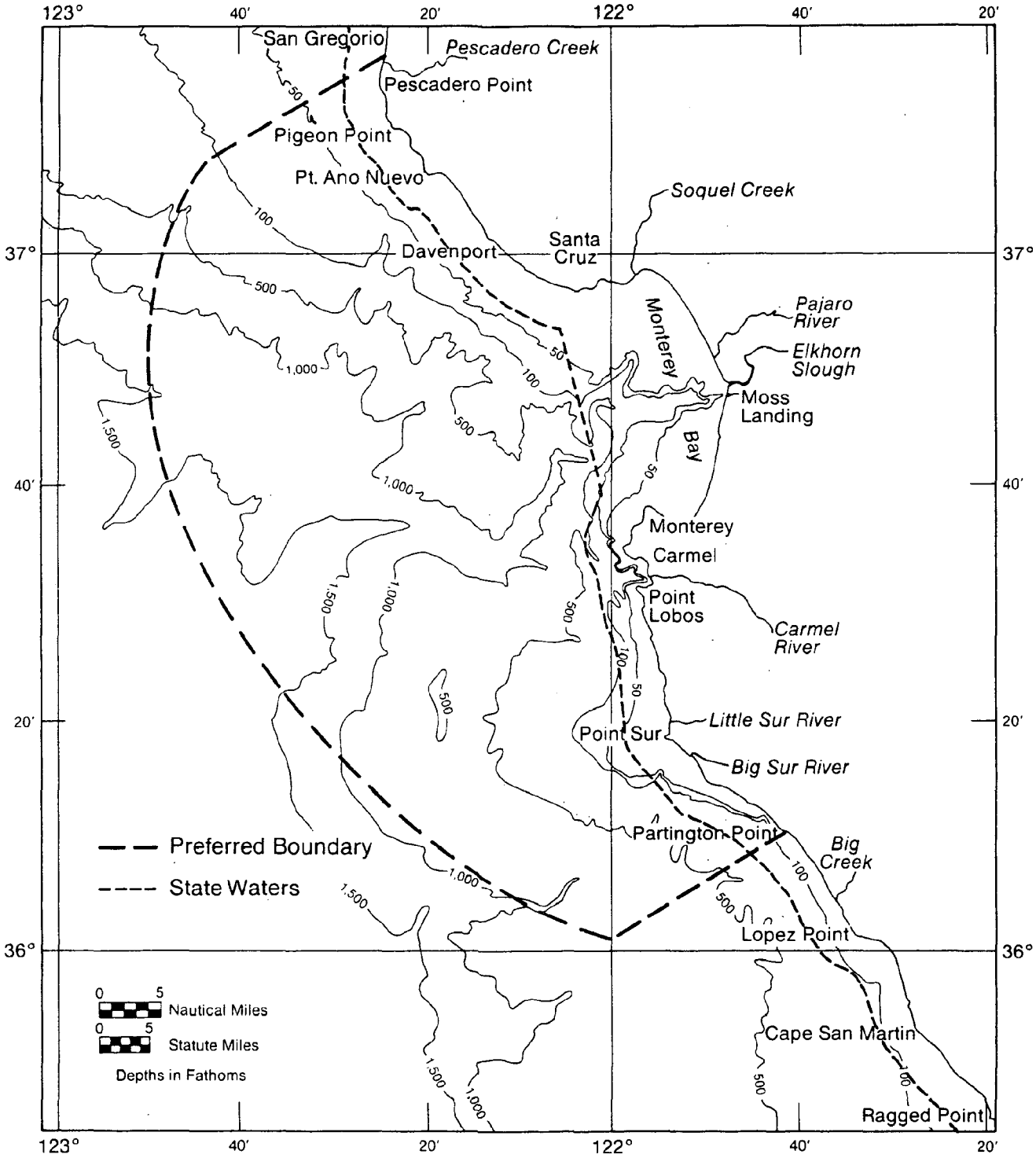


Figure 3. Proposed Monterey Bay Sanctuary Preferred Boundary Alternative.

approximately 18 nmi on a southwesterly heading of 240° and joined by an arc of approximately 46 nmi drawn from Moss Landing over the entire Monterey Canyon complex out to the abyssal plain at 1,500 fathoms (approximately 3,000 m). The land-side boundary extends to the mean-high tide level but Moss Landing, Santa Cruz and Monterey Harbors are all excluded from the Sanctuary boundaries (Figure 3).

The coastline setting varies from sandy beaches and rocky outcrops to sandstone cliffs and sand bluffs north of Santa Cruz, to over 25 miles of wind-swept dunes and beaches that fringe part of the bay, to the rugged rocky coastal areas of Monterey Peninsula and Big Sur. The nutrient-rich waters of the bay support extensive fish, invertebrate, seabird, and marine mammal populations while many commercial fisheries provide a significant economic benefit to the region and the nation.

2. Regional Access

The Monterey Bay area has been a popular seaside resort since the late 1800's. To the north is the major San Francisco-Oakland Metropolitan area with a population of around five million people. Highway Number 1 parallels the coast throughout the area, making coastal access possible in many places. North of the Monterey Peninsula, the shoreline is very accessible because of the large amount of public ownership. South of the peninsula the rugged nature of the terrain and more private ownership make ocean access difficult, although many miles of the southern coast are owned and managed by the California Department of Parks and Recreation.

B. Sanctuary Resources

The unique marine resources of the Monterey Bay area are largely the result of a major topographic feature of the seafloor and a set of oceanographic conditions that combine to produce the highly productive waters characteristic of the bay. The size, configuration, and proximity to shore of the Monterey Submarine Canyon produces strong seasonal upwelling of nutrient-rich bottom waters. These highly productive nearshore waters in turn support diverse floral and faunal populations. The extensive kelp beds, and the diversity of rock types, sediment types, and shoreline characteristics combine with the nutrient-rich waters to form several habitat assemblages.

Monterey Bay has the most diverse algal community in North America. The area supports one of the largest diversities of marine mammals in the world, including the endangered California gray whale, finback whale, humpback whale, sperm whale, and California sea otter. Año Nuevo, at the northern end of the proposed Sanctuary area, is the most important pinniped rookery and resting area in central and northern California. The bay area is important as a staging habitat for avifauna along the Pacific Flyway. The waters support extensive fish populations and major west coast commercial fishing industries.

1. Environmental Conditions

(a) Geology

The Monterey Bay region is located on the continental

margin within the California Coast Ranges province. It is situated on a major structural unit of the earth's continental crust called the Salinian Block. About 20 million years ago, this block was displaced northward from the southern Sierra-Nevada Mountain Range on the Pacific tectonic plate by movement along the San Andreas Fault. Faults in the Monterey Bay area lie primarily within two major, essentially northwest-southeast-trending fault zones: the Palo Colorado-San Gregario and the Monterey Bay fault zones (H. G. Green, pers. comm., 1989). The Monterey Bay Fault Zone is located in Monterey Bay between Monterey and Santa Cruz. It forms a diffuse zone, 10 to 15 km wide, of short en echelon, northwest-trending faults (Green, 1977). The Palo Colorado-San Gregario fault system is formed by the San Gregario fault which extends from Point Año Nuevo to Point Sur where it connects with either the Palo Colorado fault (Dohrenwend, 1971; Green, 1977) or the San Simeon fault. Movement in this active Monterey Bay Fault Zone caused the recent (17 October, 1989) San Francisco Bay area earthquake, with its epicenter of 7.1 on the Richter Scale near Santa Cruz.

The most prominent geological feature of Monterey Bay is the Monterey Submarine Canyon. The main canyon begins in 18 m of water about 100 m offshore from Moss Landing. There are two main branches of the Monterey Canyon: Soquel Canyon to the north and Carmel Canyon to the south. An additional canyon - Ascension Canyon - indents the shelf off of Año Nuevo. The entire canyon extends about 45 nmi (82 km) offshore to the foot of the continental slope at a depth of about 2925 m. At about 1830 m

depth, the height of the canyon walls attain proportions similar to that of the Grand Canyon of the Colorado River (Shepard and Dill, 1966). Today Monterey Canyon is actively being excavated and exhumed. This activity continues to be tectonically controlled as fault rupture brought about by plate motion causes earthquakes that stimulate slumping and turbidity flows within the canyon. Continued movement along strike-slip faults is also displacing a segment of the deeper part of the canyon to the north (Green, in press).

The substrate of the region is variable (Martin and Emery, 1967). The surface sediment types tend to follow the seafloor contours (Figure 4). Nearshore the sediments are sand and fine sand, offshore they are sand and mud. In both areas, the sediments overlie beds of sandstone, siltstone, and conglomerate. From the mid to late Miocene (approximately 15 million years ago) sediments were deposited in the Monterey Bay area that over time created the marine shale that is currently considered to be of primary hydrocarbon potential, specifically in the Año Nuevo and La Honda Basins.

The sediments in the canyon vary from sand nearshore to mud in the deeper areas. Rocky outcrops are found on the walls of the canyon. About 3.2 million cubic yards of sediment are deposited in the bay during the winter and spring months by the San Lorenzo River, Soquel Creek, Aptos Creek, Pajaro River, and the Salinas River (Griggs, 1986). Elkhorn Slough, a large estuary, also empties into the bay.

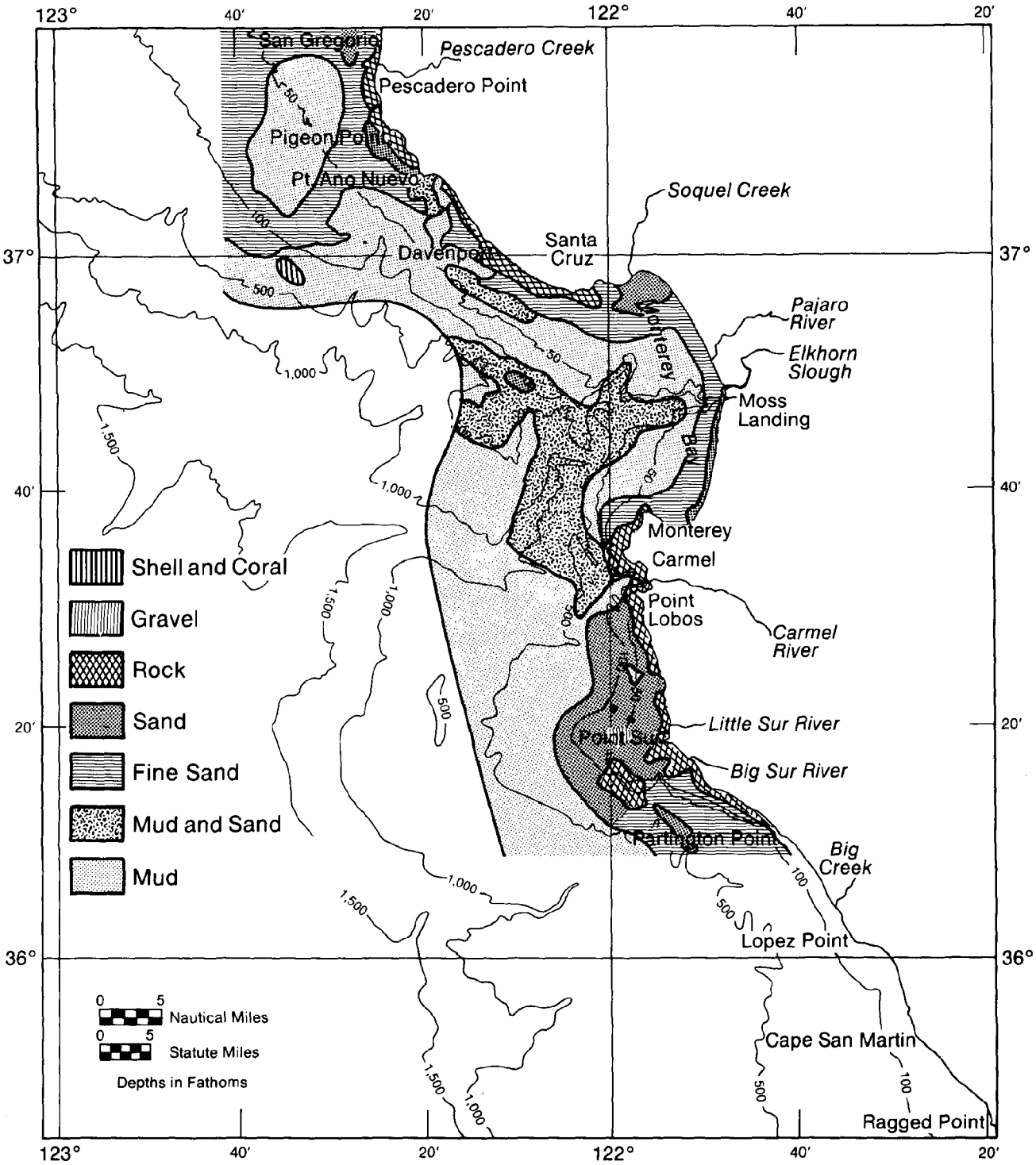


Figure 4. Monterey Bay Area Sediment Types (NOAA, 1982).

The Monterey Bay area is characterized by a narrow continental shelf and is surrounded by a variety of coastal types. The rough,boulder-strewn headlands of Point Pinos at the southern part of the bay are composed of granite. The white dunes and beaches of Pacific Grove are derived from the weathering of these granites. Sedimentary rocks, mostly shales, form the slopes of the Salinas Valley and the flat coastal shelf at the north end of the bay (Gordon, 1977). The northern coastline has sand bluffs and flat-topped terraces of mudstone as well as rocky intertidal areas. From Soquel Point southward almost to Moss Landing, cliffs fronted by sandy beaches predominate. Broad sandy beaches backed by large dunes extend southward from here to the rocky headland of the Monterey Peninsula.

(b) Meteorology

In the Monterey Bay area seasons are weakly developed. The area has a moderate maritime climate with the general pattern of wet winters and relatively dry summers. January and February are usually the wettest months, while July and August are virtually without rainfall (Gordon, 1977). The amount of rainfall varies markedly not only year to year but also on both sides of the bay. Monterey averages about 15 inches (38 cm) annually; Santa Cruz averages about 28 inches (69 cm).

During the period of March through October the prevailing winds are from the northwest. Winter winds are variable, often from the west or southwest. Winds are strongest in May (averaging 14 knots) and weakest between November and January (averaging 3

knots) (Breaker and Broenkow, 1989). The cool water of the California Current flows south along the coast during March through October; however, between November and February this current moves offshore and is replaced with the warmer northward flowing waters of the Davidson Current. The net effect of these alternating currents is that the Monterey Bay climate is characterized by both northern temperate and southern sub-tropical features.

Temperatures along the shoreline can vary significantly depending upon protection from the dominant northwest winds and storms. For example, Año Nuevo has a distinct microclimate making it warmer, and with more sunshine and fog-free days than coastal areas directly to the north or south (Weber, 1981). Both annual and diurnal temperature ranges are small because of the moderating influence of the ocean.

The central California coast is characterized by a recurrent fog during spring and summer. Heavy fog predominates in the morning near the coast with clearing usually occurring with the afternoon's warmer temperature. The fog is caused when the warm moist air associated with the prevailing westerly winds comes in contact with the cold upwelled waters along the coast.

(c) Waves and Currents

The height of the waves in the proposed Sanctuary vary with the seasons. Under more stable summer conditions, the waves are able to build broad, gently-sloping beaches. Winter conditions produce higher waves that transport sand to the offshore zone and erode beaches (Gordon, 1977).

Water temperatures in the bay appear to be largely controlled by the oceanographic conditions off the coast. Surface water temperatures average 52°F (11°C) to 54°F (12°C) during late fall and early summer. No distinct thermocline is present during this period. Surface temperatures in the summer reach 59°F (15°C) and higher (Harville, 1971). Infrared satellite images taken during spring and summer, often show cold upwelled water across the entrance of Monterey Bay and that sea-surface temperatures farther inside the Bay are higher than elsewhere, reflecting the importance of local heating within the Bay (Breaker and Broenkow, 1989).

The California Current System is a part of the great clockwise circulation of the North Pacific Ocean. At high latitudes the waters move eastward under the influence of the strong westerly winds, and near the coast of North America these waters divide into two branches. The smaller component turns northward into the Gulf of Alaska; the larger component turns south-eastward to become the California Current.

The California Current flows southward along the coast during the spring and summer (Figure 5). The water is clear and cool, of low salinity, with a high nutrient and dissolved oxygen content. Water temperatures at the surface range between 52°F (11°C) and 55°F (13°C). As the current flows southward, it is deflected offshore by a combination of the earth's rotation, the prevailing northwest winds, and encounters with the coast and Monterey submarine canyon. As the surface waters are moved offshore they are replaced with the cold, nutrient-rich waters from below. This

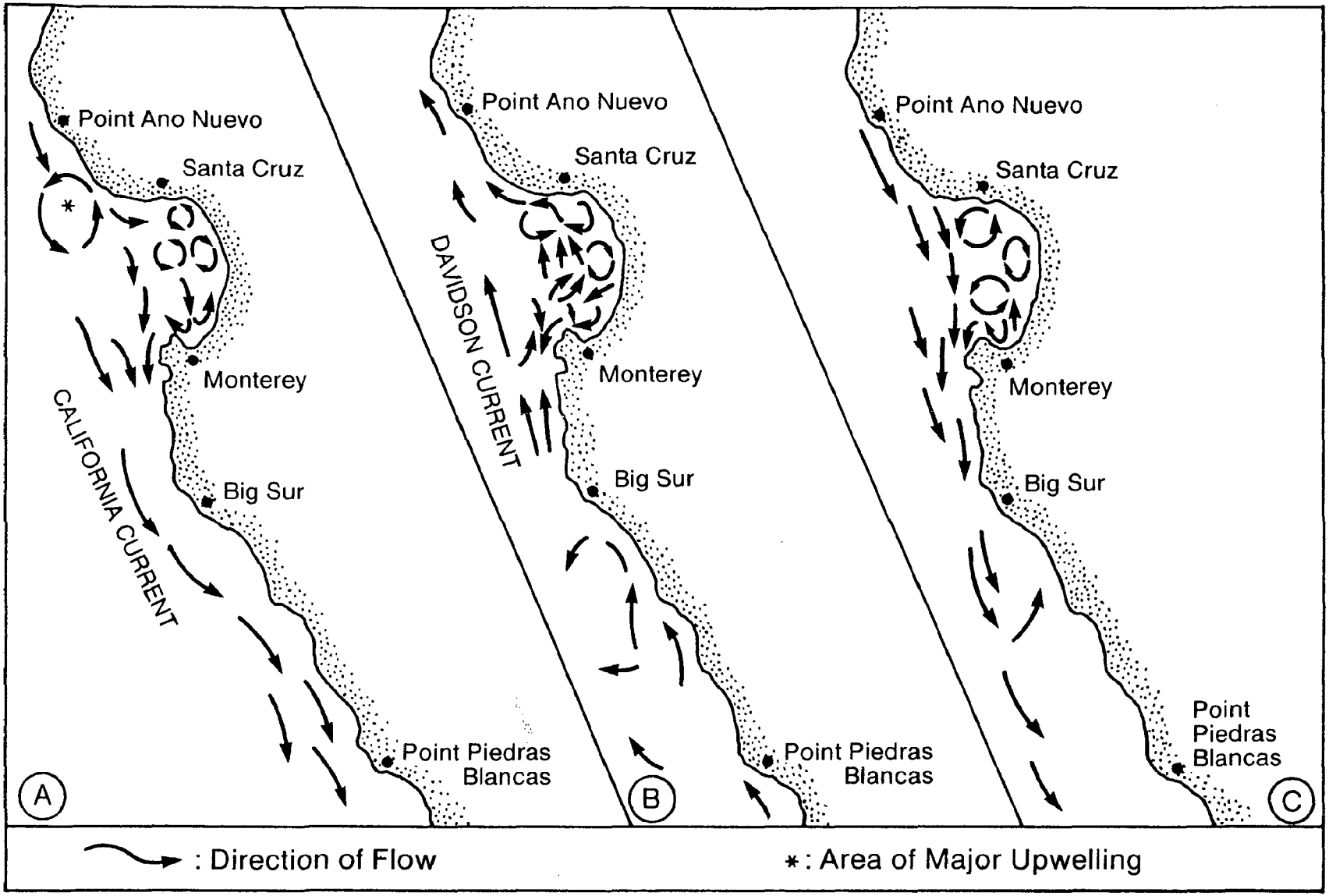


Figure 5. Surface Ocean Currents in the Monterey Bay Vicinity: (A) Spring to Late Summer, California Current, Upwelling; (B) Late Fall Through Winter, Davidson Current; (C) Late Summer to Early Fall, Oceanic Period (Modified from Association of Monterey Bay Area Governments, 1978).

process of upwelling introduces the nitrates, phosphates, and silicates that are essential for high phytoplankton production in the surface waters, which in turn is responsible for the highly productive waters of Monterey Bay. This period of upwelling occurs almost continuously between March and October.

There is a short period of time after upwelling stops where the California Current is still the dominant current pattern but water conditions change slightly. This so-called oceanic period (Figure 5) is marked by the absence of upwelling and a warming of the surface water temperature to more than 55°F (13°C).

The currents off the coast of California are variable in space and time with strong onshore-offshore directed jets and filaments. These highly transient coastal jets have typical surface currents of 50 cm/sec (Robert Haney, pers. comm., 1989). Large eddies, some as large as 60 miles (96 km) in diameter, are able to transport seawater transverse to the mean flow, i.e., normal to the coast (J. B. Wickham, pers. comm., 1989). A large area of upwelling, about 60 miles (96 km) in diameter, lies 60 miles (96 km) south of Point Sur. Filaments of cold water may be carried more than 100 miles (160 km) from this area (Breaker and Mooers, 1986).

Between November and February when the prevailing northwest winds have ceased, the California Current moves offshore and is replaced by the northward flowing Davidson Current (Figure 5). This current contains relatively warm water and is driven northward by winds from the southwest (Gross, 1972). It normally is found at depths of over 200 m running counter to the California Current.

Once it rises to the surface, it forms a wedge between the California Current and the coast. Its rate of flow is less than one knot. Upwelling stops during this period but returns in March with the return of the California Current. Below depths of about 150 m, the Davidson Current is termed the California Undercurrent and is present most of the year.

The circulation of Monterey Bay is weak and variable and strongly influenced by offshore currents which are dominated by eddies and offshore jets. Current meter observations show surface circulation to be northward about two-thirds of the time; however, major reversals in flow direction may occur for weeks at a time (Breaker and Broenkow, 1989). Non-tidal current speeds average about 5 to 10 cm/sec. A clockwise eddy in the southern Bay has recently been confirmed. The deep circulation in Monterey Canyon is frequently towards the shore.

Many processes affect the circulation in the bay, including winds, upwelling, the submarine canyon, bottom friction, tides, local heating, river discharge, eddies, mixing, offshore circulation, oceanic fronts, spring transition events, and El Nino episodes.

Wind-driven, coastal upwelling occurs north and south of Monterey Bay. These upwelled waters may be advected into the bay. Offshore upwelling apparently occurs occasionally across the entrance of the bay. The onshore current flow in the submarine canyon is consistent with bathymetrically induced upwelling. These complex currents and canyon related upwellings provide the

nutrient-rich waters which contribute to the unique qualities of the proposed Sanctuary.

(d) Water Quality

The water quality in the central California region is known to be very good (MMS, 1987). The periodic upwelling and extensive, year-round mixing with the open ocean result in well-buffered, highly productive and well-oxygenated offshore waters. However, a few specific areas within Monterey Bay have shown DDT concentrations above detectable levels. The California Department of Health and Human Services (DHS) is sampling the Bay's fish population for any toxins including pesticides and the State Mussel Watch Program is collecting data that show certain non-point and point source coastal discharges are degrading water quality in specific areas. Until further information is available and analyzed the California Regional Water Quality Control Board (CRWQCB), Central Coast Region, has determined in its Draft Water Quality Control Plan (1989) that it can only classify Monterey Bay as a Potential Water Quality Limited Segment.

Current monitoring progams by the State and studies required by dischargers for NPDES permits, as well as periodic conferences such as the State of the Bay, may help supply the necessary information to assist a decision on the classification of water quality in the Monterey Bay area.

(e) Habitat Types

The Monterey Bay area is located in the Oregonian province subdivision of the Eastern Pacific Boreal Region. This province is

characterized by a rich cold-temperate flora and fauna (Briggs, 1979). The Monterey Bay area, however, is home to a number of warm water invertebrate species characteristic of the California province to the south. This overlap and co-occurrence of warm and cold water species contributes to the diversity of the living natural resources in the Monterey Bay area.

Habitats can be characterized by their water depth, distance from shore, and the type of substrate. The habitats in the Monterey Bay area are unusual because of the many diverse types that are found together in a relatively confined area (Figure 6). The five types of habitats found in the bay area are: 1) submarine canyon habitat, 2) nearshore sublittoral habitat, 3) rocky intertidal habitat, 4) sandy beach intertidal habitat, and 5) kelp forest habitat.

- **Submarine Canyon Habitat** - This habitat is found over the canyon beyond the continental shelf in waters over 200 m deep. The waters of the bay support oceanic species of fish, birds, and marine mammals. Upwelling from the canyon supports most of the primary productivity for the entire bay. The canyon edge serves as a feeding area for endangered blue and fin whales, Pacific white-sided dolphins, northern right whale dolphins, Risso's dolphins, Dall's porpoise, and possibly the blue shark. Meso- and bathypelagic fishes include the lanternfish (Myctophidae), sablefish, deepsea sole, and Pacific rattail. Fish, as well as

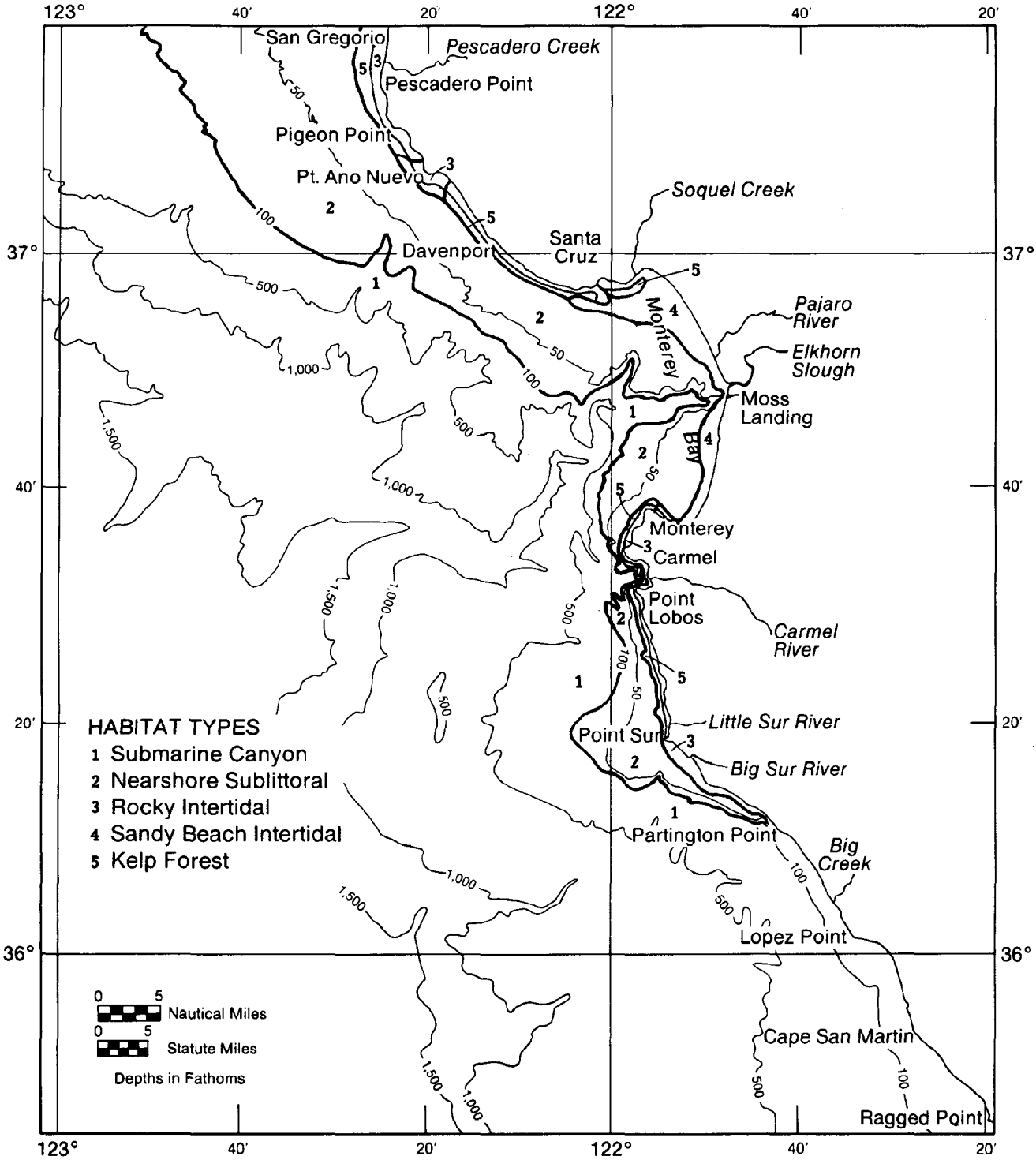


Figure 6. Types of Habitat within Monterey Bay Area (NOAA, 1982).

euphausiid crustaceans (krill) and other organisms, compose a "deep scattering layer" that undergoes vertical migrations to the surface waters. The benthic community of the canyon is virtually unstudied except for an occasional grab or trawl taken by Moss Landing Marine Laboratories. Recent video transects of the canyon down to 400-500 m by the Monterey Bay Aquarium Research Institute do, however, indicate a considerable diversity of organisms. Sponges, gorgonians, starfish, brittle stars, crinoids, and sea urchins appear to be the dominant large invertebrates (James Nybakken, pers. comm.,1989).

A team of USGS and NOAA workers using the submersible ALVIN discovered numerous biological communities nourished by seepages of sulfide and methane-rich fluids from the fan or valley-floor sediments. These deep-sea communities are significant as they not only increase our understanding of the fluid-dynamics of large deep sea sediment fans but also provide basic knowledge of abyssal communities that include species also found in hot hydrothermal vents at spreading centers (EEZ News, October, 1989).

- **Nearshore Sublittoral Habitat** - This habitat is found in the nearshore waters of the continental shelf in depths from just beyond the surf to 200 m depth. The food chain is based on planktonic productivity supported by upwelling of nutrient-rich waters from the Monterey Canyon. Pelagic organisms found in this habitat include phytoplankton and zooplankton, squid and octopus, and most of the important commercial fish (salmon, albacore,

mackerel, and anchovy). Marine birds and California sea lions feed throughout the habitat. Shallow nearshore inhabitants include Harbor porpoise and Minke whales.

The nearshore benthic habitat is characterized by a soft bottom composed of unconsolidated sand and mud sediments. This is the most extensive bottom habitat in Monterey Bay. Two major groups of invertebrates are found in this habitat: 1) the infauna, which live buried within the sediment, comprise about 90 percent of all the bottom-dwelling organisms; and, 2) the epifauna, which live on or crawl or move over the bottom. Both groups are patchily distributed. Many benthic organisms have a pelagic phase in their life histories (Nybakken, 1982).

The subtidal invertebrate fauna of the shallow offshore waters are found in a far greater number of species than are the intertidal fauna. For example, the sandy intertidal habitat has only 29 species and/or genera, the subtidal habitat includes more than 400 species and/or genera. However, less is known about these subtidal species than is known about the intertidal species (James Nybakken, pers. comm., 1989).

The dominant invertebrate groups in the shallow subtidal waters are polychaetes, molluscs, and crustaceans. Crustaceans are dominant in shallow areas; polychaetes are dominant in deeper waters.

- **Rocky Intertidal Habitat** - This habitat is found on rocky substrate between the lowest tidal level and the highest tidal

level. Organisms living in this area must be able to withstand periodic desiccation, high temperature and light, low salinities, and strong wave action (Nybakken, 1982). Variation in the degree of exposure to these environmental factors can create marked zonation patterns within this habitat (Foster et al., 1988). Marine plants are primarily red, brown, and green algae. The invertebrates include mostly sessile species such as mussels, barnacles, and anemones. Mobile grazers and predators include crabs, amphipods, littorine snails, limpets, sea stars, and sea urchins. Tidepool fish include the striped surfperch, tidepool sculpin, tidepool snailfish, and cabezon.

Rocky intertidal habitats are probably the most well studied of all habitats in and adjacent to Monterey Bay. These habitats are not uniform within the bay, but vary in composition within short distances.

- **Sandy Beach Intertidal Habitat** - Sandy beaches are the dominant intertidal habitat in Monterey Bay. The environmental conditions that exist in this habitat between high and low water require almost all organisms to bury themselves in the sand. This is a very dynamic habitat with constantly shifting sands caused by wave action and the longshore transport of sand. The overall productivity of this habitat is lower than that for rocky intertidal habitats (Nybakken, 1982).

Benthic diatoms are the only marine algae that may be present. Oakden and Nybakken (1977) found 29 genera or species of animals in

transects taken over the course of a year. Polychaete worms, bivalve molluscs, and crustaceans were the predominant invertebrates found. Sand dollars and gastropod molluscs are also found here (Wilson, 1986). The only fish that are common are those that use sandy beaches for spawning, e.g., the surf smelt.

° **Kelp Forest Habitat** - Kelp is one of an order of large brown algae. It attaches to rocky substrate and grows in water depths from about 2 m to 20 m. The floating portions of these plants form dense canopies on the sea surface. Kelp forests provide critical habitat for encrusting animals such as sponges, bryozoans, and tunicates, as well as for juvenile fish, molluscs such as abalone, algae, and for other invertebrates. Fish associated with kelp beds include greenling, lingcod, bocaccio, and many species of surfperches and rockfish. Gray whales have been reported to feed near kelp forests and to seek refuge in them from predatory killer whales (Baldridge, 1972). Kelp also provides a food resource for fish, and for grazing and detritus-feeding invertebrates, such as isopods and sea urchins. Predators, such as sea stars and sea otters, are also active there.

Kelp detached and transported during storms provides a source of food for other local habitats. Sandy beach fauna utilize the kelp washed up on the beach. Kelp material that sinks may provide a source of energy for deep water benthic organisms. Fish, particularly juvenile rockfish, utilize the habitat provided by rafts of drifting kelp (Foster and Schiel, 1985).

Sea otters and harbor seals are commonly associated with kelp forests in this area, and otter biology and the effects of sea otters on kelp communities have been the subject of numerous completed (reviewed in Van Blaricom and Estes, 1988) and continuing studies. The exact effect that sea otters have on the community structure of the Monterey Bay kelp forests remains unclear. Sea otters are known to prey on sea urchins. Sea urchins are known grazers on kelp. Comparisons of kelp forests with and without sea otters have shown that sea otter predation on sea urchins has a beneficial effect on the distribution and growth rates of kelp. Sea otters have been described as "keystone species" which play a major role in determining community structure (Estes and Palmisano, 1974). However, because other factors also affect kelp distribution and abundance, this role of sea otters is not totally accepted (Foster and Schiel, 1985). Kelp does appear to be increasing in distribution in areas where sea otters live (Reidman, 1986).

2. Natural Resources

Monterey Bay supports a wide array of temperate cold-water species, with occasional influxes of warm-water species. This species diversity is directly related to the diversity of habitats described above. The living natural resources which will be protected by Sanctuary designation are the plankton, algae, invertebrates, fish, seabirds, and marine mammals.

(a) Plankton

Plankton species present in the Monterey Bay area are primarily characteristic of the cold-water California region, but also include a few warm-water species (Holton et al., 1977; Riznyk, 1977; Garrison, 1979). Upwelling from the canyon carries some deep water species close to shore.

Diatoms are the primary component of the phytoplankton. The spring to late summer period of upwelling with its nutrient-rich waters causes a seasonal variation in the standing stock of phytoplankton. The highest primary productivity is associated with the upwelling period; the lowest during late fall through winter when the warmer Davidson Current predominates and upwelling ceases. Dinoflagellate blooms occur in the fall in the warmer waters. Satellite imagery indicates that phytoplankton concentrations are frequently higher in the northern regions of the bay, with low phytoplankton waters entering the bay from the south around Point Pinos (Hauschildt, 1985).

Unlike phytoplankton, which are limited to the euphotic zone (approximately the upper 100 m), zooplankton occur at all depths and are able to migrate vertically up to several hundred meters. The phytoplankton are fed upon by a variety of zooplankton such as ciliates, copepods, euphausiids, and pelagic tunicates. Zooplankton are in turn an important food source for fish and other organisms. Dense concentrations of euphausiids occur in the surface waters and in deeper layers from 100 to 400 m from April to November (Barham, 1956; Schoenherr, 1988). These swarms serve as

food for a variety of adult fishes, whales and sea birds (Harvey, 1979; Schoenherr, 1988), and for juvenile fishes which prey on euphausiid eggs and larvae (NOAA Rockfish Recruitment Cruise Reports, 1986-1988). Dense swarms of gelatinous pelagic tunicates also occur periodically from early spring to mid-fall (Barham, 1956).

(b) Algae

Large marine algae, or seaweeds, are diverse and abundant in the Monterey Bay area (Table 1). The extent of this diversity is shown by the presence of over 450 of the 669 species of algae described for California (Abbott and Hollenberg, 1976). The area has the largest marine flora of the temperate northern hemisphere, with numerous endemic species and the only population of one large understory kelp (*Eisenia arborea*) between southern California and Canada. It has been suggested that Monterey Bay may represent a biogeographic boundary for the distribution of algae; this, however, may be because the bay area has been studied more intensively than others (reviewed in Foster *et al*., 1988).

The seaweeds of the Monterey Bay area are composed of three main phyla: red algae (Rhodophyta: 69 percent of all species), brown algae (Phaeophyta: 20 percent), and green algae (Chlorophyta: 10 percent). They occur primarily in areas of rocky substrate and only rarely in water deeper than 40 m (Abbott and Hollenberg, 1976). The most extensive algal communities are dominated by forests of giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis leutkeana*). Bull kelp rejuvenates itself annually;

Table 1. Representative Algae Associated with the Diverse Habitats of the Monterey Bay Area.

Habitat	Representative Algae	Classification	Common Name
Submarine Canyon	phytoplankton	*Chaetoceros* spp.	diatoms
	phytoplankton	*Ceratium* spp.	dinoflagellates
Nearshore Sublittoral	No suitable substrate		
Sandy Intertidal	phytoplankton		diatoms
Kelp Beds	Kelp	*Macrocystis pyrifera*	giant kelp
	Kelp	*Nereocystis leutkeana*	bull kelp
	fucalean algae	*Cystoseira*	
Rocky Intertidal	red algae	*Endocladia* spp.	
	brown algae	*Fucus* spp.	rockweed
	green algae	*Ulva* spp.	sea lettuce

giant kelp is generally perennial, growing all year. The Santa Cruz County coast between Terrace Point and Point Año Nuevo has changed from almost total dominance of giant kelp in 1911 to an increase in the number of bull kelp stands (Yellin et al., 1977). Although sea otters may produce further changes, the primary factors affecting these kelp forests appear to be storms and substrate composition (reviewed in Foster and Schiel, 1985).

(c) Invertebrates

The Monterey Bay area has one of the most diverse and species-rich invertebrate faunas of any marine area of similar size in the entire world (James Nybakken, pers. comm., 1989). This diversity can be illustrated by the following facts: 1) Of the 33 or so invertebrate phyla, the only ones that have not been collected in Monterey Bay are Loricfera and Pogonophora; 2) For some groups (e.g., shallow water starfish), Monterey Bay may well be the richest area in the world; 3) There may be more species of molluscs in Monterey Bay than in any other locality outside of tropical or semi-tropical areas (Smith and Gordon, 1948, in J. Nybakken, pers. comm.). Those researchers listed 725 species of molluscs from the Monterey Bay alone. For limpets and chitons, the bay region is the richest and most diverse in the world (David Lindberg, pers. comm., 1989); 4) Monterey Bay is a faunal break on the Pacific Coast for molluscs (Valentine, 1966). The bay is the northern limit of the range for many southern species and the southern limit of the range for many northern species; 5) Monterey Bay has a relative abundance of some species which are uncommon or rare where they occur. This

includes the strange animal named Poeobius, which has been considered a missing link between the annelids and the sipunculans. Also, the cnidarian Tetraplatia, which is rare in the world's oceans, has been taken in abundance in Monterey Bay.

The distribution, species composition, and abundance of the invertebrate fauna in Monterey Bay are determined by many factors. The submarine geology and the types of rocky substrate or unconsolidated sediments, the submarine canyon and associated upwelling, the offshore currents and circulation patterns, the kelp forests, and the presence of mammal predators all influence the niches occupied by the various species (Table 2). The rocky intertidal habitat supports the widest array of invertebrate species (Ricketts et al., 1985; Smith and Carlson, 1975; Morris et al., 1980). Characteristic species include the periwinkles,isopods, barnacles, limpets, sea snails, crabs, chitons, mussels, sea stars, and anemones. Research into the recruitment patterns of crabs and crab bed locations in northern Monterey Bay gives an example of how the distribution of a species can be influenced by local circulation patterns. Temporal tracking of several species of crabs, including the commercially important Dungeness crab, indicates that they are not produced locally but are advected into local waters by the southerly flowing California Current (Monty Graham, pers. comm., 1989).

Invertebrates found in the sandy beach intertidal habitat are dominated by numerous species of polychaete worms, crustaceans, and molluscs. Nearshore benthic invertebrates include polychaetes and

Table 2. Representative Invertebrates Associated with the Diverse Habitats of the Monterey Bay Area (J. Nybakken, pers. comm., 1989).

Habitat	Representative Invertebrates	Classification	Common Name
Submarine Canyon	hexactinellid	Porifera	glass sponge
	gorgonians	Cnidaria	soft coral
	euphausiids	*Euphausia pacifica*	krill
	bivalve	Calyptogena	clam
	crinoids	Echinodermata	sea lily
Nearshore sublittoral	polychaetes	*Aricidea* sp.	bristle-worms
	bivalves	*Macoma* sp.	burrowing clam
	snails	*Olivella biplicate*	olive snail
	crabs	*Blepharipoda occidentalis*	spiny sand crab
	mysids	*Acanthomysis davisi*	opossum shrimp
	tunicates	*Doliolum tritonis*	salps
Sandy Intertidal	bivalves	*Tivela stultorum*	pismo clam
	crabs	*Emerita analoga*	mole crab
	amphipods	*Orchestoidea* spp.	sand hoppers
	sea urchins	*Dendraster excentricus*	sand dollar
	snails	*Olivella columellaris*	olive snail
Kelp Beds	gastropods	Haliotidae	abalone
	bryozoans	Membranipora	encrusting bryozoan
	tunicates	Ascidiacea	sea squirt
	gastropods	*Acmaea* spp.	limpet
	sea urchins	*Strongylocentrotus purpuratus*	purple sea urchin
	gastropods	Tegula	turban snails
Rocky Intertidal	sea snails	*Littorina* spp.	periwinkles
	sea stars	*Asteroidea* spp.	starfish
	barnacles	*Balanus* spp.	acorn barnacles
	bivalves	*Mytilus* spp.	mussels
	sea anemones	*Anthopleura elegantissima*	aggregate sea anemone
	sea snails	*Tegula funebralis*	Black Turban snail

other worms; molluscs such as snails and bivalves; ostracods, amphipods, isopods, and other crustaceans; and starfish.

Squid, octopus, jellyfish, salps, heteropods, and euphausiids are some of the macro-invertebrates found in the pelagic environment. Numerous larval invertebrates are also found there during their planktonic stages of development.

Invertebrates found in deep water and the canyon include various species of hexactinellid sponges and gorgonians (soft corals). Nybakken (pers. comm., 1989) has collected specimens of the clam Calyptogena, which is the same genus as the giant clams of the thermal vent areas of the Galapagos.

Invertebrate species harvested by commercial and recreational fishermen include squid, spot prawn, Dungeness crab, abalone, and pismo clam.

(d) Fishes

The diversity and abundance of the fish fauna in the Monterey Bay area is a significant resource. Generally, the area exhibits the very rich cold-temperate fish fauna of the Oregonian province (Briggs, 1979). The same environmental factors that determine the distribution, abundance, and species composition of the other living resources of the area also affect the fish communities. In addition to the presence of the submarine canyon and the upwelling of nutrients, kelp beds provide shelter and food for juvenile and adult fish, while offshore rocky reefs are prime feeding and spawning areas for many species of fish.

The diverse habitats of the area each have their own

characteristic assemblage of fish (Table 3). Although the fish fauna of Monterey Bay are relatively well known (Kukowski, 1972; Cailliet et al., 1977, in Anderson et al., 1979), fish in the submarine canyon are characterized by a variety of little known meso-and bathypelagic species. Because the canyon allows deep-living species to come close to shore, many uncommon deep-sea fishes have been taken in Monterey Bay. Anderson et al., (1979) reports 110 species of deep-living fishes belonging to 41 families were captured in the bay by Moss Landing Marine Laboratories or by fishermen. Several of these species were previously unrecorded in the area, while others were extremely rare or far beyond their normal range. The persimmon eelpout (Maynea californica) was once thought to be an extremely rare species. It has recently been found to be abundant in the Monterey Canyon in association with its own unique bottom drifting seaweed habitat (Cailliet and Lea, 1977). A rare, deep-water North Pacific frostfish (Benthodesmus elongatus pacificus), a species unknown in California, was caught in Monterey Bay in 1968 (Anderson and Cailliet, 1975). A rare prowfish (Zaprora silenus) was caught on the north shelf of the submarine canyon in 1973 (Cailliet and Anderson, 1975). The commercially important sablefish spawns in the deep waters of the canyon but lives in relatively shallow waters as juveniles (Cailliet and Osada, 1988).

Fish of the nearshore subtidal habitats exhibit the greatest diversity. This habitat includes many commercially important fish such as the pelagic schooling species (northern anchovy, Pacific

Table 3. Representative Fishes Associated with the Diverse Habitats of the Monterey Bay Area (G. Cailliet, pers. comm., 1989).

Habitat	Common Name	Genus/Species
Submarine Canyon	deep-sea sole	Embassichthys bathybius
	sablefish	Anoplopoma fimbria
	persimmon eelpout	Maynea californica
	Pacific hake	Merluccius productus
	spiny dogfish	Squalus acanthias
Nearshore Sublittoral	Pacific sardine	Sardinops caeruleus
	jack mackerel	Trachurus symmetricus
	California halibut	Paralichthys californicus
	Northern anchovy	Engraulis mordax
	bocaccio	Sebastes paucispinis
Sandy Intertidal	white surfperch	Phanerodon furcatus
	topsmelt	Atherinops affinis
	starry flounder	Platichthys stellatus
	speckled sanddab	Citharichthys stigmaeus
	Pacific sandlance	Ammodytes hexapterus
Kelp Beds	rockfishes	Sebastes spp.
	kelp greenling	Hexagrammos decagrammus
	painted greenling	Oxylebius pictus
	lingcod	Ophiodon elongatus
Rocky Intertidal	tidepool snailfish	Liparis florae
	tidepool sculpin	Oligocottus maculosus
	monkey-face eel	Cebidichthys violaceus
	rockweed gunnel	Xererpes fucorum
	blackeye goby	Coryphopterus nicholsii

herring, jack mackerel, sardine), the large predators (king salmon, sablefish, sharks), and some demersal species (English and petrale sole). Many important species of rockfish are found over rocky reefs. Monterey Bay was the southern extent of spawning for the king (chinook) salmon, although they do not presently spawn in any of the Bay's streams.

Sandy intertidal areas are used by small pelagic species (grunion and smelt) that use the beaches of the inner bay for spawning. Other species that forage near sand flats include the surf perch, striped bass, jack smelt, sand sole, sanddab, and starry flounder.

Most of the finfish found in shallow rocky reefs are also common in kelp beds. The kelp canopy, stipes, and holdfasts increase the available habitat for pelagic and demersal species and offer protection to juvenile finfish. Greenling, lingcod, and numerous species of rockfish are the dominant fishes. The rocky intertidal habitat is characterized by a rather small and specialized group of fish adapted for life in tide pools and wash areas. The most representative species are the monkey-face eel, rock eel, dwarf surfperch, juvenile cabezon, sculpins, and blennies (California Department of Fish and Game, 1979).

Sardines were the basis for an extensive fishery in the 1930's. Overfishing caused stocks of the Pacific sardine to decrease until the fishery collapsed.

(e) Seabirds

The Monterey Bay area historically has been recognized as a

uniquely important region of seabird occurrence (Loomis 1895, 1896; Beck 1910). Several environmental features are responsible for the diverse assemblage of birds in the area:

- the bay is located on the Pacific Flyway, allowing the birds a place to stopover during both north and south migrations between southern wintering grounds and northern breeding sites.
- the upwelling of nutrient-rich waters over the submarine canyon support highly productive food webs which provide abundant seabird prey.
- plumes of upwelling in the outer shelf regions also act to concentrate prey near the surface in "fronts" at the plume edges (Briggs et al., 1983a, 1984, 1987a, b; Briggs and Chu, 1986, 1987).
- the availability of food in a bay protected on three sides allows birds that normally feed far offshore to seek shelter during storms.
- the diversity of habitat types along the shore increases the variety of bird species which utilize the bay area.

Ninety-four seabird species are known to occur in the Monterey Bay region, of which about thirty species predominate in their preferred seasons and habitats (Briggs and Chu, 1987). Table 4 lists some important seabirds and their seasonal status. Thirteen species are resident breeders or former breeders within the region. Common breeding species include Brandt's cormorants, western gulls, pigeon guillemots, and common murres (Dohl, 1983). The location of important seabird colonies are shown in Figure 7.

The majority of seabirds occur here as non-breeding residents/visitors and spring/autumn migrants. The area is important habitat for visiting autumn and winter populations of ashy storm-petrels, California brown pelicans, sooty and short-tailed shear-waters, western grebes, common murres, marbled

Table 4. Representative Seabirds and their Seasonal Status in the Monterey Bay Area (from Briggs, *et al.*, 1983).

Breeding Species

Double-crested cormorant	Forster's tern
Brandt's cormorant	Common murre
Pelagic cormorant	Pigeon guillemot
Western gull	Marbled murrelet
Caspian tern	Rhinoceros auklet
Tufted puffin	Brown pelican (until 1959)
Snowy Plovers	

Winter resident/visitors

Common loon	Black scoter
Arctic loon	Surf scoter
Western grebe	Harlequin duck
Red-necked grebe	Herring gull
Laysan albatross	Glaucous gull
Northern fulmar	Black-legged kittiwake

Spring/autumn migrants

Flesh-footed shearwater	Long-tailed jaeger
Mottled petrel	South Polar skua
Brant	Laughing gull
Red phalarope	Sabine's gull
Horned puffin	Arctic tern
Pomarine jaeger	Common tern

Summer/autumn (nonbreeding) residents/visitors

Buller's shearwater	Black storm-petrel
Black-footed albatross	Royal tern
Pink-footed shearwater	Elegant tern
Sooty shearwater	Xantus' murrelet
Black-vented shearwater	Ashy storm-petrel

Rarities

Yellow-billed loon	Brown booby
Short-tailed albatross	King eider
Cape petrel	Black tern
Greater shearwater	Thick-billed murre
Least storm-petrel	Black skimmer
Red-billed tropicbird	Little gull

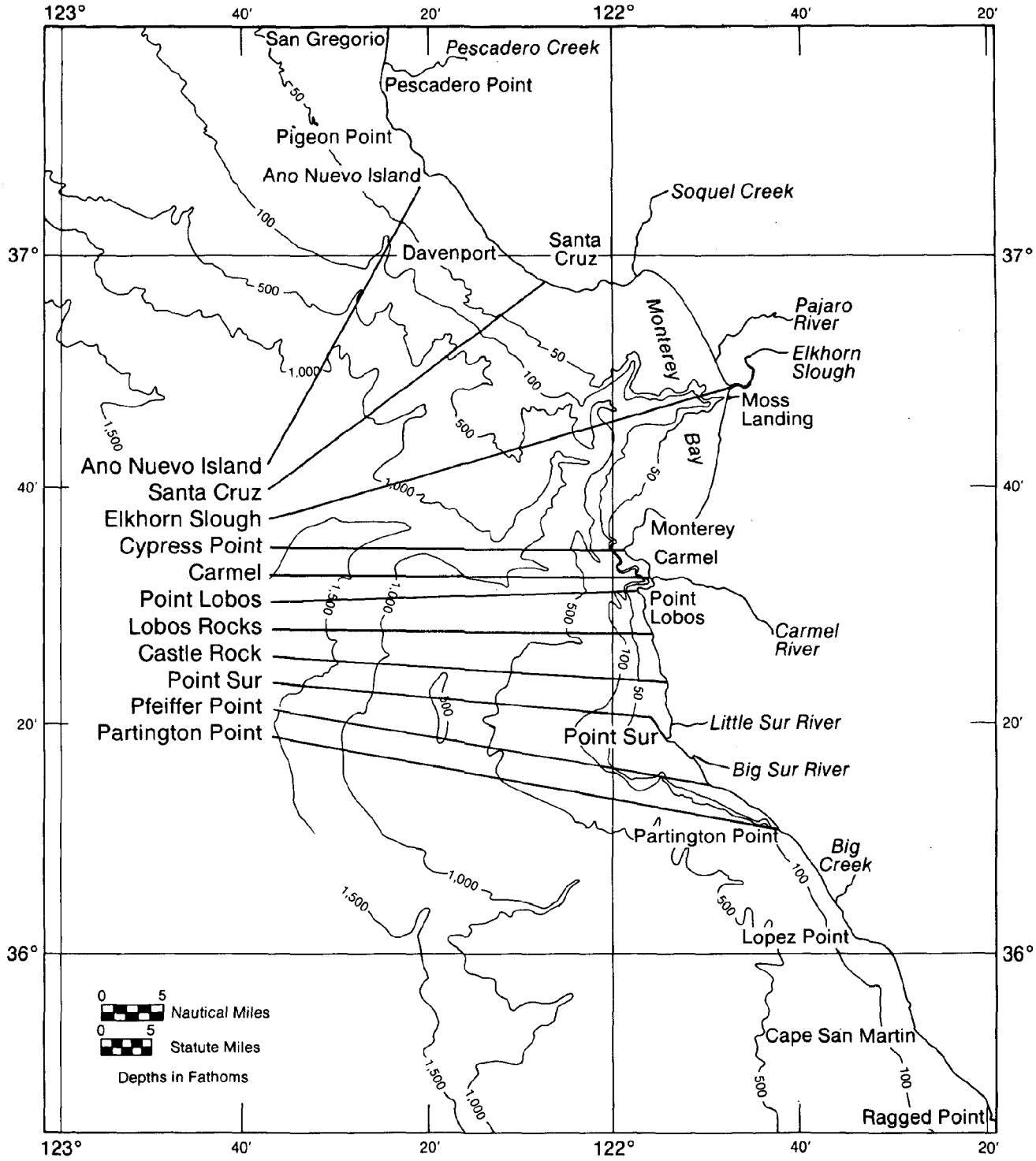


Figure 7. Location of Important Seabird Nesting Areas (U.S. Fish and Wildlife Service, 1981; in NOAA, 1982).

murrelets, Cassin's and rhinoceros auklets, surf scoters, and several species of gulls. Spring and fall migrant species include phalaropes, Pacific loons, common and arctic terns, and pomarine and parasitic jaegers. Four species of endangered birds are found in the area: the short-tailed albatross, the California brown pelican, the American peregrine falcon, and the California least tern. One species, the western snowy plover, is a candidate species for being listed as endangered or threatened by the U.S. Department of the Interior. The California brown pelican nested at Point Lobos until 1959 (Baldridge, 1974). The brown pelican now breeds during the summer in southern waters and migrate into the area in large numbers in September and October. They currently roost on Año Nuevo Island, Elkhorn Slough, and Point Lobos. The California least tern nested at Moss Landing early in the century. In 1973, the coast south of San Francisco contained only 20 colonies with a total of fewer than 700 pairs (Udvardy, 1977). Peregrine falcons feed along the shores of the bay, especially around Point Lobos and Elkhorn Slough. Five nests have been identified in Big Sur (Roberson, 1985).

Ashy storm-petrel populations currently number less than 10,000 birds. About 85% of them breed on the Farallon Islands. Almost all of them come to Monterey Bay to feed over the submarine canyon during the summer and fall (Roberson, 1985).

Additional facts about several species further indicate the importance of the Monterey Bay area to seabirds. The southernmost relic population of the severely threatened marbled murrelet

occupies several isolated sites in the Santa Cruz Mountains. Año Nuevo Island was recently colonized by rhinoceros auklets (their southernmost confirmed nesting site) and contains the largest colony of western gulls in the region (Lewis and Tyler, 1987). The seacliffs of Santa Cruz and Monterey counties support more nesting pigeon guillemots than the Farallon Islands, which has the largest single colony in California.

During spring migration, large numbers of shorebirds gather on the beaches. Common migrant shorebirds include sandpipers, turnstones, plovers, sanderlings, willets, and godwits. Many of these species also winter in the area in large numbers. Elkhorn Slough seasonally harbors over 30,000 shorebirds during migrations (Stenzel et al., MS). Nearly a fifth of California's breeding population of snowy plovers nest on the beaches in the area and this species is especially common in the vicinity of Pescadero Marsh. In addition to being a candidate species for the endangered or threatened list, the plover is also a Species of Special Concern in California (Remsen, 1978).

Sea ducks and geese use the coves along the bay for staging during spring migration. Año Nuevo Bay is an important wintering site for Harlequin ducks (a species of Special Concern) and brant.

(f) Marine Mammals

Twenty-six species of marine mammals have been observed in the Monterey Bay area, including five species of pinnipeds (seals and sea lions), one fissiped (the sea otter), and twenty species of cetaceans (whales and dolphins) (Table 5). Figure 8 shows the

Table 5. Marine mammals found in the Monterey Bay area. Status abbreviations: SR - seasonal resident, YR - year-round resident, ST - seasonal transient (A. Baldridge, pers. comm., in Heimlich-Boran, 1988)

Common Name	Genus/Species	Status
PINNIPEDS:		
California sea lion	Zalophus californianus	SR
Steller sea lion*	Eumatopias jubatus	SR
Northern elephant seal	Mirounga angustirostris	SR
Northern fur seal	Callorhinus ursinus	ST
Guadelope fur seal **	Arctocephalus townsendi	ST
Harbor seal	Phoca vitulina	YR
FISSIPED:		
Southern sea otter *	Enhydra lutris	YR
CETACEANS:		
California gray whale **	Eschrictius robustus	ST
Blue whale **	Balaenoptera musculus	ST
Fin whale **	Balaenoptera physalus	ST
Minke whale	Balaenoptera acutorostrata	SR
Humpback whale **	Megaptera novaengliae	ST
Pacific right whale **	Eubalaena glacialis	ST
Sperm whale **	Physeter catadon	ST
Pygmy sperm whale	Kogia breviceps	ST
Baird's beaked whale	Berardius bairdi	ST
Cuvier's beaked whale	Ziphius cavirostris	ST
Short-finned pilot whale	Globicephala macrorhynchus	ST
Killer whale	Orcinus orca	ST
False killer whale	Pseudorca crassidens	ST
Risso's dolphin	Grampus griseus	SR
Pacific white-sided dolphin	Lagenorhynchus obliquidens	SR
Northern right whale dolphin	Lissodelphis borealis	SR
Dall's porpoise	Phocoenoides dalli	SR
Harbor porpoise	Phocoena phocoena	SR
Bottlenose dolphin	Tursiops truncatus	ST
Common dolphin	Delphinus delphis	ST

** Endangered * Threatened

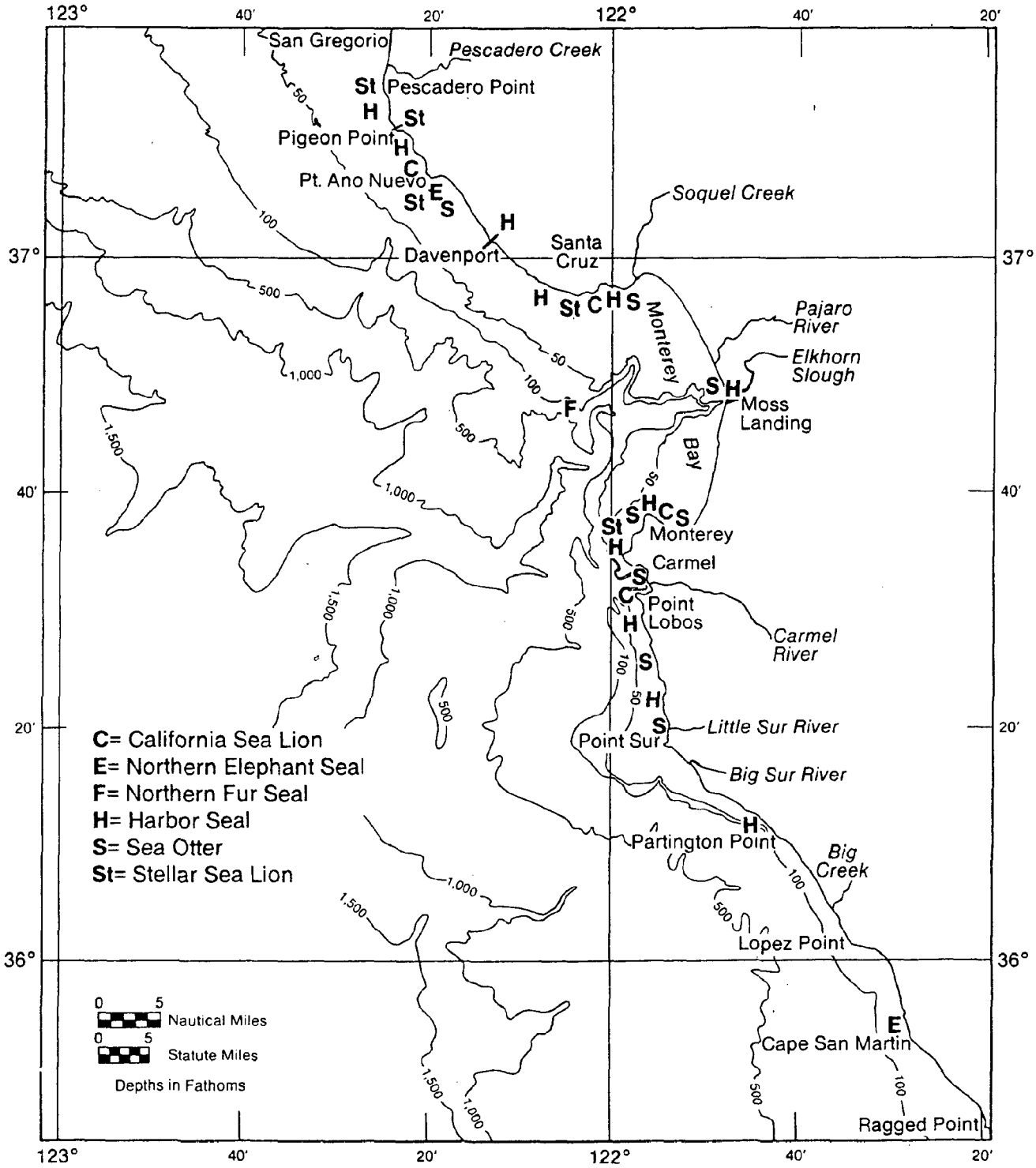


Figure 8. Principal Sea Otter and Pinniped Areas of Concentration in the Monterey Bay Area (U.S. Fish and Wildlife Service, 1981; California Department of Fish and Game, 1980; in NOAA, 1982).

principal sea otter and pinniped breeding and haulout areas.

The five species of pinnipeds considered common in the Monterey Bay area include California sea lions, Stellar sea lions, Northern elephant seals, Northern fur seals, and Pacific harbor seals. An additional species, the Guadeloupe fur seal, has been reported from records of sick animals stranded on the beach. One juvenile male was found along the shore near Fort Ord in April 1977 (Webber and Roletto, 1987). Año Nuevo is the most important pinniped breeding site in the area and is the most important pinniped rookery and resting area in central and northern California.

In any season, California sea lions are the most abundant pinniped in the area (Bonnell et al., 1983). They breed farther south along the coast in the summer, then migrate northward, reaching their greatest numbers in the Monterey Bay area in autumn. Sea lions haul out on offshore rocks and islands. The greatest numbers occur on Año Nuevo Island, with the fall population reaching more than 7,000 animals. Both the haul-out sites and the foraging grounds are essential to the health of the species. Other popular haul-out sites include the offshore rocks of the outer coast between the Monterey Peninsula and Point Sur, and the long breakwater of Monterey Harbor.

Although Año Nuevo Island has the largest breeding population of Stellar (northern) sea lions south of Alaska (Loughlin et al., 1984), the numbers of this species have been declining throughout their range over the last 30-year period. Due to this rapid

decline in the species NOAA published on 5 April, 1990 an emergency rule listing the Stellar sea lion as threatened to be followed by a permanent ruling. These sea lions presently breed almost exclusively on offshore rocks to the northwest of Año Nuevo Island. The latest aerial survey (in the summer of 1985) showed the population to be 1,169 animals, including 328 pups (Bonnell and Le Boeuf, unpubl. data). The population declined to a low during the 1983 ocean temperature anomaly (El Nino), but recovered to pre-El Nino levels in 1984 and 1985. NOAA will be developing a "recovery plan" for this species with special attention to rookery areas such as Año Nuevo.

Northern elephant seals breed in the winter months and then disperse to feed in pelagic waters throughout the eastern North Pacific. A portion of the population returns to the colony later in the year to undergo an annual molt. Peak abundances occur on land in the spring when juvenile males and females haulout to molt. The largest populations are on Año Nuevo Island and the adjacent mainland point. The breeding population at these locations presently numbers about 3,500 animals (Le Boeuf, unpubl. data). The spring population on land exceeds 4,000 animals. Estimates based on population structure indicate that elephant seals of the Año Nuevo colony account for about 4% of the entire world population of this species (M.L. Bonnell, pers. comm., 1989).

Pacific harbor seals are year-round residents in the area. They haul out at dozens of sites along the coast from Point Sur to Año Nuevo. Peak abundance on land is reached in late spring and

early summer when they haul out to breed, give birth to pups, and molt. More than 1,800 animals were counted on land in this area during a survey in 1982. This represents more than 11% of the entire state population (Bonnell, et al., 1983). A summer of 1986 census counted 1,364 seals on only 38 of the 72 known haul out sites in the area (Hanon, et al., 1987). Favorite haul out sites are isolated sandy beaches and rocky reef areas exposed at low tide.

Northern fur seals occur in the open waters over the Monterey Canyon in winter and spring. They feed offshore after migrating from the Pribilof Islands. The greatest density of animals are found well offshore over the continental slope in waters from 100 to 1,000 fathoms (200 to 2,000 m) depth. Northern fur seals rarely haul out on land, although they are occasionally seen on Año Nuevo Island. They have a declining population presently estimated at 1.2 million animals. This species has been proposed for designation as a depleted species by the NOAA.

Of the twenty species of cetaceans seen in the Monterey Bay area (Table 5), about one-third occur with frequency. Six of the whales are listed as endangered species: the blue, fin, humpback, gray, right, and sperm.

Gray whales are seasonal migrants. They travel close to shore and are the object of most of the whale watching in the area. They pass through the area twice on their yearly migration from Alaska to Baja California where they breed and then return. Reilly (1984) estimated the 1980 population of gray whales to be 15,000 animals.

Blue whales have significantly increased in numbers within and adjacent to Monterey Bay. Once considered only a summer visitor of limited numbers, blue whales have become a major constituent of the cetacean fauna from late spring until late autumn or early winter. Over 40 animals were counted in one day in Monterey Bay in the summer of 1986 (T. Dohl, pers. comm., 1989). Less than 2,000 blue whales exist in the eastern north Pacific (Haley, 1987). They migrate from northern feeding areas to waters off Baja California and Central America in the fall.

Minke whales are one of the largest whales that feed close to shore within Monterey Bay. Up to 12 animals are regularly seen in the southern bight of the bay and south to Point Sur during summer (A. Baldridge, pers. comm., in Heimlich-Boran, 1988).

Fin whales have increased in numbers and length of stay in the area in recent years. This species utilizes the Monterey, Soquel, and Carmel canyons for feeding. They are found in greatest numbers at the heads of each of these canyons in depths of 200 m to 2000 m (T. Dohl, pers. comm. 1989).

Humpback whales are often seen in nearshore waters from 100 m to 200 m depth. Although still an endangered species, their numbers have increased dramatically throughout central California beginning in the early 1980's. At first limited to the general area of the Farallon basin, they are now found in coastal waters from Point Sur to Pillar Point from late-April to mid-December.

The Pacific Right whale is an extremely endangered species. Fewer than 200 individuals may inhabit the entire North Pacific

(Braham and Rice, 1984). Little is known about this species; its breeding areas are unknown but presumed to be on their wintering grounds in warmer waters. No right whales have been seen in Monterey Bay, but they were seen in 1986 and 1987 in the waters off of Half Moon Bay, north of Año Nuevo (Scarff, 1987).

Sperm whales are occasionally seen offshore at the mouth of the Monterey Canyon. Pilot whales, false killer whales, and two species of rare beaked whales have also been sighted.

Killer whales have been seen throughout the bay, occasionally attacking gray whales (Baldridge, 1972).

Two species of porpoise are commonly found in the bay: Dall's porpoise and the harbor porpoise. The harbor porpoise is usually found over sandy bottoms just off the surf in the north central part of the bay. Dall's porpoise is seen frequently along the edge of the canyon.

Pacific white-sided dolphins, northern right whale dolphins, and Risso's dolphins are the most numerous cetaceans in the area. All three species will often travel together in a school.

Bottlenose dolphins are found in small numbers (12-18) within the bay seemingly on a year-round basis. Common dolphins are found all year, sometimes in schools of 400-600 animals. This species is normally considered a warm water animal and was once thought to extend north only to Point Conception. Both dolphin species have increased in numbers in recent years (T. Dohl, pers. comm., 1989).

The California or southern sea otter is a threatened species that is found throughout the shallow waters of Monterey Bay from

Point Pinos to Año Nuevo Island. Sea otters inhabit a narrow zone of coastal waters, normally staying within about one mile from shore. They forage in both rocky and soft-sediment communities as well as in the kelp understory and canopy. They seldom are found in open waters deeper than 30 m, preferring instead the kelp beds which serve as vital resting, foraging, and nursery sites. Otters are an important part of the marine ecosystem. By foraging on kelp-eating macroinvertebrates (especially sea urchins) sea otters can, in many instances, influence the abundance and species composition of kelp assemblages and animals within nearshore communities (Riedman, 1987).

The California sea otter population is a remnant of the North Pacific population that was decimated by the commercial fur trade in the 18th and 19th centuries. In 1914, this population in California occupied a few miles of the rocky Point Sur coast and was estimated to contain about 50 otters. By 1938, when the public became aware of these remnant otters, the total California population was between 100-300 animals. Between 1938 and 1976 the population increased at about 5 percent per year. From 1976 until the early 1980's, the population did not grow at all, mainly because of the number of otters drowning from entanglement in fishing nets. Since state legislation restricted the use of entangling nets, spring population counts may be increasing at about 8 percent per year (in Saunders, 1989). However, this population growth rate is still much lower than the growth rates of sea otter populations in the Aleutian Islands. In addition to the

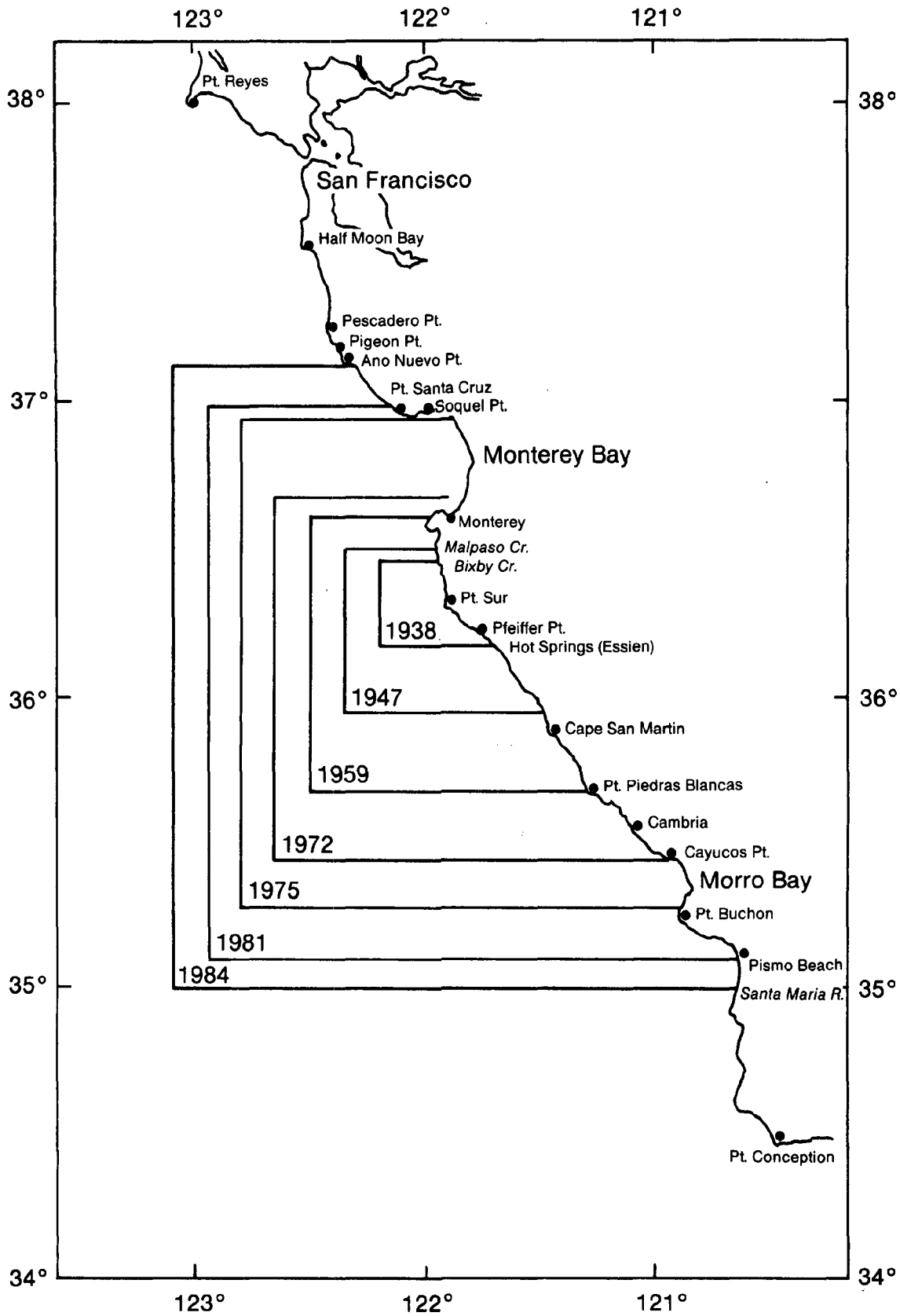


Figure 9. Rate of Range Expansion (1914-1984) of the California Sea Otter Population (Reidman, 1986).

entanglement in fishing nets, other possible factors for the low population growth include illegal shooting, white shark attacks, pathological disorders, starvation, and adverse weather conditions. The most recent census (1988) indicates a total population of fewer than 1800 animals (Saunders, 1989). Approximately 31 percent of this population is currently found in the area from Point Sur north to Año Nuevo/Pigeon Point. Figure 9 shows the rate of sea otter range expansion from 1914 to 1984. A state-designated Sea Otter Game Refuge extends from Carmel south to Cambria, encompassing about half the otter's established range.

3. Cultural and Historical Resources

Cultural and historical resources are prehistoric and historic remains comprising a non-renewable resource base that provides anthropologists and historians with information for reconstruction of past cultural systems and behaviors (BLM, 1980). The coastal lands of central California contain numerous archaeological sites, most of which represent Native American resources.

Recent geologic history has produced a number of geomorphic changes in the Monterey Bay area as a result of sea level change, tectonics and changing erosion and sedimentation rates. As a result there may be many undiscovered inundated prehistoric aboriginal sites within the proposed Sanctuary. The gap in our understanding of the full historical significance of these resources presents an exciting and fertile area for additional research into the history of Monterey Bay.

Archaeological evidence suggests that the earliest human occupancy of coastal California began well over 10,000 years ago with immigrants who were primarily hunters. About 7,500 years ago the people became dependent on shoreline resources and seed gathering (Meighan, 1965, in Gordon, 1977). More recently, the Monterey Bay area is within the former territory of the Costanoan Indians. The Costanoan economy was a continuation of the dependence of previous cultures on the shoreline resources. Old habitation sites can be located today by kitchen midden deposits (also called shellmounds) which accumulated in the villages. Many of these deposits on the coast are found in sand dunes. More than a dozen shellmounds are located on the dunes at Año Nuevo Point. Many shellmounds are found above the rocky shoreline of the Monterey Peninsula.

Offshore cultural and historical resources include aboriginal remains and sunken ships and aircraft. An in-house study conducted by the BLM in 1979 to compile and organize available shipwrecks data identified 1,276 vessels of historic interest that were reported lost along the central and northern coast of California.

The lighthouse at Point Pinos has been designated a national and California historic site. Multiple historic sites are located at Santa Cruz, Carmel and Monterey.

C. Human Activities

1. Commercial Fishing and Mariculture

The Monterey Bay area has a large and economically important commercial fishing industry. The major commercial fishing ports are Moss Landing, Santa Cruz, and Monterey. Table 6, derived from 1987 California Department of Fish and Game statistics, shows a summary of the poundage and ex-vessel value (greater than $20,000) of landings of some of the commercial species at four ports in Monterey Bay. In 1987, a total of over 29 million pounds of fish with a value of almost $10 million was landed at Moss Landing, Monterey, Santa Cruz, and Salinas. The diversity of the commercial catch is shown by the number of different species or species groups landed at each port: 89 at Monterey, 69 at Moss Landing, 59 at Santa Cruz, and 5 at Salinas. These statistics also include shrimp, crab, octopus, squid, eels, lobster, abalone, and sea urchins. Market squid represented the largest catch in terms of poundage (over 12 million pounds), followed by rockfish (6 million pounds), mackerel (2.5 million), sole (almost 2 million pounds), tuna (1.3 million pounds), and anchovy (1.15 million pounds). The various species of rockfish represented the most important fish in dollar value ($2.1 million). Additional valuable species include salmon ($2 million), swordfish ($1.53 million), squid ($1-2 million), and tuna ($.98 million).

There are four main types of commercial fisheries in the Monterey Bay area: 1) a troll fishery for salmon and albacore, 2) a trawl fishery for the various species of rockfish and flatfish,

Table 6. Summary of poundage and value (over $20,000 only) of fisheries data for 1986 for the Ports of Santa Cruz, Moss Landing, and Monterey - Salinas (combined). California Dept. of Fish and Game, 1987.

	Santa Cruz		Moss Landing		Monterey + Salinas	
	Pounds	Value	Pounds	Value	Pounds	Value
Salmon	193,085	565,070	276,218	793,564	236,520	658,754
Rockfish (all)	56,317	32,651	3,257,030	1,052,225	2,675,657	1,029,697
Swordfish	34,558	135,771	96,129	381,664	262,441	1,019,270
Squid			4,056,560	381,905	8,312,730	843,392
Sole (all)			1,717,164	541,344	261,855	105,296
Tuna	50,583	39,263	1,195,167	868,427	97,779	69,410
Sablefish			613,360	182,953	258,867	57,979
Cal. Halibut	50,769	113,524			39,672	86,054
White Croaker			215,161	68,004	81,350	20,857
Lingcod			171,660	57,856	139,675	52,762
Mackerel					2,546,110	144,693
Sanddab			75,593	24,366		
Shark	14,669	21,660			87,531	86,591
Anchovy					1,153,530	75,077
Other	101,040	101,299	508,927	80,047	290,767	134,010
Total	500,991	1,009,238	12,182,969	4,438,355	16,444,484	4,383,842

3) a gill and trammel net fishery for California halibut, rockfish, and white croaker and 4) a roundhaul and lampara net fishery for squid, anchovy, and herring. Figure 10 shows the location of primary commercial fishing areas and types of gear utilized.

A small trap fishery for sablefish consisting of one to three boats also exists within the bay.

Approximately 6 to 15 gill-net boats participate in this fishery off Monterey Bay (Personnal Communication, Marine Resources Division, Monterey Bay area, CDF&G, March 1990). This method of fishing is now restricted to waters deeper than 20 fathoms and maybe restricted in the future to beyond 30 fathoms.

There are approximately 8 trawlers participating in this fishery using a mixture of otter trawls and roller trawls. No trawlers are currently allowed within 3 miles of the coast (Personal Communication, Marine Resources Division, Monterey Bay area, CDF&G, March 1990).

In general fishing activity is extensively regulated to not only ensure continuous production of fish stocks for long-term harvest but also to minimize by-catch and reduce potential conflict with marine mammals and seabirds. For a detailed description of the existing regulatory regime governing fishing see the sections on fishing activities in the environmental consequences of the status quo regime and exising authorities in Appendix 2.

There are presently eleven mariculture operations within the area. Silverking Oceanic Farms in Davenport operates a silver and king salmon hatchery. Up to one million fish may be released to

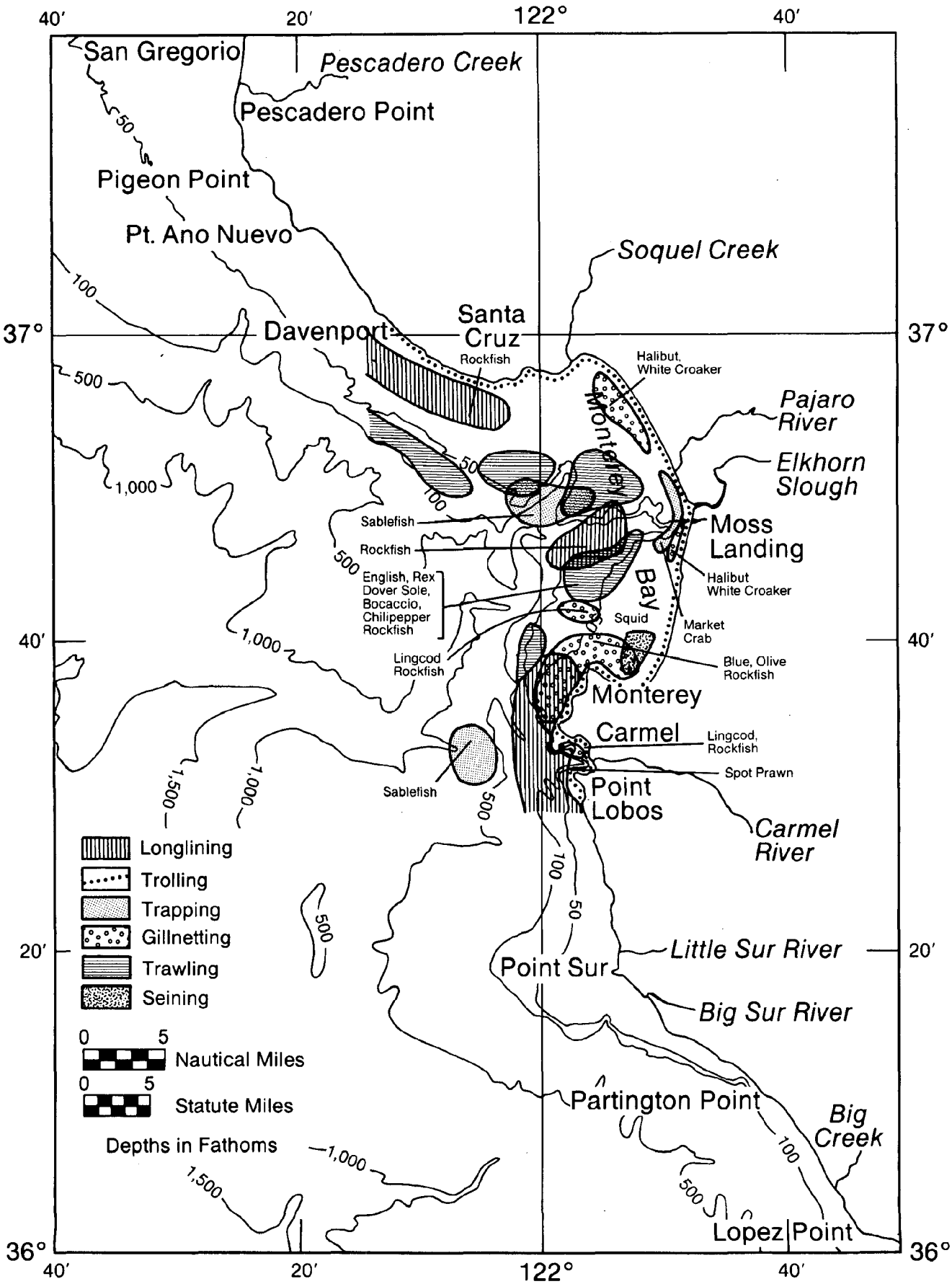


Figure 10. Location of Primary Commercial Fishing Areas in Monterey Bay (AMBAG, 1978).

the ocean annually. These fish mature in the ocean with about two to three percent of them eventually returning to the farms to spawn where they are harvested for sale. This company is planning to raise Atlantic salmon in pens for eventual sale.

Pacific Mariculture is involved in research to determine the feasibility of culturing abalone for sale to restaurants and markets. It is now completing research and development at the Long Marine Laboratory and recently received approval from Santa Cruz County for production of abalone.

Pacific Mariculture is the only bivalve mollusc hatchery in California. It produces oyster and clam seed for grow-out to other growers.

There are two inactive oyster leases (Danny Burns Shellfish and Monterey Bay Marine Farm) which are limited in their operations because of water quality problems in the Elkhorn Slough growing waters.

Sea Life Supply raises sea hares (a species of nudibranch or sea slug) in grow-out pens near the mouth of ELkhorn Slough. They are used for neurophysiological research.

Until recently, Ocean Genetics, Inc. operated an algae research farm where a variety of forms of algae were grown for chemical extracts, such as agar and medicinal materials. A new company, Quantify, Inc., was recently started and is presently raising algae using Long Marine Laboratory water to produce phycobiliproteins.

Granite Canyon Marine Laboratory of the California Department

of Fish and Game is actively involved in aquaculture research. It is presently studying the feasibility of abalone aquaculture and planning some form of marine finfish aquaculture.

Until 1988, Aquaculture Enterprises, Inc. operated a lobster hatchery and grow-out. Most research involved hybrid development to maximize growth rates. Some lobsters were sold to market.

Abalone West and Pacific Abalone Farms are each involved in red abalone research and development.

Kelp is harvested commercially. KELCO Company harvests a portion of the kelp canopy in Carmel Bay for alginate extraction. Kelp is also harvested as food for abalone in local aquaculture facilities (Foster, pers. comm., 1989).

2. Oil and Gas Activities

Activities in the Central California Planning area began in 1963 when the first Federal OCS oil and gas lease sale resulted in the acceptance of bids for 29 tracts in the area off San Francisco. Twelve exploratory wells were drilled but no development occurred and all leases were relinquished in mid-1968.

The Minerals Management Service, within the U.S. Department of Interior, is authorized to prepare and implement 5-year plans which identify the federal waters to be opened for offshore oil drilling. The current 5-year plan divides California into northern, central, and southern planning regions. The first lease sale scheduled for the Central California region is Lease Sale #119, which covers approximately 1.7 million sea-bottom acres (Figure 11). However,

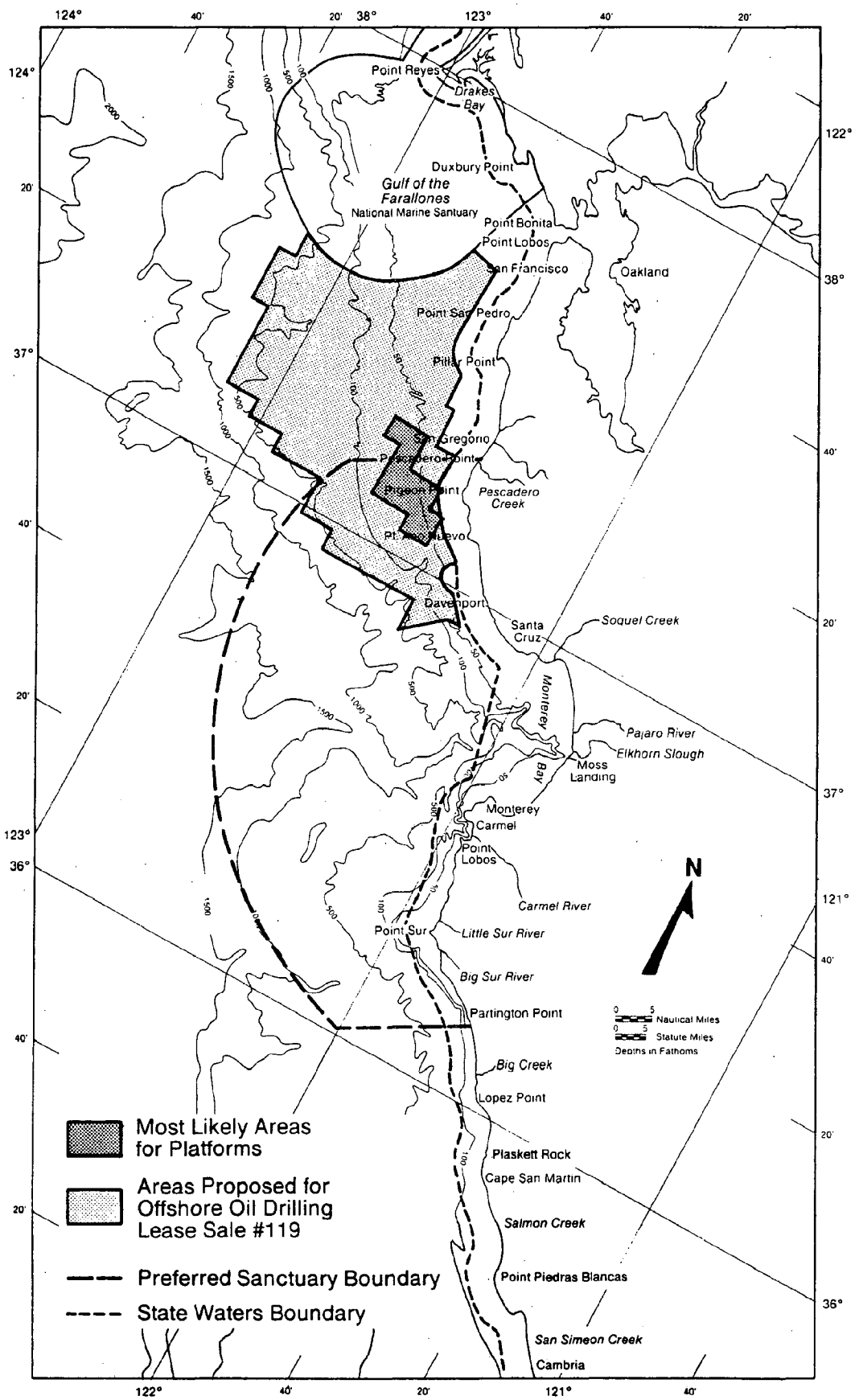


Figure 11. Potential Oil and Gas Development in the Vicinity of Monterey Bay.

future 5-Year Plans may consider leasing other geographical areas within the central California planning area that may contain additional hydrocarbon resources.

The current Lease Sale process, which takes up to two years, includes public hearings, environmental studies, and recommendations from the Governor. The outlined process in Figure 12 for Lease Sale #119 is currently on hold in the early phase of the pre-sale process. Thus far, only the "Call for Information" step has been completed by MMS for the proposed sale and no further activities are being carried out.

All state waters, within three miles of shore, off central California have been designated an oil and gas sanctuary. No oil and gas leasing is permitted within this three-mile state limit.

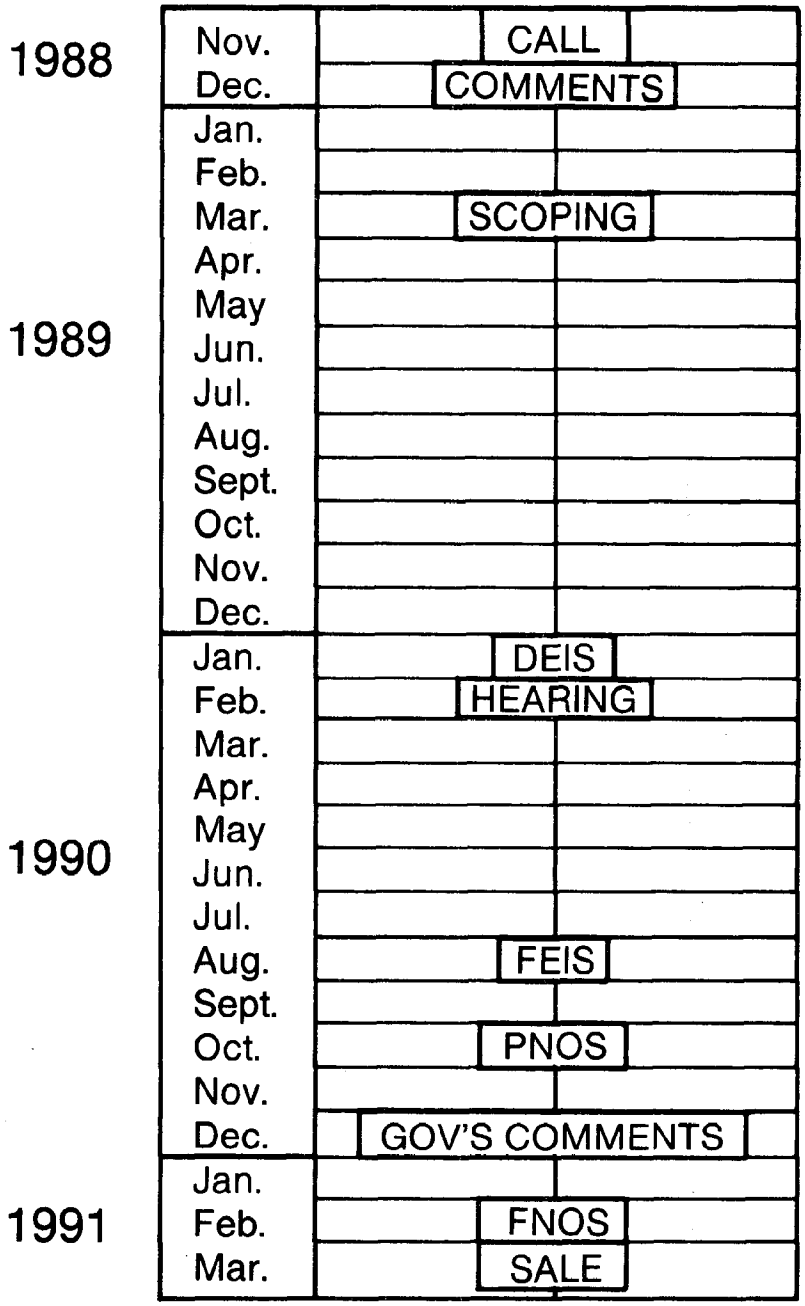
The six central California coastal counties (Monterey, Santa Cruz, San Mateo, San Francisco, Marin, and Sonoma) are cooperatively sponsoring a Central Coast Counties OCS Regional Studies Program to identify and assess the implications of potential offshore oil development related to Lease Sale 119.

3. Commercial Shipping

Approximately 39 tankers and 166 cargo and passenger ships pass the Monterey coast every month (U.S. Fish and Wildlife Service, 1986). Almost all of these vessels are U.S. flag vessels transporting cargo between U.S. West Coast northern and southern ports. Some commercial shipping vessels enter Monterey Bay. In 1986, a total of 5 vessels offloaded at either Monterey Harbor or

CENTRAL CALIFORNIA LEASE SALE SCHEDULE

Lease Sale #119 DEFERRED



DEIS: Draft Environmental Impact Statement
FEIS: Final Environmental Impact Statement
PNOS: Proposed Notice of Sale
FNOS: Final Notice of Sale Deferred

Figure 12. Lease Sale #119 Schedule. (From Central Coast OCS Region Studies Program, January 1989).

Moss Landing Harbor (U.S. Army Corps of Engineers, 1986). Until 1982, commercial vessels delivered oil products to Pacific Gas and Electric's (PG&E) power generating plant at Moss Landing. The plant is able to operate on either gas or oil fuel and just recently returned to oil for its fuel source. PG&E was denied permission to construct an offshore marine terminal for off-loading oil from 90,000 DWT tankers.

Most of the commercial shipping along the coast follows customary north-south shipping lanes. The U.S. Coast Guard had proposed to establish a routing system composed of amended Traffic Separation Schemes (TSS) and new Shipping Safety Fairways (SSF) along the coast of California. A TSS is an internationally recognized routing measure that separates vessels into opposing streams of traffic through the establishment of traffic lanes. A SSF is an area in which no fixed structures are permitted.

The San Francisco TSS was proposed to be extended 28 nmi to the southeast along the coast to a point approximately due west of Santa Cruz. Two parallel one-mile wide SSF were proposed from the termination of the extended TSS to the Santa Barbara Channel TSS at Point Arguello. With the exception of the waters off Point Conception, the proposed routing system followed current traffic patterns along the coast. Pillar Point was the nearest area of the coast to the amended shipping lanes (about 5 nmi). Point Sur was approximately 8 nmi away, while Año Nuevo was 10 nmi distant.

This proposal is now on hold and alternatives to the TSS described above are being considered that would provide additional

safeguards from the possibilities of collisions and of oil spills reaching the shore of the Monterey Bay area.

Recent implementation of Annex V of MARPOL by the United States makes it illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters of the United States and illegal to dump other types of garbage in the ocean depending on the type of garbage and the distance from shore (see Appendix 2 for details of these restrictions).

4. Military Activity

There are two military activity areas within Monterey Bay (Figure 13). The U.S. Army administers a restricted firing range impact area extending 8,000 yards offshore from its Fort Ord military installation. Its purpose is to provide a safety buffer for the public against stray rounds from the small arms firing ranges. Activities are prohibited in the restricted area on days when the ranges are being used. This danger zone is also utilized for Navy mine warfare operations from February 16 through July 31 each year.

The U.S. Navy has an operating area in the northeast section of the Bay that can be used for mine sweeping practice maneuvers. Minehunting training is conducted by Navy minesweeping ships in this section of Monterey Bay twice per quarter and each exercise lasts about one week. Inert metal shapes are placed (or moored) on the bay floor and are located only by sonar; nothing is dragged through the water during these training exercises and all objects

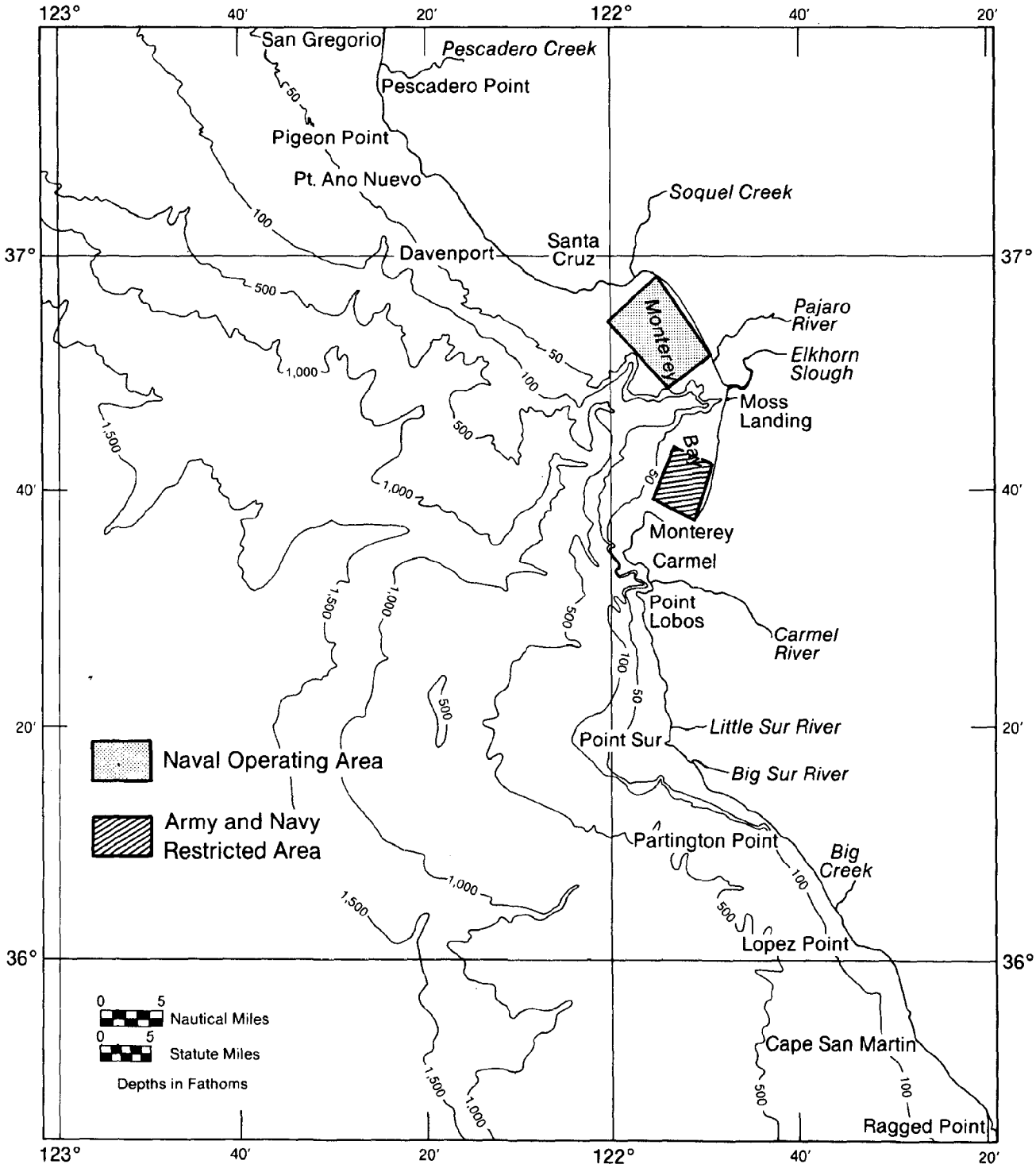


Figure 13. Nearshore Military Activity Areas in Monterey Bay.

are recovered after completion (Capt. Larson, Pers. Comm., August, 1989).

A Warning Area (W-285) exists to the west of the proposed Sanctuary and overlaps the western boundary. It is in frequent use for both air and surface training -- 700 scheduled uses occur per month (Capt. Larson, Pers. Comm., August, 1989).

A military air training route (IR-207) exists across the proposed Sanctuary starting from between Carmel and Monterey and proceeding northwest. It is used exclusively for air navigation at an altitude of 3000 feet above mean sea level with approximately 30 flights per month (Capt. Larson, Pers. Comm., August, 1989).

All of these areas are marked on either nautical charts or on San Francisco Sectional Aeronautical Charts.

5. Research and Education

The highly diverse biota and the physical features of Monterey Bay combine to provide outstanding opportunities for scientific research. The wide variety of habitats are all readily accessible to researchers. There are nine research and/or education programs in the area (Figure 14).

The Hopkins Marine Station of Stanford University is located in Pacific Grove. The main research effort is in using intertidal organisms to study cellular and developmental biology, immunology, and neurobiology. Research is also conducted on the ecology of the rocky intertidal zone of the Hopkins Marine Life Refuge located offshore of the laboratory.

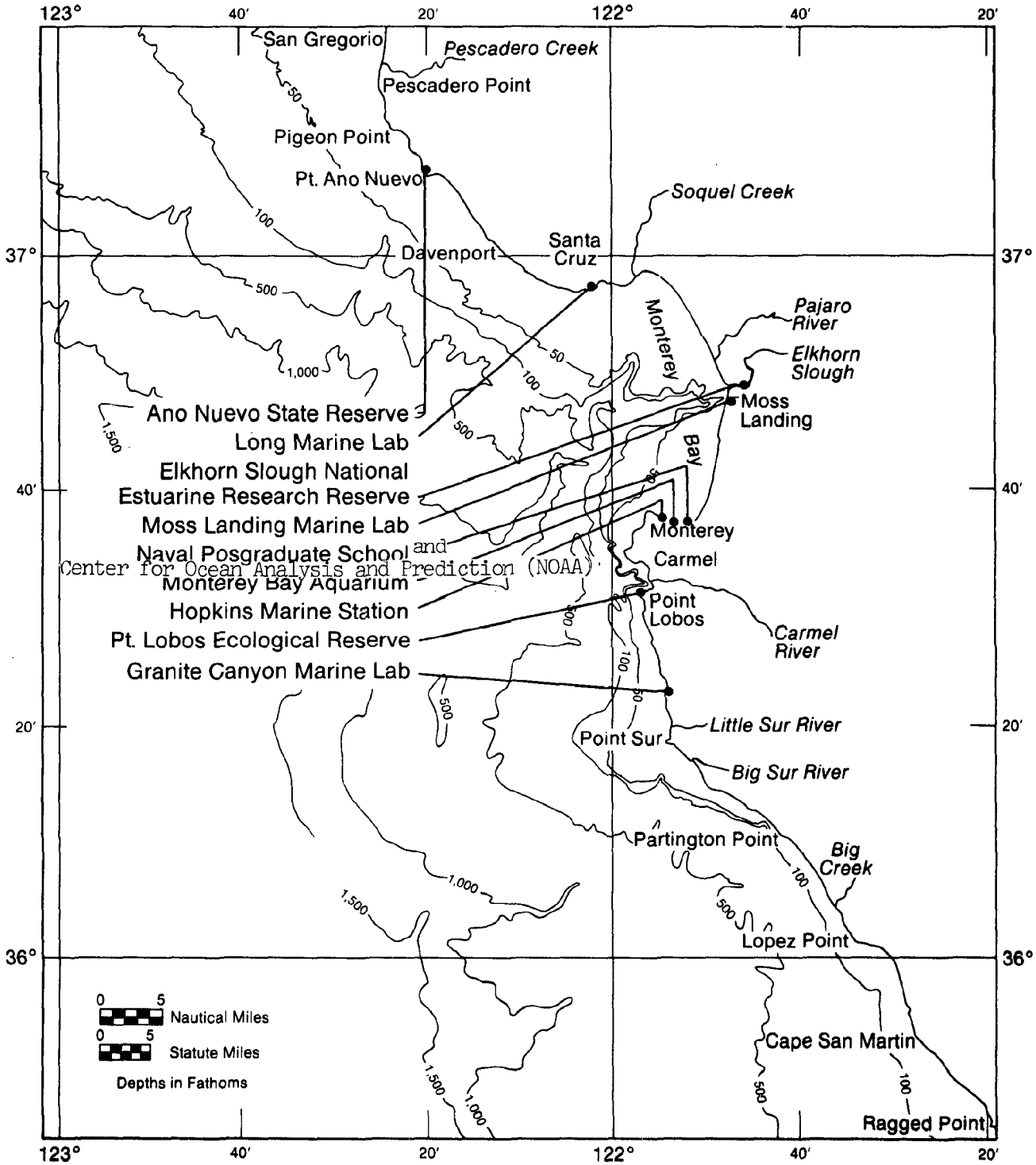


Figure 14. Existing Research and Education Programs in the Monterey Bay Area.

The Naval Postgraduate School is operated by the U.S. Navy in Monterey. Research is conducted exclusively on physical oceanography. The school shares access to the research vessel maintained by Moss Landing Laboratories. Recently NOAA's Center for Ocean Analysis and Prediction has shared facilities with the Naval Postgraduate School and assists in the distribution of NOAA's ocean and atmospheric data to local users at universities as well as other State and Federal agencies.

Moss Landing Marine Laboratories of San Jose State University conducts research in many fields, e.g., oceanography, geology, invertebrates, ichthyology, marine algae, and marine mammal and seabird behavior. The Laboratory facilities, located at Moss Landing, were destroyed in the recent earthquake. Their activities are being continued at a temporary location in Salinas. The Laboratories operate the R/V Point Sur for research cruises.

The Long Marine Laboratories and the Institute of Marine Sciences of the University of California at Santa Cruz conducts research on cetaceans, pinnipeds (especially at Año Nuevo), sea otters, invertebrates, and plankton.

Granite Canyon Marine Laboratory of the California Department of Fish and Game is located on the Big Sur coast. In addition to its involvement in mariculture research, it is presently conducting two large studies in marine toxicology. The Marine Bioassay Project is developing sensitive tests using marine species for evaluating the toxicity of municipal/industrial effluents. The Oil Spill Cleanup Agent or Dispersant Toxicity Project is evaluating

the toxicity and toxicological properties of oil spill disperants, utilizing sensitive marine life forms (Michael Martin, pers. comm., 1989).

The Monterey Bay Aquarium is operated by a non-profit foundation, and conducts a variety of research through their Research Division. Research is primarily focused on the natural nearshore habitats of the Bay, especially the kelp forest communities and sea otters. The Monterey Bay Aquarium Research Institute was incorporated in May 1987. It is planning an extensive research project to study the Monterey Submarine Canyon. It will use the R/V Point Lobos to launch a remote-operated unmanned submarine to explore the deep waters of the canyon (S. Webster, personal communication, 1989).

Extensive marine and coastal education and interpretive efforts complement Monterey Bay's many research activities. For example, over 7 million visitors, assisted by 500 volunteer guides trained in interpreting the marine environment, have experienced the interpretive exhibits of the Monterey Bay Aquarium since it opened in fall of 1984. Over 70,000 school children participate in aquarium education programs each year (J. Packard, personal communication, 1989). A number of other institutions have highly successful interpretive programs as well. For example: Pt. Lobos Ecological Reserve, Elkhorn Slough National Estuarine Research Reserve, Long Marine Laboratory and Año Nuevo State Reserve all have excellent docent programs serving the public, and marine related programs for school groups and teachers (J. Packard,

personal communication, 1989). In addition, marine related post-secondary and/or postgraduate education is available through three local colleges: the University of California Santa Cruz; Moss Landing Marine Laboratories and the Naval Postgraduate School.

6. Agriculture

Commercial agriculture is an important activity in the land surrounding the bay. Agriculture includes both irrigated and non-irrigated agriculture as well as semi-agricultural land uses (lawns, cemeteries, dairies, and feedlots). Monterey County was once known as "The Salad Bowl of the World" because of the wide variety of vegetables grown there. Table 7 lists the major crops produced in Monterey County. This county alone produces 90 percent of U.S. artichokes, 60 percent of its broccoli, 50 percent of its cauliflower and mushrooms, 25 percent of its celery, and up to 80 percent of its lettuce (Monterey County Agriculture, Food for Thought, 1988). Santa Cruz County agricultural production includes berries, fruits, nuts, vegetables, field crops (hay and pasture), nursery crops, and products from the apiary, poultry, and cattle industry (Table 7). Strawberries were the most valuable crop in 1988 with a total value of 58 million dollars. Lettuce was the second most valuable at 18 million dollars, followed by roses (16 million), apples (14 million), and raspberries (almost 14 million). Total agricultural production for 1988 was 166 million dollars.

Table 7. Major Agricultural Crops Produced in Monterey (Monterey County Agriculture, Food for Thought, 1988) and Santa Cruz (Robley Levy, pers. comm., 1989) Counties.

MONTEREY

Head and Leaf Lettuce	Dry Pasture Land
Broccoli	Brussels Sprouts
Strawberries	Raspberries
Nursery	Alfalfa Hay
Cauliflower	Chili Peppers
Celery	Spinach
Mushrooms	Potatoes
Wine Grapes	Barley
Artichokes	Cabbage
Cattle	Parsley
Tomatoes	Eggs
Carrots	Apples
Salad Products	Napa
Asparagus	Dry Beans
Milk	Poultry
Green Onions	Dry Onions
Sugar Beets	Cherry Tomatoes
Seeds	Anise

SANTA CRUZ

Bushberries	Lettuce
Raspberries	Mushrooms
Strawberries	Chives
Apples	Cabbage
Avocado	Peas
Wine Grapes	Corn
Apricots	Broccoli
Peaches	Squash
Plums	Beets
Pears	Anise
Persimmons	Tomatoes
Walnuts	Snap Beans
Lemons	Spinach
Kiwis	Poultry
Artichokes	Cattle
Brussel Spouts	Apiary
Cauliflower	Nursery
Celery	Hay and Pasture

7. Ocean Waste Disposal

a) Point Source Discharges

There are four municipal and two industrial sources of discharges which empty into Monterey Bay (Figure 15): the city of Santa Cruz Wastewater Treatment Facility; 2) the city of Marina; 3) the city of Watsonville; 4) the Monterey Regional Water Pollution Control Agency (MRWPCA) consisting of the cities of Castroville, Monterey, Salinas, Seaside and Fort Ord, 5) the Pacific Gas and Electric power plant at Moss Landing, and 6) the National Refractories plant at Moss Landing. The Carmel Sanitary District has an outfall which discharges 2.2 million gallons daily (mgd) of secondarily treated sewage into Carmel Bay. Table 8 presents a summary of present discharges into Monterey Bay and Carmel Bay. All point-source municipal dischargers into the ocean in the Monterey Bay area are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit that contains terms and conditions requiring monitoring of effluent to ensure water quality standards are maintained.

A Monterey Bay regional sewage system is being constructed by the MRWPCA north of the city of Marina. The treatment plant, which was scheduled for completion in the summer of 1989, will replace small treatment plants at Monterey, Seaside, Fort Ord, Salinas, and Castroville (Marina will tie into this regional system at a later date). The outfall associated with the new system has been completed and receives the collective wastes from the five small treatment plants mentioned above. The new treatment plant, when

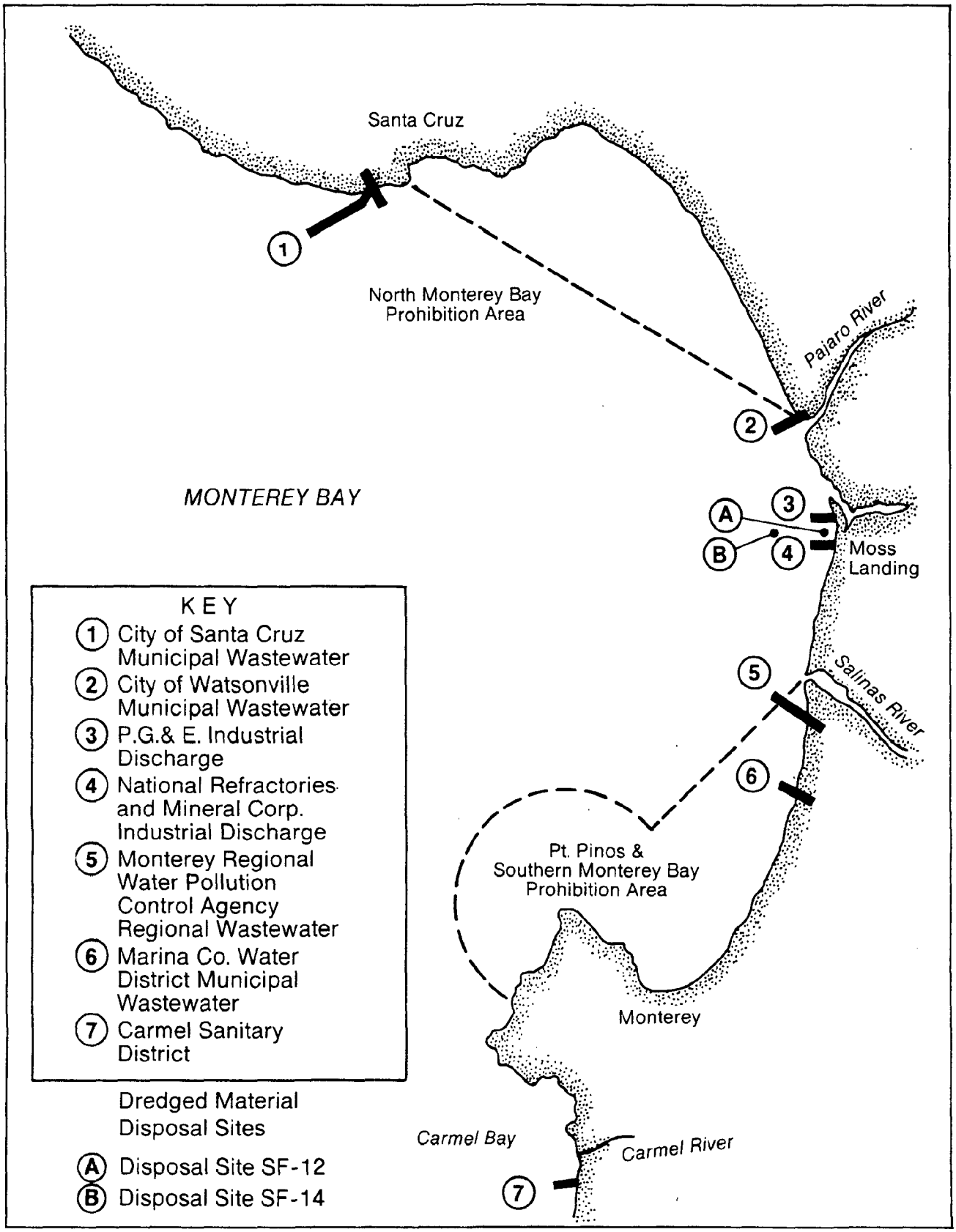


Figure 15. Existing Ocean Discharges and Dredged Material Disposal Sites in Monterey and Carmel Bays (Modified from Earth Metrics, 1986).

Table 8. SUMMARY OF PRESENT DISCHARGES INTO MONTEREY AND CARMEL BAYS (1987) (E. Melvin, pers. comm., 1989).

	Entity	Flow (MGD) Design	Flow (MGD) Current	Treatment Level	Outfall (ft) Length	Outfall (ft) Depth
	MUNICIPAL WASTE					
	Santa Cruz	21.0	12.8	Primary	12,250	110
	Watsonville	13.4	7.945	Primary	8000	64
Monterey Bay	Marina	2.0	1.5274	Secondary	2500	45
	MRWPCA		total 19.74		11,300	97
	Castroville	0.8	0.6	Secondary		
	Monterey	6.0	5.8	Secondary		
	Salinas 1	7.5 (5.5)	8.9	(<) Secondary		
	Seaside	2.0	1.9	Advanced Primary		
	Fort Ord	4.2	2.54	Secondary		
			total 42.0124			
	INDUSTRIAL WASTE					
	PGE	?	961.0 (1985)	Cooling water	600	45
	National Refractories	?	0.011 (1985)	?	620	43
			total 961.011			
Carmel Bay	MUNICIPAL WASTE					
	Carmel	?	2.2	Secondary	?	?

fully operational, will be able to treat 29.6 million gallons of wastewater per day. A 40% increase in capacity was planned into this regional system to handle the anticipated regional growth in population through the mid-1990's. The present population of 544,000 people in Monterey and Santa Cruz counties is projected to increase to 755,000 by the year 2005 (AMBAG, 1987).

The cities of Gilroy and Morgan Hill, located outside the coastal counties, have adopted a Long Term Wastewater Management Plan. The overall objective of the plan is to provide wastewater treatment and disposal capacity to accommodate the projected growth of the two cities. The method of disposal selected is the discharge of tertiary effluent into the Pajaro River during wet-weather months and land disposal during dry-weather months (Ross, pers. comm., 1989). The existing 6.1 mgd capacity will be expanded in steps to the ultimate capacity of approximately 15 mgd.

The City of Santa Cruz is presently using two ocean outfall structures, both shown on Figure 15. The new structure, which is 12,250 feet in length, in about 110 feet of water and one mile from shore, is the primary discharger of wastes. The previously used, old 2,000 foot outfall may be used only during peak wet weather flows.

(b) Non-Point Source Discharges

Marine water quality is monitored by the California Water Resources Control Board through its State Mussel Watch Program and the National Pollutant Discharge Elimination System (NPDES)

pursuant to the Clean Water Act. The State Mussel Watch program, which began in 1977, is operated under interagency agreement with the Water Resources Control Board by the California Department of Fish and Game, Marine Pollution Laboratory, and involves monitoring toxic pollutant levels in resident and transplanted California mussels, resident Monterey Bay mussels, and transplanted freshwater clams at selected stations from coastal, bay, and estuarine areas. Hayes and Phillips (1987) report the major trends in trace metals and synthetic organic substances identified after a decade of monitoring in this program. Monitoring results show the following:

1) Resident California mussels from the Monterey Harbor area contain higher lead levels than elsewhere in California or worldwide.

2) Freshwater clams transplanted to the innermost freshwater drainage (closer to the agriculture areas) that lead to Monterey Bay contain the highest levels of 26 pesticide and pesticide degradation products ever measured during the program. Chlordane, endosulfan, and DDT are some of the substances identified.

3) The highest levels of pesticides (dacthal, endosulfan, and endrin) ever measured in California mussels were found in mussels transplanted to the outer, more saline portions of the drainage to Monterey Bay.

4) High levels of tributyltin (used in anti-fouling paints) are found in mussels transplanted to semi-enclosed harbors with extensive boating activity. Low-levels of tributyltin (0.083 ppm,

wet weight) were found in mussels in Elkhorn Slough.

The high level of lead found in the mussels of Monterey Harbor was traced to a slag heap of lead smelting waste which had been placed on the inner harbor shore as railroad fill. Lead isotopic analyses were used to identify this slag deposit as the principal source of the lead (Flegal et al., 1987). Lead (and zinc) may also be leaching into the bay from the wastes associated with the more than 30 canneries that used to operate along Cannery Row (Loehr and Collias, 1983).

Elevated levels of mercury have been found in mussels at several locations along the California coast, including Año Nuevo Island. All sample locations are the site of very large pinniped and marine bird colonies. The elevated levels of mercury appear to be due to natural perturbations of the mercury cycle by higher organisms with anthropogenic sources being of secondary importance (Flegal et al., 1981).

Petroleum hydrocarbon concentrations were measured using Mussel Watch techniques. Resident mussels were shown to have higher than expected petroleum hydrocarbon body burdens in Carmel Bay, an area thought to be relatively contaminant free (Martin and Castle, 1984).

A wide range of pesticides have been entering the drainage to Monterey Bay from the surrounding agriculture areas for a long period of time. Studies other than the Mussel Watch Program have indicated other adverse effects on the water quality of the bay. The State Board Toxic Substances Monitoring program and the

Department of Food and Agriculture studied DDT levels in soils and sediments of the Blanco Drain Area. They concluded that undegraded DDT from past legal agricultural use remains at significant levels in soils and becomes available to aquatic life when it is eroded in to waterways (Hays and Phillips, 1987). Both agencies suggest that better on-farm soil management practices could reduce the amount of DDT reaching the bay. DDT and its degradation products were found in the tissues of all eight species of marine fishes caught and analyzed from Monterey Bay (Shaw, 1972).

The California Department of Fish and Game in cooperation with the California Department of Health Services is conducting an aquatic toxicology evaluation program in Monterey Bay (Welden, 1988). The main objectives of the program are to determine the average chemical contaminants found in a range of the most common commercial and sport-caught fish in the bay and to give a current risk-assessment of the effects of consuming them. This study was scheduled to be released in the fall of 1989.

Another source of non-point source pollution is the garbage generated by ships that used to be disposed of into the ocean during voyages. Studies done by the National Academy of Science (1975) and more recently by the U.S. Coast Guard (USCG) analyzed the types, density and sources of garbage generated by commercial and recreational vessels. The recent USCG analyzes were estimated on a per voyage basis because under Annex V of MARPOL, ports will be required to provide reception facilities for vessel wastes garbage. Thus "ports of call" will provide vessels the opportunity

to offload wastes into land facilities rather than into the ocean as was past practice.

8. Ocean Dredging and Sand Mining

Both maintenance dredging and commercial sand mining occur within Monterey Bay. Disposal of dredged material in the bay is regulated under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbor Act of 1899. A Waste Discharge Requirement (WDR) permit is needed before one can dump in the ocean. The WDR is similar in form to the NPDES permits for point-source discharges with similar requirements for monitoring of the activity to ensure the deposit meets water quality standards.

A sediment budget analysis performed for Monterey Bay indicates a budget deficit. This signifies an erosional rather than a depositional trend for the Bay (Oradive, 1986). The results of the analysis indicate that about 2.1 million cubic yards of sediment are deposited annually into the bay while an estimated 2.34 million cubic yards of sediment are lost annually. Sediment deposition occurs from cliff erosion, river discharges, and longshore drift, with over half of the total coming from the river discharges. Sediment losses occur from deposition into the submarine canyon, sand mining operations, off-shore deposition by rip currents, and eolian sediment transport to the dunes.

Longshore transport along the bay is generally in a southerly direction. The discharge of sediment from the San Lorenzo, Pajaro, and Salinas Rivers has, through the ages, combined with this

southerly transport and the prevailing northwesterly breeze to build the expansive sand dunes along the bay (McGee, 1986). Sand for commercial use has been dredged in the bay area for the last 70 years (Clark and Osborne, 1982). Deposits in the southern part of the bay are presently being mined by the Monterey Sand Company. This company operates sand extraction plants in Marina and Sand City. About 150,000 cubic yards of sand have been extracted every year since 1978. Erosion of the beach has occurred in the vicinity of this mining and some researchers believe it has increased because of the mining (Griggs, 1986; McGrath, 1986, 1987). Combellick and Osborne (1977) state that mining and weak longshore transports of new sand are the principal factors causing erosion. Because most sand transported along the northern bay is lost to the submarine canyon, the only source of suspended sand in the southern bay is the Salinas River. This river source does not appear to be adequate to support sand mining without erosion occurring. Porter et al. (1979) concluded in 1975 that the quantity of sand supplied to the southern beaches from the Salinas River is inadequate to consider the mined sand as a renewable resource (in Clark and Osborne, 1982). The major source of the mined sand thus appears to be the historic and current erosion of the nearshore sand dunes. Current State Lands Commission leases and Corps of Engineers permits are being reviewed. Additionally, an environmental impact statement has been required by the Corps of Engineers for renewal of local sand mining permits.

Periodic dredging of sediments is required at several harbors.

The boat harbor of Santa Cruz is dredged annually removing 100,000 to 130,000 cubic yards of sand. Moss Landing harbor requires dredging every two to three years. Most dredge spoils from this dredging are currently used for beach nourishment by being pumped directly to beaches east and south of the harbors.

Two offshore sites are presently being used for dredged material disposal (Figure 15). Disposal of dredged material has occurred intermittently off the end of Sandholdt Pier at Moss Landing about 400 feet from shore since 1947 (Disposal Site SF-12). When dredge spoils do not meet disposal criteria for beach nourishment, they must be taken by barge to a deep water disposal site near the head of the submarine canyon (Disposal Site SF-14).

9. Recreational Activities and Tourism

The moderate climate, rich diversity of marine flora and fauna, and variety of coastal types present many recreational opportunities for residents and tourists alike. Shoreline and nearshore recreation occurs throughout the bay area, with concentrations from Point Lobos to Santa Cruz.

Monterey Bay has been a tourist attraction since the late 1800's. The most recent estimate of tourist visitors to the area was 18 million annually (AMBAG, 1978). The total number of tourists to Santa Cruz annually is 2.5 million (Santa Cruz County Conference and Visitors Council, pers., comm, 1989). There were 1,723,311 overnight visitors to Monterey Peninsula in 1988 (Monterey Peninsula Chamber of Commerce, pers. comm., 1989). The

primary recreational activities are sportfishing, boating, hiking, skindiving, sightseeing, nature observation, and surfing.

Many existing attractions are open to the public. The Monterey Bay Aquarium opened in 1984 and currently attracts about 1.6 million visitors annually (S. Webster, per. comm., in Heimlich - Boran, 1988). Thirty-one state beaches, parks, refuges, reserves, and historic parks are operated by the California Departments of Parks and Recreation and Fish and Game (Table 9).

Numerous protected areas of special environmental significance allow varying levels of public use. These include the Point Lobos Ecological Reserve, the Carmel Bay Ecological Reserve, the Año Nuevo State Reserve, the Pacific Grove Marine Garden Fish Refuge, the Hopkins Marine Life Refuge, and the California Sea Otter Game Refuge. The Año Nuevo State Reserve attracts over 140,000 visitors annually (Coastal Concern, 1989).

Recreational boating activities originate primarily in the harbors of Santa Cruz, Monterey, and Moss Landing. Each harbor has a marina servicing recreational boaters, commercial fisherman, and partyboat charters. Approximately 2,100 boat slips are available in these harbors. All the marinas are full and have long waiting lists. Five boat ramps, one at Santa Cruz, and two each at Moss Landing and Monterey, are available for launching small boats from trailers. The boat ramp at Santa Cruz was used to launch approximately 8,000 boats in 1987 (Santa Cruz Port District, 1987). Overnight berths are available in the marinas for transient

Table 9. Units of the California State Park System within the proposed Monterey Bay National Marine Sanctuary.

(Adapted after Table from R.E. Felty, Regional Director, Department of Parks and Recreation, Personal Communication, February, 1989) and Pacific Coast Ecological Inventory Maps (Monterey and San Francisco), U.S. Fish and Wildlife Service, 1981.

San Mateo County

Bean Hollow (SB)
Año Nuevo (SR and ASBS)
Pescadero (SB)

Santa Cruz County

Big Basin Redwoods (SP)
Wilder Ranch (SP)
Natural Bridges (SB)
Lighthouse Field (SB)
Twin Lakes (SB)
Capitola (SB)
New Brighton (SB)
Seacliff (SB)
Manresa (SB)
Sunset (SB)

Monterey County

Hopkins Marine Life Refuge (SF)
California Sea Otter Game Refuge (SF)
Zmudowski (SB)
Moss Landing (SB)
Elkhorn Slough National Estuarine Research Reserve (State/Federal)
Salinas River (SB)
Marina (SB)
Monterey (SB)
Monterey (SHP)
Pacific Grove Marine Gardens Fish Refuge (SF and ASBS)
Asilomer (SB)
Carmel Bay Ecological Reserve (SR and ASBS)
Carmel River (SB)
Point Lobos (SR and ASBS)
Garrapata (SP)
Pfeiffer Big Sur (SHP)
Andrew Molera (SP)
Julia Pfeiffer Burns State Underwater Park (SP and ASBS)

SR = State Reserve
SP = State Park
SF = State Refuge
SB = State Beach
SHP = State Historic Park
ASBS = Area of Special Biological Significance

boaters. The use of "thrill craft" such as jet-skis or mini-motorboats has begun to become a highly popular sport.

Recreational fishing is a very popular activity both in Monterey Bay and the exposed coastal areas (Figure 16). Five major types of recreational fishing are pursued: private boat or skiff fishing, partyboat fishing, spearfishing, pier and shore (surf) fishing, and shellfishing. Skiff fishing is limited almost entirely to sheltered Monterey and Carmel Bays. Most of the skiff catch is made up of white croaker, several species of rockfishes, Pacific sanddab, lingcod, and mackerel (Table 10). The rugged nature of some sections of the coast make shorefishing impossible. Where the shoreline can be reached there is excellent rocky-shore fishing for lingcod, kelp greenling, cabezon, surfperch, and rockfishes. Most sandy beaches offer good surf fishing for surfperches and flatfishes (Table 10). Pier fishing is available on the public piers in Monterey, Seacliff State Beach, Capitola, and Santa Cruz. Jetties at Moss Landing harbor and Santa Cruz Small-Craft harbor provide good fishing for surfperch, starry flounder, and rockfishes. Table 10 also shows the main fish species caught from piers and jetties. Surf smelt and night smelt are netted in the surf off sandy beaches during certain months of the year.

Partyboats operate primarily out of Monterey, Moss Landing, and Santa Cruz harbor; a total of 25 were operating in 1987. The Big Sur coast is a very popular partyboat fishing area (Table 11). Salmon, lingcod, mackerel, and many varieties of rockfish are the

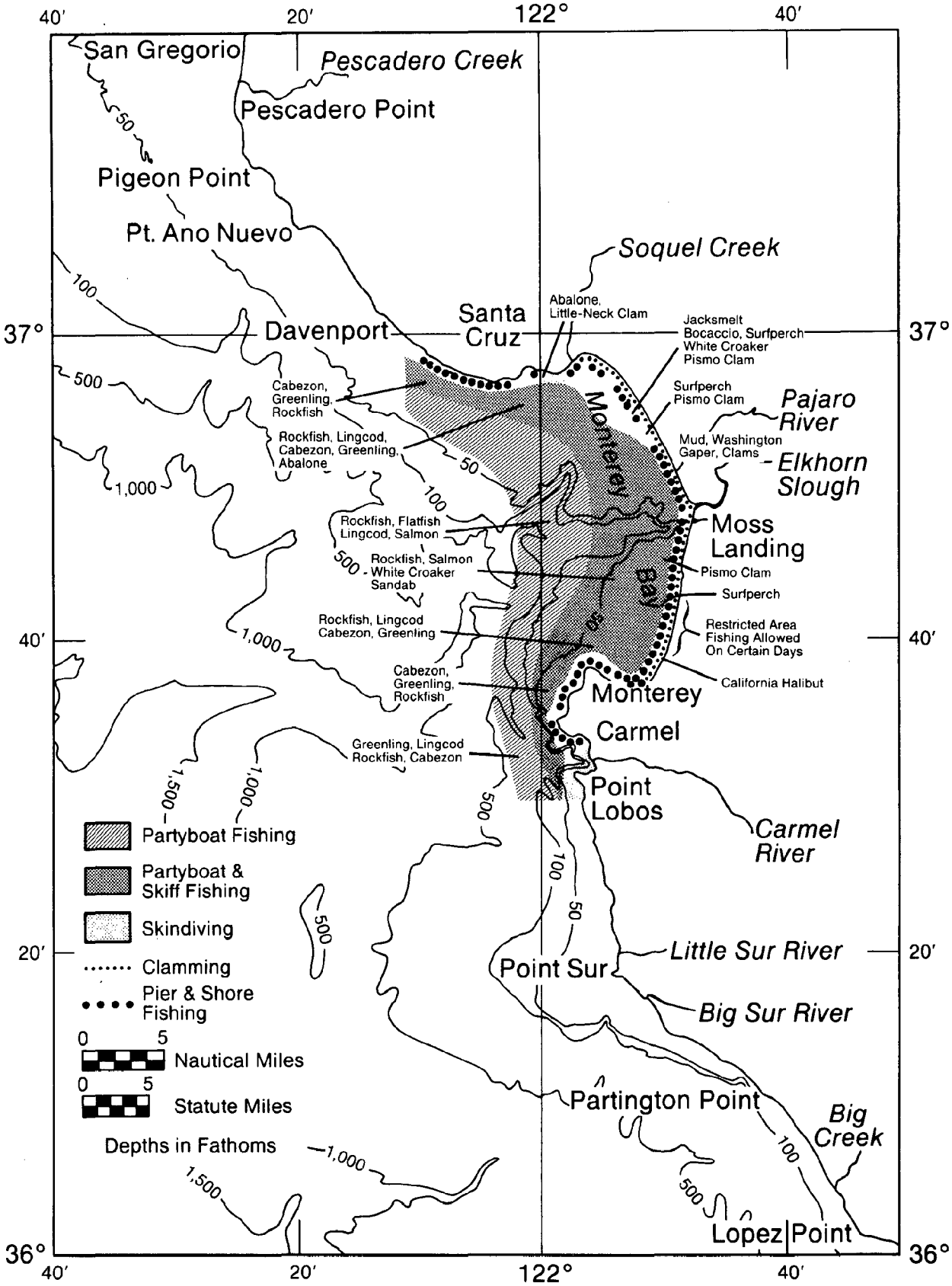


Figure 16. Location of Primary Sportfishing and Shellfishing Areas in Monterey Bay (From Central Coast OCS Regional Studies Program, 1989).

Table 10. Major Species of Fish Caught from Private or Rental Boats, Beaches, Piers and Jetties (Marine Recreational Fisheries Statistics Survey, 1987).

Private or Rental Boats	Beaches
Blue rockfish	Barred surfperch
Pacific sanddab	Staghorn sculpin
Rockfishes (general)	Flatfishes
Longfin sanddab	Surfperches
Lingcod	Calico surfperch
Gopher rockfish	Senorita
Albacore tuna	Silver surfperch
Yellowtail rockfish	Walleye surfperch
Chilipepper	Black perch
Brown rockfish	Rockfishes (general)

Piers	Jetties
Staghorn sculpin	Surfperches
Jacksmelt	Rockfishes (general)
White croaker	Staghorn sculpin
Pile perch	Northern sculpin
White seaperch	Pile perch
Surfperches	Rainbow seaperch
Lingcod	Senorita
Chinook salmon	Starry flounder
Rainbow trout	Cabezon
Kelp rockfish	White croaker

Table 11. Fish Caught by Commercial Partyboat Fleet For the Ports of Monterey, Moss Landing, and Santa Cruz (California Department of Fish and Game, 1987)

Species	Number of Fish Caught
Rockfish (unspecified)	373,849
Salmon (all species)	12,755
Lingcod	11,133
Pacific mackerel	4,162
Sablefish	3,208
Jack mackerel	1,773
Flatfish (unspecified)	1,024
Cabezon	390
Albacore tuna	318
Sanddab	236
Whitefish, ocean	100
White croaker	64
Pacific bonito	27
California halibut	17
Petrale sole	4
White seabass	1
Sturgeon	1
All Others	9,253
Total	418,978

Note: Total based on 45,461 anglers fishing from 25 boats in 1987.

main species caught.

Clam digging in ocean waters has been all but eliminated because of sea otter foraging, while other shellfish such as limpets and mussels are harvested from rocky tidepools. Abalone were once collected on rocky shore areas but their numbers have dwindled from overharvesting and sea otter predation.

The Monterey Bay area is well known for recreational diving. The area from Cannery Row on the Monterey Peninsula to Point LobosState Underwater Reserve is the most popular diving area in all of central and northern California. More than 70 percent of all diving between Point Conception and Oregon occurs in this area (U.S. Department of the Interior, 1987). Other underwater parks popular with divers include Carmel Bay State Underwater Park and Julia Pfeiffer Burns State Underwater Park (McMillon, 1982). Rosenberg (1987) presents an excellent guide to diving in the Northern California and Monterey Peninsula area.

Opportunities for nature observation include whale watching, viewing seabird nesting and roosting sites, and observing marine mammal pupping and haul-out areas. Partyboats are used for nature observation tours, including watching blue whale and migrating California gray whales. One company (Shearwater Journeys), which offers natural history boat trips, takes over 3000 people each year out on Monterey Bay to view seabird and marine mammals (Sheila Baldridge, pers. comm., 1989) Rocky shorelines provide the hiker with the opportunity to view the fascinating flora and fauna associated with the rocky intertidal habitats.

Surfing is a popular activity throughout the bay area, especially at Pacific Grove, Moss Landing, Asilomar Beach, the mouth of the Big Sur river, and Santa Cruz. The main surfing season runs from late summer through early spring (J. Young, pers. comm., 1989). Santa Cruz has been a major surfing area since the turn of the century. Its long history is traced in the Santa Cruz Surfing Museum. Wind surfing has also increased in popularity in the last few years with major competition located in the small bay south of Año Nuevo.

Section III: Action Plan

A. Overall Management and Development Concept

The first task upon Sanctuary designation will be to establish liaison with the appropriate agencies to ensure the Sanctuary mandate can be carried out through a cooperative management strategy. Samctuary staff will meet with other agencies and institutions operating in the area to familiarize them with the Sanctuary mandate and staff, and determine appropriate working relationships. For example, discussions with California Departments of Fish and Game and Parks and Recreation, Regional Water Quality Control Boards, U.S. Coast Guard, U.S. Fish and Wildlife Service, local businesses, Association of Monterey Bay Area Governments, towns and cities, agricultural and fishing representatives and research institutions would determine resources most in need of management.

A Monterey Bay National Marine Sanctuary Advisory Committee (SAC) will be created by the Marine and Estuarine Management Division to assist the Sanctuary Manager in policy making. The Committee will consist of appointed representatives of governmental agencies, research and education, and commercial and environmental interests. The SAC will create subcommittees to assist in developing programs in research, education, recreation, and planning and facilities for the Sanctuary. The SAC will play a key role in determining what the management priorities should be, and in bringing the other agencies together.

The Sanctuary staff will work with other agencies to coordinate resource management programs and look for necessary support for such programs. The Sanctuary also will support management-related research and monitoring through funding, staffing, and other means that may be available and appropriate.

Other immediate and high priority activities will include reviewing development or management proposals that will impact upon the marine resources, providing policy advice to other agencies working in the proposed Sanctuary area, and making presentations to appropriate levels of government.

Another priority will be to assist in coordination and support of existing interpretive and education programs, such as those of the California Department of Parks and Recreation and the Monterey Bay Aquarium. MEMD headquarters and Sanctuary staff will review and develop educational materials, signage, interpretive displays and appropriate facilities in cooperation with existing programs. Interpretive information provided to those using the Sanctuary for recreation uses may help them enjoy their visit more and increase their awareness of Sanctuary resources.

The general public and interested organizations in central and northern California will play important roles in attaining resource protection goals in the Sanctuary. Interpretive programs fostering public understanding and, hence, support for management objectives, are inherent in the plan's concept. The establishment of a MBNMS will provide an excellent opportunity to inform the public about the value of efforts to protect its fragile resources and the need

for a long-term management framework. Effective communication will depend on publications, exhibits, and special events that convey the significance of the Sanctuary's resources to both the in-state and out-of-state public.

The management plan proposes actions tailored to specific issues affecting the Sanctuary. The plan recognizes the need for a balanced approach reflecting the existing protection priorities and the multiple use character of the area. Implementation of this plan will require cooperation and coordination among many federal, state and local government agencies as well as private organizations and individuals. See Appendix 2 for a listing and brief description of the various state and federal management authorities which have statutory responsibility for protecting marine resources in the proposed Monterey Bay National Marine Sanctuary area. Information exchange, sharing facilities and staff, and the coordination of policies and procedures for resource protection will be features of all programs, including research and education. The plan is designed to guide management of the proposed MBNMS for the first five years after implementation. During this period, management initiatives will generally fall into three basic programs: Resource Protection, Research, and Education. The remainder of this section describes guidelines and initiatives for each program.

B. Resource Protection

1. General Context in Management

The proposed designation of Monterey Bay as a National Marine Sanctuary focuses attention on the value of the area's resources. To ensure that these resources are protected, the Sanctuary resource protection program includes: (1) coordination of policies and procedures among the agencies sharing responsibility for resource protection; (2) participation by other agencies in the development of new procedures to address specific management concerns (i.e., monitoring and emergency-response programs); and (3) the enforcement of Sanctuary regulations in addition to those already in place.

In formulating the proposed Sanctuary regulatory regime NOAA: first, analyzed the resources and human uses of the Monterey Bay environment; second, analyzed the existing regulatory regime with regard to protection of the resources and qualities of the Monterey Bay area from possible harmful human activities; third, proposed alternative regulatory regimes, including relying on the existing regulatory regime, to protect the proposed Sanctuary's resources and qualities; fourth, analyzed the environmental consequences of each regulatory alternative, including no additional action with Sanctuary designation, to the resources and qualities of the Monterey Bay area; and fifth, proposed draft regulations based on the preferred course of action, the one deemed necessary to protect Sanctuary resources and qualities.

The choice of proposed regulations was not only based on the

environmental consequences of each action but also constrained by the MPRSA, which states in Section 304(c):

(1) Nothing in this title shall be construed as terminating or granting to the Secretary the right to terminate any valid lease, permit, license, or right of subsistence use or of access if the lease, permit, license, or right -

(A) was in existence on the date of enactment of the Marine Sanctuaries Amendments of 1984, with respect to any national marine sanctuary designated before that date: or

(B) is in existence on the date of designation of any national marine sanctuary, with respect to any national marine sanctuary designated after the date of enactment of the Marine Sanctuaries Amendments of 1984.

(2) The exercise of a lease, permit, license, or right is subject to regulation by the Secretary consistent with the purposes for which the sanctuary is designated.

2. Designation Document and Sanctuary Regulations

A summary of the existing regulatory regime in the area of the proposed MBNMS is included in Part III--(Section 1) Status Quo Alternative. The proposed Designation Document (Appendix 1) describes the relationship between Sanctuary designation and other regulatory programs. The proposed Designation Document also includes a list of activities subject to regulation now or in the future.

To ensure protection of Sanctuary resources and conservation of Monterey Bay's valuable habitat, NOAA proposes seven additional regulations governing oil, gas and mineral activities; discharges and deposits (from both within and from outside of the boundaries); historical resources; alteration of or construction on the seabed;

marine mammals and seabirds; and overflights. If necessary to protect Sanctuary resources, vessel traffic and "thrill craft" may be regulated in the future.

However, any of the prohibited activities other than exploring for, developing, or producing oil, gas or minerals in the Sanctuary could be conducted lawfully if: Necessary for national defense or law enforcement; necessary to respond to an emergency threatening life, property, or the environment; or pursuant to:

(1) a National Marine Sanctuary permit;

(2) a certification by the Director of the Office of Ocean and Coastal Resource Management of a valid lease, permit, license, or other authorization issued by any Federal, State, or local authority of competent jurisdiction as of (or if conducted pursuant to any valid right of subsistence use or access, in existence as of) the effective date of this designation subject to complying with any terms and conditions imposed by the Director as he or she deems necessary to achieve the purposes for which the Sanctuary was designated; or

(3) a valid lease, permit, license, or other authorization issued by any Federal, State, or local authority of competent jurisdiction after the effective date of Sanctuary designation, provided that the Director was notified of the application in accordance with the requirements set forth in the Sanctuary regulations and the Director did not object to the issuance of such authorization, and such authorization contains, and the owner or holder complies with, such terms and conditions,

as the Director deems necessary to protect Sanctuary resources and qualities.

The prohibitions would apply to United States-flag vessels and to persons who are citizens, nationals or resident aliens of the United States and to foreign-flag vessels and persons not citizens, nationals, or resident aliens of the United States to the extent consistent with generally recognized principles of international law, and in accordance with treaties, conventions, and other agreements to which the United States is a party.

The first activity prohibited would be exploring for, developing, or producing oil, gas or minerals in the Sanctuary. The resources and qualities of the Monterey Bay area, particularly sea otters, sea birds, and pinnipeds that use the haul-out sites, kelp forests and rocks along the Monterey Bay coast, and the high water quality, are especially vulnerable to oil and gas activities in the area. A prohibition on oil and gas activities within the proposed Sanctuary boundaries will provide partial protection from oil and gas activities for the resources and qualities within the proposed boundaries. A prohibition on mineral activities within the proposed Sanctuary is necessary to be consistent with the prohibition on the fifth activity as discussed below.

The second activity prohibited would be depositing or discharging from any location within the boundaries of the Sanctuary materials or other substances except fish, fish parts, chumming materials or bait used in or resulting from normal fishing operations in the Sanctuary; biodegradable effluents incidental to

vessel use generated by marine sanitation devices approved by the U.S. Coast Guard; water generated by routine vessel operations (e.g., cooling water and deck washdown) excluding bilge pumping; or engine exhaust. This prohibition is necessary in order to protect the Sanctuary resources and qualities from the effects of pollutants deposited or discharged into the Sanctuary.

The third activity prohibited would be depositing or discharging, from beyond the boundaries of the Sanctuary, materials or other substances, except for the exclusions discussed above for the second activity, that subsequently enter the Sanctuary and injure a Sanctuary resource or quality. The intent of this prohibition is to protect the Sanctuary resources and qualities from the harmful effects of land and seagenerated non-point and point source pollution.

The fourth activity prohibited would be moving, possessing, or injuring or attempting to move, possess, or injure a Sanctuary historical resource. Historical resources in the marine environment are fragile, finite and non-renewable. This prohibition is designed to protect these resources so that they may be researched and information about their contents and type made available for the benefit of the public. This prohibition does not apply to accidental moving, possession or injury during normal fishing operations.

The fifth activity prohibited would be drilling through, dredging or otherwise altering the seabed of the Sanctuary; or constructing, placing or abandoning any structure or material on

the seabed of the Sanctuary, except as a result of: anchoring vessels; normal fishing operations; routine harbor maintenance; installation of navigation aids; maintenance of mariculture operations existing as of the effective date of these regulations; and the construction of docks and piers. The intent of this prohibition is to protect the resources of the Sanctuary from the harmful effects of activities such as, but not limited to, excavations for archeological purposes, drilling into the seabed, strip mining, ocean mineral extraction and dumping of dredge spoils.

The sixth activity prohibited would be taking marine mammals in the Sanctuary or seabirds in or above the Sanctuary, except in accordance with and as permitted by regulations promulgated under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The term "taking" includes all forms of harassment. The MMPA and the ESA both prohibit the taking of specific species protected under those Acts. Sanctuary enforcement officials may consider harassment cases pursuant to the MMPA and ESA. The proposed prohibition would overlap with the MMPA and ESA but also extend protection for Sanctuary resources on an environmentally holistic basis. It would include all marine mammals in the Sanctuary and seabirds in or above the Sanctuary.

The seventh and final activity prohibited would be flying motorized aircraft at less than 1000 feet above the Sanctuary within three nautical miles of State of California designated reserves, parks, beaches or refuges, or the Los Padres National

Forest. This prohibition is intended to protect marine birds and mammals from the disturbance and harassment of low-flying aircraft. For example, seabirds are often congregated near the shoreline and sea otters are distributed among the kelp beds within three nautical miles of the coastline.

Vessel Traffic

At present only a few, large commercial vessels visit the Monterey Bay region, mainly to dock at Moss Landing. The area has had a long history of safe vessel traffic but there still remains a threat to the valuable resources of the Monterey Bay area from possible collisions and spills of hazardous materials. NOAA has determined that existing shipping safety regulations are adequate and that no immediate action is necessary. However, NOAA will maintain close communication with the United States Coast Guard to evaluate the need for additional regulations and/or emergency response plans and equipment. In the future regulations may be promulgated that may include but are not limited to one or a combination of the following: (1) coast-wise vessel traffic be routed outside the boundaries of the Sanctuary, (2) all large vessels inbound to and outbound from Monterey Bay be restricted to port access route(s), (3) oil barge traffic be prohibited within the Sanctuary, and (4) special designs be required, such as double hulls, for petroleum and other hazardous substance transport vessels in the Sanctuary. The regulations could, for example, restrict vessel traffic from specified areas such as around Año Nuevo or prohibit vessel traffic within specified distances from

the shore unless the vessel was entering or leaving a harbor within the Sanctuary boundaries.

Operation of "Thrill Craft"

"Thrill Craft" means any motorized vessel which is generally less than thirteen feet in length as manufactured, is capable of exceeding a speed of twenty miles per hour, and has the capacity to carry not more than the operator and one other person while in operation. The term includes but is not limited to jet skis, wet bikes, surf jets, miniature speed boats, and hovercraft.

These craft can pose a serious threat to the resources of the Monterey Bay area. There is a potential for collisions with marine mammals and birds, injury to kelp beds, and disturbance, due to the noise and exhaust, of the craft to organisms near and on the surface at large distances from the source of the craft. NOAA will monitor the activities of these "thrill craft" to determine, first, if indeed there is a threat to the resources and, second, if regulations should be promulgated prohibiting these activities in specified zones.

Emergencies

Where necessary to prevent or minimize the destruction of, loss of, or injury to a Sanctuary resource or quality, or minimize the imminent risk of such destruction, loss or injury, any activity, including those not listed in the scope of regulations, is subject to immediate temporary regulation, including prohibition, in accordance with the Administrative Procedure Act.

Defense or Law Enforcement Activities

No prohibition set forth in the Sanctuary regulations shall apply to activities that are necessary for national defense or law enforcement. Whenever an activity necessary for national defense or law enforcement would violate a prohibition set forth in the Sanctuary regulations were it not necessary for national defense or law enforcement, the head of the agency taking the action shall notify the Secretary of Commerce or designate of the proposed activity if there is sufficient time to permit consultation without jeopardizing national defense or law enforcement. Such notification shall be sufficiently in advance of undertaking the activity in order to permit consultations as to how the activity could be conducted to minimize any adverse impact on Sanctuary resources and qualities without compromising national defense or law enforcement. Activities that are not necessary for national defense or law enforcement, such as training exercises and routine vessel operations, are subject to all prohibitions contained in the Sanctuary regulations.

Fishing Regulations, Licenses, and Permits

Fishing in the Sanctuary, including fishing for shellfish and invertebrates and mariculture, shall not be regulated as part of the Sanctuary management regime authorized by the Act. However, fishing in the Sanctuary may be regulated other than under the Act by Federal and State authorities of competent jurisdiction, and designation of the Sanctuary shall have no effect on any

regulation, permit, or license issued thereunder, e.g., regulations promulgated under the California Fish and Game Code and regulations implementing Fishery Management Plans promulgated under the Magnuson Fishery Conservation and Management Act, 16 U.S.C. §§ 1801 et seq. Notwithstanding the above, discharges and deposits from fishing vessels may be regulated pursuant to Article IV, section 1, paragraph (b) of the Designation Document; drilling through, dredging or otherwise altering the seabed of the Sanctuary or constructing, placing or abandoning any structure or material on the seabed of the Sanctuary in connection with fishing and mariculture activities may be regulated pursuant to Article IV, section 1, paragraph (d); and taking of marine mammals and seabirds may be regulated pursuant to Article IV, section 1, paragraph (e).

Effect on Other Regulations, Leases, Permits, Licenses, and Rights

If any valid regulation issued by any Federal, State, or local authority of competent jurisdiction, regardless of when issued, conflicts with a Sanctuary regulation, the regulation more protective of Sanctuary resources and qualities shall govern.

The procedures and criteria for issuance of Sanctuary permits and notification and certification of other leases, permits, licenses, approvals, or other authorizations are described in detail, with examples, in the proposed Sanctuary regulations (see Appendix 1). A summary of the effect of Sanctuary regulations on other regulatory authorities follows:

(a) Issued Before Designation

Pursuant to section 304(c)(1) of the Act, 16 U.S.C. § 1434(c)(1), no valid lease, permit, license, approval, or other authorization issued by any Federal, State, or local authority of competent jurisdiction, or any right of subsistence use or access, may be terminated by the Secretary of Commerce or his or her designate as a result of this designation or as a result of any Sanctuary regulation if such lease, permit, license, approval, other authorization, or right of use or access was issued or in existence as of the effective date of this designation. The Secretary of Commerce or his or her designate, however, may regulate the exercise of such authorization or right consistent with the purposes for which the Sanctuary is designated.

The prohibitions set forth in the Sanctuary regulations shall not apply to any activity authorized by any lease, permit, license, approval, or other authorization issued as of the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, or to any right of subsistence use or access in existence as of the effective date of Sanctuary designation, provided that the owner or holder of such authorization or right notifies the Secretary or his or her designate of the existence of such authorization or right and requests certification in accordance with the Sanctuary regulations, if the exercise of such authorization or right would otherwise violate a prohibition set forth in the Sanctuary regulations, and complies with any terms and conditions on the

exercise of such authorization or right imposed by the Secretary or his or her designate as he or she deems necessary to achieve the purposes for which the Sanctuary was designated. Pending the imposition of terms and conditions by the Secretary or his or her designate, such owner or holder may exercise any such authorization or right without being in violation of any prohibitions set forth in the Sanctuary regulations.

(b) Issued After Designation

The prohibitions set forth in the Sanctuary regulations shall not apply to any activity authorized by any lease, permit, license, approval or other authorization issued after the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, if the Secretary or his or her designate was notified of the application for such authorization by the applicant in accordance with the Sanctuary regulations and the Secretary or his or her designate did not object to the issuance of such authorization, and such authorization contains, and the owner or holder complies with, such terms and conditions as the Secretary or his or her designate deems necessary to protect Sanctuary resources and qualities.

(c) Issuance of Sanctuary Permits

The prohibitions set forth in the Sanctuary regulations shall not apply to any activity authorized by a permit issued by the Secretary or his or her designate in accordance with the Sanctuary regulations. Such permits shall only be issued if the Secretary or his or her designate finds that the activity for which the permit

is applied will: further research related to Sanctuary resources; further the educational, natural or historical resource value of the Sanctuary; further salvage or recovery operations in or near the Sanctuary in connection with a recent air or marine casualty; assist in managing the Sanctuary; have only negligible, short-term adverse effects on Sanctuary resources and qualities; or further salvage or recovery operations in connection with an abandoned shipwreck in the Sanctuary title to which is held by the State of California.

In addition, the Secretary or his or her designate may issue special use permits in accordance with section 310 of the Act.

Since the Sanctuary regulations prohibit oil, gas, or mineral exploration, development, or production, the Designation Document provides that the Secretary or his or her designate may in no event permit or otherwise approve such activities in the Sanctuary, and any leases, licenses, permits, approvals, or other authorizations issued after the effective date of Sanctuary designation authorizing the exploration, development, or production of oil, gas or minerals in the Sanctuary shall be invalid.

Thus, the regulatory regime that the proposed regulations would establish provides for multiple uses of Monterey Bay while at the same time providing for the protection of Sanctuary resources and qualities.

For example, if a city or town were discharging sewage effluents into the Bay pursuant to a valid National Pollution Discharge Elimination System (NPDES) permit issued prior to the

effective date of Sanctuary designation, the city or town could continue to discharge under the permit without being in violation of the discharge prohibition by requesting certification of the permit in accordance with the Sanctuary regulations. The Director would then impose on the exercise of the NPDES permit such terms and conditions as he or she deems necessary to achieve the purposes for which the Sanctuary was designated. Such discharges would remain subject to all prohibitions, restrictions and conditions imposed by any other authority of competent jurisdiction.

For another example, if an entity is dumping dredge spoils in the Bay pursuant to a valid existing permit, the entity could continue to do so by requesting and obtaining certification in accordance with the Sanctuary regulations.

Prior to conditioning existing or future leases, permits, licenses, approvals, other authorizations, or rights NOAA intends to consult with relevant issuing agencies as well as owners, holders or applicants. NOAA's policy is to encourage best available management practices to minimize non-point source pollution entering the Sanctuary and to require at a minimum secondary treatment and sometimes tertiary treatment or more, depending on predicted effects on Sanctuary resources and Sanctuary qualities, for point source pollution, such as municipal sewage discharge.

3. Contingency Plans for Major Emergencies

The resources of the MBNMS are susceptible to natural and human-related changes. Many of these changes are gradual and can be detected only through long-term monitoring of environmental and biological indicators. However, certain sudden and catastrophic changes in conditions (due to an accidental oil spill or vessel grounding, for example) could seriously impact resources and present severe health and safety hazards.

A number of Contingency Plans are presently in effect in the Monterey Bay area. Under the National Contingency Plan for the removal of oil and hazardous substances in coastal and marine areas of EPA's Region IX (California, Nevada and Arizona), remedial action to control or remove this type of material that could endanger the public health is the responsibility of U.S. Coast Guard (USCG) directed Regional Response Teams acting through an On-Scene Coordinator and a Regional Response Center. The USCG's hazardous materials mission under the Oil and Hazardous Substance Pollution Contingency Plan is to: (1) prevent spills, (2) investigate spills that may occur and (3) coordinate response between all responsible parties.

The Eleventh Coast Guard District, based in San Francisco, will provide Regional Response Center facilities. The On-Scene Coordinator will receive scientific support from NOAA and assistance as necessary from the Regional Response Team and other appropriate Federal and state agencies.

Assistance is also possible from private groups and industry.

All of the relevant public and private agencies that would assist in a clean-up have Oil Spill Contingency Plans on file in the USCG Monterey Bay Office which are required to undergo periodic updates and approval by the USCG (LTJG Ray Perry, Personal Communication, April 5, 1989).

The Moss Landing Power Plant and Marine Terminal has an Oil Spill Contingency Plan that was most recently updated in November, 1988. Tankers that unload at the Moss Landing terminal carry an average of one hundred and fifty thousand (150,000) barrels of oil. A boat, contracted by PG&E, equipped with portable skimmers, containment booms and other spill cleanup equipment is with the tanker during unloading. Two more boats are stationed at the plant docks, similarly equipped, but without crews. However, some Moss Landing PG&E employees are trained to operate the boats and equipment and are available on an "on-call" basis. The USCG can respond within 15 minutes and provide the necessary additional personnel, boats and equipment from the Monterey Coast Guard Station, if necessary (Carl Walker personal communication after discussion with Dan Bishop, May 4, 1989).

The U.S. Navy has a Contingency Planning Guide (Draft, 1987) that details the oil spill response equipment, operating personnel and spill responses specialists that are available from the Supervisor of Salvage of the Naval Sea Systems Command for major spill response efforts. The Navy oil spill plans outline responsibility for all Navy spills such as those emanating from damaged Navy Fleet oilers or from Military Sealift Command

chartered tankers.

In addition a number of oil companies and organizations including, Exxon Company (April, 1980), Cities Service Oil and Gas Corporation (Draft April, 1986; revised, 1988), Atlantic Richfield Company (April, 1981) and the Western Oil and Gas Association (January, 1987), have Oil Spill Contingency Plans or Documents that are designed to provide information and logistical support to the responsible government agency, discharger and other interested agencies in the event of a spill.

Finally, Clean Bay and Clean Seas are two industry-supported oil spill clean-up cooperatives operating in the San Francisco Bay and the Santa Barbara areas, respectively. The primary responsibility to develop oil spill prevention control techniques rests with management of each member company. However, the services, equipment and personnel of each cooperative are available to member, non-member and government agencies in each area of interest. The dividing line between the two cooperative areas of operations is at Cape San Matin. Therefore the resources of Clean Bay would be most relevant for oil spills in the Monterey Bay area although mutual assistance is available from each other's region.

Clean Bay consists of 17 members including 6 oil refineries. The cooperative would have a 4 hour response time to Moss Landing, and 8 to 10 hours with the vessels located in Richmond. Within 6 to 7 hours Clean Bay could mobilize a plan located in Oakland and spray dispersants on the spill from the air. This type of dispersant action needs approval from the Coast Guard (Rick

Willett, personal communication, May 18, 1989).

A Marine Safety Office Contingency Plan is currently under review at the Coast Guard station in Monterey Bay. It is designed to incorporate and coordinate the above plans, resources and equipment in the event of a spill in the Monterey Bay region. However, the Monterey Bay Aquarium staff, based on their recent involvement in the Exxon Valdez spill, have concluded that the current Monterey Bay contingency plan for oil spill removal and wildlife recovery is inadequate (Julie Packard, personal communication, May 1, 1989).

To provide further protection to Monterey Bay resources, the Sanctuary staff will assess the state of preparedness of the relevant parts of the contingency plans as they relate to the Sanctuary. This action will entail exchanging information with government and industry response teams and seeking their support in assessing detection and clean-up capabilities that can be used to protect Bay resources and a possible trial simulation in Monterey Bay. In addition, and consistent with the National Marine Sanctuary Program Regulations (15 CFR Part 922), NOAA will provide the necessary resources and impetus to develop and implement a site-specific contingency and emergency-response plan designed to protect the Monterey Bay Sanctuary's resources. The plan shall contain alert procedures and actions to be taken in the event of an emergency such as a shipwreck or an oil spill.

An MEMD-level contingency and emergency-response plan has been prepared for the Channel Islands and Key Largo National Marine

Sanctuaries. A similar plan for the proposed MBNMS will be created that will:

- Describe emergency-response procedures and coordination requirements for MEMD and Sanctuary staff;
- Provide a geographic information system depicting resources at risk;
- Outline procedures for emergency research; and
- Provide damage assessment guidelines.

In conjunction with this plan, agreements may be formulated to improve spill detection programs and augment containment capabilities (i.e., with additional equipment, staff, and deployment plans). These efforts will be closely coordinated with similar efforts to protect the Elkhorn Slough NERR.

4. Encouraging Compatible Use of the Sanctuary

Encouraging the private and public uses the Sanctuary in ways that are compatible with the protection of Sanctuary resources and qualities is an important aspect of the resource program. The MEMD will encourage compatible visitor use by undertaking the following:

- Monitoring commercial and recreational activities in the Sanctuary and encouraging other agencies to do so to detect areas of particular management concern;
- Collecting and publicizing information on commercial and recreational activities in the Sanctuary;
- Consulting with other agencies on policies and proposals for the management of activities which may affect protection of Sanctuary resources; and
- Developing educational materials aimed at enhancing public awareness of the Sanctuary's resources and their need for protection.

Monitoring and information exchange programs are discussed

under research (Subsection C). The development of materials is discussed under education (Subsection D).

5. Surveillance and Enforcement

A primary feature of the resource protection program is the surveillance of Sanctuary waters and enforcement of applicable regulations. Although a detailed enforcement plan has not been developed, NOAA, at present, envisions a State-Federal cooperative enforcement system involving the State of California Resources Agency, 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 and Federal waters, close coordination between State and Federal authorities would be required.

The USCG has broad responsibility for enforcing all Federal laws in navigable waters under U.S. jurisdiction. Where these laws regulate fishing harvests, the USCG works closely with the NMFS and the CDF&G. The CDF&G enforces Federal as well as California fishing regulations in the exclusive economic zone (200 miles from the State's coastal baseline) and acts as the primary agency for the enforcement of fishery regulations applying to Monterey Bay.

Sanctuary designation would have the effect of broadening USCG enforcement responsibilities to include the enforcement of Sanctuary regulations. Neither NOAA nor the USCG has the resources to conduct systematic surveillance and enforcement operations to ensure compliance with Sanctuary regulations. However, both the

USCG and the State conduct operations in the area. The USCG would provide limited surveillance in conjunction with multi-mission, surface or aerial operations.

NOAA plans to rely on such observers from other agencies and cooperating organizations, including excursion and service boat operators, to assist in providing the surveillance information needed for the enforcement program. The enforcement program is expected to be sufficiently strong to deter widespread violation of Sanctuary regulations. However, in the event that analyses of use patterns after Sanctuary designation indicate that additional surveillance is required, NOAA will provide for more intensive enforcement to protect Sanctuary resources. The effectiveness of Sanctuary enforcement operations will be evaluated two years after Sanctuary designation and annually thereafter.

Emphasis will also be placed on information development and dissemination as well as after-the-fact enforcement efforts. The interpretation and education program will therefore be important in engendering voluntary compliance with Sanctuary regulations.

(a) Public Education and Information

Because the most effective enforcement is prevention, the Sanctuary education program will make every effort to inform users of the need to use the Sanctuary environment wisely. Much of this effort will involve the preparation of easily understood brochures and other written materials on regulations, and the reasons for them. These materials will be made available to all Sanctuary users.

(b) Planning and Coordination

Information obtained from the research program and from surveillance- enforcement activities on Sanctuary visitor use patterns, frequently occurring violations, and potentially sensitive resources, will be reviewed in periodic meetings between the Sanctuary Manager, the Sanctuary Advisory Committee and enforcement agency personnel to determine the adequacy of surveillance levels.

C. Research

1. General Context in Management

Specific sites within the study area have a long history of research and a considerable amount of baseline environmental information has been documented. These are historical research areas of national significance. Año Nuevo Island and Año Nuevo Point have been intensively studied as has the rocky intertidal area along the northern shoreline of the Monterey Peninsula (Hopkins Marine Life Refuge and Pacific Grove Marine Gardens Fish Refuge). The Monterey Canyon and the Bay environment have been the focus of research as well.

Six major marine research institutions are found in the proposed Sanctuary. These are the University of California's Institute of Marine Sciences at Long Marine Laboratory at Santa Cruz; San Jose State University's Moss Landing Marine Laboratories at Moss Landing; Stanford University's, Hopkins Marine Station; the Center for Ocean Analysis and Prediction (NOAA) and the Naval

Postgraduate Marine Laboratory; Granite Canyon Marine Laboratory (California Fish and Game) and Monterey Bay Aquarium Research Institute (Incorporated May, 1987).

The opportunities for undertaking marine research in the area are excellent. The diversity of habitat types and communities is outstanding and past studies provide important baseline information. The Monterey Canyon provides a unique opportunity to undertake deep water marine research without having to undertake long and expensive cruises offshore. Finally, the marine research institutions within the area provide an exceptional resource to draw upon in furthering our understanding and thus the management of the proposed Sanctuary's marine resources.

Effective management of the MBNMS will require the inauguration of a research program that effectively coordinates the existing research programs and addresses management issues. The role of the Sanctuary can serve to provide a forum for discussion of research priorities and exchange of information among local research institutions. The Sanctuary can also provide limited but long term logistical and financial support for research studies consistent with the goals of the Sanctuary program.

Specific priority research needs for the Sanctuary will be identified and approved by MEMD with advice from the Sanctuary Advisory Committee. This process is described in the following Sections.

Scientific investigations into the Monterey Bay ecosystem structure and function is essential so that managers can develop

effective solutions to management problems. Research funded by the MEMD will be directed to improving our knowledge of the Sanctuary's environment and resources. This research will not only expand our understanding of basic coastal and marine processes but will be the basis for evaluating activities that may affect the Sanctuary's resources. The general direction of the research program and the process for preparing an annual Sanctuary Research Plan is discussed below.

2. Framework for Research

The research program consists of three major project categories:

- Baseline studies to determine the features and processes of the natural environment; to determine the abundance, distribution, and interaction of the living resources; distribution and status of cultural resources and to describe the pattern of human activity in the Sanctuary from prehistoric times to the future;
- Monitoring to document changes in environmental quality, in ecology, and in human activity; and
- Predictive studies to assess the causes and effects of environmental and ecological changes.

Each of these categories is described in more detail below:

(a) <u>Baseline Studies</u>

Baseline studies will be designed to obtain a better understanding of the physical oceanography and ecology of the Sanctuary. Because Monterey Bay is located in an area subject to hydrocarbon spills and discharge effluents, Sanctuary managers need sound information on water circulation. This information would be used to improve understanding of the dispersion pattern of possible oil spills and current land-source and ocean-source discharges into

the Sanctuary as part of the Sanctuary's contingency planning efforts. A basic understanding of the physical oceanographic processes of the Monterey Bay area at a mesocosm scale is essential before one can undertake predictive studies of human activities on the marine environment.

Studies into the transport of discharges and materials from sources to sinks throughout the water column is necessary before one can conclusively establish cause and effects of these anthropogenic inputs. It is hoped that ultimately this research will establish a firm scientific basis from which to apply management and possible regulatory measures that will reduce the impacts and costs of these human activities on the environment and society.

Basic physical oceanographic studies should focus on interchange of water masses between Bay and open ocean, upwelling and gyre dynamics. Process oriented studies can use resident, indicator species to identify local water mass movement and elucidate key productivity areas or areas of high diversity. Results could then be incorporated into an understanding of food chain relationships and predator-prey foraging dynamics.

Such studies could then be expanded upon to determine whether effects on the resources of the Monterey Bay area are caused by biological impacts, i.e., inter- or intraspecific competition or predation such as between salmon, seabirds, shorebirds and marine mammals, or from abiotic effect such as sea temperature rise from El Nino events or from human activities such as degradation of

water quality via pollutants. For example, a fishery stock assessment could be instituted to determine the species composition and abundance of the fish population on Monterey Bay. The data collected in this study would serve to document the Bay's value as a fishery habitat and provide the basis for estimating the effects, if any, of increased fishing intensity, climatic change, fluctuations in predator and prey abundance, or pollutants on the fishery.

Comprehensive knowledge of the distribution of organisms and their dependence on environmental factors is needed for interpretation as well as for resource protection. The environment at representative depths and locations should be characterized by the collection of additional baseline data on water temperature and salinity, light penetration, upwelling circulation and nutrient-load. This information should be correlated with data on the abundance and distribution, by depth zone and location of species populations living within and transiting the Monterey Bay area. Data of this type have been collected by the numerous research institutions surrounding Monterey Bay (Section II), but there are still many gaps in our knowledge of Monterey Bay ecology, specifically land-sea interactions.

The interaction of physical oceanography with biological studies will assist in developing an understanding of the ecology of the region and the general health and productivity of the Bay area. The research and education programs in general will emphasize a multi-disciplinary, multi-institutional, integrative

approach that will engender a regional and cooperative attitude to basic and applied scientific issues. The geographic location of the proposed Sanctuary provides an excellent opportunity to integrate research that investigates the effects of man's land activities on the resources and human uses of the marine environment. The data collected from these studies would serve to document the Bay's value as a productive ecosystem and focus for public recreation and provide the basis for estimating the effects, if any, of present and future land-use practices on the Bay's resources.

Additionally, an historical context study, including a general literature search, will be conducted to identify probable historical, archeological and paleontological sites within the Sanctuary. This research will be followed by a field reconnaisance-type remote sensing survey and archeological assessment to locate and evaluate to the existing historical and cultural resource base in the Sanctuary. These baseline cultural and historical resource studies will provide the fundamental information necessary for developing a cultural and historical resource management strategy and education/interpretation program for the Sanctuary.

(b) Monitoring

Effective management requires a data base more comprehensive than simply the number of plants, animals, and non-living elements within the Sanctuary. It requires an understanding of long-term

changes to the status of the resources. Monitoring provides such understanding. Monitoring data indicative of the relative health of resources can be used to detect ecological changes and trends. This program should include pollution monitoring studies and studies to monitor the population dynamics of species inhabiting the benthos and water column of Monterey Bay's intertidal zone, canyons and continental shelf. Changes in the relative distribution of these species could indicate the existence of natural or man-caused threats to Bay resources. A three-phase monitoring program has been initiated at the neighboring Elkhorn Slough National Estuarine Research Reserve. This program can be coordinated and developed in concert with a program suitable for the Monterey Bay National Marine Sanctuary.

The resources of Monterey Bay are exposed to many different types of threats. Research and monitoring needs could be ranked according to the perceived magnitude of the threat. Among the threats to the Bay resources are: oil and gas activities as well as discharges from the land and ocean including point source (sewage treatment plants, combined sewer overflows, etc.) and non-point source (agriculture, marinas, urban runoff, etc.) pollutants. Pollutant loading into the Sanctuary can occur indirectly via land runoff from rivers or the atmosphere and directly from man's activities such as ocean dumping, outfall pipes or vessel discharges.

Many activities and phenomena in the Bay warrant long-term investigation and monitoring. For example studies could be

implemented to monitor the effects of (1) commercial vessel traffic in the area; (2) recreational activities, such as the use of jet-skis, hovercraft, and small power boats (thrill craft); (3) changes in the abundance and proportions of adult to juvenile invertebrates and fish larvae; (4) fluctuations in the abundance of whale, pinniped and seabird species in the Sanctuary; (5) the intensity and relative importance of sport fishing, commercial fishing and nature observation activity; (6) biological input of organics and fecal coliforms from pinnipeds at Año Nuevo; (7) effects of natural versus man-induced (i.e., sand mining) erosion and sedimentation; (8) fate of enteric pathogenic bacteria in Monterey Bay and West Coast waters in general; and (9) fishery/mammal interactions such as the by-catch of sea otters and birds in gill nets and the competition between sport divers and otters for abalone.

In general the monitoring data needs to be collected and analyzed in a manner so that it is widely applicable and provides timely and pertinent information for academic and management purposes. Status and trends of contaminants in Monterey Bay is presently underway with the Mussel Watch Program. However, there is a need for before, during and post-hydrocarbon activity monitoring and toxicological assessments. These studies should be directed at all trophic levels of concern including plankton, algae, fisheries, invertebrates, mammals, and birds. Recently a monitoring program has been initiated by Minerals Management Service (MMS) for hydrocarbon activities in Southern California (MMS, 1988). A similar study should be considered if Lease Sale

119 in central California is to proceed as scheduled.

Overall the monitoring program will assist in our understanding of the general health of the Bay. It could help discover sources of pollutants and assist in the establishment of cause and effects relationships as part of long-term toxicological evaluations. It could also elucidate the changing patterns, and magnitudes of input of contaminants. Finally the monitoring program will carefully address the issue of what to do with the data and how to apply the findings for basic science as well as applied management purposes.

(c) Predictive Studies

In addition to baseline research and monitoring, the Sanctuary research program will include studies, as needed, to analyze the causes and consequences of changes in the ecosystem and to predict the effects on it of new or more intense human activity in the area. Unlike the monitoring program these predictive studies are envisioned to be more short-term and directly targeted to an immediate management issue. Studies could be made to determine the effects on marine mammals of possible increases in boating activity if heightened interest in whale watching and fishing excursions results from Sanctuary establishment. A knowledge of these effects would enable management to provide information to Sanctuary users to avoid disturbing these animals unnecessarily.

Other studies of whales, pinnipeds and seabirds in the Sanctuary could be initiated to determine their range, where they

come from, and how dependent they are on the food resources of the Bay. These studies should be closely tied into similar studies conducted in the GFNMS and Año Nuevo research programs. One such study, for example, might be an investigation to determine (1) whether the decrease in Steller sea lions in the Farallon and Channel Islands can be attributed to a decline in prey availability and compare the results to a similar study on the relatively stable Stellar sea lion population on Año Nuevo and; (2) the importance of the Monterey Bay fish stocks in sustaining the Steller sea lion population.

3. Selection and Management of Research Projects

To ensure that projects considered for funding by the MEMD are directed to the resolution of Sanctuary management issues and concerns, the Sanctuary Manager, the SAC and the MEMD, will follow procedures developed by the MEMD, to ensure that the Sanctuary's research program is consistent with overall Program policies and directions. These procedures include: (1) preparing an annual Sanctuary Research Plan (SRP) and (2) monitoring the progress of research in the Sanctuary. To some degree, the research program for the MBNMS will be coordinated with the research and monitoring program at the Elkhorn Slough National Estuarine Research Reserve.

(a) <u>Preparing an Annual Plan</u>

Each year a Sanctuary Research Plan (SRP) will be prepared for the MBNMS. The SRP will then be incorporated into a national plan which includes annual plans for each Sanctuary. Steps involved in

the annual planning process include:

- Identifying management concerns for the Sanctuary with supporting evidence or rationales.

- Based on the identification of management concerns, research priorities shall be established. Research priorities are established by the Sanctuary Manager in cooperation with the SAC and MEMD. The most important factors to be considered in establishing annual research priorities will be the following:

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

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

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

- Research workshops are held on an occasional basis to facilitate the identification of research problems. After the management issues and research priorities are developed, a draft SRP is prepared.

- The draft SRP is circulated by the MEMD for peer review.

- A final SRP is prepared. This SRP includes documentation of how each project meets the national selection criteria. The final SRP is then incorporated by MEMD into a National Sanctuary Research Plan. The highest ranking research projects are selected from the national plan and a procurement schedule is prepared.

- A research announcement and request for proposals (RFP) is prepared. The announcement discusses management concerns and summarizes past and on-going research. Its purpose is to solicit proposals from the scientific community for specific research to carry out the SRP.

If research proposals include activities that are prohibited by Sanctuary regulations a permit may be issued by NOAA upon application by researchers or, it may be determined that all or part of the research should be conducted outside of the Sanctuary. Research on specially protected or endangered species, such as the brown pelican and certain marine mammals, may require additional

research permits from other agencies.

(b) Monitoring Progress

The Sanctuary Manager will monitor the performance of research projects and keep records of all research underway, equipment being used on site, frequency of researchers' visits, and progress to date. Progress reports and final reports to the MEMD and Sanctuary Manager will be required to ensure conformance to schedules outlined under the terms of the contract. Final reports may be reviewed by recognized scientists and resource managers before approval by the MEMD. Outstanding project reports will be published by the MEMD in its Technical Report Series.

4. Information Exchange

To complement directly funded research, the MEMD will encourage research funded from other sources particularly where it supports Sanctuary management objectives. In this regard, the MEMD will make available to other agencies and private institutions current Sanctuary resource data obtained from past and ongoing research projects.

D. Education

1. General Context in Management

Sanctuary designation could provide local governments, businesses, citizen groups, farmers and existing institutions, information and techniques to protect the natural environment of

Monterey Bay. Increased public understanding and appreciation of the value of Monterey Bay resources is essential for their protection. The interpretive program for the MBNMS will be focused on improving public awareness of the Sanctuary and providing information on Bay resources and Sanctuary regulations designed to protect them.

2. Educational Opportunities

Opportunities for interpreting the MBNMS fall into two broad categories: education for local visitors and potential users of the Sanctuary, including; school groups and teachers, fishermen, boaters, divers, etc., as well as education for visitors at local information Centers and at the Sanctuary headquarters. Interested groups not visiting either location may also benefit from learning about the Sanctuary's resources.

The diversity of habitats and communities, the unique Monterey Canyon, and the overlap of human uses of the resources such as fisheries present unique opportunities for education. There are many potential vehicles for education including the highway pulloffs, existing State park, beach, refuge and reserve programs, university extension programs, and boat tours. The large numbers of visitors to the area (for example, 1 - 2 million yearly on the Big Sur coastal highway) is a potential "market" for educational information in addition to local residents and agencies.

The Monterey Bay Aquarium in Monterey, the Año Nuevo facilities, and the Elkhorn Slough NERR, as well as other State and private educational facilities such as Point Lobos, Point Lobos

Natural History Association, Big Sur, and university programs add an exciting, existing dimension to interpretation of the proposed Sanctuary area, and present a great opportunity for presentation of information on the proposed Sanctuary program.

As well as established facilities there are a number of locations throughout the Sanctuary's coastal area that present additional opportunities for educational and interpretive services for visitors to the area. For example the Pigeon Point Lighthouse, Davenport, Wilder Ranch, Pt. Santa Cruz and New Brighton/Seacliff Pier already provide education opportunities on a variety of cultural, historical and fishing subject areas. Waddell Creek, Moss Landing State Beaches, Carmel/Stillwater and the Pt. Sur Lighthouse are all excellent recreational sites for windsurfing, sportdiving, whalewatching, surfing and sportfishing. Big Basin, Natural Bridges State Park, Salinas River National Refuge, Asilomar and the area between Lover's Point to Pebble Beach are areas of easy public access for nature viewing and intertidal and estuarine ecology education. Finally, Santa Cruz Pier and Harbor, Capitola Wharf, Manrisa/Sunset Beach, Moss Landing Harbor, Marina, Monterey Harbor and Piers, Coast Guard Breakwater and Carmel Beach are all excellent locations to establish signs and displays. These educational displays would provide visitors, residents and users of the Sanctuary with a brief description of the Sanctuary's resources and uses. The signs could also outline the objectives and goals of the National Marine Sanctuary Program and specifically educate the public regarding the Monterey Bay National Marine Sanctuary

regulations.

3. Educational Programs

Education for the MBNMS will consist of three distinct sub-programs:

- Site visitor programs and information for regular users such as fishing and whale watching excursions, other recreational visitors to Sanctuary waters and local public and school groups;
- Information center programs for those visiting the facilities at the MBNMS headquarters and other nearby information centers; and
- Outreach programs for interested groups not visiting the Sanctuary.

It should be noted again, however, that many of these programs will be carried out in coordination with programs already sponsored by existing interpretative programs.

(a) Site Visitor Programs

Whale watching and other nature viewing at Monterey Bay is generally incidental to sport fishing from excursion boats, but there is a potential for excursions solely for the purpose of nature viewing. Nature enthusiasts visiting Monterey Bay have the opportunity to enjoy watching sea lions, porpoises and Grey whales as well as the large flocks of seabirds that feed in Bay waters. Brochures and educational materials will be made available to fishermen and nature viewers to make them aware of Sanctuary regulations, particularly with regard to waste disposal, and to inform them about the seabirds and marine mammals that may be seen

in the Sanctuary and the rich ecological communities lying beneath its waters.

On-site education provided by the MBNMS manager will consist largely of written material describing the Sanctuary and explaining its regulations. This information will be available to the wide variety of recreationists and tourists who visit the area. The program will actively coordinate with existing educational programs. If there is sufficient public interest and if funding and staff resources are available for expanding this program, the Sanctuary Manager will consider co-sponsoring special excursions to Monterey Bay waters, organized by non-profit organizations, and providing on-board interpreters.

(b) Information Center Programs

The establishment of a Sanctuary headquarters in the area and the existence of other visitor and information centers along the coast provide an opportunity to inform visitors to these sites about the Monterey Bay environment. Many of these visitors would not normally visit Monterey Bay; yet, given the opportunity to see educational exhibits and brochures about the Sanctuary at these centers, their appreciation for the special qualities of the Bay environment should be enhanced. The feasibility of establishing additional distribution points for brochures and information and space for posters and displays will be investigated.

There are geographically distributed educational/interpretive programs that present a range of opportunities for users to gain an

appreciation of the marine environment. To a large extent these programs are not coordinated.

Año Nuevo State Reserve: The University of California, Santa Cruz, has a visiting schools program, and is involved in the Año Nuevo docent program which train guides. There is a guided walk program at Año Nuevo dealing with all aspects of the natural history of the reserve. Emphasis is on the growth of the elephant seal population, and pinniped ecology. A visitor center is being planned and the area attracts approximately 140,000 visitors/year.

Long Marine Laboratories Aquarium: Presents program and docent led tours of research facilities.

Pacific Grove Marine Gardens Fish Refuge: Primarily used for recreation, especially diving.

Hopkins Marine Life Refuge: This area is primarily used by researchers.

Point Lobos State Reserve: A small educational program is conducted and some guided walks are available. School groups are encouraged to visit Asilomar State Beach rather than Point Lobos.

Carmel Bay Ecological Reserve: This area is used by researchers, sport-fishermen and sport divers.

California Sea Otter Game Refuge: At present the Refuge does not have an educational program dedicated to the California Sea Otter.

Natural History Museum in Santa Cruz and Pacific Grove Natural History Museum: Provides visitors with information on the marine environment.

Moss Landing Marine Laboratory: Holds an open house each year to present ongoing research. In addition, programs are offered to school groups.

Monterey Bay Aquarium: Presents programs dealing with all facets of the proposed Sanctuary environment. The goal of the aquarium is to "promote public knowledge and appreciation of the marine environment through an exhibit program based in Monterey Bay". Based on the theme of habitats of Monterey Bay, the Aquarium exhibit program offers visitors a first-hand look into the world of these diverse undersea communities. On-site school and outreach programs provide information to approximately 100,000 school children per year.

California State Park and Beach System: The parks and beaches offer public access to the shoreline throughout most of the study area. Access is only difficult along the Big Sur shoreline. There are only a limited number of educational programs considering the rich marine resources.

(c) Outreach Programs

Finally, the MBNMS educational program will try to reach groups in the coastal region of California and elsewhere who have an interest in Monterey Bay and related areas, but are not apt to visit the area. This project entails identifying these groups and making educational materials available to them.

These programs will be carried out in conjunction with similar local programs to provide off-site education. Where possible, they

will involve close cooperation with environmental study groups such as the Sierra Club, Center for Marine Conservation, Audubon Society, Friends of the Sea Otter, and the Whale Center; research and education organizations, such as the California Academy of Sciences, the University of California and the Pescadero Marsh Natural Reserve; local officials in Monterey, Santa Cruz and San Mateo counties; the State Sea Grant Program and the Association of Monterey Bay Governments (AMBAG) and representatives of the tourism and recreational and commercial fishing industries. These groups will be provided with educational materials on the Sanctuary and will be encouraged to inform others of the availability of these materials. If interest is strong enough, a slide presentation or mobile exhibit may be developed for the use of schools and private groups.

Section IV. Administration

A. Administrative Framework

This section of the management plan describes the roles of the agencies that will be involved in Sanctuary management, proposes strategies to coordinate their activities, and provides for periodic evaluation of the effectiveness of the management plan. Sanctuary management consists of three functions: resource protection, research, and education. Administration oversees all other functions and establishes who is responsible for implementing specific programs. The administrative framework ensures that all management activities are coordinated.

The MEMD is responsible for the overall management of the proposed MBNMS. The MEMD will coordinate its on-site activities through cooperative agreements with the State, regional, local and other Federal agencies. The general administrative role of each agency is as follows.

1. Marine and Estuarine Management Division

The National Marine Sanctuary Program is managed by the MEMD. A site-specific management plan is prepared for each Sanctuary to ensure that on-site activities in resource protection, research, and education are coordinated and consistent with Sanctuary goals and objectives.

The MEMD develops a general budget, setting out expenditures for program development, operating costs, and staffing. Funding priorities will be reviewed and adjusted annually to reflect

evolving conditions in the proposed MBNMS and National Marine Sanctuary Program priorities and requirements. The MEMD also establishes policies and procedures in response to specific issues in each Sanctuary. Detailed MEMD responsibilities are listed under the resource protection, research, education, and general administration sections which follow.

The Sanctuary Manager for the MBNMS reports directly to the MEMD. In this capacity, the Manager represents the MEMD and is the primary spokesperson for the MBNMS. The Sanctuary's headquarters will be located in the Monterey Bay region. The Manager will serve on the Elkhorn Slough National Estuarine Research Reserve Advisory Committee, assuming the role formerly filled by the Gulf of the Farallones NMS Manager.

2. Sanctuary Advisory Committee

The National Marine Sanctuary Program is different from other special area management programs because Sanctuaries are to be managed for research and education as well as for resource protection. In addition, several agencies and interest groups are involved with the Sanctuary's management. Accordingly, a mechanism to assist the interested groups in participating in Sanctuary management will be developed. The Sanctuary Advisory Committee (SAC) will be established to provide this management function.

The Marine and Estuarine Management Division will determine the structure, composition and functions of the SAC. All interested groups and agencies will be consulted to ensure that the SAC takes all interests into account and that the committee is

representative of a broad based constituency to ensure that the Manager has a broad information base upon which to make any management decisions. The experience and expertise of the SAC will be available to the Manager on an ad hoc basis as well as during regularly scheduled meetings. In order to function efficiently in an advisory capacity it may be beneficial to subdivide the SAC into subcommittees that correspond to the resource protection, research, education and general administration issues. Detailed SAC responsibilities are listed under the resource protection, research, education and general administration sections which follow.

3. Federal Agencies

The USCG is responsible for enforcing Federal laws in waters under U.S. jurisdiction. This mission includes the enforcement of Sanctuary regulations promulgated for the MBNMS. The USCG also manages operations for the control or removal of oil and hazardous substances resulting from offshore spills. In addition to enforcing fishing and vessel discharge regulations, the USCG is also responsible for regulating vessel traffic, maintaining boater safety, and coordinating search and rescue operations.

The United States Fish and Wildlife Service and National Marine Fisheries Service (NMFS) also have existing management and enforcement capabilities in the proposed Sanctuary area with regards to fisheries, marine mammals and endangered species.

The EPA has regulatory responsibilities with regard to sewage outfalls, and ocean dumping. EPA has delegated discharge

permitting authority to the State government.

The Corps of Engineers grant permits that are based on EPA guidelines for the discharge of dredged materials into State waters. The Corps has sole jurisdiction over marine construction, excavation or fill in any navigable waters of the United States.

The United States Army and Navy both conduct military training activities in the proposed Sanctuary area.

4. State, regional and local agencies

The Monterey Bay area already has an infrastructure for coastal resource management and numerous personnel with enforcement training as well as wide experience with the resources and user groups within the proposed Sanctuary area. In general NOAA will work closely within the existing administrative framework of State, regional and local resource management agencies such as the State of California's Resources Agency, which is responsible for the management and enforcement at the variety of State parks, beaches, refuges and reserves. Other California state agencies with existing primary jurisdiction in the area of Monterey Bay are: the Coastal Commission, the Regional Water Quality Control Board, the State Lands Commission, the Air Resources Board and the Historical Resources Commission.

It is NOAA's intent to work closely with the State to ensure full Federal-State cooperation and to coordinate the Sanctuary program effectively with the existing State administrative framework. This cooperation will involve the formalization of Cooperative Agreements, Memoranda of Understanding and deputization

of officials, if necessary, for enforcement purposes.

NOAA will also cooperate with regional organizations such as the Association of Monterey Bay Area Governments (AMBAG), local fishery organizations and Harbor Masters as well as with the Cities of Monterey and Santa Cruz and neighboring towns such as Moss Landing.

To facilitate the administrative procedures regarding certification and notification of leases, licenses, permits, approvals, rights or other authorizations (as described above, Part II, Section III, B.2. Designation Document and Regulations), NOAA intends to work closely with the owners or holders of, or applicants for, leases, licenses, permits, approvals, rights or other authorizations as well as with the appropriate issuing agencies. The Sanctuary Manager will also work with AMBAG to receive notice of activities that may affect the proposed Sanctuary.

B. Resource Protection: Roles and Responsibilities

1. Marine and Estuarine Management Division

(a) Approves priorities for funding for resource protection;

(b) Monitors the effectiveness of interagency agreements for surveillance and enforcement and negotiates changes where required;

(c) Develops contingency and emergency-response plans and, based on these plans, negotiates applicable interagency agreements;

(d) Monitors the effectiveness of existing Sanctuary regulations and promulgates changes where necessary; and

(e) Coordinates efforts to protect and manage Sanctuary resources with other Federal, state, regional and local agencies and with public and private organizations as well.

2. Sanctuary Manager

(a) Recommends to the MEMD priorities for allocating funds annually to resource protection, considering the advice of the SAC to ensure consistency with Sanctuary regulations and provide adequate resource protection;

(b) Assists in the coordination of surveillance and enforcement activities by providing liaison with the Federal, state, regional and local agencies;

(c) Reports regularly to the MEMD on surveillance and enforcement activities, violations, and emergencies;

(d) Provides information for use in training Sanctuary enforcement officials;

(e) Monitors and evaluates the adequacy of emergency-response plans and procedures in the Sanctuary;

(f) Maintains a record of emergency events (e.g., oil spills) in and around the Sanctuary; and

(g) Evaluates overall progress toward the resource protection objectives of the Sanctuary program and prepares semi-annual and bi-monthly progress reports highlighting activities for the MEMD.

3. Sanctuary Advisory Committee

(a) Advises the Sanctuary Manager on the effectiveness of interagency agreements for surveillance and enforcement and;

(b) Advises the Sanctuary Manager on the effectiveness of the Sanctuary regulations in providing adequate resource protection.

4. Federal Agencies

(a) USCG holds broad responsibility for enforcing all Federal laws throughout the Sanctuary;

(b) USCG ensures enforcement of Sanctuary regulations;

(c) USCG provides on-scene coordination and Regional Response Center facilities under the National Contingency Plan for the removal of oil and hazardous substances in the event of a spill that threatens the Sanctuary;

(d) NMFS works with the CDF&G, under the Magnuson Fishery Conservation and Management Act (MFCMA), on approving and enforcing Fishery Management Plans (FMPs) prepared by regional fishery management councils to ensure protection of fishery resources;

(e) NMFS shares responsibility with the FWS for implementation of the Marine Mammal Protection Act and the Endangered Species Act to prevent taking of any endangered species;

(f) EPA has regulatory responsibilities with regard to sewage outfalls (under the Clean Water Act via National Pollutant Discharge Elimination System (NPDES) Permits), and ocean dumping (under Title I of the Marine Protection, Research, and Sanctuaries Act) to protect water quality;

(g) The Corps of Engineers (COE) grants permits that are based on EPA guidelines for the discharge of dredged materials into State waters. Pursuant to the Rivers and Harbors Act, a permit must be obtained from the COE prior to any marine construction, excavation or fill activities in any navigable waters of the United States (33 U.S.C. 403). The COE may refuse to issue permits on the basis of a threat to navigation or potential adverse effects on living marine resources.

5. State, regional and local agencies.

(a) California Department of Fish and Game (CDF&G) responsible for managing living resources and enforcement of state laws and regulations throughout the Sanctuary;

(b) CDF&G is deputized to enforce specific federal laws throughout the Sanctuary (e.g., the Endangered Species Act, MFMCA);

(c) CDF&G and California Department of Parks and Recreation (CDP&R) evaluate progress towards management objectives for resource protection and adjust annual priorities accordingly;

(d) CDP&R has established an Underwater Parks Program which is managed in conjunction with CDF&G to protect special marine resources and water-based recreational values in ocean waters within state jurisdiction.

(e) CDP&R is responsible along with the National Park Service for the management of the Los Padres National Forest.

(f) CDF&G and CDP&R monitors the effectiveness of State regulations within the Sanctuary and considers recommended changes to the State regulations through the State Legislature and Governor of California's Office;

(g) CDF&G monitoring and surveillance of fisheries resources (populations) through port sampling and marine contamination through mussel watch program;

(h) CDF&G provides on-scene coordination of State clean-up response in the event of an accidental spill of oil or hazardous materials which threaten the State's fish and wildlife resources;

(i) California Coastal Commission (CCC) under the California Coastal Act of 1976 establishes a comprehensive set of specific policies and issues permits for the protection of coastal resources and the management of orderly economic development throughout the coastal zone;

(j) The State Lands Commission (SLC) has jurisdiction over all state owned lands and submerged lands. SLC has adopted regulations for the protection and use of public trust lands in the coastal zone;

(k) State Water Resource Control Board (SWRCB) and the nine regional water quality control boards (RWQCB) have primary authority for regulating water quality in California. The authority to administer the NPDES permits has been delegated by EPA to the SWRCB and by the State to the Regional boards;

(l) 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); and

(m) California Historical Resources Commission is the State agency responsible for the preservation of representative and unique archaeological, paleontological, and historical sites in the land and water areas of the state.

C. <u>Research: Roles and Responsibilities</u>

1. Marine and Estuarine Management Division

(a) Prepares annual Sanctuary Research Plan's (SRP's) for each Sanctuary;

(b) Prepares an annual National Research Plan (NRP) and budget, based on the SRP's of individual Sanctuaries and in accordance with priorities determined at the National level;

(c) Sets dates for procurement based on the NRP;

(d) Administers interagency agreements and contracts for research;

(e) Reviews all interim and final research reports submitted by the Sanctuary Manager; and

(f) Issues permits, through OCRM, for research activities, considering the recommendations of the Sanctuary Manager, to ensure consistency with Sanctuary regulations and provide additional technical review where necessary.

2. Sanctuary Manager

(a) Recommends generic areas of research to resolve management issues;

(b) Develops the Sanctuary Research Plan (SRP);

(c) Reviews research documents and progress reports submitted by contractors;

(d) Prepares assessments of research needs and priorities based on management requirements and research continuity;

(e) Implements the SRP's;

(f) Coordinates research and monitoring activities in the Sanctuary in cooperation with the MEMD, the SAC and other interested agencies or parties;

(g) Coordinates an on-site process for reviewing and evaluating research proposals and permit requests, considering the views of the MEMD, Sanctuary Advisory Committee, concerned individuals and interest groups;

(h) Submits recommendations to MEMD on the issuance of Sanctuary research permits, considering the recommendations of the SAC; and

(i) Oversees permitted research activities.

3. Sanctuary Advisory Committee

(a) Advises the Sanctuary Manager on review of research proposals, interim, and final reports;

(b) Advises the Sanctuary Manager on approval of proposals for research in the Sanctuary;

(c) Advises the Research Coordinator and the Sanctuary Manager on priority research needs; and

(d) Advises the Sanctuary Manager on the issuance of research permits.

D. Education: Roles and Responsibilities

1. Marine and Estuarine Management Division

(a) Reviews and approves the list of annual priorities for education and the annual education budget prepared by the Sanctuary Manager;

(b) Reviews and approves design proposals for all educational facilities;

(c) Reviews all educational materials prepared for the Sanctuary;

(d) Evaluates progress toward accomplishing objectives for education and adjusts long-term priorities accordingly; and

(e) Issues Sanctuary education permits, through OCRM, considering the recommendations of the Sanctuary Manager, to ensure compliance with Sanctuary regulations and provide additional technical review where necessary.

2. Sanctuary Manager

(a) Recommends annually to the MEMD a list of priorities and an annual budget for education;

(b) Prepares and circulates as required Requests For Proposals (RFP) for educational projects;

(c) Supervises the design and production of educational materials and facilities for the Sanctuary;

(d) Provides training for State staff assigned to the Sanctuary;

(e) Encourages local and regional organizations to participate in Sanctuary education;

(f) Disseminates information about the National Marine Sanctuary Program and the Sanctuary;

(g) Oversees the development of any facilities constructed for the Sanctuary, reviews site analyses and design specifications, makes recommendations as to construction and maintenance contracts, and performs similar tasks;

(h) Submits recommendations to MEMD on the issuance of Sanctuary education permits, considering the recommendations of the SAC; and

(i) Oversees permitted education activities.

3. Sanctuary Advisory Committee

(a) Advises the Sanctuary Manager, in raising public awareness of the Sanctuary and advises on the development of a local constituency by means of brochures, presentations, structured events articles for publication, and other activities consistent with the management plan;

(b) Advises the Sanctuary Manager on how to establish and operate combined MBNMS-Elkhorn Slough NERR information and education facilities to increase public awareness and appreciation of the resources of the Sanctuary; and

(c) Advises the Sanctuary Manager on the issuance of education permits.

E. General Administration: Roles and Responsibilities

1. Marine and Estuarine Management Division

(a) Ensures that the Sanctuary is operated in a manner consistent with established National program policies and with applicable National and international laws and provides guidance to the Sanctuary Manager;

(b) Identifies, analyzes, and resolves Sanctuary management problems and issues;

(c) Formulates comprehensive, long-term management plans for the Sanctuary and revises the management plan as necessary;

(d) Directs and assists the Sanctuary Manager in the implementation of the management plan;

(e) Coordinates Sanctuary management with other Federal and State agencies and private organizations;

(f) Evaluates the effectiveness of Sanctuary management and regulatory measures;

(g) Prepares a program budget for the Sanctuary;

(h) Provides funding for overall Sanctuary management and administration;

(i) Makes recommendations to the Director of the Office of Ocean and Coastal Resource Management as to the issuance of National Marine Sanctuary permits containing terms and conditions deemed appropriate (including research and education permits, see above), considering the recommendations of the Sanctuary Manager, to conduct an activity otherwise prohibited by the

Sanctuary regulations if the activity will: further the educational, natural or historical resource value of the Sanctuary; further salvage or recovery operations in or near the Sanctuary in connection with a recent air or marine casualty; assist in managing the Sanctuary; have only negligible, short-term adverse effects on Sanctuary resources or Sanctuary qualities; or further salvage or recovery operations in connection with an abandoned shipwreck in the Sanctuary title to which is held by the State of California;

(j) Issues certifications, through OCRM, with terms and conditions deemed necessary to achieve the purposes for which the Sanctuary was designated, of pre-existing leases, licenses, permits, approvals, or other authorizations, considering the recommendations of the Sanctuary Manager, to conduct a prohibited activity; and

(k) Issues terms and conditions, through OCRM, deemed necessary to protect the Sanctuary resources and qualities on applications for leases, licenses, permits, approvals, or other authorizations (or objects to issuance of such authorizations), considering the recommendations of the Sanctuary Manager, to conduct a prohibited activity.

2. Sanctuary Manager

(a) Coordinates on-site efforts of all parties involved in Sanctuary activities, including State, Federal, local and regional agencies, Elkhorn Slough NERR and the public;

(b) Reviews the management plan periodically and recommends changes to the MEMD as needed;

(c) Assists the MEMD in preparing the annual budget for the Sanctuary;

(d) Oversees day-to-day operation of the Sanctuary, including administrative functions such as bookkeeping, purchasing and keeping records of visitor activities;

(e) Supervises Sanctuary staff and other personnel, including enforcement and interpretive employees assigned to the Sanctuary;

(f) Represents the Sanctuary viewpoint on local issues and at public forums;

(g) Submits recommendations to MEMD on criteria and terms and conditions for National Marine Sanctuary permits, certifications and applications for leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity.

3. Federal, State, Local and Regional Agencies

(a) Assist in the preparation and implementation of a comprehensive, long-term management plan for the proposed Sanctuary;

(b) Assist in the periodic review of the management plan; and

(c) Appropriate issuing agency assists in the development of criteria and terms and conditions for certifications and applications for leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity.

4. Sanctuary Advisory Committee

(a) Advises on the specific plans for Sanctuary developments;

(b) Advises on all proposals for activities within the Sanctuary;

(c) Advises the appropriate Federal, State or local government on proposed actions, plans and projects in areas adjacent to or affecting the Sanctuary;

(d) Enhances communication and cooperation among all interests involved in the Sanctuary;

(e) Advises on rules and conditions for all forms of public recreation;

(f) Advises on an overall plan for the use, development and maintenance of Sanctuary lands and building; and

(g) Advises the Sanctuary Manager on recommendations to MEMD on criteria and terms and conditions for National Marine Sanctuary permits, certifications and applications of leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity.

F. Staffing Levels

Depending on the budget and personnel assigned to the Monterey Bay National Marine Sanctuary upon designation, staffing would include a NOAA manager, an assistant manager, administrative assistant, research coordinator, education coordinator and a joint position of an interpreter/enforcement official. The Sanctuary staff will work closely with the USCG, NMFS and other State and

Federal agencies in providing enforcement and surveillance in the area of the proposed Sanctuary. The need for additional staff will be determined during the first two years of operation.

G. Headquarters and Visitor Center Facilities

Sanctuary headquarters and administrative offices will be established at a suitable location within the Monterey Bay region. Areas being considered include the Cities of Monterey, Moss Landing and Santa Cruz.

Alternatives, Including the Preferred Alternative

PART III: ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

In evaluating the proposal to designate a Monterey Bay National Marine Sanctuary (MBNMS), the National Oceanic and Atmospheric Administration (NOAA) has analyzed institutional, boundary, management, and regulatory alternatives in terms of achieving optimum protection of the ecosystem, improving scientific knowledge of the area, and promoting public understanding of the value of Monterey Bay area resources and qualities. This section describes the alternatives considered in the evaluation process. Part IV describes the environmental consequences of the alternatives described below.

The fundamental choice of alternatives is between the two institutional alternatives: (1) no action or continuing the status quo, and (2) the preferred alternative, Sanctuary designation as a complementary measure to existing programs. Boundary, management, and regulatory alternatives are considered in the context of the preferred institutional alternative.

Section I: Status Quo Alternative

A. Resource Protection Regime

Reliance solely on State and Federal authorities now exercising authority over resources and activities in the study area without any marine sanctuary designation represents the status quo alternative. The extent of these controls is summarized in Table 12 (see Appendix 2 for a detailed description of relevant State and Federal agency authorities and statutory provisions that manage human activities and help protect Sanctuary resources and qualities).

This section provides a brief overview of the existing resource protection regime and an analysis of the long-term effectiveness of this regime to adequately protect Sanctuary resources and qualities (i.e., status quo reliance).

A variety of State and Federal governmental agencies and departments are responsible for regulating the proposed Sanctuary uses and managing individual resources situated therein. To date, acceptable levels of environmental quality appear to have been maintained in the offshore environs. On their own, however, they do not appear to provide the area with sufficient long-term protection reflective of the exceptional diversity of natural resources found in the Monterey Bay coastal and offshore region. Faced by prospects of more intense human activity threats, their capacity to perform effectively may deteriorate due to limited staffing, equipment, and enforcement funds. In addition, because the complex web of existing authorities is characterized by quite

Table 12. Existing State and Federal managment authorities as they relate to resources and activities.

Managed Resources and Activites	MANAGEMENT AUTHORITIES																		
	STATE AUTHORITIES									FEDERAL AUTHORITIES									
	AQCA	ASBS	CCA	SR	FGC	HCRPA	OCS	UP	WQCA	GAA	CWA	ESA	FCMA	MBTA	MMPA	NHPA	OCSA	OPA	FWSA
RESOURCE PROTECTION																			
1. Marine Mammals				DFG	DFG							NMFS FWS			FWS NMFS				
2. Marine Birds				DFG	DFG							FWS		FWS					
3. Fish/Shellfish				DFG	DFG PFMC								NMFS PFMC						
4. Research		WRCB										NMFS			NMFS				
5. Recreation		DPR	CCC		DPR			DPR											USCG
6. Historic/Cultural				DFG		HPC										HCRS NPS			
ACTIVITY MANAGEMENT																			
1. Oil and Gas Development -- Exploration & Development			CCC				SLC			EPA	COE EPA						MMS		
-- Platform Placement			CCC				SLC										MMS COE		
-- Pipelines			CCC														MMS COE		
-- Water Discharges		WRCB			DFG				WRCB		EPA								
-- Air Dischrages	ARB				DFG					EPA									
2. Fishing			DFG		PFMC DFG								NMFS PFMC						

Table 12. Existing State and Federal managment authorities as they relate to resources and activities.
(continued)

Managed Resources and Activites	MANAGEMENT AUTHORITIES																			
	STATE AUTHORITIES									FEDERAL AUTHORITIES										
	AQCA	ASBS	CCA	SR	FGC	HCRPA	OCS	UP	WQCA	GAA	CWA	ESA	FCMA	MBTA	MMPA	NHPA	OCSAL	OPA	FWSA	MPRSA
3. Shipping	ARB			DFG					WRCB	EPA	EPA							USCG	USCG	
4. Recreation		DPR	DFG	DFG	DPR						USCG EPA									
5. Research				DFG	DFG								FWS	NMFS FWS						
6. Ocean Dumping																				EPA COE

Table 12. Abbreviations of State and Federal authorities and agencies.

State

AQCA	-	Air Quality Control Act; California Health and Safety Code §§39000-42708
ASBS	-	Areas of Special Biological Significance; California Water Code §13260
CCA	-	California Coastal Act; California Public Resources Code §27000
SR	-	State Reserves, Refuges etc; California Fish and Game Code §1580 and §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 §6370
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
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
PWSA	-	Ports and Waterways Safety Act; 33 USC §§1221-1227

Abbreviation 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

Table 12. (Continued)

Federal

MMS	-	Minerals Management Service - 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
PFMC	-	Pacific Fisheries Management Council; Joint Federal-State
USCG	-	United States Coast Guard - Department of Transportation
USGS	-	United States Geogical Survey - Department of the Interior

narrowly defined missions, severe interjurisdictional policy conflicts are possible in the future. Should use pressures mount, overall management effectiveness may suffer as a result. At present, there is no one institutional entity able to facilitate conflict resolution in the interests of marine resources protection and management. The absence of such an integrative mechanism appears undesirable given the presence of so many resources, which in turn support a variety of valuable human uses.

The Federal agencies with existing primary responsibilities in the area of Monterey Bay are: the National Marine Fisheries Service (NMFS) of the Department of Commerce; the Environmental Protection Agency (EPA); U.S. Fish and Wildlife Service (FWS) and the Minerals Management Service (MMS) of the Department of the Interior; the Corps of Engineers (COE), the Department of the Army and the Department of the Navy of the Department of Defense; and the U.S. Coast Guard (USCG) of the Department of Transportation.

The California state agencies with existing primary jurisdiction in the area of Monterey Bay are: the Coastal Commission, the Regional Water Quality Control Board, the State Lands Commission, the Department of Fish and Game, the Department of Parks and Recreation, the Air Resources Board and the Historical Resources Commission.

This section will review briefly the responsibilities of these agencies in the Monterey Bay area. Additional information is provided in Appendix 2.

1. Federal Authorities

The NMFS works with the CDF&G, under the Magnuson Fishery Conservation and Management Act, on approving and enforcing Fishery Management Plans (FMPs) prepared by regional fishery management councils. Through a cooperative enforcement agreement, the CDF&G is also deputized to enforce FMPs beyond three miles from the State's coastal baseline.

NMFS shares responsibility with the FWS for implementation of the Marine Mammal Protection Act and the Endangered Species Act. The protection of cetaceans and pinnipeds is the responsibility of NMFS. The FWS is responsible for protecting endangered bird species and some marine mammals (such as the southern sea otter). Three of these bird species: the California brown pelican, the American peregrine falcon, and the California least tern, are found in the vicinity of Monterey Bay as well as the majority of the entire population of southern sea otter. The short-tailed albatross is extremely rare in this area but was recently sighted off central California in the vicinity of the Cordell Bank National Marine Sanctuary.

The USCG, in addition to its enforcement of fishing regulations, is responsible for enforcing regulations under the Clean Water Act (CWA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) to prevent pollution caused by discharges from vessels of oil, hazardous substances, or other pollutants. The USCG is also responsible for regulating vessel traffic, maintaining boater safety, and coordinating search and

rescue operations.

The EPA has regulatory responsibilities with regard to sewage outfalls, and ocean dumping. Sewage outfall regulation is governed under the Clean Water Act (CWA) via the National Pollutant Discharge Elimination System (NPDES), administered by the EPA. Under the NPDES program, a permit is required for the discharge of any pollutant from a point source into the navigable waters of the United States, the waters of the contiguous zone, or ocean waters. Within California state waters, EPA has delegated NPDES permitting authority to the State government. Title I of the Marine Protection, Research, and Sanctuaries Act prohibits the transportation of any materials from the United States for the purpose of dumping them into the territorial sea, the contiguous zone, and the ocean beyond without a permit from EPA.

The COE grant permits that are based on EPA guidelines for the discharge of dredged materials into State waters. The COE has sole jurisdiction over marine construction, excavation or fill in any navigable waters of the United States.

Pursuant to the Rivers and Harbors Act, a permit must be obtained from the COE prior to any marine construction, excavation or fill activities in any navigable waters of the United States (33 U.S.C. § 403). The COE may refuse to issue permits on the basis of a threat to navigation or potential adverse effects on living marine resources.

The MMS is responsible for the overall management of offshore oil and gas exploration and development operations in accordance

with the provisions of the Outer Continental Shelf Lands Act (OCSLA). These include enforcement of regulations pursuant to the OCSLA (30 C.F.R. Part 250) and the stipulations applicable to particular leases discussed above. This responsibility was formerly divided between the Bureau of Land Management and the U.S. Geological Survey.

The United States Army maintains an offshore restricted area extending approximately 8,000 yards offshore from its Fort Ord Military Installation. The restricted area functions as a safety buffer to protect the seagoing public from stray firearm rounds escaping from small arms firing ranges at Ford Ord. The ranges are used intermittently throughout the year. In addition, a U.S. Navy operating area exists in the northeast section of the Bay. This ocean space is reserved for mine sweeping practice maneuvers during specified months of the year.

2. State Authorities

The California Coastal Act of 1976 (the CCA) is the foundation of the California Coastal Management Program. The CCA establishes the State Coastal Commission and various regional commissions to implement the Act, granting it permit authority until such time as local governments adopt local plans approved by the Commission. It establishes a comprehensive set of specific policies for the protection of coastal resources and the management of orderly economic development throughout the coastal zone. The CCA defines the coastal zone as the land and water area of the State, extending seaward to the outer limit of the State's jurisdiction, including

all offshore islands, and extending inland generally 1,000 yards from the mean tide line. In significant coastal, estuarine, habitat, and recreational areas, it extends inland to the first major ridge line or 5.0 nm (8.0 km) from the mean high tide, whichever is less.

The State Lands Commission has jurisdiction over all state owned lands and submerged lands extending 3.0 nm (5.6 km) from the mean high tide line. Administration of State lands includes leasing of these lands for various legislatively authorized purposes; in particular, oil and gas exploration and development. In addition, as the State agency with sole responsibility for administering the trust, the SLC has adopted regulations for the protection and use of public trust lands in the coastal zone.

The CDF&G is responsible for enforcing California as well as Federal fishing laws in the 200-mile wide exclusive economic zone as well as in State waters of the territorial sea. The CDF&G also works with other Federal and State agencies with water quality projects and environmental reviews.

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 (CDP&R) has established an Underwater Parks Program which is managed in conjunction with CDF&G. CDP&R also shares responsibility with the National Park Service for management of the Los Padres National Forest.

The Porter-Cologne Water Quality Control Act is designed to enhance and maintain water quality in State waters, including ocean waters, under the jurisdiction of the State. The State Water Resource Control Board (SWRCB) and the nine regional water quality control boards (RWQCB) have primary authority for regulating water quality in California. The authority to administer the NPDES permits has been delegated by EPA to the SWRCB and by the State to the Regional boards.

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).

State 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. The Commission evaluates and makes recommendations to the State Historic Preservation Officer on nominations to the National Register. The Commission also recommends state registration of sites as landmarks and points of interest to the Public Resources Department which is responsible for maintenance of registered sites.

Under the status quo alternative, existing activities and controls would continue as presently administered. No comprehensive management scheme for the Monterey Bay area would be implemented.

Section II: Designation as a National Marine Sanctuary

This institutional alternative, NOAA's preferred alternative, proposes to designate Monterey Bay as a National Marine Sanctuary, in accordance with the provisions of Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 16 U.S.C. §§ 1431 et seq. This alternative is detailed in Part II of this document, the Sanctuary management plan. Through the management plan and the implementing regulations (Appendix 1), the preferred alternative ensures the protection of vital Sanctuary resources and Bay area habitat, offers research opportunities, and provides an education/interpretive program to enhance public awareness about the Monterey Bay area. This comprehensive program is not possible under any of the existing institutional structures alone.

The preferred alternative will cost some $504,000 for FY 1990 or $2,520,000 over five years. Approximately half of these funds will be allocated to research and resource protection and half to education and administration. The preferred boundary was selected because it correlates closely with the areal distribution of important Bay resources; the management alternatives were selected because they are more cost-effective than other alternatives and conform closely to the goals of the National Marine Sanctuary Program. The regulations were selected because they will improve protection of Monterey Bay area resources and qualities from the adverse impacts of human activities.

A. Boundary Alternatives

A number of boundary options were identified in the evaluation process. These options were narrowed to seven, which were then considered in terms of (1) the distribution of living resources, (2) geological and physical oceanographic parameters and, (3) management logistics. A brief geographical description of each boundary alternative follows. For the discussion of the environmental consequences of each boundary alternative see Part IV, Section II, C.

1. Boundary Alternative 1

This alternative represents the smallest area that would be considered for Sanctuary status encompassing approximately 460 square nautical miles. The boundary extends from the mean high tide level at Pigeon Point on a south west heading of 240° to the 50 fathom isobath; then generally following this isobath south to the point where it intersects the 3 mile geographic limit drawn from the baseline across Monterey Bay; then south along the 3 mile limit to a point where it intersects the 100 fathom isobath on the Sur platform; then proceeding generally southeast along the 100 fathom isobath to the head of Partington Canyon, until it rejoins the 3 mile limit and then south along the three mile limit until it reaches a point three miles off Partington Point on a heading of 240° and then proceeding shoreward to the mean high tide level (Figure 17). The land-side boundary follows along the mean high tide level but Santa Cruz, Moss Landing and Monterey Harbors are all excluded from this alternative's boundaries.

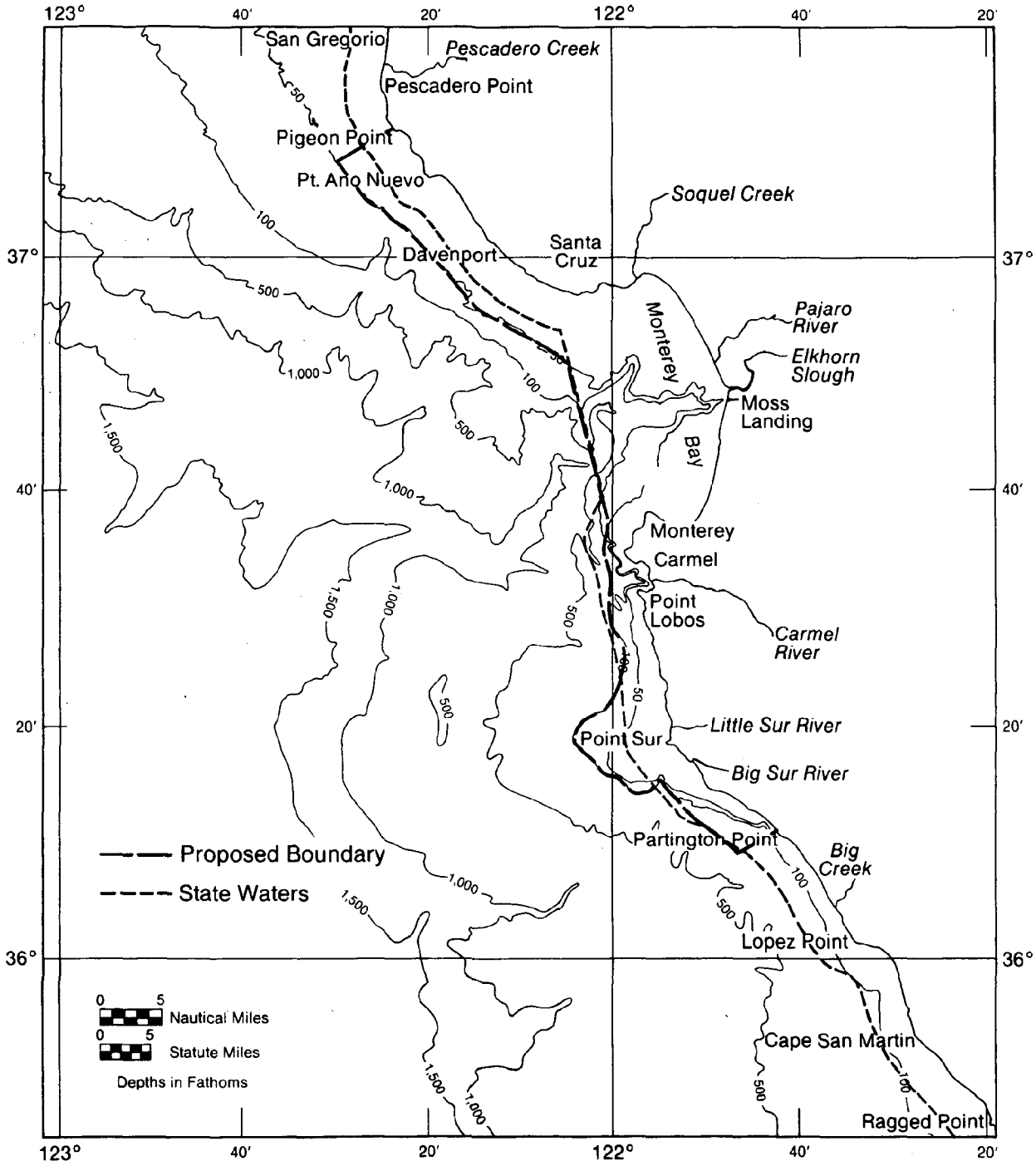


Figure 17. Proposed Monterey Bay National Marine Sanctuary Boundary Alternative #1.

2. Boundary Alternative 2

This boundary alternative, the preferred alternative, establishes a Sanctuary area of approximately 2,200 square nautical miles, adjacent to Monterey Bay, off the central coast of California. The proposed Sanctuary boundary includes the coastal and ocean waters over, and the submerged lands under, the entire Monterey Canyon between the northern boundary of Pescadero Marsh, 2.0 nmi north of Pescadero Point, and the southern boundary of Julia Pfeiffer Burns Underwater Park and Area of Special Biological Significance (ASBS), 2.5 nmi southeast from Partington Point, and extending from the mean high tide line from these sites seaward approximately 18 nmi on a southwesterly heading of 240°. These southern and northern boundaries are joined by an arc drawn from Moss Landing, with a radius of 46 nmi, over the entire Monterey Canyon complex out to the abyssal plain at 1500 fathoms (approx 3000 m) (Figure 18). Santa Cruz, Moss Landing and Monterey Harbors are all excluded from the Sanctuary boundaries.

3. Boundary Alternative 3

This boundary alternative would establish a Sanctuary area of approximately 2,900 square nautical miles. This alternative is a variation of Alternative 2 with a boundary extension to the south. Specifically the boundary extends south from the southern boundary of the preferred alternative (#2, described above), along the 500 fathom isobath (1000 m) to a point due east of Cambria and then generally proceeding shoreward to the mean high tide level at Cambria (Figure 19).

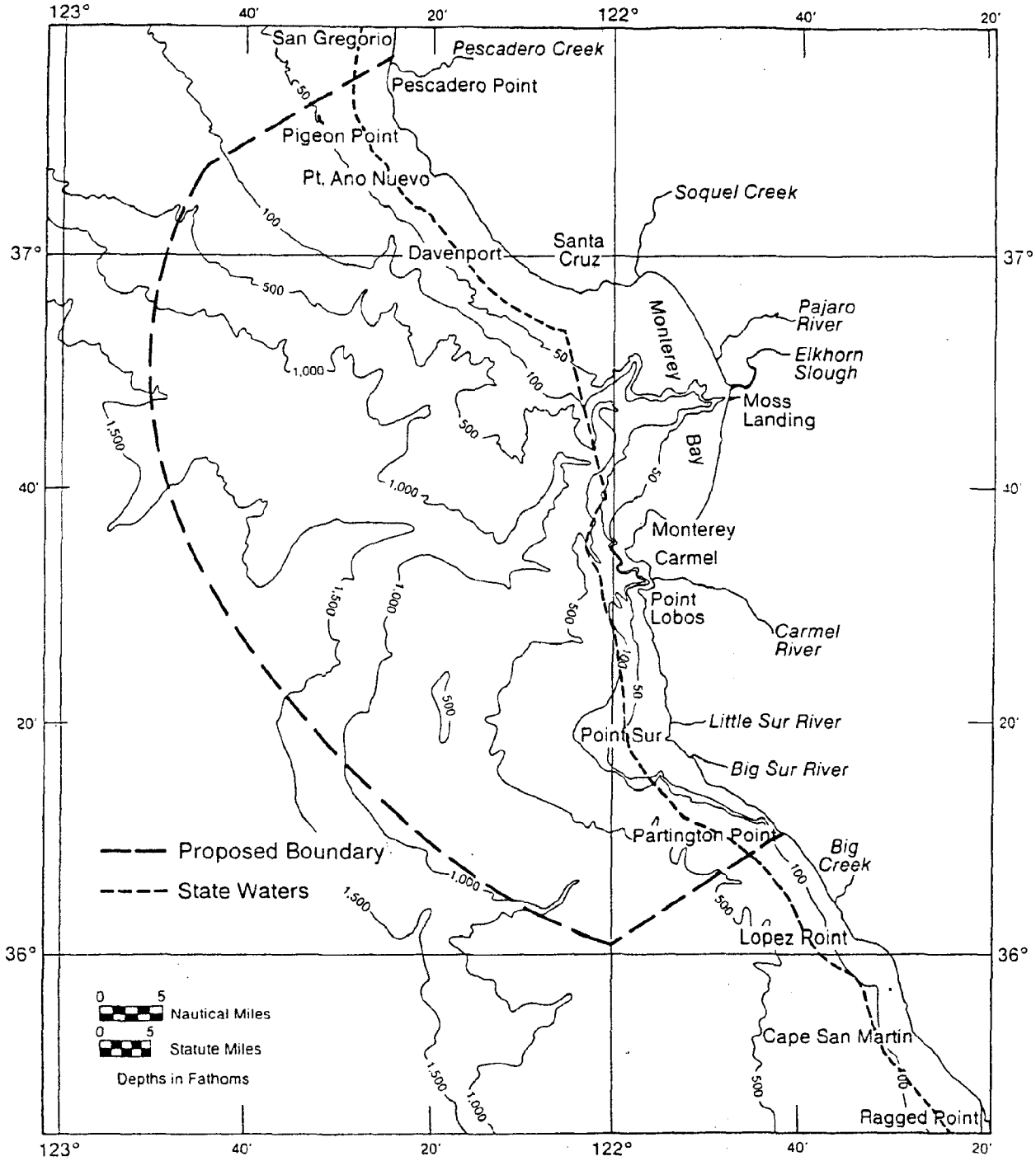


Figure 18. Proposed Monterey Bay National Marine Sanctuary Boundary Alternative #2.

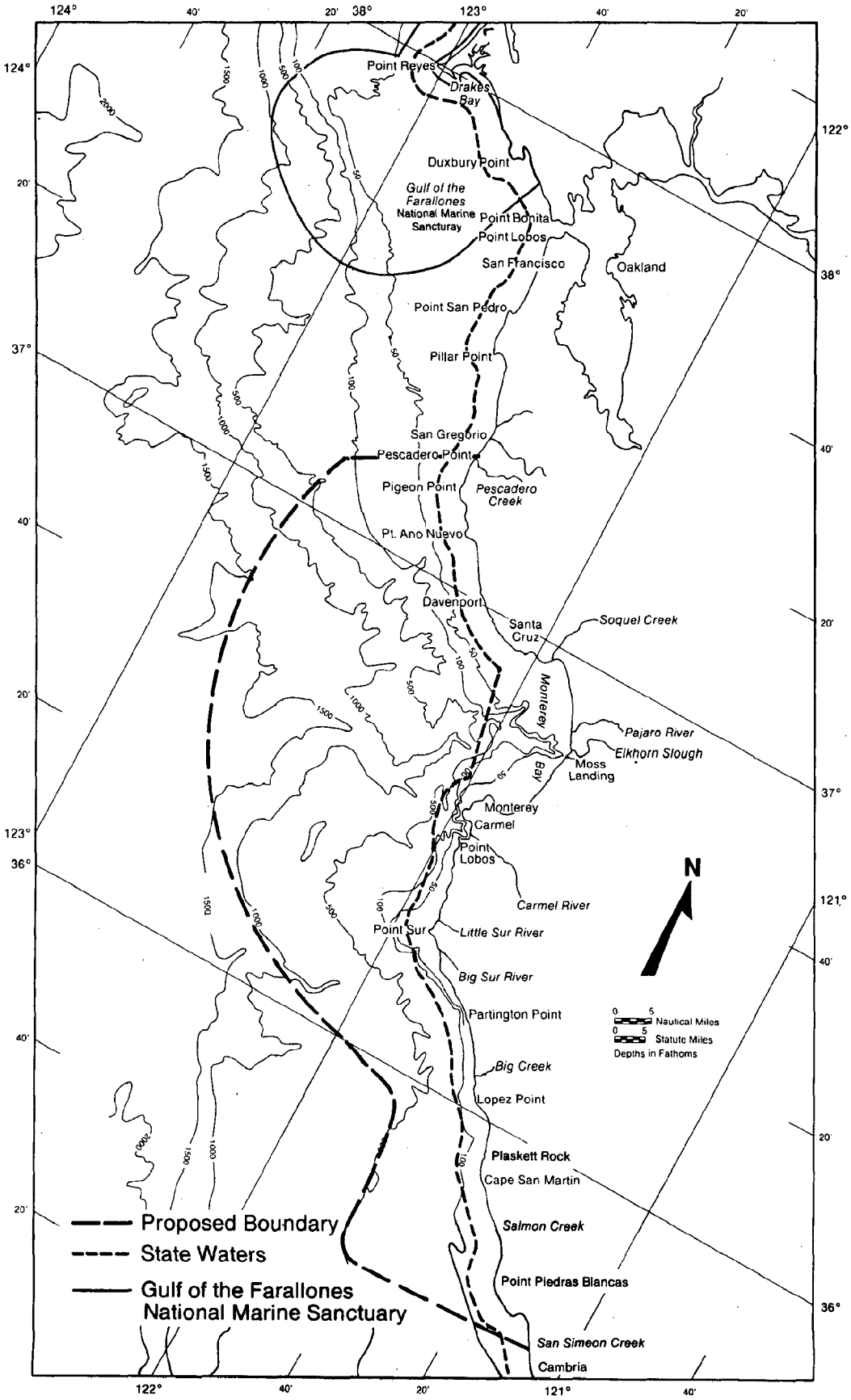


Figure 19. Proposed Monterey Bay National Marine Sanctuary Boundary Alternative #3.

4. Boundary Alternative 4

This boundary alternative would establish a Sanctuary area of approximately 3,100 square nmi (Figure 20). This alternative is another variation of Alternative 2 but with a boundary extension to the north.

Specifically the boundary extends north from the northern boundary of the preferred alternative, along the 500 fathom isobath (1000 m) to the border of the Gulf of the Farallones National Marine Sanctuary. The northern border of this alternative is contiguous with the Gulf of the Farallones and proceeds generally south along the coast, across the Golden Gate from Point Bonita to Point Lobos, and along the coast but excludes Princeton Harbor in Half Moon Bay, until this alternative rejoins the boundary of the preferred alternative 2, at the northern boundary of Pescadero State Beach.

5. Boundary Alternative 5

This boundary alternative would establish the largest Sanctuary area of approximately 3,800 square nautical miles (Figure 21). This alternative is a combination of the preferred alternative in addition to both the southern and northern extensions described above. The boundary would therefore start at the Gulf of the Farallones National Marine Sanctuary, move south along the 500 fathom isobath, then generally proceed in an arc around the Monterey Bay Canyon out to 1500 fathoms until the arc rejoins the 500 fathom isobath, then generally proceed south along the 500 fathom isobath to a point due east of Cambria then proceed

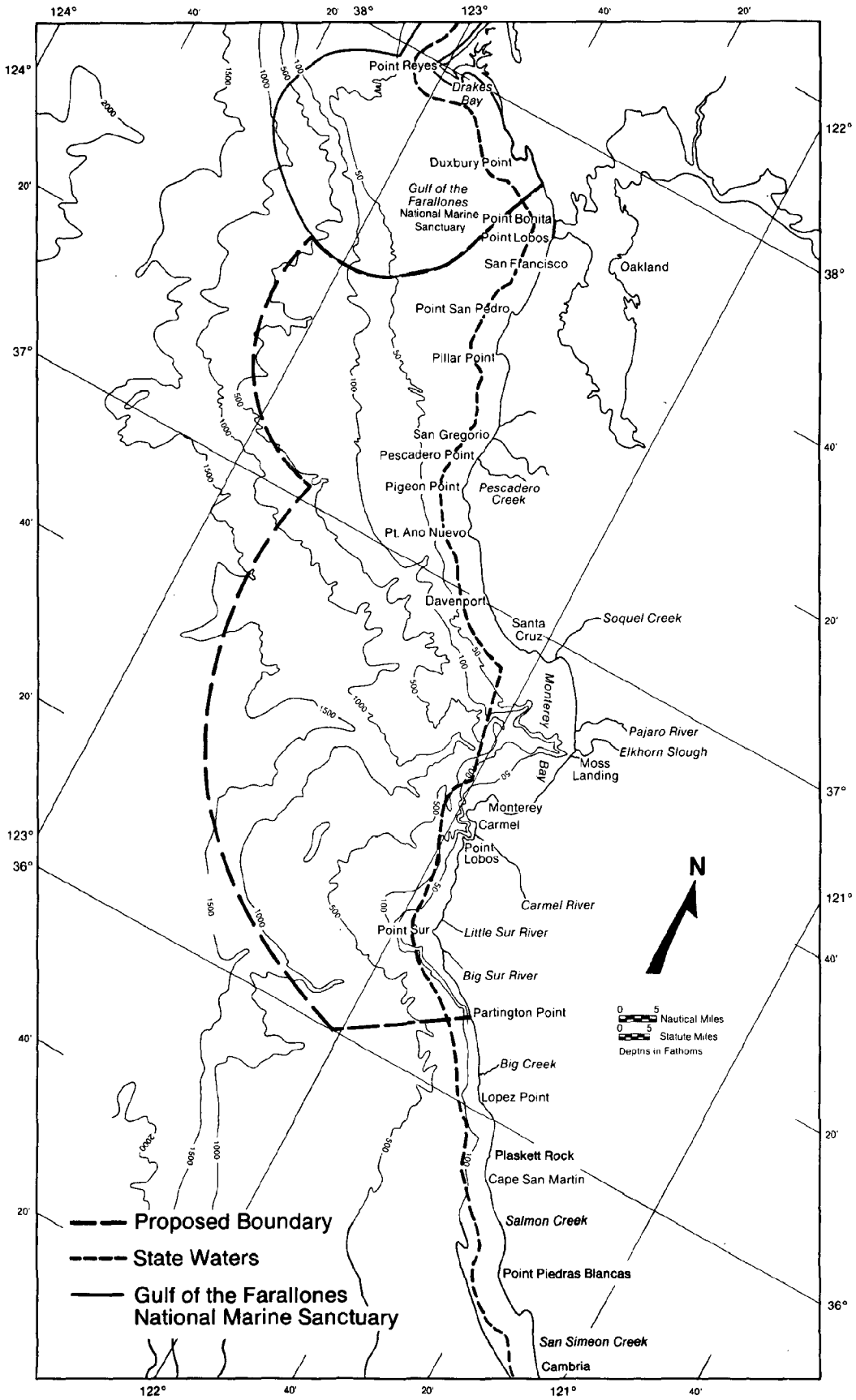


Figure 20. Proposed Monterey Bay National Marine Sanctuary Boundary Alternative #4.

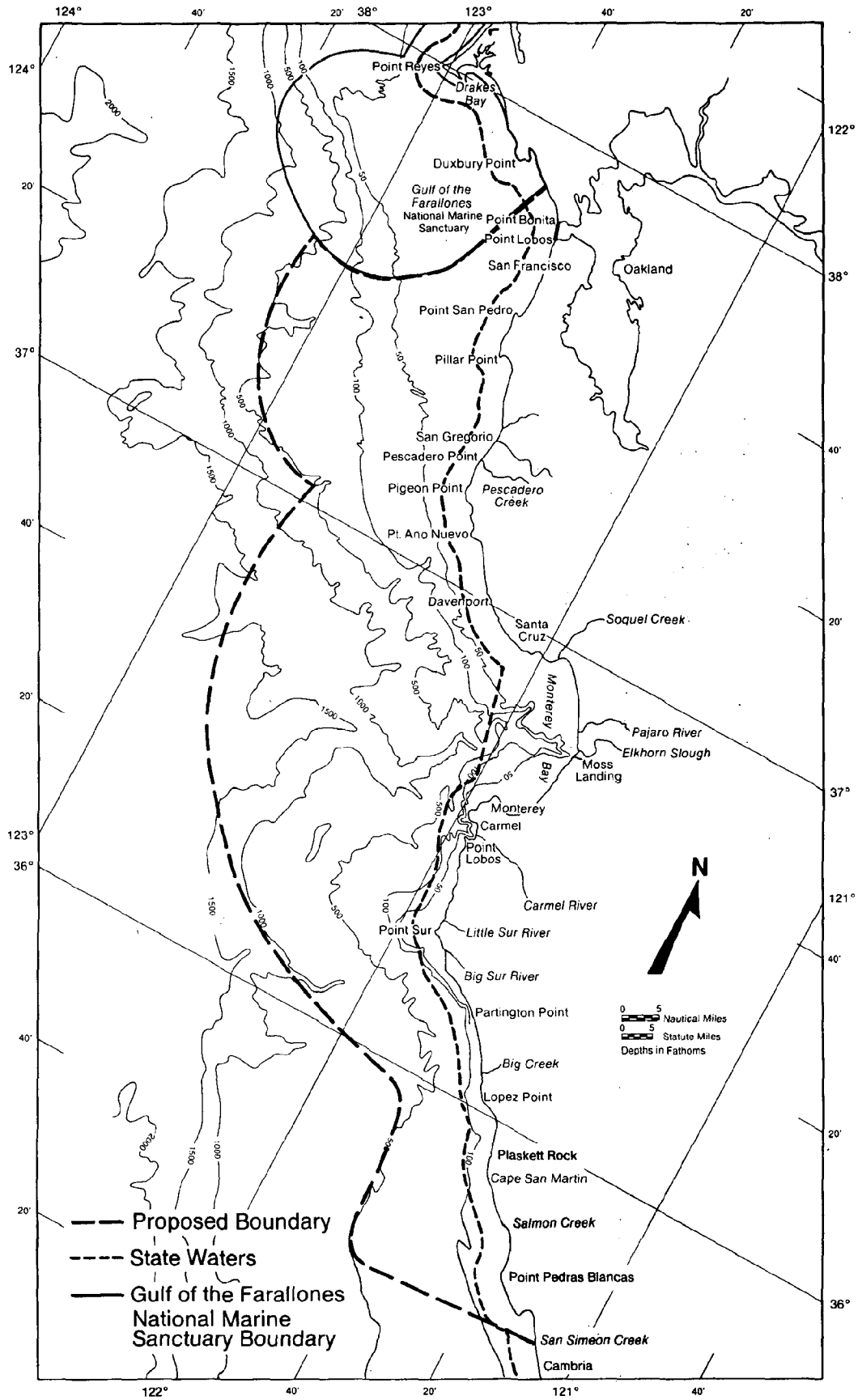


Figure 21. Proposed Monterey Bay National Marine Sanctuary Boundary Alternative #5.

shoreward to the mean high water. The coastal boundary is along the mean high water from the Gulf of the Farallones southern boundary then proceeding south to Cambria except that Princeton, Santa Cruz, Monterey, and Moss Landing Harbors are all excluded from the Sanctuary and the boundary crosses the Golden Gate from Point Bonita to Point Lobos.

6. Boundary Alternative 6

This boundary alternative would establish a Sanctuary area of approximately 1,800 square nautical miles (Figure 22). Proposed boundary alternative #6 would begin at Pescadero Point and proceed on a southwesterly heading of 240° out to the seaward limit of State waters, then proceed south along the boundary of State waters to a point 240° off Table Rock, then proceed on a southwesterly heading of 240° to 36° 50′ latitude, then proceed due west along this latitude to a point 46 nmi from Moss Landing, then proceed southward along an arc drawn from Moss Landing, with a radius of 46 nmi, to 36° 10′ latitude then proceed due east along this latitude to Partington Point.

7. Boundary Alternative 7

This boundary alternative would establish a Sanctuary area of approximately 880 square nautical miles off Monterey Bay and extending over the Monterey Canyon (Figure 23). This alternative is a variation of boundary alternative #1 (Figure 17) with a seaward extension over the Monterey Bay Canyon. Boundary alternative 7 intersects boundary alternative #1 at latitude 122°; then turns seaward along the 500 fathom isobath on the northern

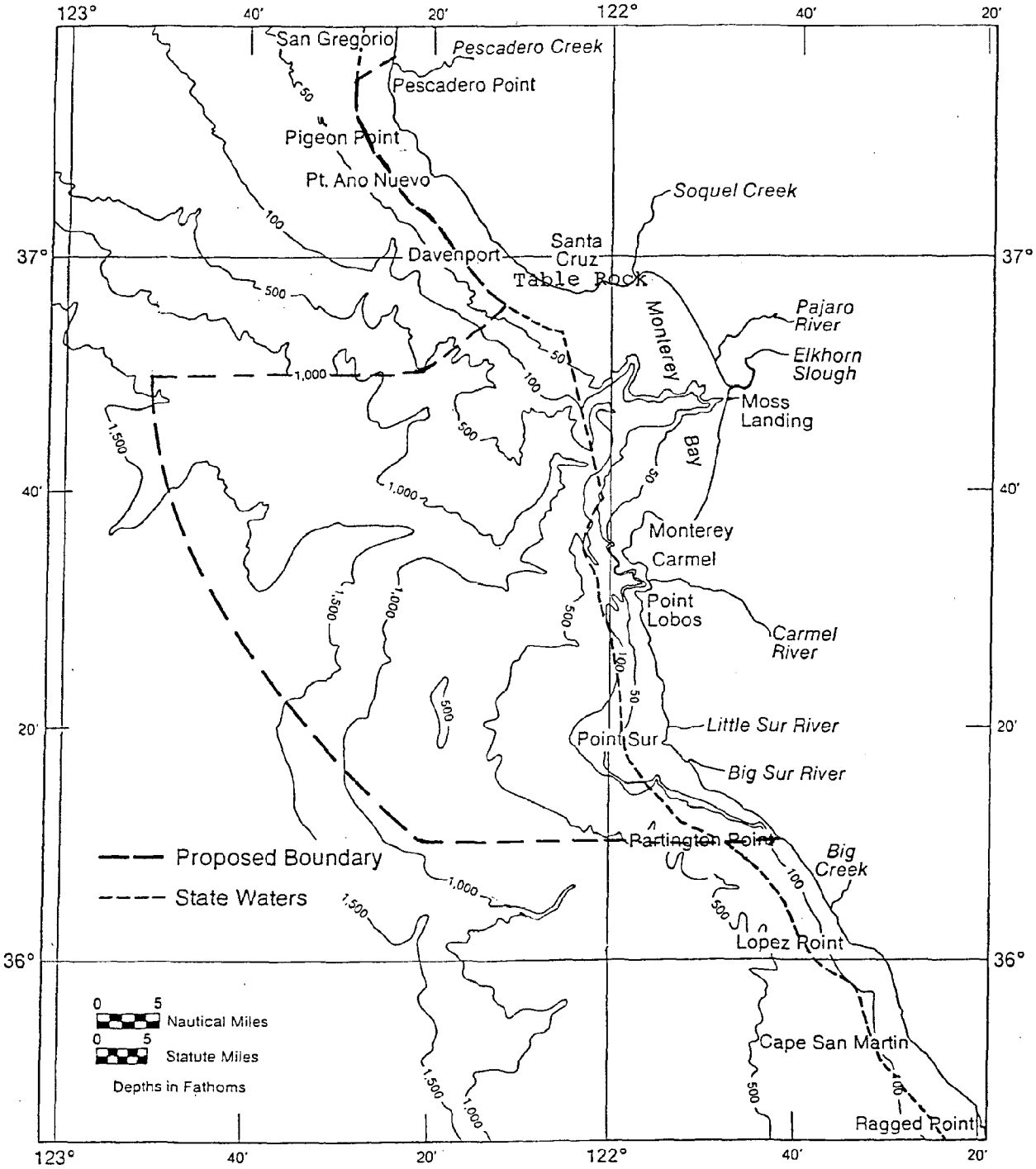


Figure 22 Proposed Monterey Bay National Marine Sanctuary Boundary Alternative #6

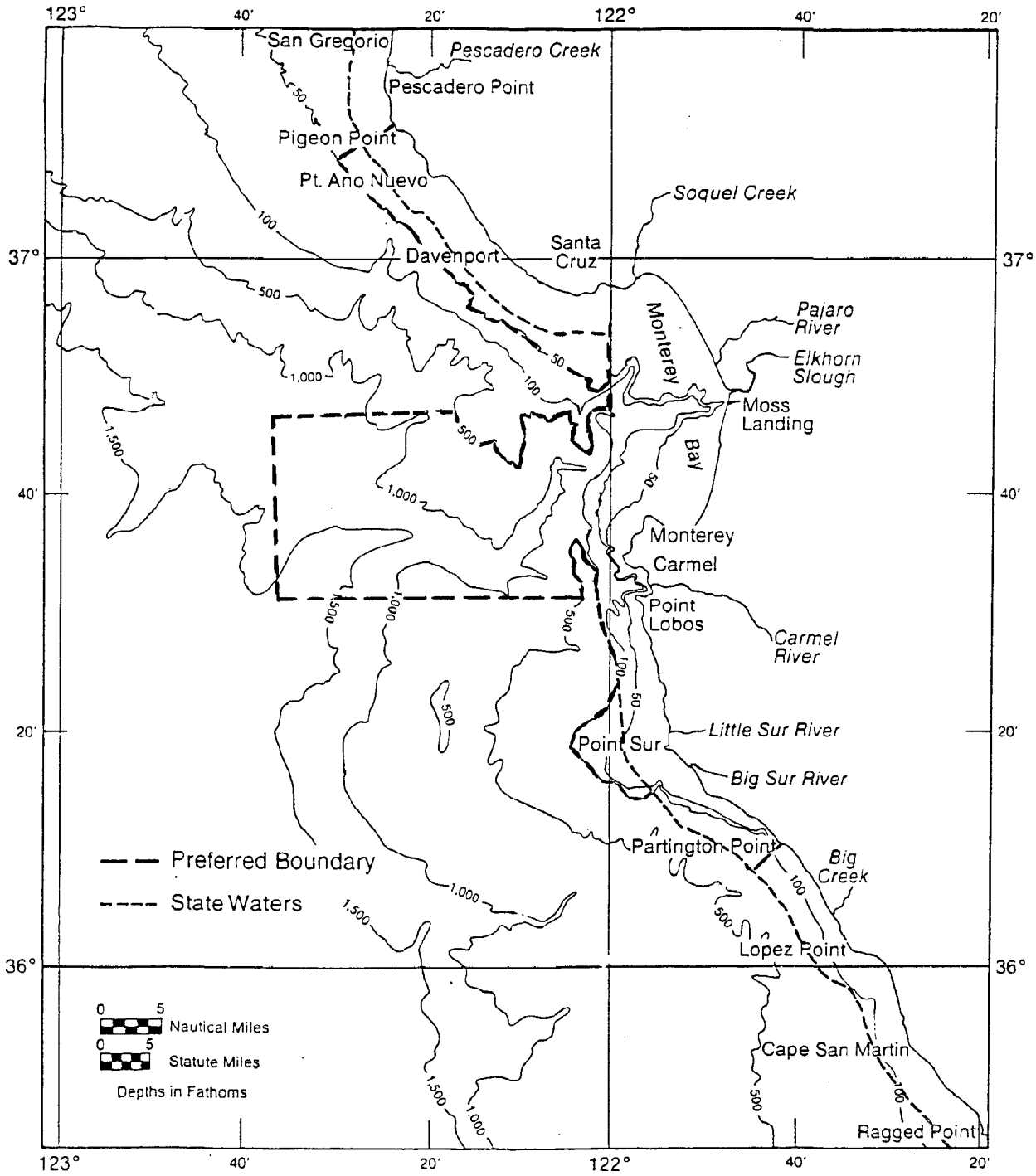


Figure 23. Proposed Monterey Bay Sanctuary Boundary Alternative #7

side of the Monterey Canyon; then due westward along latitude 36° 46′ to longitude 122° 30′; then due south along longitude 122° 30′ to latitude 36° 30′; then eastward to the intersection with the 100 fathom isobath off Point Lobos; then southward to along the state boundary line off Partington Point, then inshore to Partington Point.

B. Management Alternatives

Two management alternatives were identified and considered in terms of (1) resource protection, research, and interpretation requirements and (2) cost-effectiveness.

1. Management Alternative 1

Under this alternative, NOAA would establish an independent management and administrative system for the Monterey Bay National Marine Sanctuary in a headquarters that is managed and operated directly by NOAA. The location of the Headquarters would be in the Monterey Bay region with the specific site dependent on the size and location of the Sanctuary boundaries.

This alternative would gradually phase in a variety of program activities and focus initially on research and education. Staffing would start with a NOAA manager and phase in an assistant manager, administrative assistant, research coordinator, education coordinator and a joint position of an interpreter/enforcement official.

The office would coordinate directly and actively with other

state and local agencies in decision making and implementation of Sanctuary regulations. The Sanctuary Manager and the Advisory Committee would begin the process of informing the public as well as regional officials of the Sanctuary's mandate, regulations and research and education programs.

This alternative is cost effective as it slowly phases in the necessary management structure in parallel to the growing presence of the Sanctuary and the demands of its users. However, the Sanctuary would initially have low visibility and reduce the effectiveness of the resource protection regime due to the limited staff. In addition, due to the long coastline boundary of the Sanctuary and the variety of shoreline habitats and user groups, one centralized information center may not provide optimal representation or access to widely separated visitor groups.

2. Management Alternative 2

The preferred alternative is to set up the Sanctuary headquarters soon after designation (within six months) and immediately provide full-staffing in the positions described for alternative 1. In addition, the preferred option is to provide "satellite" information centers as well as the main headquarters facility so that other areas of the Sanctuary are represented.

The preferred alternative would ensure that the Sanctuary program is implemented rapidly and cultivates the public support gained during the early, designation process. The wide variety of opportunities for interpretation as well as research requires the

full-time attention of individual research and education coordinators. The Sanctuary Manager will then be able to devote him/herself to the coordination of existing management authorities and resource protection. In the long run this alternative will not increase the budget of the Sanctuary as all of these personnel will be required for effective management in the future.

C. Regulatory Alternatives

Regulatory alternatives governing eight types of potential or current uses of the Sanctuary (oil, gas and mineral activities; discharges and deposits; possession, moving or injury of historical resources; alteration of or construction on the seabed; taking of marine mammals and seabirds; overflights; commercial vessel traffic; and operation of "thrill craft") were evaluated in terms of need and effectiveness for resource protection. Activities not included in these eight categories, such as fishing, would continue to be subject to existing regulations. In case of conflict with a Sanctuary regulation, the regulation that the Director of the Office of Coastal and Resource Management deems more protective of Sanctuary resources and qualities would govern.

(1) Oil, Gas and Mineral Activities

(a) No Regulation

Under this alternative the resource protection regime would rely on the Department of the Interior's Outer Continental Shelf (OCS) Oil & Gas 5-Year Leasing Plan, the proposed Sanctuary

regulatory and management framework, and existing Federal statutes to provide protection to the Sanctuary's resources.

Environmental review and the opportunity for the public comment take place prior to any hydrocarbon production under the provisions of the Outer Continental Shelf Lands Act and the National Environmental Policy Act. The current OCS Oil & Gas 5-Year Leasing Plan includes Lease Sale 119 and is currently at the stage of gathering information for the preparation of a DEIS for the Lease Sale. The tracts considered for leasing are in the northern area of the proposed Sanctuary.

If areas within the Sanctuary are leased for hydrocarbon activities in the future, NOAA has authority to condition or deny approval for, as necessary, permits or other authorizations granted to operators (lessees or contractors) by other authorities for activities which are otherwise prohibited under Sanctuary regulations. Such conditions may include, but are not limited to, the establishment of a monitoring program and scientific research studies to measure the effects of hydrocarbon activities on Sanctuary resources and the restriction of discharges. Any conditions imposed by NOAA on other authorities' permits would be made in consultation with those agencies and the permitees.

Finally, NOAA has the ability to enact emergency regulations to prohibit hydrocarbon activities, or any other activities, where necessary to prevent or minimize the destruction, of, loss of, or injury to a Sanctuary resource or quality, or minimize the imminent risk of such destruction, loss or injury, on a temporary basis.

(b) Regulate and/or Permit in Certain Areas within the Sanctuary

Under this alternative, a regulation could be promulgated prohibiting oil, gas and mineral activities within discrete areas in the Sanctuary. These areas could include, but are not limited to, geographical zones around Areas of Special Biological Significance, State Reserves, Beaches, Parks or other marine areas and habitats that are especially fragile and vulnerable to the effects of oil and gas activities. In addition, hydrocarbon activities maybe restricted and only permitted if executed with discharge and/or monitoring requirements. The monitoring requirement would be similar to the following:

> Within specified areas of the Sanctuary the operator (lessee) is required to submit a monitoring plan to assess the effects of oil and gas exploration, development and operations on the biotic communities of the Sanctuary. Monitoring investigations are to be conducted by qualified, independent scientific personnel, these personnel and all required equipment must be available at the time of operations. The monitoring team must submit its findings to the Minerals Management Service Regional Manager (RM) (Pacific OCS Office) and the MEMD in accordance with a pre-established schedule. The findings must be submitted immediately in case of imminent danger to the biota of the Sanctuary resulting from drilling or other operations. If it is determined by the RM, in consultation with the MEMD, that surface disposal of drilling fluids presents no danger to the Sanctuary, no further monitoring of that particular well or platform is required. If, however, the monitoring program indicates that the biota of the Sanctuary are being harmed, or if there is any likelihood that a particular well or platform may cause harm to the biota of the Sanctuary, the RM and MEMD shall require implementation of mitigating measures such as: (1) the disposition of all drill cuttings and fluids by barging, or by shunting the material through a down pipe that terminates an appropriate distance, but no more that 10 meters, from the bottom, of (2) other appropriate operational restrictions.

This regulation would also require that a formal interagency consultation process between the MEMD and MMS be established to

oversee the monitoring process with the Sanctuary.

(c) Prohibit Throughout the Sanctuary

This is the preferred alternative. The resources and qualities of the Monterey Bay area, particularly sea otters, sea birds, and pinnipeds that use the haul-out sites, kelp forests and rocks along the Monterey Bay coast, and the high water quality, are especially vulnerable to oil and gas activities in the area. A prohibition on oil and gas activities within the proposed Sanctuary boundaries will provide partial protection from oil and gas activities for the resources and qualities within the proposed boundaries. A prohibition on mineral activities within the proposed Sanctuary is necessary to be consistent with the prohibition on drilling through, dredging or otherwise altering the seabed of the Sanctuary; or constructing, placing or abandoning any structure or material on the seabed of the Sanctuary as discussed below.

(2) Discharges or Deposits

(a) No Regulation

Under this alternative, the provisions of the Clean Water Act (CWA), Title I of the MPRSA, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan would provide some protection from potentially harmful discharges and deposits from land and sea sources. Discharges of oil and chemical waste are regulated under provisions of the Act to Prevent Pollution from Ships of 1980, as amended in

1982 and 1987 (33 U.S.C. §§ 1901 et seq.). On October 27, 1988 the USCG announced a Notice of Proposed Rule Making that would implement the pollution prevention requirements of Annex V of the International Marine Pollution Convention, MARPOL 73/78 (53 FR 43622). These proposed regulations are expected to reduce the incidence of discharges of plastics and other ship-generated garbage into the marine environment.

(b) Prohibit Discharges

The preferred alternative is to prohibit without NOAA approval depositing or discharging from any location within the boundaries of the Sanctuary materials or other substances except fish, fish parts, chumming materials or bait used in or resulting from normal fishing operations in the Sanctuary; biodegradable effluents incidental to vessel use generated by marine sanitation devices approved by the U.S. Coast Guard; water generated by routine vessel operations (e.g., cooling water and deck washdown) excluding bilge pumping; or engine exhaust.

Depositing or discharging, from beyond the boundaries of the Sanctuary, materials or other substances, would also be prohibited without NOAA approval, except for the exclusions discussed above, that subsequently enter the Sanctuary and injure a Sanctuary resource or quality. The intent of this prohibition is to protect the Sanctuary resources and qualities from the effects of pollutants deposited or discharged into the Sanctuary as well as land and sea-generated non-point and point source pollution.

(3) Moving, Injuring or Possessing Historical Resources

(a) No Regulation

Under this alternative any historical resources (as defined by Sanctuary Program and Sanctuary regulations to include, inter alia, cultural resources) would remain subject only to the existing management regime, with permits provided by the State Lands Commission. Any historical resources known to be within the proposed Sanctuary, especially those that are on the National Register listing under the National Historic Preservation Act, would be carefully monitored by Sanctuary staff. In addition, any activity that could lead to the discovery of historical resources would be carefully monitored. The Sanctuary Manager would try to ensure that adequate information is available regarding the national significance of these resources and appropriate management measures are in place.

(b) Prohibit Moving, Injuring or Possessing Historical Resources

This is the preferred alternative. It is desirable to protect and manage any historical resources that may be in the Sanctuary. Under this alternative, moving, possessing, or injuring or attempting to move, possess, or injure a Sanctuary historical resource would be prohibited without NOAA approval. NOAA intends to work closely with the CA State Lands Commission regarding approval to move, injure or possess abandoned shipwrecks, title to which is held by the State of California.

This regulation would apply throughout the Sanctuary. Historical resources in the marine environment are fragile, finite and

non-renewable. This prohibition is designed to protect these resources so that they may be researched and information about their contents and type made available for the benefit of the public. This prohibition does not apply to accidental moving, possession or injury during normal fishing operations.

(4) Alteration of or Construction on the Seabed

(a) No Regulation

Under this alternative the benthic resources and the various substrates of the Sanctuary would continue to be protected only by the existing management regime. Existing State and Federal regulations governing activities on the seabed would still apply. There would be no special emphasis on the importance of the seabed as an environment that provides a variety of habitats that in turn supports the rich colonies of kelp and other algae as well as benthic invertebrates.

(b) Prohibit Alteration of or Construction on the Seabed

The preferred alternative is to prohibit without NOAA approval alteration of or construction on the seabed except as a result of: anchoring vessels; normal fishing operations; routine harbor maintenance; installation of navigation aids; maintenance of mariculture operations existing as of the effective date of these regulations; and the construction of docks and piers. The intent of this regulation is to protect the resources of the Sanctuary from the harmful effects of activities such as, but not limited to, excavations for archeological purposes, drilling into the seabed,

strip mining, ocean mineral extraction, and dumping of dredge spoils.

(5) Taking Marine Mammals and Seabirds

(a) No Regulation

Under this alternative the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) would provide some protection to the marine mammals and seabirds of the Sanctuary: both prohibit the taking of specific species protected under those Acts. These resources would continue to be protected on a species and case-by-case basis without consideration of their role in the ecosystem or under the special purview of the Sanctuary management regime.

(b) Prohibit Taking Marine Mammals or Seabirds

The preferred alternative is to prohibit taking marine mammals in the Sanctuary or seabirds in or above the Sanctuary unless approved by NOAA, except in accordance with and as permitted by regulations promulgated under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The term "taking" includes all forms of harassment. The MMPA and the ESA both prohibit the taking of specific species protected under those Acts. Sanctuary enforcement officials may consider harassment cases pursuant to the MMPA and ESA. The proposed prohibition would overlap with the MMPA and ESA but also extend protection for Sanctuary resources on an environmentally holistic basis. It would include all marine mammals in the Sanctuary and seabirds in or above the Sanctuary.

(6) Overflights

(a) No Regulation

Aircraft overflights have been observed regularly to disturb bird and mammal communities in the neighboring Gulf of the Farallones National Marine Sanctuary. Although the Federal Aviation Administration charts showing the California Sea Otter Refuge indicate the State of California requires overflights to maintain a minimum height of 1000 feet, other sensitive areas to the north of the Refuge at Carmel Bay are not protected.

(b) Prohibition of Overflights

The preferred alternative is to prohibit flying motorized aircraft at less than 1000 feet over the waters within three nautical miles of State of California designated parks, beaches, reserves or refuges, or the Los Padres National Forest. This regulation is intended to protect marine birds and mammals from the disturbance and harassment of low-flying aircraft. Seabirds are often congregated near the shoreline and sea otters are distributed among the kelp beds within three nautical miles of the coastline. Similar regulations are enforced as a result of Sanctuary designation in the Channel Islands and Gulf of the Farallones National Marine Sanctuaries.

(7) Operation of Commercial Vessels

No Regulation

This is the preferred alternative. The term "Commercial

Vessel" includes any vessel engaged in the trade of carrying cargo, including but not limited to tankers and other bulk carriers and barges, vessels used in seismic surveys, and vessels engaged in the trade of servicing offshore installations. At present only a few, large commercial vessels visit the Monterey Bay region, mainly to dock at Moss Landing. Almost all of the current vessel traffic within the proposed Sanctuary passes through the western edge of the proposed boundary. The navigation aids on geographic coastal points and the deep offshore water assist to minimize the possibility of groundings. Overall, the area has had a long history of safe vessel traffic but there may be a threat to the resources of the Monterey Bay area from possible collisions and possible spills of oil and hazardous materials.

The probability and magnitude of a spill from all sources of vessel traffic remain uncertain. However, current U.S. Coast Guard studies are investigating the probabilities of a spill contacting the shores of the Monterey Bay area from different offshore locations, once a potential spill did occur. As part of the investigations consultations are underway to determine what potential impacts may exist to endangered species in the area such as the California Sea Otter. As these results become available, NOAA will work with the U.S. Coast Guard to ensure that all the resources and qualities of the proposed Sanctuary are accounted for in the investigation and that future plans for routing of vessel traffic off the coast of California take into account the purposes of the Sanctuary. In addition, NOAA will maintain close

communication with the U.S. Coast Guard to evaluate the need for additional regulations and/or emergency response plans and equipment.

(b) Regulation of Vessel Traffic

Under this alternative, a regulation would be promulgated prohibiting or otherwise regulating operation of commercial vessels. The regulation would be developed in consultation with the U.S. Coast Guard and the International Maritime Organization. Such regulation may include but is not limited to one or a combination of the following: (1) coast-wise vessel traffic be routed outside the boundaries of the Sanctuary, (2) all large vessels inbound to and outbound from Monterey Bay be restricted to port access route(s), (3) oil barge traffic be prohibited within the Sanctuary, and (4) special designs be required, such as double hulls, for petroleum and other hazardous substance transport vessels in the Sanctuary.

(8) Operation of "Thrill Craft"

(a) No Regulation of "Thrill Craft"

This is the preferred option. "Thrill Craft" means any motorized vessel which is generally less than thirteen feet in length as manufactured, is capable of exceeding a speed of twenty miles per hour, and has the capacity to carry not more than the operator and one other person while in operation. The term includes but is not limited to jet skis, wet bikes, surf jets, miniature speed boats, and hovercraft.

These craft can pose a serious threat to the resources of the Monterey Bay area. There is a potential for collisions with marine mammals and birds, injury to kelp beds, and disturbance, due to the noise and exhaust of the craft, to organisms near and on the surface at large distances from the craft. NOAA will monitor the activities of these "thrill craft" to determine, first, the extent of this activity and if indeed there is a threat to the resources and, second, if regulations should be promulgated prohibiting these activities in specified zones.

(b) Prohibit Operation of "Thrill Craft"

Under this alternative a regulation would be promulgated prohibiting the operation of "thrill craft" in specified areas including but not limited to Areas of Special Biological Significance, State Parks, Beaches, Reserves and Refuges. There is no current evidence that this activity poses a serious threat for Sanctuary resources.

PART IV: ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

In selecting the appropriate institutional, boundary, management, and regulatory alternatives for the proposed Monterey Bay National Marine Sanctuary, NOAA evaluated the environmental consequences of their implementation. This section discusses these consequences including those resulting from the preferred alternative. The consequences of the proposed action are discussed in the context of the expected impacts to the affected activities and existing jurisdictions, if any, for the affected activity and, the expected benefit to the resources and qualities of the proposed Sanctuary.

Section I: Status Quo Alternative

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

Currently, no institution addresses the range of significant questions concerning the interaction of resources and uses in the area. While a variety of organizations conduct research, there is no systematic coordination to ensure that information needs are addressed in a timely and adequate manner. Even if information

becomes available through research projects, no institution is charged with applying that information to practical management issues, such as modification of regulations. Similarly, no agency attempts to monitor the health, stability and changing conditions of this valuable marine ecosystem. Resource assessment through gathering baseline data and continued monitoring of environmental conditions is essential in order to assess the adequacy of the protection afforded these important resources. The status quo alternative would leave the protection of this area to the chance coordination of the regulatory efforts of a number of agencies and would forego opportunities for affirmative management.

Presently, numerous government agencies are vested with some regulatory authority over certain activities within the area (See Appendix 2). The regulatory activities are not performed in the context of a comprehensive management plan, and no organizational structure exists to coordinate research and regulation. For example, other than the California Mussel Watch Program, there is no systematic environmental monitoring program nor is there a mechanism for applying research findings to the resolution of management issues. In addition, a major gap exists between the collection of data required under current NPDES permits and the use and application of these data to water quality issues.

These existing authorities provide a considerable degree of protection for marine resources in general and the collection of State Parks, Beaches, Reserves and Refuges do so in particular. In general, however, the statutes described above and the agencies

administering them are each directed at a single purpose, region or activity. No entity looks to the welfare of all the living and non-living resources or the ecosystem of this entire marine area. Cumulative impacts on the resources, arising from various activities subject to the jurisdiction of separate agencies, may escape the attention of any single agency.

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

Some particular problems which may arise if the present institutional and regulatory structure continues to control activities in the absence of the proposed Sanctuary are discussed below. This Section describes the current environmental consequences of the leaving the resources and qualities of the Monterey Bay area to the existing regulatory regime and administration. This description provides a baseline to compare with the following section describing the preferred action of

Sanctuary designation and corresponding additional regulations, management, research and education programs.

A. Resource Protection Regime

Several different forms of habitat and species protection--each of which was instituted for different purposes--exist in the proposed Sanctuary area. At the State level, for example, the California Department of Fish and Game has authority in territorial waters to protect exceptional marine habitats through the designate of ecological reserves, marine life refuges, and game refuges. Several protected areas have already been established (Table 9). These and other State programs, e.g., Areas of Special Biological Significance, provide geographically discrete protection for sensitive habitats and species along much of the mainland coast. In reality, of course, marine mammals, seabirds, and other marine flora and fauna depend on habitats and foraging areas far more extensive then those covered by existing protective regulations.

1. Oil, Gas and Mineral Activities

There is presently no oil and gas development taking place in the study area. Lease Sale 119 is on hold and no additional Lease Sales are planned during the current 5-Year Plan. Part of the rationale for including boundary alternatives that would permit neighboring oil and gas activities is based on the assumption that the status quo regulatory and administrative offshore oil and gas regime is adequate in preventing significant adverse impacts of oil

and gas activities on the environment. Oil and gas offshore operational technology has advanced considerably since the 1960's (Baker, 1985) and the experiences from past blowouts and spills have served as the catalyst for the present day relatively strong Federal OCS oil and gas regulatory regime. Department of the Interior, MMS, final rule for oil and gas and sulphur operations in the OCS, (30 CFR Parts 250 and 256) provides the regulatory regime for more performance standards and new and updated requirements for operational and environmental safety. The use of Best Available and Safest Technologies is required by the Director of MMS to help prevent significant effects on safety, health or the environment (30 CFR Part 250.22). Numerous regulations exist to help prevent blowouts during the different phases of oil and gas activities and which require adequately trained personnel during OCS operations.

The nationally recognized, sensitive marine resources of the Monterey Bay area, however, warrant more comprehensive, long-term protection from adverse environmental effects of oil spills, discharges and, noise and visual disturbance. Future Lease Sale Plans in the central California Planning area, such as Lease Sale #119, and associated development will occur close to shore, near sensitive haul-out areas and in highly productive marine waters that are all part of the Monterey Bay ecosystem.

For example, a group of Santa Cruz Basin tracts off San Mateo County, approximately 10 nmi due east of Año Nuevo, are scheduled to be included in MMS's Lease Sale #119 and are known to be of high oil and gas resource potential (Figure 11). Due to the unique

nature and environmental sensitivity of Año Nuevo it seems additional safeguards to protect the proposed Sanctuary's resources may be necessary. Presently, no administrative mechanism exists to set aside such an important area. For each sale, all tracts not already leased are reconsidered.

Although there are stipulations on oil and gas leases imposed by MMS in environmentally sensitive areas, and MMS regulations at 30 CFR Part 250 deal with many safety and environmental concerns, considering the known vulnerability of the marine flora and fauna to oil spillage and the difficulty of containing oil spills in the open ocean, a prohibition of oil and gas development appears to be necessary.

The Sanctuary regime is especially desirable because for almost 3/4 of the year the known current patterns would cause any spilled oil and discharges to flow into Monterey Bay. (For a detailed discussion of the possible consequences of oil and gas activities that will be prevented with Sanctuary designation, see below).

Thus, although the existing management system for oil and gas activities does include certain regulatory provisions for spill prevention, protection of particularly sensitive areas, and the preservation of the marine environment, National Marine Sanctuary designation appears more desirable to achieve formal acknowledgment, and more coordinated long-term stewardship, of the region's significant offshore resources.

2. Discharges or deposits

Existing water quality in the Monterey Bay area is classified as very good. However, a number of discrete areas along the coast of the Bay area are known to have high levels of specific contaminants. Local land point-source (eg. municipal dischargers and ocean dumping sites) and non-point source discharges (eg. urban runoff and agricultural practices) are believed to be the cause of many of the pollutants. Questions remain as to not only the exact nature of the source and corresponding appropriate management measures but also the exact nature of the environmental consequences of the discharges and any potential health threats to humans and the environment. It can also be assumed that increasing population demands on the Monterey Bay coast will further degrade water quality in the future.

There is also an unknown amount of pollutants and garbage that enter the Monterey Bay area from the ocean. These discharges and deposits may have been transported far distances by ocean currents or may have come from passing vessels. It is possible that pollutants also enter the ocean surface of Monterey Bay from the air but magnitudes and effects of this source are completely unknown.

The combination of above discharges and deposits serve to form the background or ambient water quality in the Monterey Bay area.

Numerous laws and regulations apply to the disposal of waste in the marine environment. However, most decisions are made on a case-by-case basis, which provides less certainty of protection

than would a designation of a no-discharge area. Certain gaps remain in the regulatory framework.

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

Beyond the territorial sea, EPA approval is needed for ocean dumping and for any location of a new ocean outfall. EPA regulations take the ecological productivity and sensitivity of an area into consideration; nevertheless, such regulations do not guarantee that EPA will prohibit the disposal of waste in the area.

Ocean dumping, municipal outfalls, and dredged material disposal can smother benthic biota and introduce substances into the marine environment, which may affect fish, bird, and mammal resources. However, all ocean dumping must now meet the standards for implementing Title I of the MPRSA. 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 (Cava, 1989, personal communication.)

Discharges from fishing vessels during normal fishing operations such as cooling waters from boat engines and fish wastes are unlikely to harm the resources of the study area; therefore no additional regulations appear necessary.

Regulations exist that cover the contamination of oceans waters by discharges from a variety of sources, including: 1) discharges from point sources (which require a National Pollutant Discharge Elimination System permit); 2) discharges from non-point sources; 3) discharges of oil and hazardous substances; and 4) ocean dumping.

The CWA prohibits the discharge of oil and other hazardous substances "which may affect natural resources.....under the exclusive management authority of the United States" (33 U.S.C. §§ 1251-1367). The CWA also provides for the establishment of the National Contingency Plan to contain, disperse, or remove oil and hazardous substances after a spill (see Part II, Section III). The CWA thus furnishes some protection to marine resources from the harmful effects of effluent discharges.

The CWA, however, provides for a maximum penalty of only $10,000 for a single discharge incident without the initiation of a civil action. This does not provide a sufficient deterrent for protecting important Sanctuary resources; $50,000 is the maximum penalty allowed per day under the MPRSA. Moreover, under the status quo, there would probably be no specialized effort by the USCG to enforce the CWA in the Monterey Bay area as distinct from other offshore waters.

The international agreement (Annex V, MARPOL) regulating garbage disposal from ships and other watercraft is now part of the amendments to the Act to Prevent Pollution from Ships (APPS). Animals and birds may eat or become entangled in floating or

submerged wastes such as plastic packing materials or discarded fishing lines. An opportunity exists to help attain the goals of the APPS through the Sanctuary regulations prohibiting discharges and deposits.

Several Bay communities now discharge waste (partially treated) directly into ocean waters, portions of which are designated as State Areas of Special Biological Significance (ASBS). The City of Watsonville has applied for a waiver of secondary treatment requirements of the Clean Water Act (Section 301(h)) and, if provided a waiver, would discharge the only effluent into Monterey Bay not meeting secondary treatment standards. The City of Santa Cruz currently discharges sewage which has received advance primary treatment. Santa Cruz has entered into a consent decree with the California Water Quality Control Board stating that it will meet secondary treatment requirements by 1995.

Such ocean outfalls, particularly those discharging partially treated matter into Monterey Bay, must be assessed to determine the magnitude of their threat to sensitive marine resources. Much of this research still needs to be done while an opportunity also exists to use already collected data and apply it to the management problems. Existing state and Federal regulatory and management arrangements appear to be striving toward alleviating harmful waste outfall loads over the long term in the interests of marine environmental protection. To date, implementation obstacles have hindered the attainment of regional waste treatment facilities

sufficient to render ocean discharges environmentally safe. There is no single agency that reviews the discharges from an ecosystem or habitat perspective. The California Air Resources Board monitors ambient air quality as well as EPA and the Department of the Interior for Federal OCS activities.

The Association of Monterey Bay Area Governments acts as a clearing house in the Monterey Bay area for permits or licenses that require multi-agency review and comment. An opportunity exists to coordinate the necessary data analysis and research and consult within the existing regulatory framework to achieve water quality that is consonant with Sanctuary designation.

3. Historical Resources

Many cultural and historical resources are known to exist in the area but few have been specifically examined and protected. Generally, the area's potential as a baseline indicator of regional environmental conditions of interests to marine scientists and archaeologists appears under utilized; such an integral mechanism for assessing the adequacy of resources protection efforts is being ignored.

Existing regulatory authorities provide some protection for underwater historical or cultural resources. California can register sites as either "points of interest" or "land marks", and the latter designation provides some protection to sites in State waters. Salvage operations in State waters must also be permitted by the State Lands Commission. Registration on the National

Register of Historic Sites provides protection only against Federal and not private activities.

To date, surveys of the study area's submerged lands for historic resources have been limited. The Bureau of Land Management (BLM), now MMS, for example, conducted a 1979 survey of the shipwreck literature in central and northern California as part of its EIS for lease Sale #53. This agency is required by law to consider potential disturbance and damage mitigation actions for significant underwater historic resources if oil and gas activities are proposed nearby.

4. Alteration of or Construction on, the Seabed

Dredging, dredge disposal, and related uses involving seabed alteration are not presently extensive in the study area (see Part II, Section 2). Ocean disposal of dredge spoil from local harbors is an ongoing activity and in certain cases is deposited on shores for beach nourishment. Certain activities, such as routine harbor and navigation maintenance are also vital for the local economy and safety of the users in the proposed Sanctuary. However, if the pace of activities or demand for uses such as sand mining, strip mining and ocean mineral mining accelerate substantially in the future there is a potential for severe environmental threats to the resources of the Monterey Bay area. These activities are known to increase the turbidity of the water column, disturb and alter benthic communities on the ocean floor, and alter natural erosion and sedimentation rates.

Once again the regulatory regimes responsible for these uses may not take into account the ecosystem perspective or sensitivity of area resources and qualities.

5. Taking Marine Mammals or Seabirds

The abundant and diverse marine mammals and seabirds that exist in the Monterey Bay area currently use their habitats in close proximity to a number of human activities. So far there is no specific evidence that marine mammals or seabirds are threatened by any one activity. However, a number of conflicts potentially exist between human and marine mammal and seabird uses of the Monterey Bay area. Specifically, sportdivers compete with Sea Otters for abalone and commercial fishery nets may threaten diving seabirds and submerged marine mammals.

The current regulatory regime under the U.S. Departments of the Interior and Commerce gives each Department the authority to designate and protect oceanic habitats if found to be "critical," for species listed as "endangered" under the Endangered Species Act (ESA). The Marine Mammal Protection Act (MMPA) and the ESA prohibit the "taking" of marine mammals and threatened or endangered species. The Migratory Bird Treaty Act prohibits the hunting of seabirds. The term "taking" has been interpreted broadly by the administering agencies, so that the ESA and MMPA provide considerable protection. However, the potential threats to marine mammals and endangered species range from direct injuries to a specific animal or population to indirect or cumulative

degradation of their habitats. Neither the MMPA nor the ESA fully prevent such degradation of habitats. Section 7(a) of the ESA does provide protection against actions which jeopardize endangered species or their critical habitats, but this section applies only to activities authorized, funded or carried out by Federal agencies, not to private or state actions. There is no explicit provision for the designation or protection of marine mammal habitats under the MMPA. Thus, the MMPA and the ESA both provide some protection to the marine mammals and seabirds of the Sanctuary by prohibiting the taking of specific species protected under those acts. However, these acts only provide protection to these species on a case-by-case basis without consideration of their role in the ecosystem or from the special purview of the Sanctuary management regime.

A portion of the habitat area used by marine mammals and seabirds foraging at Monterey Bay is already protected under the National Marine Sanctuary Program. The nearby GFNMS provides protection for marine habitats used by mammals and seabirds, but Monterey Bay, which is an important feeding ground for many of the same mammals and seabirds and which also supports a unique combination of benthic organisms, is not similarly protected under the present regime.

With the exception of the Title III of the Marine Protection, Research and Sanctuaries Act (MPRSA), no Federal authority currently exists to identify and protect localized marine habitats of exceptional importance to non-endangered species. However,

Title III of the MPRSA has never been implemented in the Monterey Bay area. Also, while the Marine Mammal Protection Act (MMPA) and the Migratory Bird Treaty Act proscribe the hunting and taking of marine mammals and seabirds, they do not protect their habitats from potentially adverse uses. Such program deficiencies have left certain valuable marine habitats largely unprotected. If current uses intensify to seriously threaten resources, the lack of suitable management authority to intervene could allow undesirable environmental impacts.

6. Overflights

There are a number of small, private airfields in the Monterey Bay area and often small planes can be observed flying along the coastline. NOAA's San Francisco Sectional Aeronautical Chart indicates on the chart a Notice to Pilots that prohibits flights below 1000 ft (305 m) Above Ground Level (AGL) over the Año Nuevo and Point Lobos State Reserves and the California Sea Otter Game Refuge. This prohibition is intended to protect marine mammals and seabirds from being disturbed and startled by low-flying aircraft. There have been reports of low-flying aircraft (below 1000' AGL) in other areas of Monterey Bay which have startled bird populations and caused stampedes of marine mammals.

The California Department of Fish and Game regulations that presently prohibit overflights less than 1000 ft above the Año Nuevo Reserve, Point Lobos Reserve and the California Sea Otter Game Refuge appear to provide adequate protection to the resources

of these particular areas from visual and acoustical disturbances from aircraft. However, other areas and resources may warrant the same type of protection from not only aircraft but also other vehicles such as jet-skis and thrill craft in general.

Although the Federal Aviation Administration's (FAA) charts showing the California Sea Otter Refuge indicate that the State of California requires overflights to maintain a minimum height of 1000 feet (305 m), other sensitive habitat areas, such as Reserves and Refuges, are not noted on these charts and are not otherwise protected. Persistent low altitude overflights can severely disrupt various marine mammal and seabird behavior patterns, particularly those of breeding and nesting.

7. Vessel Operation

There are a number of vessels that pass along the California coastline that may pose a threat to the resources of the Monterey Bay area due to catastrophic accidents such as collisions and groundings. Although it is impossible to eliminate all probability of such accidents the U.S. Coast Guard is working on proposals to reduce vessel accidents by creating Vessel Traffic Separation Schemes and areas where no obstructions can be placed off the shore of California. Such schemes have to be approved by the International Maritime Organization before they take effect. Once in place adherence to the traffic lanes by vessels is entirely voluntary.

Most intentional discharges of oil from vessels (and some

releases of air pollutants) generated during loading and off-loading are explicitly regulated by existing regulations. Other potential threats due to vessels, such as noise and visual disturbances, propeller hits, grounding, and accidental oil spills, are not (and in certain instances cannot be) controlled or prevented.

The USCG voluntary vessel traffic lanes out of San Francisco currently receive a very high level of compliance. Under the existing regulatory system commercial vessels, including tankers and other bulk carriers may transit anywhere in the proposed Sanctuary, even near the very sensitive nearshore areas, where they could cause visual disturbances and create increased danger of pollution, both from operational discharges and from accidental groundings. Generally, based on good seamanship, large vessels are kept at a considerable distance from the shore. However, local vessel traffic will probably increase considerably with the development of the tracts to be leased in the Central California OCS any many of those vessels may be capable of navigating quite near to Año Nuevo and other offshore areas. Given this and other expected increases in vessel traffic, the risks of vessels entering such nearshore waters and disturbing marine bird mammal populations seem likely to increase. Disturbance could result in flight or other changes in behavior. Repeated disturbances may cause mammals to temporarily or permanently abandon an area. Although the USCG can create mandatory vessel lanes, via the International Maritime Organization, such action seems unlikely in this area, and in most

cases the USCG is more likely to act on the basis of vessel safety, rather than from the need for resource protection.

Generally speaking, few large vessels transiting the study area's customary lanes and adjacent ocean waters have occasion to enter Monterey Bay. The only exception is oil tankers, originating primarily at San Francisco Bay refineries, which utilize the Bay for nearshore off-loading at the Pacific Gas and Electric (PG&E) power plant. This traffic represents a continuing environmental concern, especially in regard to certain Monterey Bay marine mammal and seabird communities, should oil spills occur either in nearshore transit (due to grounding or collisions) or while off-loading. Vessels presently follow routine and safe entry and exit procedures into and out of the Bay and unload one at a time. The USCG's Monterey station keeps a close watch on these operations with regard to marine environmental protection. No major spills have ever occurred in the Bay although minor accidental discharges have been documented. A proposed expansion of Moss Landing's offshore terminal by PG&E has been withdrawn. Consequently, oil product delivery pattern--at least in term of tanker vessel size--will remain the same, i.e., 50,000 DWT maximum.

8. Operation of Thrill Craft

Thrill craft are a relatively new form of water sport and in the Monterey Bay area are currently only operated in small numbers and usually only during the summer. However, the abundance and rapid growth of other uses of the area, including recreational

water-sports, and the high density of inshore flora and fauna warrants a long-term perspective on the management of uses and resources of the proposed Sanctuary.

The State of Hawaii has already proposed regulations that would permit operation of thrill craft only in specified areas, in part to avoid injury to neighboring marine mammals. If the use of thrill craft were to increase, and/or other uses or resources of the Sanctuary were threatened by thrill craft, then the Sanctuary manager will investigate the issue in coordination with the affected parties and propose possible management and/or regulatory measures.

9. Military and Law Enforcement Activities

The restricted area maintained by the U.S. Army in Monterey Bay appears to provide adequate protection to the sensitive marine resources from any currently conducted military training activities which might adversely affect them. The U.S. Navy's utilization of a nearby Bay portion for mine sweeping maneuvers from February through July each year appears to pose no serious threat to the resources and qualities of the area. On-going law enforcement programs involving overflights and use of vessels also appear to be infrequent and pose no threat to Sanctuary resources and qualities.

10. Fishing Activities

Fishing activities are great in the Monterey Bay area and the productive fish stocks support an economically very valuable

fishery. To ensure continued healthy stocks and minimization of adverse environmental impacts, commercial fisheries are already heavily regulated.

The Magnuson Fishery Conservation and Management Act (MFCMA) provides for enforcement of Fishery Management Plans (FMP's) prepared by the Pacific Fishery Management Council and approved by the Secretary of Commerce after review by the National Marine Fisheries Service. Fishing in Monterey Bay waters is regulated by the groundfish and salmon FMP's. In the FMP's, the Council establishes catch limits for groundfish and specifies the duration of the fishing season and catch and size limits for salmon. Commercial fishing-gear restrictions are specified for both the groundfish and salmon fisheries. In addition, the CDF&G enforces State regulations for fishing activities (See Appendix 2). It appears that the existing regime provides adequate protection to Monterey Bay from the effects of overfishing.

In general fishing activity is extensively regulated to not only ensure continuous production of fish stocks for long-term harvest but also to reduce potential conflict with marine mammals and seabirds.

The gill net fishery has been regulated since 1984 by the State and Federal governments because of the mortality of seabirds and sea otters that became entangled in the nets. Approximately 6 to 15 boats participate in this fishery off Monterey Bay (pers. comm., Marine Resources Division, Monterey Bay area, CDF&G, March 1990). This method of fishing is now restricted to waters deeper

than 20 fathoms. In April 1989 the halibut gill net fishing was closed inside 40 fathoms due to the incidental capture of over 40 harbor porpoises (Edward Melvin, pers. comm., 1989). Future regulations on this fishery are pending (due January 1, 1991) which would prevent gill-netters from fishing within 30 fathoms (pers. comm., Marine Resources Division, Monterey Bay area, CDF&G, March 1990). This would effectively move the current gill-net inshore fishery beyond the zone of distribution of shore birds and coastal marine mammals.

The 1988 Amendments to the Marine Mammal Protection Act established an exemption for commercial fishermen to take marine mammals incidental to their fishing activities. The amendments require the National Marine Fisheries Service, with NOAA, to establish an exemption, observer, and reporting system to document incidental captures of marine mammals by fishermen that are expected to take marine mammals. Based on reports of the fishermen, the NMFS is to submit to Congress its recommendations to manage commercial fishing activities in a way that reduces adverse impacts to marine mammals.

The NMFS has registered fishermen in fisheries known to capture marine mammals, including the following fisheries operating in the vicinity of the proposed Monterey Bay NMS:

-- Gillnet fisheries for thresher shark, angel shark, swordfish, halibut, white sea bass, yellow tail, soupfin shark, white croaker, and bonito/flying fish, and

-- Purse seine fisheries for herring, anchovy, mackerel, tuna, sardines, and squid.

Fishermen began reporting incidental captures to NMFS under

these amendments on July 1, 1989.

The trawler fishery has also been extensively regulated and no trawlers are currently allowed within 3 miles of the coast (pers. comm., Marine Resources Division, Monterey Bay area, CDF&G, March 1990). Approximately 8 boats participate in this fishery using a mixture of otter trawls and roller trawls. No data exists on amount of incidental take of birds and marine mammals due to the trawler fishery beyond three miles. It is unlikely that trawling will cause incidental take of marine mammals and seabirds as the gear is only deployed over short periods of time and covers small areas of the ocean floor. Also, this type of activity occurs outside of three miles which is beyond the range of most of the nearshore diving birds and sea otters. In addition, during an experimental period of 5 years, two trawlers were permitted to fish within three miles and during this experimental period there was no incidental take of marine mammals or seabirds (pers. comm., Marine Resources Division, Monterey Bay area, CDF&G, March 1990).

There is almost no data regarding the effects of roller trawling near and on the bottom to benthic organisms and habitats (Edward Melvin, pers. comm., March, 1990). However, preliminary estimates from the few boats that roller trawl would indicate very minimal impact (pers. comm., Marine Resources Division, Monterey Bay area, CDF&G, March 1990).

11. Enforcement

A reliable and effective enforcement capability is also necessary to ensure that regulations are observed. The CDFG has approximately 8 skiffs, two 65 ft. patrol boats (in Monterey and San Francisco), one 30 ft. patrol boat in San Francisco. CDFG staffs a 30 ft. vessel owned by NOAA for patrolling the Gulf of the Farallones National Marine Sanctuary. No boats patrol all ocean waters from Bodega Bay to Monterey. The 65 ft. vessel in Monterey occasionally patrols the area south of Monterey. (Capt. Phil Helms, CDF&G, Personal Communication; 1989). The two larger patrol boats in the 65 ft. (20 m) class traverse the proposed Sanctuary area out of San Francisco, and Moss Landing from Bodega Bay to Morro Bay. Finally CDF&G has two 100 ft. patrol boats: one originates from the south in Long Beach and patrolling Santa Barbara and Ventura counties, but does not conduct surveillance runs on any regular basis into the proposed Sanctuary's southernmost segment. The other 100 ft. boat, based to the north in Eureka, occasionally heads south through the proposed Sanctuary.

CDFG wardens sometimes patrol the Año Nuevo Reserve mainland, the Point Lobos Ecological Reserve, and California Sea Otter Game Refuge by foot or vehicle; however, no wardens are permanently located at any of these areas. Moreover, patrols by boat or on land are responsible for enforcing not only specific regulations applicable to individual reserves and refuges, but also the entire California Fish and Game Code. Thus, arrangements appear somewhat strained regarding enforcement and monitoring.

Certain enforcement functions in the proposed Monterey Bay Sanctuary area are also carried out by the California Department of Parks and Recreation (CDP&R). For example, although the Año Nuevo State Reserve and the Point Lobos Ecological Reserve were originally designated under CDF&G authority, CDP&R assumed on-site management responsibility. Pursuant to this mandate, CDP&R staff are permanently located at both areas and conduct regular land-based patrols. They do not, however, have general authority to prohibit diving, fishing, collecting, or other human activities which may adversely affect, e.g., through intrusion, sensitive marine resources. Also, the CDP&R is entirely dependent on the CDF&G for the prosecution of violations occurring beyond the intertidal zone. As a result, actual CDP&R enforcement levels in the study area tend to reflect CDF&G capabilities. The CDF&G occasionally conducts patrols of Año Nuevo and Point Lobos Reserves, but, due to personnel shortages, the CDP&R has assumed primary management responsibility here as well.

The NMFS recently entered into a cooperative agreement with the State CDF&G whereby both parties agreed to enforce each other's regulations. However, due to practical constraints of budget and staffing NMFS enforcement activity has remained largely confined to its own statutory responsibilities.

In view of available State and Federal enforcement staff and the large marine area of approximately 2,200 square nmi (6860 square Km) to be covered, the current enforcement capability appears inadequate.

B. Research and Education

The existing management system contains no mechanism for maximizing the area's research value, e.g., by means of a comprehensive or extended program framework. A variety of organizations conduct significant research in the ocean waters of the Monterey Bay area on an individual basis. The establishment of a Monterey Bay Marine Geological Consortium has been proposed. The consortium, consisting of the Institute of Marine Sciences-University of California at Santa Cruz, the Moss Landing Marine Laboratories, and the Monterey Bay Aquarium Research Institute, would improve marine geological and geophysical studies of the Monterey Bay and offshore regions. To date, however, no coordinating entity exists to identify regional research information needs or to design strategies for filling them. Thus, scientific research is pursued in a rather fragmented fashion which often fails to incorporate other relevant environmental quality parameters.

Although literature and other educational information on Monterey Bay and its habitat values is available to the general public, these efforts are largely uncoordinated and the collected research is rarely applied to management problems. Tourists, recreational fishermen and, nature enthusiasts who visit the Bay thus have little or no knowledge of its geology or of the complex communities of biota that inhabit the canyon and surrounding waters. Nor do they realize the value of Bay waters to the mammals and birds that feed there or pass through in transit.

C. Management

Presently, some 11 Federal, seven State, and various other regional and local government agencies are vested with some regulatory authority over specific resources and human activities (Table 14). However, no single entity has management jurisdiction to govern marine resource use and conservation comprehensively, i.e., for the entire Monterey Bay region. Generally, each has a narrow geographic or functional jurisdiction. Present arrangements, therefore, fail to integrate a breath of scope sufficient for sustained regional resource protection in the offshore environment. Although the importance of individual resources, e.g., endangered species, is on occasion well acknowledged in law and regulatory implementation is often fairly effective, the system under-emphasizes the national significance and preservation priorities warranted by this unique marine environment. The formal designation of a Monterey Bay region marine sanctuary, providing a concerted management focus on coordination of existing regulatory arrangements, will ensure long-term protection of the exceptional diversity of marine resources in the region.

Section II: Sanctuary Designation -- The Preferred Alternative

The preferred alternative would permit the implementation of a coordinated and comprehensive management scheme resulting in the most cost-effective protection of Monterey Bay area resources. This alternative would promote resource protection in four ways: (1) It would bolster the existing regulatory resource protection regime. (2) It would establish a coordinated research program to expand knowledge of the Monterey Bay area environment and resources and thus provide the basis for sound management. (3) It would include a broad-based education\interpretive program to improve public understanding of the Monterey Bay area's importance as the habitat for a unique community of marine organisms. (4) It would provide a comprehensive management framework to protect this habitat.

This unique, biologically diverse and relatively undeveloped natural setting is extraordinary, considering its proximity to the Monterey and San Francisco metropolitan regions. Besides providing an ecologically diverse haven for so many significant concentrations of living resources, the waters also support a number of socially beneficial human activities. These range from fishing to commercial shipping, nature observation, education, scientific research, national defense and law enforcement, and recreation. To date, such activities have been pursued at low intensity levels. However, these and other potential human activities, e.g., oil and gas development, are clearly capable of

generating conflicts which could harm the resources of this marine area. Of particular concern are potential damage to species and habitat degradation or destruction which could irreparably damage resource quality over the long term.

The proposed boundaries will integrate many important nearshore and oceanic marine resource zones into one management regime. These zones include: the entire Monterey Canyon complex, the adjacent continental shelf, the Bay itself and certain highly productive shoreline and intertidal areas, such as the marine communities within Pescadero Marsh, Año Nuevo, Elkhorn Sough, Carmel Bay, the Big Sur Platform and coastline, Julia Pfeiffer Burns State Park, and the California Sea Otter Refuge.

Also, five Areas of Special Biological Significance (ASBS) established by the State of California would be included in this alternative. One of the United States' largest marine bird rookeries is incorporated, as well as lesser (but in some cases, recolonizing) pinniped breeding populations. Many species of migratory waterfowl visit seasonally by virtue of the area's position on the Pacific Flyway. Also, gray whales regularly pass through these waters on their southward and northward migrations. In addition, the Sanctuary boundaries include the ocean waters north and west of the Monterey Bay, which are rich foraging and fishing areas. In addition to unifying the rich habitat areas listed above in one management and planning unit, the proposed Sanctuary, through regulations, would create a buffer area between potentially harmful activities outside the proposed Sanctuary and

especially sensitive habitat areas. In short, the marine ecosystem's diverse resources 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.

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

A. Resource Protection Regime

The proposed designation will improve resource protection by instituting new regulatory measures and by supplementing present surveillance and enforcement actions. The overall effect of these regulations, narrowly focused on specific activities, will be beneficial. NOAA when promulgating these regulations must work within the constraints of Title III of the MPRSA. Specifically, section 304(c) provides that NOAA cannot terminate valid leases,

permits, licenses or rights of subsistence use or of access existing as of the date of Sanctuary designation but can regulate the exercise of such authorizations and rights consistent with the purposes for which the Sanctuary was designated. The impacts of each proposed regulation are discussed below.

(1) Hydrocarbon Activities

Exploring for, developing, or producing oil, gas or minerals is prohibited in the Sanctuary;

This proposed regulation prohibits oil, gas or mineral exploration, production and development activities throughout the entire Sanctuary. The prohibition on mineral activities within the proposed boundaries is consistent with the prohibition on alteration of, or construction on, etc., the seabed as discussed below. The proposed regulations will prohibit activities in the Sanctuary which might otherwise result in chronic discharges, catastrophic oil spills, and various other activities associated with petroleum development which may harm wildlife (including many endangered species) within some of the primary foraging waters surrounding the major bird and pinniped rookeries and resting places in the area. The proposed prohibition of hydrocarbon activities will ensure continued absence of leasing in the currently deferred Federal OCS areas off Monterey and Big Sur and deferred state waters and add an additional layer of protection to environmentally sensitive areas such as off Año Nuevo.

While it is clear that the natural resources and qualities of Monterey Bay are of National significance and value, scientific

evidence and public opinion are still divided regarding the effects of oil and gas activities on these natural resources and qualities. Due to the mandate of the MPRSA to protect these Nationally significant natural resources and qualities and the identified risks to these resources, NOAA is proposing to eliminate concern for any adverse environmental impacts that may occur in the Sanctuary from oil and gas activities by prohibiting these activities within the proposed Sanctuary boundary (approximately 2,200 square nmi).

A recent NAS study (NAS, The Adequacy of Environmental Information for Continental Shelf Oil and Gas Decisions: Florida and California, 1989) as well as past EPA (1983) and NAS (1985) studies have all examined whether there is adequate information available to determine the effects of oil and gas activities on the marine environment. Many uncertainties still exist.

It is possible that adverse environmental impacts may occur within the Sanctuary as a result of oil spills, synergistic effects of various discharges from oil and gas activities associated with nearness to a drilling site, or sublethal effects from low-level exposure to these wastes discharged from oil and gas activities.

Offshore hydrocarbon exploration, development and production activities, including the transshipment of oil to the mainland, may cause unforseen and potentially substantial discharges of oil (chronic and catastrophic discharges) into the marine environment in a number of ways. The regulations are intended to protect sensitive marine resources more effectively against the risks and

adverse impacts of: (1) well blowouts caused by equipment failure or damage and geologic hazards, (2) oil spills and pipeline leaks, (3) noise and visual disturbances caused by drilling, the presence of drill rigs or platform, work crews, supply boats, and helicopters, (4) pollution associated with aquatic discharges, and (5) short-term pipeline construction upheaval.

Normal hydrocarbon operations result in chronic, small oil spillage. Since the Monterey Bay area has had no history of hydrocarbon production there is no direct evidence of the effects of exploration and production spills in these waters. Most of the evidence that is discussed in this section is extrapolated from the experiences in other California marine areas especially the neighboring Gulf of the Farallones, now designated as a National Marine Sanctuary, and from MMS data from the 5-Year Plan and discussions on past and future leases off the central California coast.

Although most of the proposed Monterey Bay Sanctuary is excluded from the MMS 5-year plan for outer continental shelf (OCS) leasing (MMS, 1987), if hydrocarbon exploration and development were permitted at a later date, such operations would threaten Bay resources. Table 13 summarizes the known threats to marine organisms which result from offshore oil development and Table 14 describes how NOAA's proposed Sanctuary provisions will help mitigate these impacts. This section analyzes the potential adverse impacts identified above, the extent to which NOAA's

Table 13. Summary of Threats to marine mammals, seabirds, and marine organisms resulting from offshore oil resources development and production (modified from University of California, Santa Cruz, 1976.)

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

Table 14. 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 distances between potential spill/pollutant discharge point (i.e. rigs, platforms and pipelines) sensitive and resources which allows natural weathering and dilution of contaminents bereaching important marine life concentration areas --Excludes noise and visual disturbances of routine operations from the vicinity of important marine life habitats. --Reduces potential visual intrusion on aesthetic values of the 31 Units of State Park, Beach, Reserves and Refuges and the proposed Sanctuary itself. --Reduces potential air pollution.

proposed Sanctuary provisions serve to mitigate them, and the anticipated socioeconomic consequences of these regulations.

By excluding hydrocarbon activities from the Sanctuary, the proposed regulation establishes a "time and space" buffer area between oil and gas activities and particularly sensitive island and nearshore habitat areas. The MMS OCS 5-Year Plan (Mid 1987 to Mid 1992) (the "Plan") includes oil and gas leasing from some of the area under consideration in Lease Sale 119. The Plan and Lease Sale 119 defer, among other areas, a large area offshore Monterey Bay and Big Sur (53 FR 46421). The area withdrawn by the Plan comprises a significant portion of the proposed Sanctuary (Figure 11).

However, the protection afforded by this prohibition is contingent upon the continued absence of oil and gas development in State waters. Although the State Lands Commission does not now foresee any action to lease tracts for hydrocarbon activities in the area in question, leasing is possible and could affect the status of Federal OCS tracts. Moreover, the Plan does not cover the water due west of Año Nuevo and north of Monterey Bay (Figure 11).

As discussed in Part II Section II, there are currently no oil and gas activities or leased tracts within the Sanctuary preferred boundaries. Lease Sale #119 is currently on hold in the early phase of the pre-sale process. Thus far, only "Call for Information" has been completed by MMS for the proposed sale and no further activities are being carried out.

A number of Lease Sale 119 tracts lie within the Bodega and Año Nuevo Geological Basins. These have been divided by MMS for planning purposes into the San Francisco and Santa Cruz Subareas. Based on Maps that were presented during the scoping process for Lease Sale #119 it can be estimated that approximately fifty tracts at the southern end of the Lease Sale area would be included within the Sanctuary's preferred boundary. However, the lease sale process has not concluded the area identification step and it is uncertain exactly how many tracts will be included within the preferred boundary.

(a) Oil Spills

The proposed prohibition on oil, gas and mineral activities in the Sanctuary establishes this area as a buffer between possible oil spills occurring outside the Sanctuary as a result of Lease Sale #119 or future sales, and the highly sensitive Año Nuevo 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 Part II, Section 2). The existence of a buffer zone ensures that in the event of an oil spill, the oil would have to undergo a minimum amount of weathering before reaching more sensitive nearshore and intertidal areas. The weathering process would allow the more toxic fractions of the petroleum to evaporate and would permit some natural dispersion to occur. Also, San Francisco Bay-based contingency crews would have

more time to reach the spill site and deploy containment and/or diversion equipment either at sea or around entrances to highly vulnerable Bays and sloughs.

The proposed regulation will increase the likelihood of employing at-sea containment rather than onshore cleanup. Although more difficult to achieve, at-sea containment is generally preferable to nearshore or onshore cleanup or containment efforts because it is likely that cleanup crew, equipment, and associated disturbances will compound the adverse impact caused by the spill itself (U. S. Bureau of Land Management, 1979). For instance, Lindstet-Siva (1976) states that attempts to boom rookery beaches may be counter-productive since most species of pinnipeds will abandon rookeries if repeatedly disturbed. Because suitable areas for pinniped rookeries are quite limited, abandonment of a rookery in this area could have severe consequences. Even if disturbed only once, several days may be required before activity patterns return to normal on a disturbed beach. Rookeries and haulout areas that are just being established (see Part II, Section 2) may be even more sensitive to disturbance than beaches of long-standing use. 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.

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 (See Part II, Section III) would also gain additional mobilization and cleanup time should a catastrophic spill occur.

The Monterey Bay 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. It seems that the available control technology, e.g., booms vs. chemicals, most suitable for possible oil spills in or near the Sanctuary is inadequate (J. Packard, 1989, personal communication). It is possible that spills originating from Lease Sale 119 will, due to adverse oceanic conditions, have to be combatted more with chemical agents than with mechanical recovery or diversion boom techniques.

Lindstet-Siva also recommended that human activity be kept to a minimum in nearshore waters and on beaches used by pinnipeds and that the use of chemical dispersants in the open sea be considered to mitigate the effects of the spill. Dispersants act to facilitate the incorporation of the oil into the water column and can be used when conditions prevent the deployment of containment and collection equipment. The application of dispersants is contingent on permission given by the Environmental Protection Agency. This permission is granted on a case-by-case basis depending on specific spill site condition and is planned to result

in the least overall environmental damage.

However, an insufficient amount of research, especially for newly developed dispersant chemicals, has been conducted to assess adequately their effects on the marine environment although some studies suggest that the impacts of using dispersants at times exceeded that of the oil alone (MMS, 1987).

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

Finally, although the buffer zone will allow a greater time margin in which to commence containment action, open ocean spill containment is not yet predictably successful in seas as dynamic as those of the study area. The buffer would also allow time to employ dispersants if that technique is proven to be advisable. The success or failure of at-sea containment and recovery

operations in the event of a spill depend heavily on the prevailing marine conditions, the amount of time before the oil will reach critical resources, and the speed of response. Theoretically, under calm sea conditions, containment and recovery equipment can function effectively. However, the effectiveness of containment booms and skimmers falls off dramatically as wave height or wind velocity increase; in fact, booms will not function well if water currents exceed one to two knots (California Office of Planning and Research, 1978). 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, 1978).

The following discussion identifies some of the major environmental risks caused by different sources of oil spills to the water and sediments and relates these risks specifically to significant marine resources found within the preferred Sanctuary alternative.

(i) Sources of Oil Spills

Accidents, natural disasters, and human error can lead to situations which result in the inadvertent release of oil into the marine environment. Spills can be caused by well blowouts, barge and tanker accidents, pipeline breaks and leaks and equipment failures. In addition to accidents, natural disasters, and human error, natural oil and gas seeps also may release oil into the

marine environment. This is particularly true in off-shore southern California.

Over the next 30 years, the MMS estimates there is a 98% probability that approximately four spills of 1000 barrels or greater will occur in the vicinity of the Sanctuary. Of the spills referred to above, it is estimated that there is a 50% probability that 0.69 spills of 1000 barrels or greater will occur that would be directly attributable to central California OCS oil and gas activities ie. from platform, pipeline and tanker spills. It is projected by MMS (1987) that one platform would develop Lease Sale 119 and that all oil produced would be shipped by tanker and thus no pipeline spills are projected.

The remaining sources of oil spills are from: (1) oil tankers transporting imported oil, (2) oil tankers transporting domestic oil produced from other OCS Leases under the current 5-Year Lease Sale Plan, and (3) oil tankers transporting domestic oil produced from sources other than under the current 5-Year Lease Sale Plan, ie., mainly tankering of TransAlaskan Pipeline Oil (MMS, 1987).

According to MMS (1987) the estimated mean number (Est. Mean #) and probability (Prob.) of each source of spill, using a Poisson distribution, is as follows:

-Spills from OCS Sources in Central California	Est. Mean #	Prob.
- Platforms	0.30	
- Pipelines	0.00	
- Tankers	0.39	
SUBTOTAL	0.69	0.5
-Spills From Other Sources in Central California		
- Current 5-Year Plan OCS Transport	0.36	0.3
- Other Domestic Transport	1.51	0.78
- Imported Transport	1.42	0.76
TOTAL SPILLS: ALL SOURCES	3.98	0.98

If during exploration, oil companies discover major hydrocarbon resources, then an unknown amount of additional sales with associated development could occur with a corresponding increase in the probability of an oil spill. Likewise, the reverse may be true if less hydrocarbon resources are discovered than estimated.

The risk from oil exploration, development and production, including platform, tanker and pipeline spills is discussed below:

- Offshore Platforms and Well Blowouts:

During the period 1964 - 1988, thirty eight percent of the oil spilled in association with drilling and production in the OCS was caused by blowouts. During these 24 years, a total of 161,688

barrels were discharged into marine waters as a result of blowouts at offshore wells in the Gulf of Mexico. An additional quarter of a million barrels was spilled as a result of non-blowout associated incidents (MMS 1988).

Massive spills caused by well blowouts have been highly publicized, but such spills are rare. According to LaBelle in the Final EIS for OCS development in the Gulf of Mexico (1984) the OCS spill-rate for platform spills greater than 1,000 barrels (bbl) was 1 per billion barrels produced, 1.6 for pipeline spills, and 1.3 for spills involving tankers. More recent figures by Anderson and LaBelle (1988) indicate that when oil and gas production for the years 1981 to 1987 are included, and the first 2.5 billion barrels of production are not considered (when 73% of all platform spills occurred), the rates decrease. The rates are now considered to be 0.60 for platforms and 0.67 for pipelines. It is possible that the primary reason for the reduction in rates is due to the decreased amount of incidents since 1980 which may be a result of increased technology and safety, and the gains in experience of the industry (Anderson and LaBelle, 1988). Most blowouts have been relatively minor, especially in recent years. From 1964 to 1981, 99.5% of the spill volume caused by blowouts in the Gulf of Mexico was spilled in the years 1964 through 1971. After 1971 the volume of blowout-produced spills was negligible, yet there was no reduction in the number of blowout spills (The Futures Group, 1982). It should be noted that since 1971 there have been no blowouts that exceeded 1,000 bbl of oil spilled. The OCS spill-rate for small platform or

pipeline spills is 379 spills per billion barrels produced or transported. Ninety-nine percent of these spills are less than 50 barrels and 89% are less than one barrel (MMS, 1986).

Although the offshore oil industry has been successful in reducing the volume of oil spills, the record indicates that, if oil development were to take place in the area of Monterey Bay, spills from blowouts and platform accidents are likely to occur.

The large majority of spills involve relatively small amounts of oil, usually less than 500 gallons (10 barrels) (MMS, 1990).

Severe, long-term, impacts on marine environments would result from large, acute oil spills greater than 1,000 barrels. Between the years of 1964 and 1988 there were 22 spills of this magnitude at offshore facilities on federal leases. Of these incidents, four were well blowouts and seven were vessel-related damage to submerged pipelines. Combined they accounted for 89% of the total oil spilled in major events.

Any large oil spill would be particularly hazardous to the sensitive fish, invertebrates, seabirds and marine mammals that inhabit the diverse habitats of the Bay because of its potential for depositing high concentrations of toxic substances in the water column and intertidal areas. This process was demonstrated by the IXTOC well blowout, which occurred in June, 1979, in Mexican waters off the Gulf of Mexico. The IXTOC blowout released some 10,000 barrels (one barrel is equivalent to 42 gallons) of oil per day into the ocean for nine months, thus providing scientists with their first major opportunity to study the transport of oil from a

subsurface spill (MMS, 1986).

It should be noted that the IXTOC incident was the largest OCS blowout in the world and took place in foreign waters. This operation was not subject to the same federal controls that would apply to a U.S. regulated facility. In another example of a blowout, the Santa Barbara Platform A in waters off of southern California, spilled 77,000 barrels of oil over a period of ten days in 1969. The Santa Barbara spill occurred at a time prior to the promulgation of 30 CFR regulations (Oil and Gas and Sulphur Operations in the OCS) and the development of more advanced technology to prevent blowouts from occurring.

However, over the lifetime of central California oil and gas activities, and taking into account the cumulative impacts of oil spills, it has been shown above that there is a 50% probability of an oil spill from OCS activities in central California and that the estimated mean number of oil spills from platforms is 0.30.

- Pipelines:

Ninety-seven of all OCS production has been transported by pipeline, with no less than 95% in any single year (Anderson and LaBelle 1990). Offshore and onshore oil and gas pipelines are considered impact-producing factors of special concern in the marine and coastal environments on the basis of potential accidental oil spills. Since 1970, the number of pipeline segments added in the federal OCS per year ranged from 200-275 (U.S. Department of Interior, 1983). Installations since 1970 have added

between 400-800 (averaging 600) miles per year to the existing network in federal waters (AL,1990).

Offshore pipelines are exposed to numerous hazards including corrosion, geologic hazards, hydrodynamic forces, and accidental damage caused by anchors or by other objects. Pipeline corrosion can be internal or external and may result in leaks and breaks. Geologic hazards capable of causing pipeline failure are sediment instability and seismic activity. To minimize the potential for pipeline failure resulting from such hazards, preconstruction route surveys are analyzed to determine the safest and most stable route for pipeline placement.

Hydrodynamic forces may remove sediments from around a pipeline and cause stresses from sagging or vibration from currents where velocities are sufficiently high. Anchors, fishing nets, trawl doors, cables, or any other objects that may be dragged or dropped on a pipeline can cause damage and possible leakage.

Pipelines are termed seafloor sources of oil as opposed to sea level sources such as tankers and platforms. Oil spilled from seafloor sources (pipelines, wellheads) may be entrained and transported for great distances by subsurface currents (U.S. Department of Interior, 1983). This was the case with a seafloor source, IXTOC-1, where oil released at the seafloor circulated in the Gulf of Mexico for months until reaching the Texas coast hundreds of miles to the north (DOI, 1983).

Data on oil spills from pipelines on the U.S. OCS, 1964-1987 (Anderson and LaBelle 1990:27) indicate that for eight pipeline

accidents oil spill amounts ranged from 3,500 to 160,638 barrels. Further nearly 40% of all oil spilled in 1988 was from non-vessel sources such as pipelines (U.S. Coast Guard, Marine Pollution Retrieval System, 1989).

As stated above there are no plans to use pipelines to transport oil from central California OCS development during this 5-Year Plan and thus there is no estimated mean number of spills from this source. However, in the future with additional Lease Sale Plans pipelines maybe reconsidered as a method of transportation of oil from the OCS to the shore.

- Tankers:

This discussion relates directly to the probability of a spill resulting from the tankering of oil from an OCS facility located in the Central California Planning Area. As stated above, it is estimated that there is a probability of 0.39 spills of greater than 1,000 barrels (MMS, 1987). Further discussion on the environmental consequences of tankering activities from sources other than central California OCS facilities is contained in the Environmental Consequences of Vessel Traffic section below.

(ii) Transport, Fates and Effects of Oil in the Marine Environment Regardless of Source

Although most spilled crude oil initially floats, approximately 1% - 5% of the volume of a surface slick will occur in the water column as a result of dissolution, dispersion,

sinking, or sedimentation in the vicinity of the spill. Studies show that a sub-surface plume of stratified materials is formed beneath an oil slick. The heavier molecules sink first while the lighter ones are carried further in the current. Because the oil in such a plume remains below the surface it may have a different chemistry than the surface slick and maybe more toxic to marine organisms.

In the case of the IXTOC blowout, it was found that a subsurface plume of oil droplets, extending from the wellhead and generally aligned with the surface slick, contained high concentrations of low molecular weight aromatics, alkyl benzene and naphthalene compounds which are acutely toxic to marine organisms (MMS, 1986).

Subsurface currents would generally serve to sweep entrained oil, especially from seafloor sources such as pipelines and wellheads) along or near the seafloor until reduced current velocity allowed settling and deposition (Fiest and Boehm, 1980). As the specific gravity of much of the oil is near that of seawater it can be expected that the oil will remain in suspension until deposited at or near shorelines or bars. Additionally resuspension and redeposition of the oil due to storm waves or currents is to be expected.

In Monterey Bay, it is difficult to predict the fine-scale transport of pollutants and exact path of source to sink of an oil spill due to the highly complex current and eddy patterns in the vicinity of the proposed Sanctuary. A spill occurring in the

vicinity of the proposed Sanctuary could be driven directly to the bay by the California Current, the Davidson Current, or the eddies associated with these coastal currents and cause considerable damage to sanctuary resources. The proposed development of the OCS to the north of Monterey Bay poses concern due to the south flowing California current for 2/3 of year and the close juxtaposition of the breeding and resting habitat at Año Nuevo.

Estimates of the trajectory of spilled oil in the region are based on a report prepared for the U.S. Coast Guard by Ecological Consulting, Inc., February, 1990. This report analyzes the seasonal probability of an oil spill coming into contact with the sea otter range (Point Año Nuevo to the mouth of the Santa Maria River) if it were to occur off the coast of California. The study shows that a spill occurring in the area being considered for oil and gas exploration has a significant chance of contacting the Monterey Bay area. If a spill were to occur at a point roughly 10 nmi southwest of Point Año Nuevo, it would have a 41.8% chance of coming into contact with the sea otter range within 30 days.

In addition to the acute effects of large oil spills on marine ecosystems, such spills may have long-term effects on surviving marine organisms. Sublethal and long-term hydrocarbon impacts on ecosystems are associated with low oil concentrations in marine environments which may result from the evaporation, degradation, and dispersion of hydrocarbons following a large spill or from chronic, small spills (less than 1,000 barrels). Of the two, chronic small spills may pose a greater hazard to marine ecosystems

than isolated large spills. Both the EPA and the NAS have reviewed the literature and past studies on the long term effects of chronic, small oil spills to the ecosystem but the data remains inconclusive due in part to the lack of adequate numbers of long-term studies.

Due to the patchiness of the marine environment in terms of distribution and abundance of marine organisms it is possible for a small spill to cause more environmental damage than a large spill if the small spill occurs during a special time (ie. breeding or feeding seasons) and at a particular location (nesting or breeding habitats). For example, this is evident off central California from a comparison of the magnitude and effects of oil spills from the Apex Houston and the Puerto Rican (discussed below under Environmental Consequences of Vessel Traffic), where even such small spills, in the short term, could kill a large number of individual birds or other marine organisms depending on the area where the spill impacts.

Certain species of marine mammals and birds are seasonally present around the Monterey Bay area in numbers representing an ecologically significant percentage of their entire population (as discussed in Part II Section 2). Potential harm to pinniped and marine populations would be magnified if an oil spill were to occur during a period of high density or during a breeding season. For another example, this seasonal susceptibility has been highlighted by the U.S. Bureau of Land Management (1979a) in regard to the marine resources surrounding the Northern Channel Islands.

Thus, regardless of source and magnitude, oil spills in the marine environment in the Monterey Bay area demonstrate a number of concerns:

- The size of the spill does not necessarily correlate with the resulting damage to the environment;
- In most cases of oil spilled in the central California region, the existing capability to contain and clean up the spill has not been equal to the task at hand. The areas affected are coastal marine waters and to be effective, clean-up equipment requires less turbulent waters; and
- Mitigating measures alone may not be sufficient to ensure adequate protection of Sanctuary resources.

The greatest damage to the marine environment occurs under any of the following circumstances:

- The oil is spilled into or reaches a confined, shallow body of water, such as a small bay. Thus, the volume of oil spilled is large with respect to the body of water being affected.
- The oil is refined oil, such as home heating oil or diesel oil.
- Storms or heavy surf cause the oil to be churned into the bottom sediments.

In many instances, it does appear that the marine ecosystem can recover from the damage occasioned by oil spills although the rate and completeness of recovery remain subject to dispute. Oil can directly affect living marine organisms biochemically, behaviorally or physically (see, for instance, Boesch et al, 1973; National Academy of Sciences, 1983; EPA, 1985; MMS, 1987; Michael, 1977). Petroleum hydrocarbons can also have sublethal or indirectly lethal effects on marine organisms through the destruction or alteration of food supply, chemical interference with reproductive success, synergistic effects which may reduce

resistance to disease, and other stresses which alter behavioral patterns such as feeding. The physical damage resulting from the coating of marine organisms, the feathers of marine birds, the fur of marine mammals, and the respiratory apparatus of fish with oil is well documented (see, for instance, U.S. Bureau of Land Management, (1979a).

Below is a summary of the impacts of oil spills on the biological resources, habitats and uses of the Monterey Bay area.

Effects on Marine Mammals

Pinnipeds and Sea Otters

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

Although northern fur seals depend only partially on their fur for thermal protection, oiling could depress their thermoregulatory abilities, which could lead to hypothermia and death (Kooyman, et al., 1977). Studies by Kooyman, et al., (1977) indicate that among sea mammals, the most profound effects of oiling may be on the sea otter pup; its thermal conductance increased by 2.1 times after

oiling, indicating a significant loss of insulation capacity. The results of Kooyman's later studies confirm that even a light oiling could have marked detrimental effects on the thermoregulatory abilities of otters (Kooyman and Costa, 1979.)

Northern fur seals have been sighted in the vicinity of the Farallon Islands and Monterey Bay 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.

Pinnipeds and sea otters exposed to oil spills may be adversely affected by hydrocarbons contacting their fur or skin or being ingested or inhaled. 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. Oil contamination of their fur can cause loss of buoyancy and thermal insulation, as fouling of the feathers does with birds. Loss of insulation is probably more serious for pinnipeds and sea otters than loss of buoyancy. Oil contamination of their fur is therefore especially harmful to fur seals and sea otters which depend on their fur for insulation. Phocid seals rely on blubber and vascular mechanisms for thermal regulation and are thus more resistant to thermal loss caused by contact with oil (Geraci and St. Aubin, 1980). Of the pinnipeds in the Monterey Bay area, the northern fur seals and the California and Steller sea lions are fur

seals; the northern elephant seals and harbor seals are phocids.

As stated earlier, the ingestion of oil by pinnipeds is most likely to occur during feeding or as the animals clean their coats. The impact of such ingestion would probably depend upon the amount ingested, its toxicity, and the physical condition of the pinnipeds. The long-term effects on pinnipeds of various levels of hydrocarbon bioaccumulation are unknown.

Cetaceans

The adverse effects of oil spills on cetaceans are the result of oil contact with the skin or eyes, fouling of baleens and ingestion or inhalation. Because the skin of cetaceans is smooth and furless, oil is unlikely to adhere to it, although it may adhere to the callosities that occur on right and humpback whales. In a study of bottlenose dolphins to determine the effects of direct skin contact with spilled oil, it was found that exposure to crude oil for periods of up to 45 minutes produced short-term, morphological and biochemical changes to the skin, but recovery appeared to be rapid (Geraci and St. Aubin, 1982).

It has been assumed that cetaceans may suffer eye irritation as the result of contact with oil, but this assumption has not been scientifically confirmed. Baleen whales such as the humpback, blue and gray whales (all observed in Monterey Bay area waters) are subject to baleen fouling as a result of exposure to spilled oil. This may impair their ability to feed, however, humpback whales have been observed feeding in oil-slicks without apparent immediate ill effects (NOAA, 1979).

The bioaccumulation of oil in both baleen and toothed cetaceans is most apt to occur as the result of eating contaminated food supplies. There is little likelihood that oil would be inhaled through the blow-hole although it is possible that toxic fumes might be inhaled in small quantities (Geraci and St. Aubin, 1980). Although the effects of hydrocarbon accumulation in cetaceans are unknown, it can be assumed that the longer an animal is exposed to spilled oil, the more likely it is to suffer adverse effects. Prolonged exposure is most apt to occur when contamination occurs in a feeding ground, such as within or adjacent to Monterey Bay.

In general, little is known about the ability of cetaceans to avoid oil spills. As noted above, humpback whales have been observed feeding in an oil slick. Bottlenose dolphins, however, can detect and will avoid thick oil accumulations but do not avoid thin oil sheens (Geraci and St. Aubin, 1982, 1983).

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

at present showing the bioaccumulation of oil through the food chain resulting in a biomagnification effect on cetaceans.

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

Several endangered species of whales, including the highly endangered blue whale, occasionally appear in the study area (see Part II, Section 2). 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. 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

proposed Sanctuary area twice annually.

Effects on Marine Birds

Oil spills in Monterey Bay area waters could have a major impact on foraging seabirds. Floating oil affects marine birds by fouling feathers and through ingestion, inhalation, and irritation of eyes and membranes. The major cause of immediate mortality among seabirds contaminated by oil is fouling of the feathers, which reduces flying and swimming ability and results in a loss of buoyancy and of thermal insulation. 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.

The ingestion of toxic hydrocarbons, sometimes by preening contaminated feathers, can produce physiological stress which may eventually result in death. If non-fatal contamination occurs during the breeding season it may lead to reproductive failure. Birds that have ingested toxic elements may produce inviable eggs, and birds whose feathers are contaminated may transfer oil to eggs or chicks, thus reducing hatching or fledgling success (NOAA, 1979).

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, or to spend considerable time swimming on the water, to dive when alarmed, and species which exist in small, isolated populations are extremely

vulnerable (U.S. Bureau of Land Management, 1980.) To some extent, all marine birds which breed in large colonies are vulnerable to contact with floating oil during the nesting season since they concentrate together for all or most of that period.

The study area is characterized by a number of marine bird breeding colonies, including some of the largest marine bird rookeries in the continental United States (see Part II, Section 2 and Figure 7, above). In addition, many migrating species congregate in the offshore regions throughout the year. Impacts due to oil spills and associated cleanup operations would be greatest when marine bird densities were at their peak. Such densities vary throughout the spring and summer for different species.

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

(Bureau of Land Management, 1980). All of these birds have been identified foraging in Monterey Bay area waters.

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 cause even more stress than light oiling.

An oil spill in the area under consideration would be almost certain to affect large numbers of birds, particularly if it occurred between March and August. For certain species such as the ashy storm-petrel and the california least tern, nearly the entire population can be found in the study area during nesting or migration periods. Of the approximately 94 species of seabirds that are known to occur in the region, one third of all species rely on the areas habitats during breeding and migration seasons (Briggs and Chu, 1987) (see Part II, Section II). Clearly, an oil spill reaching, or in the vicinity of the Monterey Bay area, 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 (see above for discussion of events).

As indicated earlier, oil pollution may pose threats to bird

populations beyond immediate mortality from ingestion of oil or fouling of feathers. Because of the direct dependence of marine birds on nearshore food sources, long-term contamination of foraging grounds could cause major alterations in marine reproductive capabilities. 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 Gulf of the Farallones and Island area remain unknown to a major degree. Oil spill treatment and cleanup operations (including the adverse effects of human intrusion) can also have important impacts on marine birds and mammals. Often the emulsifiers used and the associated human activity during cleanup procedures have been more harmful than the oil (MMS, 1987). 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 (MMS, 1987). Mechanical cleanup and containment devices, such as booms, pose no toxic threat to marine birds; however, the extensive human activity associated with deployment can cause social disturbances within the marine bird and mammal populations. In addition, the effectiveness of mechanical devices is limited by sea and weather conditions. As with oil spills themselves, the impacts of cleanup operations would be particularly severe at times when marine birds and mammals were highly concentrated, e.g., during breeding or feeding activities.

Most incidents involve oil-soaked birds, although occasional

mammal oiling, e.g., of elephant seals, also occurs. Generally, oil slicks on nearshore waters or oil covered rocks on the neighboring Farallon Islands are rare (Kellogg, et al., 1978). Few open water slicks in the vicinity have ever reached these Islands with sufficient strength to cause widespread ecological damage. However, among the more recent spill incidents, the 1971 Golden Gate tanker collision appears to have caused the greatest marine bird mortality near the Islands. The estimated mortality counts in this incident probably reflect only a portion of the birds affected by oil pollution, as it is likely that many contaminated bird carcasses were not found.

Effects on Fish, Planktonic and Benthic Biota

The impact of an oil spill on Monterey Bay area fish stocks and benthic fauna would depend largely upon the type of oil involved and on the timing of the spill with respect to reproduction and larval development. The lethal toxicity of oil ranges from .1 to 100 parts per million of soluble aromatics for adult marine organisms. Larvae are usually 10 to 100 times more sensitive than adults. Sublethal effects have been demonstrated with aromatic compounds in concentrations as low as 10 to 1,000 parts per billion (Johnston, 1979). The impact of a spill is thus apt to depend on the magnitude of egg and larval mortality. Because the early life stages are often pelagic, they are more susceptible to the effects of a surface slick.

Heavier hydrocarbon elements are characterized by aromatics of

higher molecular weight and lower water solubility. These elements may be avoided by adult finfish, but benthic organisms such as those populating Monterey Bay are highly susceptible to their lethal effects. The sublethal effects of hydrocarbons on marine organisms include the disruption of normal feeding behavior, breeding, and locomotion; interference with thermo-regulation; reduced resistance to stress; and diseases caused by the intake of carcinogenic or potentially metagenic chemicals (MMS, 1986). Some organisms, however, may have the ability to compensate for minor toxic stress and may thus be able to tolerate low concentrations of toxic hydrocarbons.

A large oil spill in, or close to, valuable fishing areas would also pose a 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 on prevailing weather conditions.

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

Both lethal and sublethal effects of petrochemical pollution have been noted in fish (Hawkes, 1977; Patten, 1977; Sinderman, 1978, 1982). 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; Sinderman, 1982). In addition to 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) and Sinderman (1978) have found changes in behavior, metabolism, locomotor and activity patterns, growth, feeding and reproduction. Laboratory research, for example, has demonstrated deleterious effects on the survival and growth of eggs and larvae during spawning conditions due to short, low-level hydrocarbon exposures (Whipple et al., 1978). These laboratory results do not necessarily predict the effects of open ocean exposure to hydrocarbon discharges, where levels of contaminants may differ.

There are three main ways oil spills or chronic exposure can affect fisheries: loss of fishing time or gear; tainting of the fish; and direct destruction of the fishery (Michael, 1977). In the aftermath of a spill, the risk of fouling gear or of catching tainted fish is apt to reduce overall fishing effort. This reduction of effort has a substantial but probably only short-term economic impact. The most serious long-term effect is lingering tainting of stocks (Michael, 1977). Although direct toxic effects on an entire fishery of finfish whose populations cover large areas are not probable, smaller fishery segments can be seriously harmed.

Generally, fisheries are most vulnerable during the reproductive and juvenile stages. Many species concentrate in small geographic areas at these times and thus contaminant concentrations could have serious ecological consequences (Michael, 1977).

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

Although offshore production in general may be compatible with healthy fisheries, studies following past oil-tanker spills demonstrate some long-term damage from crude oil in the near shore area. Studies of two species of flatfish (plaice and flounder), centered on breeding grounds and estuarine habitat, show 18 months after the spill a significant reduction in recruitment into these two fisheries (Amoco Cadiz, 1980). Similarly, studies of the species show a significant amount of fin rot and internal organ lesions, spread across various year classes in the area. Scientists cannot predict what effect the spill will have on breeding or survivability of the fish in the impacted area (Amoco Cadiz, 1980), and often hatcheries and aquaculture facilities in the area have to shut down operations temporarily. Two issues are involved: the health risk from shellfish contaminated by hydrocarbons, taken from the areas affected by the spill, and the risk that any new organisms (i.e., spat) grown or hatched near the

sites could not survive.

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

Drilling and production platforms do form an artificial reef environment which has short-term benefits for the fishery. The fishery habitat exists only for the life of the field and disappears once the platform is removed. This limited enhancement of the fin and shellfish habitat must be balanced against threats posed by oil and gas production. In addition, health concerns are raised over the quality of fish that are exposed to the operational discharges of drill platforms and are then subsequently caught and consumed by the public.

Effects on Estuaries, Wetlands and other Critical Coastal Habitats

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 (Michael, 1979). As a result of the 1971 Golden Gate Bridge oil tanker collision, for example, a significant amount of oil was washed up on the mussel beds and high rocks at Duxbury Reef. Although comparison of pre-oil and post-oil transects showed a significant short-term decrease in marine life after the oil spill the visible signs of the pollution passed rather quickly, and there is no documented long-term damage (Chan, 1977.) However, oil films pervaded the upper tidepool waters almost a year later and selective evidence of marginal organisms recruitment, e.g., acorn barnacles, was observed (Chan, 1973). Generally, the more mobile forms of marine life (crabs, snails, etc.) suffered greater losses than the sessile organisms, e.g., acorn barnacles and limpets (Chan, 1973).

Wetlands and estuaries are critical coastal habitats for a number of the species discussed in Part II, Section 2. These areas are highly productive areas that are important in sustaining offshore oceanic biota with nutrient resources as well as habitat for part of their life-cycles.

Once in the sediments of an estuary oil can remain for years and destroy the entire ecosystem (MMS, 1987). If the substrate is heavily oiled, erosion can be increased 24 times (MMS, 1987) and thereby permanently alter the morphology and physical fluid dynamics of the estuary. Finally, according to MMS (1987) it is extremely difficult to protect estuary mouths by sealing them off if they are larger than 100 m. Pescadero Marsh, Pajarro River/Watsonville Slough and Elkhorn Slough all have openings of

100 m or greater and are especially vulnerable to oil spills. This is of special concern due to the limited number of such habitats in the entire central California region.

(b) Discharges

In addition to oil spills, the proposed prohibition on oil, gas and mineral activities in the Sanctuary also establishes this area as a buffer between discharges occurring outside the Sanctuary as a result of Lease Sale #119 or future sales, and the highly sensitive Año Nuevo island and mainland coastal and intertidal habitats.

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

The proposed regulation's prohibition of hydrocarbon activities throughout the Sanctuary will prevent certain discharges of contaminants due to routine rig and platform operations, which would occur if the tracts were leased and developed.

An estimated 302,000 barrels of muds and cuttings and 225 million barrels of formation waters would be discharged during the lifetime of potential OCS development off central California (MMS, 1987). The exclusion of oil and gas activities will eliminate concern for any adverse environmental impacts that may occur within the Sanctuary as a result of synergistic effects of various discharges, nearness to a drilling site, or sublethal effects from low-level exposure to these wastes discharged. While discharges

outside the boundary may reach the proposed Sanctuary, their impacts will be buffered by dispersion and dilution. Further, discharges or deposits from beyond the boundaries of the Sanctuary that subsequently enter the Sanctuary and injure a Sanctuary resource or quality are prohibited if it may reasonably be expected at the time of such discharge or deposit that the materials or other substances discharged or deposited will enter the Sanctuary and injure a Sanctuary resource or quality (See below (2) under Discharges).

Hazards to living resources from oil development operations can result from the on-site discharge of drill cuttings and drilling muds which may adversely affect benthic biota as well as fishery resources, seabirds and marine mammals. Drilling muds consist of naturally occurring minerals such as barite, simple chemicals such as sodium hydroxide and potassium chloride, and complex organic compounds such as lignosulfonates and formaldehydes. Department of the Interior OCS Order Number 7 forbids the discharge of drilling muds containing toxic substances into ocean waters.

In 1983, the Marine Board of the National Research Council conducted a study of drilling discharges. The study found that these discharges present minimal risk to the marine environment. The Marine Board did note, however, that drilling discharges do have an impact on the immediate benthic environment (National Research Council - Marine Board, 1983). However, more recent research (EPA, 1985) has shown significant benthic impacts from

platform discharges up to two miles from drilling sites.

Fluids and the lighter elements in drilling discharges are rapidly dispersed in the water column. The heavier elements, over 90 percent of the discharged material, settle to the bottom, usually in a plume extending in the direction of prevailing bottom currents. The potential impacts on marine organisms resulting from the discharge of drilling muds and cuttings are: 1) decreased primary production caused by increased turbidity which reduces light levels; 2) interference with filter feeding caused by high particulate loads; 3) burial of benthic communities; and 4) injury resulting from the acute or chronic toxic effects of drilling mud constituents.

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

(c) Acoustic and Visual Disturbance

Oil and gas platforms, rig, 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, particularly during sensitive nesting, pupping and migration seasons. If these disturbances occur very close to shore stampeding by pinnipeds or sudden flights 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 Stellar Sealions from ever fully recovering at their breeding areas on Año Nuevo, although the likelihood of this occurring has not been scientifically substantiated. (See Part II, Section 2 for a discussion of marine mammal and bird populations with rookeries, or in the process of establishing rookeries, on Año Nuevo Island and the coastline 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 boundaries would lessen the noise and human activity in nearshore waters. It would also decrease the need for additional supply boats to enter the nearshore waters or incidentally approach nesting or resting marine mammals or marine birds.

In addition, the prohibition of oil and gas activities within

the Sanctuary pursuant to future leases would reduce the potentially adverse aesthetic impacts from oil and gas platforms, rigs, pipeline construction, and other activities, and serve to preserve the wilderness character of the Island waters. While the significance of undisturbed views and wilderness is difficult to quantify in monetary terms, their protection is nonetheless important, particularly in proximity to heavily populated urban areas such as the San Francisco Bay metropolitan region and given the international fame of the Route 1 scenic drive along the Monterey Bay and Big Sur coastline. The area has never been exposed to offshore oil and gas development and no platforms have ever been visible from the shore.

(d) Socioeconomic Effects

Given the wealth of sensitive renewable, natural resources within the proposed Sanctuary, the high tourism and commercial fishery value of the area, and the present indications of low National oil and gas resource potential, it is NOAA's judgment that the net economic effect resulting from a restriction on hydrocarbon operations is likely to be positive.

The net economic effect of the proposed regulation depends largely on: the amount of hydrocarbon reserves foregone, dollar value of the oil, the estimated value of the renewable resources, and the economic value of the tourist industry.

It is thought that the proposed regulation will have positive economic effects in the long-run by contributing to the

preservation and health of renewable sources of income, such as fishing and recreation, due to the long-term protection to such activities from potential oil spills, discharges and visual and acoustical disturbance. In addition, the Sanctuary research and education programs will have long-term benefits by enabling natural resource managers to make better informed decisions regarding the preservation, enhancement and possible additional economic benefits of the area's natural resources and uses.

Lease Sale 119 is currently on hold in the early phase of the pre-lease sale process. Thus far, only the "Call for Information" has been completed by MMS for the proposed sale and no further activities are being carried out. Current industry interest in these specific tracts is unknown. MMS estimates that the high case conditional mean estimate of the undiscovered, economically recoverable oil resources for the entire Central California Planning area is 530 million barrels (Personal Communication, MMS, March, 1990). The FEIS for the proposed 5-Year OCS Oil and Gas Leasing Program Mid-1987 to Mid-1992 (MMS, 1987) states that one sale in the Central California planning area will produce approximately 153 million barrels of oil and 286 billion cubic feet of gas. More recent estimates from MMS Pacific Region is that Lease Sale 119 contains conditional resources of approximately 180 million barrels of oil. Finally, it is estimated (Personal Communication, MMS, March, 1990) that the portion of the Central California Planning Area included in the preferred Sanctuary boundary has a conditional resource potential of 110 million

barrels of oil and 180 billion cubic feet of gas with an estimated net economic value of 280 to 370 million dollars.

At the current rate of U.S. oil consumption (17.5 million barrels/day, API, Personal communication, 1989) the projected resources of the oil within the proposed boundary amounts to less than seven days worth of energy. On should bear in mind the fact that on the California OCS, the average oil and gas production over the past 21 years was only 33.1 million barrels of oil and 32.8 billion cubic feet of gas per each of the producing fields (Personal Communication, MMS, March, 1990). In addition, it is estimated that only 6 percent of all OCS resources (discovered and undiscovered) are in fields containing more than 3 days of supply of oil for the Nation and over 80 percent of all OCS sources to be discovered are in fields containing 1 day's or less supply of oil (Personal Communication, MMS, March, 1990).

All of the above estimates are based on conditional estimates of resources and no estimates of reserve quantities can be determined until drilling occurs. As a result one cannot compare one estimate to another as each is derived from conditional probabilities. Projections on quantity and quality of oil reserves may be modified, based on the findings resulting from exploration pursuant to OCS Sale #119 and other factors which may make recovery more or less economically feasible, such as increases or decreases in the price of imported oil or prohibitive costs of or environmental restrictions on alternative energy sources. Thus, reliable estimates of the amount and value of hydrocarbon resources

affected in the Central California OCS are not available. The proposed regulation would also affect the availability of oil and gas resources and State income from the leasing of tracts located in State waters. Data on the quantity of State oil and gas OCS resources in the central California area are not available. Currently, however, there is a State moratorium on such leasing.

Finally, only approximately 60 of the lease tracts in the area south of the Gulf of the Farallones selected for consideration under Lease Sale #119 fall either totally or partially within the proposed marine Sanctuary. Oil and gas resources to the north in Lease Sale 119 would still be available as well as any tracts that are part of future Lease Sales outside of the proposed boundary and within the Central California Planning Area.

It is possible that the proposed prohibition would reduce U.S. Treasury income from offshore leasing royalties and that the industry bids on tracts affected by the prohibition would be lost in future lease sales. The total amount of lost revenue estimated by MMS from these conditional resource estimates may be modified by the results of petroleum development pursuant to actual results from drilling associated with some future Lease Sale, as well as an analysis of economic feasibility and environmental and regulatory constraints. Economic feasibility is determined solely by the oil industry based on lease sale costs at the time of sale, current oil prices, proposed project costs, and environmental reviews and mitigation costs. Oil development costs and expected returns per investment are considered confidential information by the oil

industry. Once again, environmental and regulatory constraints are impossible to identify due to the lack of experience of the Central California Planning Area with offshore oil and gas development.

(b) Discharges and Deposits

Discharging or depositing, from within the boundaries of the Sanctuary, any material or other substance is prohibited except:

(i) fish, fish parts, chumming materials or bait used in or resulting from normal fishing operations in the Sanctuary;
(ii) biodegradable effluents incidental to vessel use generated by marine sanitation devices approved by the U.S. Coast Guard;
(iii) water generated by routine vessel operations (e.g., cooling water and deck washdown) excluding bilge pumping; or
(iv) engine exhaust.

Discharging or depositing, from beyond the boundaries of the Sanctuary, materials or other substances, other than those listed in (i), (ii), (iii) and (iv) above, that subsequently enter the Sanctuary and injure a Sanctuary resource or Sanctuary quality is prohibited.

The proposed regulations prohibiting discharge or deposit of materials or other substances without NOAA approval complements the existing regulatory system, would enhance the area's overall recreational and aesthetic appeal, maintain the present good water quality in the Sanctuary, and help protect Sanctuary resources.

An exception to this absolute prohibition is existing discharges or deposits pursuant to any valid permit executed as of the effective date of these regulations. These discharges are allowed subject to all prohibitions, restrictions and conditions validly imposed by any other authority of competent jurisdiction, provided, however, that NOAA may regulate the exercise of these existing permits or other authorizations to achieve the purposes for which the Sanctuary was designated.

NOAA will also review applications for non-preexisting permits and other authorizations (and applicants must provide timely notice

of the filing of the applications and any additional information NOAA deems necessary) and either approve them, approve them with terms and conditions, or disapprove them.

NOAA intends to consult with scientific institutions and local, State and regional organizations such as the Association of Monterey Bay Area Governments, as well with the owners, holders of or applicants for any authorization or right and the relevant permitting authorities of these activities to determine means of achieving the Sanctuary purposes.

If additional conditions are necessary, NOAA will work with the permittees and permitting authorities to determine the necessary level of conditions to provide adequate protection of the proposed Sanctuary's resources. NOAA will work with the existing authorities to formalize the consultative and management role of the Sanctuary through agreements such as Memoranda of Understanding.

For example, the requirement of NOAA certification of existing permits for municipal sewage outfalls will ensure NOAA consideration of potential impacts on Sanctuary resources and qualities. The NOAA certification process will be coordinated with EPA and State and Regional Water Quality Control Boards. NOAA approval of future permits for municipal sewage outfalls is necessary in order for such outfalls not to be subject to Sanctuary regulatory prohibitions and will ensure protection of Sanctuary resources and qualities. Procedures to ensure efficient administration of NOAA certification and other approval processes

are laid out in the proposed Sanctuary regulations (see Appendix 1).

Thus, if a city or town were discharging sewage effluents into the Bay pursuant to a valid National Pollution Discharge Elimination System (NPDES) permit issued prior to the effective date of Sanctuary designation, the city or town could continue to discharge under the permit without being in violation of the discharge prohibition by requesting certification of the permit in accordance with the proposed Sanctuary regulations. The Director would then impose on the exercise of the NPDES permit such terms and conditions as he or she deems necessary to achieve the purposes for which the Sanctuary was designated. Sanctuary management will be empowered to take into account when reviewing proposed NPDES permits the sensitivity of Sanctuary resources such as finfish and shellfish populations to municipal discharge effluents. Such discharges would remain subject to all prohibitions, restrictions and conditions imposed by any other authority of competent jurisdiction.

In reviewing existing or future permits, licenses, approvals, or other authorizations NOAA intends to encourage best available management practices to minimize non-point source pollution entering the Sanctuary and to require at a minimum secondary treatment and preferably tertiary treatment or higher depending on the sensitivity of threatened Sanctuary resources and qualities, for point source pollution, such as municipal sewage discharge.

Thus, NOAA will work with the cities of Morgan-Hill and Gilroy

and the Regional Water Quality Control Board (RWQCB) to ensure that the resources and qualities of the Sanctuary will not be negatively affected if the proposed discharge into the Pajaro River is approved. Also, NOAA will consult with the RWQCB and the City of Watsonville to determine what affect its discharge of primary effluent is having on the resources and qualities of the Sanctuary.

For another example, if an entity is dumping dredge spoils in the Bay pursuant to a valid existing permit, the entity could continue to do so by obtaining certification in accordance with proposed Sanctuary regulations.

Any proposed dumping of dredge spoils will be reviewed for the effects on Sanctuary resources and qualities, e.g., the benthic environment and any local populations of algae and kelp. The negative impacts of ocean dumping and dredge disposal include smothering of benthic organisms, increase in water column turbidity resulting in potential damage to industry that requires pollutant-free water (such as for cooling purposes, refractories etc.), mariculture operations, shellfish harvesting, commercial and sport fishing and the negative aesthetics due to odor and water discoloration to contact and non-contact water recreation.

A study on the release of dredged material over a 100 fathom contour site near the Farallon Islands found a relatively abundant but not diverse benthic macrofauna. The study concluded that most of the dumped material went straight down and covered the bottom at an average depth of about 1 foot (0.3 m). Depending on use levels of such a disposal site, smothering and oxygen depletion could

significantly harm the benthic community in the area (COE, 1975). However, in the case of Monterey Canyon the continuous natural disturbance at the Canyon head causes a naturally resilient benthic population (COE, 1977). Community resilience is correspondingly lower in the more complex and stable communities of deeper water (COE, 1977). The environmental complexities of sediment, water and biological interactions means that it is necessary to analyze the natural disturbance regime at the potential dredging or disposal site and its relation with the associated benthic communities for effective management.

Disposal of dredged material is already regulated by Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. Current disposal practices within the Sanctuary are regulated by the Regional Water Quality Control Board (RWQCB) Waste Discharge Requirements (WDR) under the authority of the Clean Water Act. Sanctuary certification of authorized dumping and dredging activities will be done in coordination with the Harbor Masters, COE, EPA, RWQCB and Regional Water Quality Control Board WDR.

WDRs include prohibitions and discharge limitations including limited time intervals for disposal (WDR No. 88-73 and WDR No. 88-68). In the case of the Moss Landing WDR (No. 88-73) and the Santa Cruz WDR (No. 88-68), there are also provisions that if the spoils are clean enough it is encouraged that they be used for beneficial beach nourishment. NOAA can work within this existing process to ensure that these requirements are in place, enforced and adequate to protect the resources of the Sanctuary.

NOAA will ensure that Sanctuary research data is applied to the certification process and that environmental data is carefully analyzed and used in the certification of the permit.

In addition, the regulations under Title I of the MPRSA prohibit ocean disposal of dredged material which proves to be toxic to the organisms of the disposal site. Ocean disposal of any materials dredged from a site where pollution is possible must be preceded by bioassay tests to determine the effect on aspects of the marine environment. The test results will determine whether any material from Moss Landing and Santa Cruz may be legally dumped at any ocean disposal site in the area under Title I. The Sanctuary requirement of certification will assure review for possible impacts without imposing undue burdens.

This regulation also prohibits without NOAA approval, vessels discharging or depositing oil, pollutants, litter and other solid wastes directly or indirectly into the Sanctuary. Although particular discharges, such as oil, are now generally regulated under the Clean Water Act (CWA), the Sanctuary regulation is designed specifically to protect the area's living resources from the effects of all harmful effluent and solid wastes.

Consistent with the provisions of the Marine Plastic Pollution Research and Control Act (MPPRCA) of 1987 that amends the Act to Prevent Pollution from Ships which implements Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL), this Sanctuary regulation would prohibit the disposal of litter and other solid wastes, such as fishing lines and non-

biodegradable plastic or metal objects and thus protect marine animals and seabirds in the Sanctuary from ingesting these wastes while foraging, or becoming entangled in them, possibly leading to illness or death.

Pinnipeds entangled in plastic packing material or discarded fishing lines have occasionally been seen near the Farallon Islands and Channel Islands (F. Cava, 1989, personal communication). In areas of the northern Pacific Ocean as many as 8,000 fur seals become entangled in such debris annually (Haley, 1978). The incidence of the mortality associated with this type of mammal disturbance remains unclear.

Socioeconomic Impacts of Regulation

The impact of this regulation on most Sanctuary users is expected to be minor. Non-biodegradable and other potentially harmful trash will have to be kept on boats and disposed of at proper facilities, most likely on the mainland. The impact of this regulation on vessel operations is expected to be minor. The exceptions to this regulation are designed to allow continued use of the Sanctuary by vessels. Fish, fish parts, and bait used in or resulting from normal fishing operations within the Sanctuary, exhaust, vessel cooling waters, and approved marine sanitation wastes are exempted specifically from the prohibition.

The regulation does not prohibit existing sewage outfall discharges or dumping and the disposal of dredge material within the Sanctuary pursuant to permits existing as of the date of

Sanctuary regulations, provided however, that NOAA may regulate the exercise of these permits as necessary to achieve the purposes for which the Sanctuary was designated. In addition, holders of permits, licenses, or other authorizations issued after the effective date of Sanctuary designation allowing the discharge of municipal sewage or the discharge of dredged material will be subject to Sanctuary regulatory prohibitions unless approved by the Director of the Office of Ocean and Coastal Resource Management.

The regulation may impose additional costs by requiring the use of more expensive dredge disposal methods or dumping sites. The regulation could also result in additional costs if the Director were to determine that a higher level of treatment or other, more expensive sewage disposal methods were preferable to disposal in the Sanctuary. It is difficult to predict accurately the economic impact of this regulation without analyzing specific proposals. The application of this regulation to dumping and dredge disposal adds further protection of the resources and qualities to that afforded by the existing legislation. The requirement of Sanctuary certification or other approval of permits for municipal outfall and dredge disposal will ensure that these potentially harmful activities receive special consideration from the Sanctuary viewpoint.

Another positive effect of the regulations will be that data from existing studies can be used to make better informed management decisions. For example, DDT and its degradation products have been found in the tissues of all eight species of

marine fishes caught and analyzed from Monterey Bay (Shaw, 1972). The California Department of Fish and Game in cooperation with the California Department of Health Services is conducting an aquatic toxicology evaluation program in Monterey Bay (Welden, 1988). The main objectives of the program are to determine the average chemical contaminants found in a range of the most common commercial and sport-caught fish in the bay and to give a current risk-assessment of the effects of consuming them. This study was scheduled to be released in the fall of 1989 but has not yet been released. Sanctuary management can use this data to attempt to formulate management measures to address and possibly mitigate the source of the pollution to assist in achieving a more healthy and productive fishery.

Another positive impact of the regulation on water quality is on existing aquaculture facilities and research institutions which require a high water quality standard for raising organisms and conducting experiments that need relatively uncontaminated background seawater supplies.

(3) Historical Resources

> Moving, possessing or injuring, or attempting to move, possess, or injure, a Sanctuary historical resource is prohibited. This prohibition does not apply to accidental moving, possession or injury during normal fishing operations.

This regulation is aimed at protecting historical resources (as defined in the program regulations, this term includes cultural resources) from damage and/or removal. Existing regulatory authorities provide some protection for underwater historical resources. California can register sites as either "points or interest" or "landmarks", and the latter designation provides some protection to sites in State waters. Salvage operations in State waters must also be permitted by the State Lands Commission. The proposed Sanctuary regulations provide for issuance of a NOAA permit to further salvage operations in connection with an abandoned shipwreck in the Sanctuary title to which is held by the State of California.

As part of the Sanctuary management regime NOAA intends to research the number and type of historical resources within the boundaries of the Sanctuary. This research will further our understanding of how to protect these resources so that they are available for future generations.

Historical resources are defined to mean resources possessing historical, cultural, archaeological or paleontological significance, including sites, structures, districts, and objects significantly associated with or representative of earlier people, cultures, and human activities and events. Thus any inundated

prehistoric aboriginal sites and associated artifacts, as well as shipwrecks would be included in the resource protection regime of the proposed Sanctuary.

NOAA will also seek National Register listing of identified resources located in the Sanctuary under the National Historic Preservation Act. 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 ensures 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 existing activities within the Sanctuary.

(4) Alteration of or Construction on the Seabed

> Constructing, placing, or abandoning on the seabed of the Sanctuary any structure or material; or drilling through, dredging or otherwise altering the seabed of the Sanctuary is prohibited. This prohibition does not apply if any of the above results from: anchoring vessels, normal fishing operations, installation of navigation aids, maintaining mariculture operations existing as of the effective date of Sanctuary designation, routine harbor maintenance, or construction of docks and piers.

Dredging activities are not extensive within the preferred alternative's proposed Sanctuary boundaries (see Part II, Section 2); nevertheless, unrestricted alteration of, construction on, or drilling of the seabed represents a potential threat to 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. This proposed regulation will allow limited and ecologically sound dredging (particularly along the mainland and in harbors) at levels fairly certain not to harm breeding grounds, haul out areas, and foraging areas.

The regulation prohibits persons from placing objects on the seabed, such as but not limited to artificial reefs, unless permitted by the Director. The prohibition also includes placement or abandonment of any structure or material on the seabed, which includes vessels that run aground and thereby helps ensure that the owners and operators are responsible for their removal.

Existing holders of authorizations have an obligation to seek certification from NOAA of their authorizations. Existing activities, such as dumping of dredge spoils or other waste would

be monitored by NOAA and NOAA may require conditions on their existing permits if it determines that these activities injure a Sanctuary resource or quality. The current sand mining operations north of the City of Monterey will be specifically studied, in cooperation with the industry and the relevant permitting authorities, to determine if the resources and qualities of the Sanctuary are being injured and if additional terms and conditions should be required on existing authorizations as necessary to achieve the purposes for which the Sanctuary was designated.

Socioeconomic Impacts of Regulation

No severe economic impacts upon commercial firms are expected. 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. Dredging exceptions would allow for navigational projects, and the maintenance of existing facilities for harbors and mariculture. The regulation of projects for docks and piers in the nearshore area will remain the responsibility of the existing regulatory authorities. Activities regarding the construction and placement of pipelines approved by the Director of the Office of Ocean and Coastal Resource Management are allowed. Sand mining activities will specifically be examined to first, determine the degree of impact on the resources of the Monterey Bay area and second, discuss with the permittee any mitigating measures

or permit conditions that may be necessary to protect the resources of the area.

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

(5) Taking of Marine Mammals or Seabirds

Taking any marine mammal or seabird in or above the Sanctuary, except in accordance with and as permitted by regulations promulgated under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA).

NOAA enforcement officials would be able to consider taking cases in the Sanctuary along the same lines that they now consider them under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). The MMPA and ESA already provide some protection to the marine mammals and seabirds of the Sanctuary.

However, these Acts only provide protection to species on a case-by-case basis without consideration of their role in the ecosystem or the special purview of the Sanctuary management regime. The proposed regulation would overlap the MMPA and ESA but also extend it consistent with the intent of the MPRSA to protect the Sanctuary resources on an environmentally holistic basis. The proposed regulation would provide this protection effectively including all marine mammals in the Sanctuary and seabirds in or above the Sanctuary.

The regulation would not preclude a number of current activities from continuing. For example, scientific research on marine mammals and seabirds as research on Sanctuary resources is encouraged as part of the Sanctuary mandate. To facilitate this research the proposed regulations allow the issuance of Sanctuary permits for research. If the research is on Federal or State designated endangered species the researchers are already required to obtain permits from the relevant management agency. These

permits will also need Sanctuary approval to ensure the goals of the Sanctuary are met. As another example, NOAA will work with existing fisheries management agencies to ensure that the incidental taking of seabirds and marine mammals in commercial fishing nets is minimized and that the existing permits that govern this incidental take fulfill the purposes for which the Sanctuary is designated.

Finally, rehabilitation of injured, and studies on dead seabirds and marine mammals, would be permitted under these Sanctuary regulations if necessary in response to an emergency threatening life, property, or the environment or pursuant to a Sanctuary research permit.

(6) Overflights

Flying motorized aircraft at less than 1000 feet above the Sanctuary within three nautical miles of State of California designated reserves, parks, beaches or refuges, or the Los Padres National Forest, is prohibited.

The area-specific prohibition on overflights below 1000 feet (305 m) is designed to limit potential noise impacts, particularly those that might startle hauled-out seals and sea lions or birds nesting along the shoreline margins of the Sanctuary. Intrusive overflights during sensitive biological periods would thus be minimized. The regulation would complement existing California Fish and Game overflight restrictions.

In particular, adjacent water areas where marine animals forage would receive additional protection from potentially disruptive overflights. The 1000 ft (305 m) minimum height parallels the National Marine Fisheries Services's selective prohibition of overflights under 1000 ft (305 m) in areas where marine wildlife harassment is likely. Private recreational overflights outside the restricted area, which occur regularly but almost entirely along the mainland coast anyway, e.g., for whale migration watching, would not be affected. There are no commercial charters operating here.

NOAA has received no reports of low-level military overflights over sensitive areas. NOAA has consulted with the Department of the Navy and determined that current Navy flight operations appear to be executed at a safe distance from mammals and seabirds. If low-level overflights were to occur after Sanctuary designation, NOAA will identify and consult with the responsible Department as

provided for in Article 5 of the draft Designation Document.

This regulation will contribute to the protection of natural undisturbed behavior patterns of marine mammals and birds concentrating and breeding along island and mainland shorelines. Uses of the area's air space necessary for National Defense or to respond to an emergency threatening life, property, or the environment, such as Coast Guard search and rescue operations and enforcement operations, would be exempted. Because no commercial airlines fly regular routes over the area at these low altitudes, this regulation should pose no burden on commercial carriers. Over state designated beaches, parks, reserves and refuges, private planes will still be able to enjoy general scenic and whale observation opportunities, albeit from altitudes of 1000 feet (305 m) or above.

Marine mammals and birds are highly susceptible to disturbance from low-flying aircraft. The California Sea Otter Game Refuge, Point Lobos Reserve and the Año Nuevo Reserve already provide protection to their areas by prohibiting aerial overflights below 1,000 feet. Sanctuary management experience with similar regulations in the Channel Islands and Gulf of the Farallones National Marine Sanctuaries has revealed that one can enforce such regulations from the ground by observing the Identification Numbers on aircraft flying below 1000' and then reporting the incident to the appropriate airfield. NOAA will monitor the current status and future trends of overflights to determine if the regulation of overflights should be expanded to protect additional areas.

(7) Vessel Operation

Regulation of this activity is included in the Scope of Regulations (see above under Regulatory Alternatives) but the preferred alternative is not to regulate with designation.

This analysis includes U.S. and foreign flag dry cargo vessels and tankers. Environmental Consequences and risks of local tanker traffic associated with central California OCS oil and gas development offshore central California is considered separately under the section on oil, gas and mineral activities. Local vessel traffic will probably increase considerably with the development of OCS tracts off Central California due to servicing requirements and transportation of produced oil.

At present only a few, large commercial vessels visit Monterey Bay, mainly to dock at Moss Landing. The area has had a long history of safe vessel traffic but there may still remain a threat to the resources and qualities of the area from possible collisions and possible spills of hazardous materials and oil. As discussed above there is not only a threat of oil spills from offshore platforms, tankers associated with the central California OCS and pipeline accidents, but also from vessel traffic much of which is not related to United States OCS production.

For example the following recent incidents were not the result of OCS activity. The recent disaster of the Exxon Valdez grounding off Valdez, Alaska, highlights the severe environmental and socioeconomic damage that results from oil spills in the marine

environment. Recently there were three such tanker oil spills on the East Coast: one each in Rhode Island and Texas on June 23, 1989; and one on the Delaware River near the Port of Philadelphia on June 24, 1989. The largest of these resulted when the Uruguayan oil tanker President Rivera ran aground near Philadelphia, releasing 298,000 gallons of oil into the Delaware River. At Narragansett Bay, the Greek-registered World Prodigy grounded on Brenton Reef near Newport, dumping 300,000 gallons of oil. In Texas, the tanker Rachel B. collided with a barge resulting in 252,000 gallons of oil spilling into the Houston Ship Channel.

According to the U.S. Coast Guard, Marine Pollution Retrieval System (July, 1989), since 1973 there have been an average of just under 10,000 oil pollution reports per year. Since 1980 there have been 588 incidents of 10,000 bbl or greater (43 tankers, 109 barges, 58 miscellaneous vessels and 378 non-vessel incidents). In the year 1988 alone there were 5.5 million gallons of oil spilled, of which 60% was attributable to vessels.

Four spills have recently occurred off the West Coast: the tanker Puerto Rican near San Francisco in 1984, the oil barge Nestucca off the coast of Washington in 1988, the Exxon Valdez near Valdez, Alaska in March, 1989, and the American Trader in 1990. The Exxon Valdez disaster has received much publicity and scientific investigations are currently underway on the long-term effects of the spill and possible future management measures (CMC, 1989).

The example closest to Monterey Bay was the Puerto Rican

spill. This tanker was disabled about eight miles seaward of the Golden Gate by on-board explosions. The vessel eventually broke apart and discharged refined oil products within the boundary of the Gulf of the Farallones National Marine Sanctuary (GFNMS). The progress of this incident demonstrates the seriousness of the potential hazard to Monterey Bay.

The Puerto Rican was disabled shortly before the predicted on-set of the Davidson current, which reverses the direction of California coastal currents from a southerly to northerly flow (See Part II, Section II). The wind and current direction in the San Francisco Bight, however, was still to the south and initial trajectory estimates indicated that spills occurring in the area would move southward. It was therefore decided to tow the burning vessel out to sea, south of the Farallon Islands. The ship broke apart southwest of the Farallon Islands and the resulting spill did move southward initially. Unexpectedly, wind and current direction changed and the spill moved rapidly north through the Gulf of the Farallones National Marine Sanctuary and up to Bodega Bay and beyond.

Some 48,000 barrels of hydrocarbons were released into the ocean from the Puerto Rican. Of this amount, only 1,460 barrels were recovered during cleanup operations (USCG, 1985). This spill killed an estimated 2,874 seabirds, and did an unquantified amount of damage to water quality, fishery resources, marine mammals, and human uses. By comparison, in February, 1986, the tanker barge Apex Houston spilled some 600 barrels of oil along the central

California coast killing an estimated 9,817 seabirds within the Gulf of the Farallones National Marine Sanctuary.

NOAA has considered and deferred considering regulation of vessel traffic, which may include, but is not be limited to: (1) routing of all coast-wise vessel traffic outside of the boundaries of the Sanctuary, (2) prohibiting oil barge traffic within the Sanctuary, (3) restriction of all large vessels inbound to and outbound from Monterey Bay to designated port access route(s), and (4) imposing special design requirements, such as double hulls, for petroleum and other hazardous substance transport vessels in the Sanctuary.

This preferred alternative will give NOAA the flexibility to work in the future with the U.S. Coast Guard on appropriate courses of action to protect the resources and qualities of Monterey Bay. The U.S. Coast Guard is currently working with the Fish and Wildlife Service on a section 7 consultation regarding possible impacts from rerouting vessel traffic off the coast of California on endangered species, specifically the Southern Sea Otter. As information becomes available on specific probabilities of accidents, potential locations of accidents and estimates on which resources and qualities are at risk, NOAA will be able to propose to the U.S. Coast Guard appropriate mitigating measures.

USCG current, and proposed regulations also address construction standards for vessels as well as officer competency and bridge organization; these problems are more effectively dealt with on a nationwide basis. Given the difficulty in regulating

staffing and construction standards for vessels in discrete areas, the on-going USCG study of traffic lanes and proposed regulations, and the speculative nature of the projected vessel traffic increase associated with OCS leasing, it seems premature to propose Marine Sanctuary regulations to deal with these issues.

NOAA will consult with DOI and USCG as studies continue and data becomes available and may propose action in the future for public review. In addition, NOAA will maintain close communication with the USCG to evaluate the need for additional regulations regarding vessel safety and/or emergency response plans and equipment.

(8) Operation of "Thrill Craft"

"Thrill craft" means any motorized vessel which is generally less than thirteen feet in length as manufactured, is capable of exceeding a speed of twenty miles per hour, and has the capacity to carry not more than the operator and one other person while in operation. The term includes but is not limited to jet skis, wet bikes, surf jets, miniature speed boats, and hovercraft.

These craft can pose a serious threat to the resources of the Monterey Bay area. There is a potential for collisions with marine mammals and birds; injury to kelp beds; and disturbance, due to the noise and exhaust of the craft, to organisms near and on the surface at large distances from the craft. NOAA will monitor the activities of "thrill craft" to determine, first, if indeed there is a threat to the resources and, second, to determine should be

promulgated prohibiting these activities in specified zones.

(9) Defense or Law Enforcement Activities

No prohibition set forth in the Sanctuary regulations shall apply to activities that are necessary for national defense or law enforcement. It is suspected that current and projected levels of military activity are consistent with the purposes for which the Sanctuary was designated.

Nevertheless, NOAA will consult with the appropriate Department or agency and encourage continued monitoring of these activities for undesirable environmental impacts. In addition, NOAA is proposing to require the relevant agency to consult with NOAA to determine methods of minimizing any adverse environmental impacts if there is sufficient time to permit consultation without jeopardizing national defense or law enforcement. Activities that are not necessary for national defense or law enforcement, such as training exercises and routine vessel operations, are subject to all prohibitions contained in the Sanctuary regulations.

(10) Fishing, Mariculture, and Kelp Harvesting

In its evaluation of this issue, NOAA considered whether, under the present regulatory structure, sufficient protection for Sanctuary resources existed. NOAA has determined at present, after consultation with the Fish and Wildlife Service, the National Marine Fisheries Service (NMFS), the Pacific Fisheries Management Council (PFMC) and the California Department of Fish and Game that

fishing in the Sanctuary, including fishing for shellfish and invertebrates and mariculture, shall not be regulated as part of the Sanctuary management regime.

Furthermore, in its decision advising NOAA to proceed with the preparation of a Draft Environmental Impact Statement for the proposed Sanctuary, the Pacific Fisheries Management Council (PFMC) also recommended that the regulation of fishery resources remain under the jurisdiction of the State of California, the National Marine Fisheries Service (NMFS) and the PFMC.

Fishing in the Sanctuary is regulated other than under the MPRSA by Federal and State authorities. Designation of the Sanctuary shall have no effect on any regulation, permit, or license issued thereunder, e.g., regulations promulgated under the California Fish and Game Code and regulations implementing Fishery Management Plans promulgated under the Magnuson Fishery Conservation and Management Act, 16 U.S.C. §§ 1801 et seq.

NOAA did evaluate the possibility of proposing some additional Sanctuary regulation of fishing. However, the existing management authorities, the California Department of Fish and Game, NMFS and the PFMC, have comprehensive management authority over these resources. Moreover, the long-term interest of these agencies parallel those of the Sanctuary -- ensuring healthy stocks and their habitats -- and, by relying on the existing arrangements, NOAA will avoid duplication of regulations and programs.

Thus, the close coordination and consultation which has already been initiated between the PFMC, CDF&G and NOAA indicates

that Sanctuary concerns, if any, will be fully communicated to the authorities dealing with these on-going management issues.

Notwithstanding the above, the absence of fishing activities from the scope of regulation does not absolve fishermen from obeying not only existing State and Federal regulations but also Sanctuary regulations, which are designed to protect Sanctuary resources and qualities. Specifically regulated pursuant to Sanctuary regulations are, e.g.,: discharges and deposits from fishing vessels (with certain exceptions); altering of or constructing on the seabed (with certain exceptions, including but not limited to normal fishing operations and maintenance of mariculture operations existing as of the effective date of the Sanctuary regulations); and taking of marine mammals or seabirds (except in accordance with and as permitted by regulations promulgated under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA)).

Finally, what little data exist show that there is minimal impact to the benthic resources on the ocean floor from roller trawling and that both trawlers and gill-netters are prohibited from fishing in nearshore areas with high concentrations of marine mammals and seabirds, thus helping minimize any incidental taking of these species.

However, as part of the research and management regime, NOAA will consider supporting periodic monitoring of the effects of trawling and gillnetting on the Sanctuary resources and qualities. NOAA will also consider the possibility of making funds available

for technical assistance for studying the area's marine finfish, shellfish, and algae resources and for strengthening the present enforcement capabilities of the CDF&G and other enforcement entities including the NMFS and the USCG.

(11) Enforcement

The impact of enhanced surveillance and enforcement efforts focused on Sanctuary resources should be beneficial. What is proposed is a coordinated emphasis on resource protection in Monterey Bay rather than an elaborate surveillance and enforcement presence.

NOAA, at present, envisions a State-Federal cooperative enforcement system involving the California Departments of Fish and Game and, Parks and Recreation, 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 and Federal waters close coordination between State and Federal authorities would be required.

B. Research and Education

The impacts resulting from implementation of the research and education program are also expected to be positive. The research program will result in a coordinated mechanism for studying Monterey Bay area's resources and developing effective management strategies. The educational program is designed to enhance public awareness of the Bay area resources and the importance of protecting such special marine areas.

The research program would provide a coordinated effort to obtain vital baseline and monitoring data on the resources and on human activities in Monterey Bay area. Information on water quality and circulation, species density and diversity, fisheries resources and marine mammals and seabirds would be used in assessing the health of the Bay environment and the effects of human activity in the area. This would improve management's ability to develop long-term planning for the Sanctuary and would provide data useful in responding to oil spills.

The educational program would improve public awareness of the importance and fragility of Monterey Bay's resources and thus engender support for resource protection efforts. The program would provide audiovisual material, exhibits, and other information products for individuals, schools and interested groups.

A major responsibility of the Sanctuary manager is the development and enhancement of education and research efforts. As presently envisioned, the Sanctuary Information Center might also

serve as the administrative headquarters for the Sanctuary.

The Sanctuary Information Center would be the focus for research and education activity. The Center would collect literature and information on resources and activities in the Sanctuary, and also provide visitor orientation and education materials, such as slides, brochures, and apprise visitors both of regulations and the need for protecting the marine resources. Efforts to develop the Sanctuary Information Center will be coordinated with existing agencies, particularly the State of California Departments of Parks and Recreation and Fish and Game; private institutions, such as the Monterey Bay Aquarium, and other Federal agencies such as the National Park Service, and Fish and Wildlife Service.

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

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

A notification procedure should ensure that research parties are not only familiar with existing regulatory controls, but also

that they better understand which resources are particularly susceptible to adverse research-related impacts. In addition, the master listing could: (1) produce a record of scientific investigations which might provide important management information, (2) contribute to efforts to monitor use patterns within the Sanctuary, (3) be of assistance in identifying areas of research not receiving adequate attention, and (4) ensure that Sanctuary managers are aware of relevant area-specific studies and literature. Finally, this notification process would provide both sanctuary managers and researches 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.

In turn, researchers could benefit from the resources of the Information Center and, unless the research would require a permit notification would not impose any delay. The compilation of technical documents in the Sanctuary Information Center will provide a baseline of site-specific information which would help 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 research objective of the Sanctuary managers would be to map and complete a detailed inventory of historical resources. Many of the known wrecks in the area need to be documented and researched. Limited archaeological research has been conducted in the area and active research into, and mapping of, possible historical artifacts in the Bay has been initiated on a small scale (U.S. Bureau of Land Management, 1979c).

(C) Boundary Alternatives

The seven boundary alternatives would protect resources and qualities of the Monterey Bay ecosystem to varying degrees of areal extent. Each boundary alternative is explained on the basis of distribution of encompassed resources, qualities and human uses. The environmental consequences of each boundary alternative is discussed in the context of the preferred resource protection and management regime.

Those alternatives that excluded critical components of the ecosystem were not considered as they would not have met the intent and purpose of the MPRSA to protect special areas of the marine environment on an ecosystem basis and to provide a coordinated and comprehensive approach to their conservation and management.

Boundary alternative #1

Boundary alternative #1 (Figure 17) is based both on depth and distance from shore and is designed to encompass the nearshore coastal resources. The emphasis of this alternative would be on land-sea interactions and immediate coastal processes rather than the offshore marine environment.

Active tectonic and sedimentary processes are incorporated within this boundary alternative, but does not represent all of these processes. The western boundary includes the Palo Colorado-San Gregorio fault zone, the major tectonic boundary of the Salinian block; structure and stratigraphy are considerably different on either side of the line. The boundary incorporates

mainly the Monterey, Soquel and Carmel Canyons that principally cut the shelf. Also, parts of the three sedimentary cells (Año Nuevo-Northern Monterey, Southern Monterey, and Sur Cells) are included. It would only provide a minimal buffer to the natural resources of Año Nuevo and the Big Sur coastline. The heads of the Camel and Monterey Canyons would be included but the deep sea environments of the Canyon complexes would be excluded as would the areas above these canyons that are important as feeding grounds for sea birds and marine mammals.

The ground water basins for the Monterey bay region are also found within the boundary and all of the water quality studies associated with issues resulting from point-source and non-point source discharges can be addressed. However, offshore eddy, current, "jet", upwelling and pollutant dispersion patterns will not be incorporated within the boundary and thus receive less emphasis from Sanctuary initiated research studies and resource management initiatives.

This alternative is designed to encompass all of the resources in the immediate vicinity of the coastline (described in Part II, Section II). The boundary includes the entire range of fish and invertebrates found in the study area but excludes much of the feeding area over the Monterey Canyon for seabirds. The area would include the best areas for sighting cetaceans from shore (off Point Lobos, Año Nuevo and Davenport) and includes the important cetacean and seabird feeding areas along the canyon edge.

However this alternative does not provide sufficient habitat

protection to migrating and foraging mammals and Seabirds above the Canyon in the open ocean. The northern boundary would not include the northern limit of the sea otter range nor the fishery resources off Pigeon Point. Also the nearness of the western boundary to the coast would not provide the nearshore resources of Año Nuevo, Big Sur and the kelp beds an effective buffer zone from potentially harmful offshore activities.

The boundaries encompass the areas with the longest history of research; the intertidal zone in Monterey Peninsula and around Point Lobos. Interpretation of the entire range of habitat and community types typical of central and northern California would be possible. Monterey Bay, and its adjacent coastline would be the focus of the Sanctuary, and of the interpretation program. The program could focus on the various coastal environments and upon the fishery and fisheries management issues. Offshore fisheries, such as the trawlers and gill netters would be excluded and not available for study or inclusion in Sanctuary management programs to protect offshore marine resources. All marine oriented recreational opportunities (surfing, diving, sport fishing, boating, beachcombing, nature viewing) would be well represented, except for any offshore whale watching trips.

This alternative would preclude all State offshore oil and gas drilling but have almost no impact on proposed Federal OCS Lease Sales as the boundary approximately follows the three-mile limit. Also, offshore vessel traffic would pass beyond the western edge of the proposed boundary and thus be subject only to the prohibition

regarding extraterritorial discharges, not to the prohibition regarding discharges within the Sanctuary. The limited extent of the geographical buffer from this boundary alternative leaves the resources and qualities of Monterey Bay quite vulnerable to routine vessel traffic and oil and gas activities such as waste and discharge disposal as well as more catastrophic events such as well blowouts or tanker collisions.

The Sanctuary could address the sources of point-source and non-point source pollution that may affect nearshore Sanctuary resources and qualities but would be limited in its ability to manage the effects of these waste disposal activities on offshore resources.

Boundary Alternative #2

Proposed boundary alternative #2, (Figure 18) the preferred alternative, will integrate many important coastal, nearshore, and deep ocean canyon resource zones into one management regime. These zones include Monterey Bay, the Big Sur coastal area, Año Nuevo, the adjacent continental shelf, slope, and rise as well as certain highly productive shoreline and intertidal areas, marine communities within San Lorenzo, Pajaro, Salinas, Little Sur and Big Sur Rivers, Pescadero Marsh and Elkhorn Slough, and the deep ocean environments of the Ascension, Monterey Bay, Big Sur and Partington Canyon complexes and a portion of the abyssal plain off Monterey. The coastline boundary is contiguous with 31 units of the California State Park System and Beach System and Ecological

Reserves. These units include the Point Lobos State Reserve, Hopkins Marine Life Refuge, Pacific Grove Marine Gardens Fish Refuge, Carmel Bay Ecological Reserve and the Julia Pfeiffer Burns Underwater Park with protection extending to subtidal marine habitats. Also, five Areas of Special Biological Significance (ASBS), established by the State of California, would be included in this alternative. In addition, all seven major research institutions in the region are encompassed within the boundary.

The largest breeding population of Stellar sea-lions south of Alaska would be incorporated, i.e., Año Nuevo, which is also the most important rookery and resting area for other pinniped species in central and northern California, as well as many colonies of sea birds. The northern boundary would also encompass the official northern range of the Southern sea otter, extending to Pigeon Point, as well as provide a large buffer strip for contingency planning. Pescadero Marsh and Creek are important nesting areas for the snowy plover, a species of special concern in California. One fifth of the State's breeding population of snowy plovers are found in the Monterey Bay region. Pescadero Marsh is the largest coastal wetland between the San Francisco Bay and the Elkhorn Slough, covering 81 square miles. Also, the northern boundary is designed to encompass valuable commercial fishing grounds including a portion of the dover sole fishery between 400 and 1400 m and the nearshore trammel net and trawl fishery for halibut. Pigeon Point is also the site of the greatest sport and commercial salmon fishing within this boundary alternative early in the

season.

The oil and gas resources to the north of the preferred boundary alternative #2 would still be available for leasing. In all areas of Lease Sale 119 NOAA will work closely with MMS to determine any additional technological safeguards that may be necessary to protect the resources and qualities of the Sanctuary from any potential environmental injury. This boundary alternative provides a buffer zone for Sanctuary resources and qualities from oil and gas activities, enabling physical and chemical weathering of any potential oil spills before contact with the coast of Monterey Bay, and a greater response time to deploy booms and oil-spill clean-up equipment in areas of predicted high vulnerability.

Offshore vessel traffic would pass within the western edge of the proposed boundary. Thus vessel traffic within the Sanctuary would be subject to the Sanctuary prohibitions on discharges and deposits within the Sanctuary. However, the resources and qualities of the Monterey Bay area would still be vulnerable to catastrophic events such as vessel collisions or groundings and subsequent spill of oil or hazardous materials. The extent of the potential injury would depend on the season and corresponding current pattern, location and size of the spill.

The western boundary is constrained primarily from depth and geomorphic parameters. The boundary coincides with the termination of the Monterey Canyon on the ocean's abyssal plain at the Paleo Subduction Zone. Within this boundary the very active tectonic (fault rupture, earthquakes, landslides) and sedimentary processes

(turbidity flows, landslides, littoral drift) of the Monterey Bay region take place. Three major sedimentary cells (Año Nuevo-Northern Monterey Bay, Southern Monterey Bay, and Sur cells) are present, terminated by Monterey, Carmel and Sur Canyons respectively. The entire Monterey Canyon system consisting of Ascension, Soquel, Monterey, and Carmel Canyons are included as well as the Fan-Valleys of Monterey Canyon.

The western boundary will encompass the deep ocean floor where recently cold-seeps were discovered that nourish abyssal, biological communities (EEZ News, October, 1989). These deep-sea communities have only recently been discovered and investigated and usually only in association with deep-sea hydrothermal vents. Many birds and mammals are found feeding in the deep waters over the Monterey Canyon. Many of these species are endangered or threatened and almost the entire population of ashy storm-petrels feed during summer and fall within the 1000 fathom (2000 m) isobath which is encompassed by the central and northern portions of the proposed boundary.

The southern portion of the boundary is drawn to encompass a fishing "hot spot" named "The Gate" west of Point Sur. This Sur platform is heavily fished with different gear types for rockfish, dover sole, swordfish and thresher sharks. It is also a well known area to divers for its abundant and varied populations of benthic invertebrates. The preferred boundary encompasses a major portion of the Sur Canyon and the Partington Canyon complexes and is contiguous with the southern boundary of the Julia Pfeiffer Burns

Underwater Park and ASBS.

This southern area contains a pristine environment that is relatively uncontaminated when compared with more developed areas such as San Francisco Bay. The high water quality of this southern area provides the Sanctuary research program with an opportunity to contrast pollutant studies between developed versus undeveloped land/sea interfaces.

Throughout the entire area the oceanic circulation is highly variable. Many complex current patterns exist within the preferred boundary. For example, the Dungeness crab species is not produced locally, rather it is advected into local waters by prevailing currents (W. Graham, preliminary data, unpublished Master's Thesis, U.C. Santa Cruz). The influencing current during the relevant months (April-July) is the southerly flowing California Current. The Dungeness crab fishery is the most important commercial crab fishery on the West Coast but has been greatly reduced by overfishing in northern Monterey Bay, leaving a small fishery in the Moss Landing area (Dahlstrom and Wild, 1983). To re-establish a fishery for the Santa Cruz region the larvae need to recruit to local waters from north of Monterey Bay and produce an adult population that will approach self-maintaining.

Wind-driven, coastal upwelling occurs north and south of Monterey Bay and upwelled waters from these areas may be advected into the Bay. These nutrient rich waters play a vital role in sustaining the high productivity of the Monterey Bay ecosystem. One locus of upwelling is the coastline south of Monterey, where

currents and "jets" occur and may concentrate plankton, food for fishes, birds and mammals. These areas are encompassed by the proposed boundary and provide an opportunity to plan research studies to investigate these oceanographic mechanisms.

Consideration of the physical oceanographic dynamics is important to protect the Sanctuary resources from possible contaminants transportable by currents and eddies. Coastal currents can transport dissolved or suspended materials at the rate of 10-20 miles/day. The oil spilled by the Puerto Rican in October/November 1984 traveled 20 miles overnight.

Research shows many instances of coastal waters being carried into the Bay from offshore. Main coastal current direction varies seasonally, so transport can come from either north or south. The preferred alternative boundaries to the north and south will create a buffer zone for many of the most sensitive Sanctuary resources and provide the Sanctuary Manager adequate response time to prepare contingency plans for pollutants travelling along the coast. The western boundary lies seaward of important coastal eddies and "jets" that enter Monterey Bay.

In addition to unifying the rich habitat areas listed above in one management and planning area, the proposed Sanctuary, through regulations, would create a buffer area between potentially harmful activities outside the proposed Sanctuary and especially sensitive habitat areas within. 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 nearshore zone along the northern Monterey Bay coastline, Monterey Bay itself, and the Big Sur coastline to the south. Overall, this alternative is focused on Monterey Bay and enables coordination of research and education facilities in the area as well as facilitates cooperation with State and local management authorities directly involved with the Bay.

Boundary alternative #3

Boundary alternative #3 is a variation of alternative #2 with a southern extension (Figure 19). The southern boundary is designed to coincide with the southern boundary of the California Sea Otter Refuge and encompass the undeveloped and protected coastline along the Los Padres National Forest. This would provide an opportunity to integrate management and research plans on land and sea interactions across relatively pristine representatives of the two environments. In addition to the resources and features encompassed by the preferred alternative, this southern extension encompasses concentrations of bird, fish and mammal habitat. In addition, large areas of Giant Kelp and Bull Kelp are found along this southern coastline. Lopez Point is an important breeding and nesting area for large colonies of Pelagic and Brandts Cormorants, Western Gulls and Pigeon Guillemots. Around Lopez Point are large concentrations of squid and a rich area for the salmon fishery. An ASBS is located around the mouth of Salmon Creek. Large

concentrations of harbor seals use the beaches north of Plaskett Rock as a haulout site. Cape San Martin is important as a haulout area for California sea lions and is also a mainland breeding site for the northern elephant seal. Finally, this southern extension would provide more protection to the California sea otter by encompassing the entire range of the California Sea Otter Refuge.

Although this third alternative would provide additional protection to the resources and pristine habitats to the south as well as encompassing the entire sea otter refuge, these resources seem adequately protected by existing management authorities and not under any immediate or long-term threat from harmful human activities, in this southern area.

This boundary alternative is also prohibitive due to its large size and the associated problems with management logistics. Enforcement activities would be too diffuse throughout the Sanctuary to protect the resources adequately. The area does not seem to need any additional layer of protection as it is relatively undisturbed by human activities and largely inaccessible to visitors. No additional discharges are known to be in this area but it would include a greater area of the OCS Central California Planning Area and preclude any future Lease Sales in this area.

Finally the preferred alternative, Boundary Alternative #2, encompasses similar types of resources and habitats that are included in this southern extension of boundary Alternative #2.

Boundary alternative #4

Boundary alternative #4 (Figure 20) is presented in response to public comments during the scoping meetings and is justified on the basis of providing a continuous management regime between the Gulf of the Farallones National Marine Sanctuary and the proposed Monterey Bay National Marine Sanctuary. A continuous Sanctuary would ensure that the resources of the Monterey Bay area would not be vulnerable to any discharges between the Gulf of the Farallones NMS and the proposed Monterey Bay NMS and migratory species would be better protected within a continuous Central California Marine Sanctuary.

This alternative would also encompass the coastal resources of the James V. Fitzgerald Marine Reserve Area and ASBS as well as the fishery resources and industry in Half Moon Bay and Princeton Harbor. Finally, the recreational and public interpretation facilities of the Golden Gate National Recreation Area could be incorporated into the educational program of the Sanctuary.

Although this fourth alternative would provide a jurisdictional link between the Gulf of the Farallones and Monterey Bay NMSs, it does not encompass additional special marine resources to warrant Sanctuary protection. The offshore area is used heavily by vessels entering and exiting San Francisco and the Corps of Engineers for dumping activities. Also, this area contains the southern half of Lease Sale 119 and oil and gas drilling would be prohibited in this area if included within this boundary alternative.

Boundary Alternative #5

Boundary alternative #5 (Figure 21) includes all the resources described above and represents a total combination of all the different public comments and resource information gathered during the scoping process. Only a couple of commenters suggested that the alternatives include an even larger boundary extending from the State of Alaska to the Mexican border and out to 200 miles. This suggestion was determined to be beyond the scope of reasonable analysis for the draft environmental impact statement/management plan for the proposed Monterey Bay National Marine Sanctuary and therefore was not considered further.

Alternative 5, as well as 3 and 4, all suffer the major disadvantage of extending the boundary beyond the biological, geological and physical oceanographic resources of the Monterey Bay area. In addition, the large size of these potential alternatives is unwieldy from a management perspective and costly for adequate enforcement.

Boundary Alternative #6

Boundary alternative #6 (Figure 22) is based on excluding areas offered by Lease Sale 119 for development of hydrocarbon resources. The exclusion of all of Lease Sale 119 from the proposed boundary would make available any oil, gas or mineral resources in the southern portion of the Lease Sale area (Figure 11). This southern area has geological characteristics that may

have resulted in the generation and accumulation of commercial volumes of hydrocarbons. Economically recoverable hydrocarbon resources could possibly exist and, under this alternative, therefore be available for development by the oil and gas industry.

NOAA would coordinate with MMS during all phases of the OCS development planning process, including prior to the exploration plan approval, to determine any additional technological safeguards or environmental monitoring that may be necessary to help protect Sanctuary resources and qualities.

Oil and gas offshore operational technology has advanced considerably since the 1960's (Baker, 1985) and the experiences from past blowouts and spills have served as the catalyst for the present day relatively strong Federal OCS oil and gas regulatory regime. Department of the Interior, MMS, final rule for oil and gas and sulphur operations in the OCS, (30 CFR Parts 250 and 256) provides the regulatory regime for more performance standards and new and updated requirements for operational and environmental safety. The use of Best Available and Safest Technologies is required by the Director of MMS to help prevent significant effects on safety, health or the environment (30 CFR Part 250.22). Numerous regulations exist to help prevent blowouts during the different phases of oil and gas activities and which require adequately trained personnel during OCS operations.

However, it is NOAA's mandate under the MPRSA to identify special areas of the marine environment of special National significance due to their resource or human-use values and provide

authority for comprehensive and coordinated conservation and management of these marine areas. Since Monterey Bay was considered for National Marine Sanctuary status in December 1979, NOAA has appraised the physical, geological, chemical and biological resources of the Monterey Bay area as part of an entire ecosystem. The unique geology of the Monterey Canyon is one of the main causes of upwelling of the productive nutrient-rich waters that in turn are directly responsible for the abundant and diverse biological resources that are distributed from as far north as Año Nuevo and Pigeon Point to south of the Big Sur coastline. The combination of this ecosystem's resources and human uses in the proposed Monterey Bay National Marine Sanctuary meet all of the criteria set by NOAA for meeting the standards of the MPRSA.

Although it is clear that the natural resources and qualities of Monterey Bay are of National significance, scientific evidence and public opinion are still divided regarding the effects of oil and gas activities on these natural resources despite the available technology and operational regulations used in developing the OCS.

In general, boundary alternative #6 would not only exclude the majority of biological resources that are part of the Monterey Bay area ecosystem but leave the Monterey Bay area vulnerable to oil spills, blowouts, noise and visual disturbances and pollution from aquatic discharges. Specifically:

(a) There would be no buffer for Año Nuevo or fishing grounds in two canyons to the north of Monterey Bay,

(b) Scenic beauty north of Monterey Bay would be substantially

altered,

(c) The threat of oil spills (50% probability of 0.69 estimated mean number of spills of greater than 1000 barrels from activities directly associated with oil and gas activities in the central California OCS Planning area) and the discharges (estimated 302,000 barrels of muds and cuttings and 225 million barrels of formation waters), despite MMS controls, would certainly affect Sanctuary resources and qualities due to south flowing current and minimal amount of time for chemical and physical weathering processes.

Due to the mandate of the MPRSA to protect Nationally significant natural resources and qualities from an ecosystem perspective and the reality of the threat to these resources in the Monterey Bay area, NOAA is proposing to eliminate concern for any adverse environmental impacts that may occur in the Sanctuary from oil and gas activities by prohibiting these activities within the proposed Sanctuary boundary, (Alternative #2, approximately 2,200 sq. nmi).

Boundary Alternative #7

Boundary alternative #7 (Figure 23) is also based on excluding areas offered by Lease Sale 119 for development of hydrocarbon resources. Like boundary alternative #6 this scenario would exclude all of Lease Sale 119 (Figure 11) as well as additional areas adjacent to Lease Sale 119 and all the area south of Monterey Canyon exclusive of state waters. This alternative makes the

economically recoverable hydrocarbon resources that possibly exist in these areas potentially available for future development.

This boundary alternative encompasses the same coastal uses, resources and qualities described for boundary alternative #1 and in addition focuses on encompassing the main features of the Monterey Canyon at depths below 500 fathoms.

The same drawbacks advanced for boundary alternative #6 regarding both offshore technology and NOAA's statutory authority under the MPRSA apply to boundary alternative #7. This boundary alternative would leave the Monterey Bay area quite vulnerable to oil spills, blowouts, noise and visual disturbances, and pollution from aquatic discharges.

Specifically, there would be no buffer for Año Nuevo or fishing grounds in the two canyons to the north of Monterey Bay, there would be no buffer for Point Sur or fishing grounds in Partington Canyon to the south of Monterey Bay and significant portions of primary commercial fishing areas notably Rockfish longline fisheries, trawling zones off Santa Cruz, and similar longline fisheries off Point Lobos would be excluded.

Significant seaward extensions of Ascension and Partington submarine canyons would be excluded, as would significant areas of habitat for migrating and foraging animals above and below Monterey Canyon. In addition, important areas of upwelling, oceanic currents, eddies and jets north and south of Monterey Canyon would be excluded.

The scenic beauty north and south of Monterey Bay would be

substantially altered and the threat of oil spills and drilling discharges would be extended to exceptionally pristine ocean environments south of Monterey Canyon.

D. Management Alternatives

The preferred alternative offers better opportunities for interpretation and communication due to the availability of the proposed satellite facilities and immediate staffing. The full-time attention of the manager would be available for resource protection due to the immediate availability of research and education coordinators.

The management of the proposed Sanctuary would integrate and utilize all aspects of the program to provide for the preservation of the special values of this unique marine area. Research and education, coordination, long-term planning and necessary regulations are described in the enclosed Management Plan (MP).

The MP describes management goals and objectives of the Sanctuary tailored to the specific resources and uses of the area. The goals and objectives will provide all Sanctuary users with a framework for conserving resources and integrating uses compatible with the goals of the MP. These management goals are open ended and therefore allow for alternative planning strategies. Each objective of the MP represents a short-term measurable step towards achieving the management goals.

The management program for the proposed Sanctuary will be developed and implemented by NOAA and the on-site manager in conjunction with existing agencies in order to benefit from existing expertise and personnel. These include those of the California Departments of Fish and Game and Parks and Recreation, the National Park Service, and perhaps other agencies.

NOAA will also investigate mechanisms to promote State and Federal interagency coordination and cooperation, particularly with the National Park Service, the USCG, and the NMFS. A particularly useful mechanism for coordination would be a Sanctuary Advisory Committee, including members from Federal agencies, such as the National Park Service, the USCG, the NMFS; State agencies such as the Coastal Commission, the Departments of Parks and Recreation and Fish and Game, the State Lands Commission, as well as commercial and private interests and the public.

The Sanctuary manager will promote coordination among all the authorities concerned with the Sanctuary and will particularly stress consideration of the special value of the Sanctuary's living resources in the formulation of policies affecting the area. The greater understanding of Sanctuary resources and the effects of human use gained as a result of the research and monitoring will enable NOAA to provide valuable assistance to other authorities in their determinations relating to the level of protection for the resources of the Sanctuary.

The Sanctuary Advisory Committee (SAC) would be an especially useful coordinating mechanism. The SAC could ensure an exchange of information, advise the Sanctuary manager on permit applications and certifications, research priorities, amendments to the regulations, and other matters.

Section III: Unavoidable Adverse Environmental or Socioeconomic Effects

Specific environmental and socioeconomic effects of each proposed regulation are included throughout the environmental consequences section of the preferred alternative.

The net environmental and socioeconomic effects of designating the Sanctuary and implementing the Sanctuary Management Plan and regulations are estimated to be positive. While such effects are difficult to quantify, the purpose of the Sanctuary in part will be to maintain or improve water quality, fisheries, aesthetics and tourism without causing any adverse effects.

The proposed Sanctuary regulations would allow all activities to be conducted in the proposed Sanctuary other than a relatively narrow range of prohibited activities. The procedures proposed in these regulations for applying for National Marine Sanctuary permits to conduct otherwise prohibited activities, for requesting certifications for existing leases, licenses, permits, approvals, other authorizations or rights authorizing the conduct of a prohibited activity, and for notifying NOAA of applications for leases or other authorizations to conduct a prohibited activity would impose a cost in time and effort on the part of applicants for such permits or certifications and those subject to the notification requirements. However, NOAA will keep such costs to a absolute minimum by working closely with State and Federal regulatory and permitting agencies to avoid any duplication of effort and will set strict guidelines for reviewing applications in as brief a time as possible.

The regulation prohibiting discharges and deposits and alteration of or construction on the seabed may require permit holders for such activities to seek other areas of disposal or apply higher levels of treatment. All measures, terms and conditions applied to existing activities will be done in consultation with the affected party and the appropriate management agency.

Estimates of revenue foregone by the proposed prohibition of oil, gas and mineral activities within the Sanctuary boundary has been presented in detail under the socioeconomic consequences for this proposed regulation. Balancing the foregone revenue would be preventing adverse socioeconomic effects by the proposed prohibition of and oil, gas and mineral activities. For example, the proposed prohibition may alleviate or remove matters ranging from costs to local communities for developing on-shore facilities to political and legal action resulting from public controversy and apprehension concerning proposed oil and gas activities.

It is not possible to quantify the positive socioeconomic effects of prohibiting OCS oil and gas activities. The recent NAS study (1989) on the Adequacy of Environmental Information For Outer Continental Shelf Oil and Gas Decisions: Florida and California found that "few data have been collected by MMS or anyone else to address the social and economic impacts of OCS activities".

Section IV: Relationship Between Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

Sanctuary designation emphasizes the importance of the natural and historical resources of Monterey Bay area. The quality of the Monterey Bay environment is still relatively pristine and the healthy and the diverse natural ecosystem is relatively unaltered. Designation will enhance public awareness of the area and provide long-term assurance that its natural resources will be available for future use and enjoyment. Implementation of the preferred alternative ensures that changes in use patterns which degrade the Bay environment are monitored and possibly reversed.

The education, research and resource protection programs will provide information, management and protection that develops a foundation for wise public use of the area and results in long-term productivity. Similarly, information collected in the research program will assist marine natural resource managers in making better management decisions. Better management will in turn help resolve use conflicts and mitigate the adverse effects of human activities.

List of Preparers and Acknowledgments

PART V: LIST OF PREPARERS

Mr. Mark Murray-Brown - Program Specialist, Marine and Estuarine Management Division, NOAA. Mr. Murray-Brown was responsible for the overall supervision of this project and preparation of the draft EIS/MP and regulations. His academic background includes a Bachelor's degree in Biology from Bates College, ME; a Master's Degree in Oceanography from the Graduate School of Oceanography, University of Rhode Island (URI), RI; and Master's Degree in Marine Policy from the Marine Affairs Department, URI.

Mr. Joseph Flanagan - Environmental Protection Specialist, Ocean Minerals and Energy Division, NOAA. Mr. Flanagan was responsible for synthesising and collating the information and then writing Part II, Section II, which describes the resources and uses of the Monterey Bay area. His academic background includes a Bachelor's Degree in Geology and Chemistry from the University of Miami, Florida; and a Master's Degree in Environmental Systems Management from American University, Washington D.C.

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Environmental Protection Agency
Federal Energy Regulatory Commission
Marine Mammal Commission
Nuclear Regulatory Commission
Pacific Fishery Management Council

Congressional

Members of the U.S. House Committee on Merchant Marine and Fisheries
Members of the U.S. Senate Committee on Commerce, Science and Transportation
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Honorable Pete Wilson, United States Senate
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Honorable Tony Coelho, U.S. House of Representatives

California State Government and Agencies

Air Resources Board
Business, Transportation and Housing Agency
Association of Monterey Bay Area Governments
California Coastal Commission
Pacific Marine Fisheries Commission
The Resources Agency of California
Department of Fish and Game
Department of Parks and Recreation
Department of Conservation
Department of Transportation
Department of Boating and Waterways
State Water Resources Control Board
Central Coast Regional Water Quality Control Board
Oakland-San Francisco Bay Regional Water Quality Control Board
Monterey Peninsula Water Management District
State Lands Commission
Office of Emergency Services
Board Of Supervisors, San Mateo County
Board Of Supervisors, Santa Cruz County
Board Of Supervisors, Monterey County
Native American Heritage Commission
Department of Justice

National and Local Interest Groups

American Association of Port Authorities
American Bureau of Shipping
American Fisheries Society
American Gas Association
American Petroleum Institute
Amoco Production Company
Atlantic Richfield Company
Boating Industry Association
Center for Law and Social Policy
Center for Marine Conservation
Chevron U.S.A., Inc.
Cities Service Company
Coast Alliance
Conservation Foundation
Continental Oil Company
The Cousteau Society
CZM Newsletter
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Edison Electric Institute
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Environmental Policy Center
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National and Local Groups (continued)

Exxon Company, U.S.A.
Friends of the Coast
Friends of the Earth
Friends of the Sea Otter
The Greenpeace Foundation
Gulf Oil Company
Inverness Association
Marine Technology Society
The Marine Wilderness Society
Mobil Oil Corporation
National Association of Conservation Districts
National Association of Counties
National Audubon Society
National Coalition for Marine Conservation, Inc.
National Federation of Fishermen
National Fisheries Institute
National Ocean Industries Association
National Parks and Conservation Association
National Recreation and Park Association
National Research Council
National Wildlife Federation
Natural Resources Defense Council
Natural Resources Law Institute
Pacific Coast Federation of Fisherman's Associations, Inc.
Point Reyes Bird Observatory
Stinson Beach Village Association
Tomales Bay Association
The Whale Center
Union Oil Company
Water Pollution Control Federation
Wilderness Society
World Wildlife Fund-U.S.

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APPENDICES

APPENDIX 1: DESIGNATION DOCUMENT AND PROPOSED REGULATIONS

PROPOSED DESIGNATION DOCUMENT FOR

THE MONTEREY BAY NATIONAL MARINE SANCTUARY

Under the authority of Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (the "Act"), 16 U.S.C. §§ 1431 et seq., Monterey Bay and its surrounding waters offshore central California, and the submerged lands under Monterey Bay and its surrounding waters, as described in Article 2, are hereby designated as a National Marine Sanctuary for the purposes of protecting and managing the conservation, ecological, recreational, research, educational, historical and esthetic resources and qualities of the area.

Article I. Effect of Designation

The Act authorizes the issuance of such final regulations as are necessary and reasonable to implement the designation, including managing and protecting the conservation, recreational, ecological, historical, research, educational, and esthetic resources and qualities of the Monterey Bay National Marine Sanctuary. Section 1 of Article IV of this Designation Document lists those activities that may have to be regulated on the effective date of designation or at some later date in order to protect Sanctuary resources and qualities. Thus, the act of designation will empower the Secretary of Commerce to regulate the activities listed in section 1. Listing does not necessarily mean that an activity will be regulated; however, if an activity

is not listed it may not be regulated, except on an emergency basis, unless section 1 of Article IV is amended by the same procedures by which the original designation was made.

Article II. Description of the Area

The Monterey Bay National Marine Sanctuary (the "Sanctuary") boundaries encompass a total of approximately 2,200 square nautical miles (approximately 7,550 square kilometers) of coastal and ocean waters, and the submerged lands thereunder, in and surrounding Monterey Bay, off the central coast of California. The boundary encompasses the coastal and ocean waters over the entire Monterey Canyon between the northern boundary of Pescadero Marsh, 2.0 nautical miles north of Pescadero Point, and the southern boundary of Julia Pfeiffer Burns Underwater Park and Area of Special Biological Significance, 2.5 nautical miles south from Partington Point, and extending from the mean high tide line from these sites seaward approximately 18 nautical miles on a southwesterly heading of 240° and joined by an arc with a radius of 46 nautical miles drawn from Moss Landing over the entire Monterey Canyon complex out to the abyssal plain at 1500 fathoms (approximately 3000 meters). The land-side boundary follows the mean-high tide level but does not include Santa Cruz, Moss Landing, or Monterey Harbors. The precise boundaries are set forth in Appendix I to this designation document.

Article III. Characteristics of the Area That Give It Particular Value

The Monterey Bay area is characterized by a combination of oceanic conditions and undersea topography that provides for a highly productive ecosystem and a wide variety of marine habitat. The area is characterized by a narrow continental shelf fringed by a variety of coastal types. The Monterey Submarine Canyon is unique in its size, configuration, and proximity to shore. This submarine canyon, along with adjacent submarine canyons, enriches local waters through strong seasonal upwelling, modifies currents, and provides habitat for pelagic communities. Monterey Bay itself is a rare geological feature, as it is one of the few large bays along the Pacific coast.

The Monterey Bay area has a highly diverse floral and faunal component. Algal diversity is extremely high and the concentrations of pinnipeds, whales, otters and some seabird species is outstanding. The fish stocks, particularly in Monterey Bay, are abundant and the variety of crustaceans and other invertebrates is high.

In addition there are many direct and indirect human uses of the area. The most important economic activity directly dependent on the resources is commercial fishing, which has played an important role in the history of Monterey Bay and continues to be of great economic value.

The diverse resources of the Monterey Bay area are enjoyed by the residents of this area as well as the numerous visitors.

The population of Monterey and Santa Cruz counties is rapidly expanding and is based in large part on the attractiveness of the area's natural beauty. The high water quality and the resulting variety of biota and their proximity to shore is one of the prime reasons for the international renown of the area as a prime tourist location. The quality and abundance of the natural resources has attracted man from the earliest prehistoric times to the present and as a result the area contains significant archaeological and paleontological resources, such as Costanoan Indian midden deposits, aboriginal remains and sunken ships and aircraft.

The biological and physical characteristics of the Monterey Bay area combine to provide outstanding opportunities for scientific research on many aspects of marine ecosystems. The diverse habitats are readily accessible to researchers. Six major research facilities are found in the area. These institutions are exceptional resources with a long history of research and large databases possessing a considerable amount of baseline information on the Bay and its resources. Extensive marine and coastal education and interpretive efforts complement Monterey Bay's many research activities. For example, the Monterey Bay Aquarium has attracted millions of visitors who have experienced the interpretive exhibits of the marine environment. Point Lobos Ecological Reserve, Elkhorn Slough National Estuarine Research Reserve, Long Marine Laboratory and Año Nuevo State

Reserve all have excellent docent programs serving the public, and marine related programs for school groups and teachers.

Article IV. Scope of Regulations

Section 1. Activities Subject to Regulation

The following activities are subject to regulation, including prohibition, to the extent necessary and reasonable to ensure the protection and management of the conservation, ecological, recreational, research, educational, historical and esthetic resources and qualities of the area:

a. Exploring for, developing, or producing oil, gas or minerals in the Sanctuary;

b. Discharging or depositing any material or other substance;

c. Possessing, moving, or injuring, or attempting to possess, move, or injure, a Sanctuary historical resource;

d. Drilling through, dredging or otherwise altering the seabed of the Sanctuary; or constructing, placing or abandoning any structure or material on the seabed of the Sanctuary;

e. Taking marine mammals in the Sanctuary or seabirds in or above the Sanctuary;

f. Flying over the Sanctuary in motorized aircraft at low altitude;

g. Operating commercial (other than fishing) vessels in the Sanctuary; and

h. Operating thrill craft (e.g., jet skis, wet bikes, surf jets, hovercraft, speed boats less than 13 feet in length) in the Sanctuary.

Section 2. Consistency with International Law

The regulations governing the activities listed in Section 1 of this Article shall apply to United States-flag vessels and to persons who are citizens, nationals or resident aliens of the United States and shall apply to foreign-flag vessels and persons not citizens, nationals, or resident aliens of the United States to the extent consistent with generally recognized principles of international law, and in accordance with treaties, conventions, and other agreements to which the United States is a party.

Section 3. Emergencies

Where necessary to prevent or minimize the destruction of, loss of, or injury to a Sanctuary resource or quality, or minimize the imminent risk of such destruction, loss or injury, any activity, including those not listed in section 1, is subject to immediate temporary regulation, including prohibition, in accordance with the Administrative Procedure Act.

Article V. Defense or Law Enforcement Activities

No prohibition set forth in the Sanctuary regulations shall apply to activities that are necessary for national defense or

law enforcement. Whenever an activity necessary for national defense or law enforcement would violate a prohibition set forth in the Sanctuary regulations were it not necessary for national defense or law enforcement, the head of the agency taking the action shall notify the Secretary of Commerce or designate of the proposed activity if there is sufficient time to permit consultation without jeopardizing national defense or law enforcement. Such notification shall be sufficiently in advance of undertaking the activity in order to permit consultations as to how the activity could be conducted to minimize any adverse impact on Sanctuary resources and qualities without compromising national defense or law enforcement. Activities that are not necessary for national defense or law enforcement, such as training exercises and routine vessel operations, are subject to all prohibitions contained in the Sanctuary regulations.

Article VI. Effect on Other Regulations, Leases, Permits, Licenses, and Rights

Section 1. Fishing Regulations, Licenses, and Permits

Fishing in the Sanctuary, including fishing for shellfish and invertebrates and mariculture, shall not be regulated as part of the Sanctuary management regime authorized by the Act. However, fishing in the Sanctuary may be regulated other than under the Act by Federal and State authorities of competent jurisdiction, and designation of the Sanctuary shall have no effect on any regulation, permit, or license issued thereunder,

e.g., regulations promulgated under the California Fish and Game Code and regulations implementing Fishery Management Plans promulgated under the Magnuson Fishery Conservation and Management Act, 16 U.S.C. §§ 1801 et seq. Notwithstanding the above, discharges and deposits from fishing vessels may be regulated pursuant to Article IV, section 1, paragraph (b); drilling through, dredging or otherwise altering the seabed of the Sanctuary or constructing, placing or abandoning any structure or material on the seabed of the Sanctuary in connection with fishing and mariculture activities may be regulated pursuant to Article IV, section 1, paragraph (d); and taking of marine mammals and seabirds may be regulated pursuant to Article IV, section 1, paragraph (e).

Section 2. Other

If any valid regulation issued by any Federal, State, or local authority of competent jurisdiction, regardless of when issued, conflicts with a Sanctuary regulation, the regulation more protective of Sanctuary resources and qualities shall govern.

Pursuant to section 304(c)(1) of the Act, 16 U.S.C. § 1434(c)(1), no valid lease, permit, license, approval, or other authorization issued by any Federal, State, or local authority of competent jurisdiction, or any right of subsistence use or access, may be terminated by the Secretary of Commerce or his or her designate as a result of this designation or as a result of any Sanctuary regulation if such lease, permit, license,

approval, other authorization, or right of use or access was issued or in existence as of the effective date of this designation. The Secretary of Commerce or his or her designate, however may regulate the exercise of such authorization or right consistent with the purposes for which the Sanctuary is designated.

The prohibitions set forth in the Sanctuary regulations shall not apply to any activity authorized by any lease, permit, license, approval, or other authorization issued as of the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, or to any right of subsistence use or access in existence as of the effective date of Sanctuary designation, provided that the owner or holder of such authorization or right notifies the Secretary or his or her designate of the existence of such authorization or right and requests certification in accordance with the Sanctuary regulations, if the exercise of such authorization or right would otherwise violate a prohibition set forth in the Sanctuary regulations, and complies with any terms and conditions on the exercise of such authorization or right imposed by the Secretary or his or her designate as he or she deems necessary to achieve the purposes for which the Sanctuary was designated. Pending the imposition of terms and conditions by the Secretary or his or her designate, such owner or holder may exercise any such authorization or right without being in violation of any prohibitions set forth in the Sanctuary regulations.

The prohibitions set forth in the Sanctuary regulations shall not apply to any activity authorized by any lease, permit, license, approval or other authorization issued after the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, if the Secretary or his or her designate was notified of the application for such authorization by the applicant in accordance with the Sanctuary regulations and the Secretary or his or her designate did not object to the issuance of such authorization, and such authorization contains, and the owner or holder complies with, such terms and conditions as the Secretary or his or her designate deems necessary to protect Sanctuary resources and qualities.

The prohibitions set forth in the Sanctuary regulations shall not apply to any activity authorized by a permit issued by the Secretary or his or her designate in accordance with the Sanctuary regulations. Such permits shall only be issued if the Secretary or his or her designate finds that the activity for which the permit is applied will: further research related to Sanctuary resources; further the educational, natural or historical resource value of the Sanctuary; further salvage or recovery operations in or near the Sanctuary in connection with a recent air or marine casualty; assist in managing the Sanctuary; have only negligible, short-term adverse effects on Sanctuary resources and qualities; or further salvage or recovery

operations in connection with an abandoned shipwreck in the Sanctuary title to which is held by the State of California.

In addition, the Secretary or his or her designate may issue special use permits in accordance with section 310 of the Act.

If the Sanctuary regulations prohibit oil, gas, or mineral exploration, development, or production, the Secretary or his or her designate may in no event permit or otherwise approve such activities in the Sanctuary, and any leases, licenses, permits, approvals, or other authorizations issued after the effective date of Sanctuary designation authorizing the exploration, development, or production of oil, gas or minerals in the Sanctuary shall be invalid.

Article VII. Alteration of this Designation

The terms of designation may be modified only by the same procedures by which the original designation is made, including public hearings, consultation with interested Federal, State regional, and local agencies, review by the appropriate Congressional committees and Governor of the State of California, and approval by the Secretary of Commerce or his or her designate.

Appendix I. Proposed Monterey Bay National Marine Sanctuary Boundary Coordinates.

(Appendix I will set forth the precise boundaries based on the comments received on the DEIS).

END OF PROPOSED DESIGNATION DOCUMENT

Accordingly, for the reasons set forth above, 15 CFR is proposed to be amended by adding a new Part 944 as follows:

PART 944 - MONTEREY BAY NATIONAL MARINE SANCTUARY

Sec.

944.1 Purpose.

944.2 Boundaries.

944.3 Definitions.

944.4 Allowed activities.

944.5 Prohibited activities.

944.6 Emergency regulations.

944.7 Penalties.

944.8 National Marine Sanctuary permits - application procedures and issuance criteria.

944.9 Certification of leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity issued or in existence as of the effective date of Sanctuary designation.

944.10 Notification of applications for leases, licenses, permits, approvals, or other authorizations to conduct a prohibited activity.

944.11 Appeals of administrative action.

Authority: Sections 302, 303, 304, 305, 307 and 310 of Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 16 U.S.C. §§ 1431 *et seq*.

§ 944.1 Purpose.

The purpose of the regulations in this Part is to implement the designation of the Monterey Bay National Marine Sanctuary by regulating activities affecting the Sanctuary consistent with the terms of that designation in order to protect and manage the conservation, ecological, recreational, research, educational, historical and esthetic resources and qualities of the area.

§ 944.2 Boundaries.

The Monterey Bay National Marine Sanctuary consists of an area of approximately 2,200 square nautical miles of coastal and ocean waters, and the submerged lands thereunder, in and surrounding Monterey Bay, off the central coast of California. The boundary encompasses the coastal and ocean waters over the entire Monterey Canyon between the northern boundary of Pescadero Marsh, 2.0 nautical miles north of Pescadero Point, and the southern boundary of Julia Pfeiffer Burns Underwater Park and Area of Special Biological Significance, 2.5 nautical miles south from Partington Point, and extending from the mean high tide line from these sites seaward approximately 18 nautical miles on a southwesterly heading of 240° and joined by an arc with a radius of 46 nautical miles drawn from Moss Landing over the entire Monterey Canyon complex out to the abyssal plain at 1500 fathoms (approximately 3000 meters). The Monterey Bay National Marine Sanctuary does not include Santa Cruz, Moss Landing, or Monterey

Harbors. The precise boundaries of the Sanctuary appear in Appendix I following section 944.11.

§ 944.3 Definitions.

(A) "Act" means Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (16 U.S.C. §§ 1431 et seq.).

(B) "Administrator" or "Under Secretary" means the Administrator of the National Oceanic and Atmospheric Administration/Under Secretary of Commerce for Oceans and Atmosphere.

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

(D) "Director" means the Director of the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.

(E) "Commercial vessel" means any vessel engaged in the trade of carrying cargo, including but not limited to tankers and other bulk carriers and barges; vessels used in seismic surveys; and vessels engaged in the trade of servicing offshore installations.

(F) "Effective date of Sanctuary designation" means the date the regulations implementing the designation of the Sanctuary become effective.

(G) "Historical resource" means a resource possessing historical, cultural, archaeological or paleontological significance, including sites, structures, districts, and objects significantly associated with or representative of earlier people, cultures, and human activities and events.

(H) "Injure" means to change adversely, either in the long- or short-term, a chemical or physical attribute of, or the viability of.

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

(J) "Sanctuary" means the Monterey Bay National Marine Sanctuary.

(K) "Sanctuary quality" means a particular and essential characteristic of the Sanctuary, including but not limited to water quality and air quality.

(L) "Sanctuary resource" means any living or nonliving resource of the Sanctuary that contributes to its conservation, recreational, ecological, historical, research, educational or aesthetic value, including, but not limited to, the substratum of the Bay, corals and coralline algae, benthic invertebrates and algae, plankton, fish, birds, marine mammals and historical resources.

(M) "Taking any marine mammal or seabird" means harassing, hunting, capturing, collecting, or killing, or attempting to harass, hunt, capture, collect, or kill, any marine mammal or seabird, including, but not limited to, any of the following: collecting dead marine mammals or seabirds, or parts thereof, restraining or detaining any marine mammal or seabird, no matter how temporary, tagging a marine mammal or seabird, operating an aircraft or vessel or doing any other act that result in the disturbing or molesting of marine mammals or seabirds.

(N) "Thrill craft" means any motorized vessel that is generally less than thirteen feet in length as manufactured, is capable of exceeding a speed of twenty miles per hour, and has the capacity to carry not more than the operator and one other person while in operation. The term includes but is not limited to jet skis, wet bikes, surf jets, miniature speed boats, and hovercraft.

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

Other terms appearing in the regulations are defined at 15 C.F.R. § 922.2 or in the Act.

§ 944.4 Allowed activities.

All activities except those prohibited by section 944.5 may be undertaken subject to any emergency regulation promulgated pursuant to section 944.6 and all prohibitions, restrictions, and

conditions validly imposed by any other authority of competent jurisdiction. If any valid regulation issued by any Federal, State, or local authority of competent jurisdiction, regardless of when issued, conflicts with a Sanctuary regulation, the regulation more protective of Sanctuary resources and Sanctuary qualities shall govern.

§ 944.5 Prohibited activities.

(a) Except as specified in paragraphs (c) through (i) below, the following activities are prohibited and thus unlawful for any person to conduct or cause to be conducted:

(1) Exploring for, developing, or producing oil, gas or minerals in the Sanctuary;

(2) Discharging or depositing, from within the boundaries of the Sanctuary, any material or other substance except:

(i) fish, fish parts, chumming materials or bait used in or resulting from normal fishing operations in the Sanctuary;

(ii) biodegradable effluents incidental to vessel use generated by marine sanitation devices approved by the U.S. Coast Guard;

(iii) water generated by routine vessel operations (e.g., cooling water and deck washdown) excluding bilge pumping; or

(iv) engine exhaust.

(3) Discharging or depositing, from beyond the boundaries of the Sanctuary, materials or other substances, other than those listed in (2)(i), (ii), (iii) and (iv) above, that subsequently enter the Sanctuary and injure a Sanctuary resource or Sanctuary quality.

(4) Moving, possessing or injuring, or attempting to move, possess, or injure, a Sanctuary historical resource. This prohibition does not apply to accidental moving, possession or injury during normal fishing operations.

(5) Drilling through, dredging or otherwise altering the seabed of the Sanctuary; or constructing, placing or abandoning any structure or material on the seabed of the Sanctuary. This prohibition does not apply if any of the above results from: anchoring vessels; normal fishing operations; routine harbor maintenance; installation of navigation aids; maintenance of mariculture operations existing as of the effective date of these regulations; and the construction of docks and piers.

(6) Taking any marine mammal or seabird in or above the Sanctuary, except in accordance with and as permitted by regulations promulgated under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA).

(7) Flying motorized aircraft at less than 1000 feet above the Sanctuary within three nautical miles of State of California designated reserves, parks, beaches or refuges, or the Los Padres National Forest.

(b) The prohibitions in paragraph (a) apply to United States-flag vessels and to persons who are citizens, nationals or resident aliens of the United States; and to foreign-flag vessels and persons not citizens, nationals, or resident aliens of the United States to the extent consistent with generally recognized principles of international law, and in accordance with treaties, conventions, and other agreements to which the United States is a party.

(c) The prohibitions in paragraph (a)(2)-(7) do not apply to any activity necessary to respond to an emergency threatening life, property, or the environment.

(d) The prohibitions in paragraph (a)(2)-(7) do not apply to activities that are necessary for national defense or law enforcement. Whenever an activity necessary for national defense or law enforcement would violate a prohibition set forth in the Sanctuary regulations were it not necessary for national defense or law enforcement, the head of the agency taking the action shall notify the Secretary of Commerce or designate of the proposed activity if there is sufficient time to permit consultation without jeopardizing national defense or law enforcement. Such notification shall be sufficiently in advance of undertaking the activity in order to permit consultations as to how the activity could be conducted to minimize any adverse impact on Sanctuary resources and qualities without compromising national defense or law enforcement. Activities that are not necessary for national defense or law enforcement, such as

training exercises and routine vessel operations, are subject to all prohibitions contained in the Sanctuary regulations.

(e) The prohibitions in paragraph (a)(2)-(7) do not apply to any activity authorized by a permit issued pursuant to section 944.8 of these implementing regulations.

(f) The prohibitions in paragraph (a)(2)-(7) do not apply to any activity authorized by a valid lease, permit, license, approval, or other authorization issued as of the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, or by any valid right of subsistence use or access in existence as of the effective date of Sanctuary designation, provided that the owner or holder of such authorization or right notifies the Director of the existence of such authorization or right in accordance with the requirements of section 944.9 of these regulations and requests certification of such authorization or right, and provided that the owner or holder complies with any terms and conditions on the exercise of such authorization or right imposed by the Director as he or she deems necessary to achieve the purposes for which the Sanctuary was designated.

(g) The prohibitions in paragraph (a)(2)-(7) do not apply to any activity authorized by any lease, permit, license, approval, or other authorization issued after the effective date of Sanctuary designation, if the Director was notified of the application for such authorization by the applicant in accordance with the requirements of section 944.10 of these implementing

regulations and the Director did not object to the issuance of such authorization, and such authorization contains, and the owner or holder complies with, such terms and conditions as the Director deems necessary to protect Sanctuary resources and Sanctuary qualities.

(h) Notwithstanding paragraphs (e), (f), and (g) above, in no event may the Director issue a National Marine Sanctuary permit authorizing, or otherwise approve, the exploration for, development or production of oil, gas or minerals in the Sanctuary, and any leases, licenses, permits, approvals, or other authorizations authorizing the exploration, development, or production of oil, gas or minerals in the Sanctuary issued after the effective date of Sanctuary designation shall be invalid.

§ 944.6 Emergency regulations.

Where necessary to prevent or minimize the destruction of, loss of, or injury to a Sanctuary resource or quality, or minimize the imminent risk of such destruction, loss or injury, any and all activities are subject to immediate temporary regulation, including prohibition, in accordance with the Administrative Procedure Act.

§ 944.7 Penalties for commission of prohibited acts.

(a) Each violation of the Act, any regulation in this Part, or any permit issued pursuant thereto, is subject to a civil

penalty of not more than $50,000. Each day of a continuing violation constitutes a separate violation.

(b) Regulations setting forth the administrative procedures governing the assessment of civil penalties, enforcement hearings and appeals, permit sanctions and denials for enforcement reasons, and the issuance of written warnings are governed by 15 CFR Part 904.

§ 944.8 National Marine Sanctuary permits - application procedures and issuance criteria.

(a) A person may conduct an activity otherwise prohibited by section 944.5(a)(2)-(7) if authorized by a permit issued under this section.

(b) Applications for such permits should be addressed to the Director of the Office of Ocean and Coastal Resource Management; ATTN: Marine and Estuarine Management Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235. An application must include a detailed description of the proposed activity including a timetable for completion of the activity and the equipment, personnel, and methodology to be employed. The qualifications and experience of all personnel must be set forth. The application must set forth the anticipated effects of the activity, if any, on Sanctuary resources and Sanctuary qualities.

Copies of all other required licenses, permits, approvals, or other authorizations must be attached.

(c) Upon receipt of a complete application, the Director or designate, at his or her discretion, may request such additional information from the applicant as he or she deems necessary to act on the application, may seek the views of any persons and may hold a public hearing.

(d) The Director, at his or her discretion, may issue a permit, subject to such terms and conditions as he or she deems appropriate, to conduct an activity otherwise prohibited by section 944.5(a)(2)-(7), if the Director finds that the activity will: further research related to Sanctuary resources; further the educational, natural or historical resource value of the Sanctuary; further salvage or recovery operations in or near the Sanctuary in connection with a recent air or marine casualty; assist in managing the Sanctuary; have only negligible, short-term adverse effects on Sanctuary resources and Sanctuary qualities; or further salvage or recovery operations in connection with an abandoned shipwreck in the Sanctuary title to which is held by the State of California. In deciding whether to issue a permit, the Director may consider such factors as: the professional qualifications and financial ability of the applicant as related to the proposed activity; the duration of the activity and its effects, the appropriateness of the methods and procedures proposed by the applicant for the conduct of the activity; the extent to which the conduct of the activity may

diminish or enhance the qualities for which the Sanctuary was designated; the end value of the applicant's activity; and such other matters as the Director deems appropriate.

(e) A permit issued pursuant to this section is nontransferable.

(f) The Director may amend, suspend or revoke a permit issued pursuant to this section or deny a permit application pursuant to this section, in whole or in part, for good cause. Any such action shall be communicated in writing to the permittee or applicant and shall set forth the reason(s) for the action taken. Procedures governing permit sanctions and denials for enforcement reasons are governed by Subpart D of 15 CFR Part 904.

(g) It shall be a condition of any permit issued that the permit or a copy thereof be displayed on board all vessels or aircraft used in the conduct of the activity.

(h) It may be a condition of any permit issued that any data or other information obtained under the permit be made available to the public.

§ 944.9 Certification of leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity issued or in existence as of the effective date of Sanctuary designation.

(a) The prohibitions in section 944(a)(2)-(7) do not apply to any activity authorized by a valid lease, permit, license, approval or other authorization issued as of the effective date

of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, or by any valid right of subsistence use or access in existence as of the effective date of Sanctuary designation, provided that the owner or holder of such authorization or right notifies the Director, in writing, within 90 days of the effective date of Sanctuary designation, of the existence of such authorization or right, and simultaneously requests certification of such authorization or right, and provided that the owner or holder complies with any terms and conditions on the exercise of such authorization or right imposed, as a condition of certification, by the Director as necessary to achieve the purposes for which the Sanctuary was designated.

(b) The owner or holder of a valid lease, permit, license, approval or other authorization issued as of the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, or of any valid right of subsistence use or access in existence as of the effective date of Sanctuary designation, authorizing an activity otherwise prohibited by section 944.5(a)(2)-(7) may conduct the activity without being in violation of section 944.5(a)(2)-(7) pending final agency action on a timely certification request.

(c) Requests for certifications should be addressed to the Director, Office of OCean and Coastal Resource Management; ATTN: Marine and Estuarine Management Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National

Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235. A copy of the lease, permit, license, approval or other authorization must accompany the request.

(d) After receipt of a request for certification, the Director may either issue a decision within 120 days of receipt of the request or, within 30 days of receipt of the request for certification, request additional information from the applicant as he or she deems necessary to condition appropriately the exercise of the certified authorization or right to achieve the purposes for which the Sanctuary was designated. The applicant then has 30 days to supply the requested information. Failure to supply the requested information within 30 days shall cause the applicant to be immediately subject to the prohibitions in section 944.5(a)(2)-(7). The Director, in his or her discretion, may seek the views of any persons on the certification request. The Director, at his or her discretion, will then issue a decision within 120 days of receipt of the requested information or may, within 60 days of receipt of the requested information, issue a notice in the Federal Register of the intent to hold a public hearing. The public hearing will then be held within 30 days of the publication of the notice in the Federal Register. The Director will then have 60 days to make a decision from the close of the public hearing, if any. As a condition of certification, the Director may impose such terms and conditions on the exercise of such authorization or right as he or she deems

necessary to achieve the purposes for which the Sanctuary was designated.

(e) Any certification called for in this section shall be presumed without the imposition of conditions or terms unless the Director acts on the certification request within 120 days of receipt thereof or, if the Director has requested additional information, within 120 days of receipt thereof, or 60 days from the close of any public hearing held.

(f) The Director may amend, suspend, or revoke any certification made under this section whenever the continued conduct of the activity would violate any terms or conditions of the certification. Any such action shall be communicated in writing to both the holder of the certified lease, permit, license, approval, or other authorization and the issuing agency and shall set forth the reason(s) for the action taken.

(g) Either the holder, owner or the issuing agency may appeal any action conditioning, amending, suspending, or revoking any certification in accordance with the procedure provided for in section 944.11.

(h) Any amendment, renewal or extension not in existence as of the date of Sanctuary designation of a lease, permit, license, approval, other authorization or right shall be subject to the provisions of section 944.10.

§ 944.10 Notification of applications for leases, licenses, permits, approvals, or other authorizations to conduct a prohibited activity.

(a) The prohibitions set forth in section 944(a)(2)-(7) do not apply to any activity authorized by any valid lease, permit, license, approval or other authorization issued after the effective date of Sanctuary designation by any Federal, State, or local authority of competent jurisdiction, provided that the Director is notified of the application for such authorization within fifteen days of the date of application or of the effective date of Sanctuary designation, whichever is later, and that the Director or designate does not object to the issuance of such authorization and that such authorization contains, and the owner or holder complies with, such terms and conditions as the Director deems necessary to protect Sanctuary resources and Sanctuary qualities.

(b) Any person applying for a lease, permit, license, approval or other authorization from any Federal, State, or local authority to conduct an activity that would be prohibited under section 944.5(a)(2)-(7) must notify the Director in writing, within 15 days of the date of application or of the effective date of Sanctuary designation, whichever is later, of the filing of the application. Any applicant may request the Director to issue a finding as to whether an activity for which an application to any Federal, State, or local authority of competent jurisdiction for a lease, permit, license, approval, or

other authorization is proposed to be made or has been made would be prohibited by section 944.5(a)(2)-(7) unless the Director is notified and does not object to issuance.

(c) Notification of the filing of an application must be addressed to the Director, Office of Ocean and Coastal Resource Management; ATTN: Marine and Estuarine Management Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235. A copy of the application must accompany the notification.

(d) Upon receipt of a notification, the Director may request such additional information from the applicant as he or she deems necessary to determine whether to object to issuance of such lease, license, permit, approval, or other authorization, or what terms and conditions such authorization must contain in order to protect Sanctuary resources and Sanctuary qualities. The Director, in his or her discretion, may seek the views of any persons and hold a public hearing on the application.

(e) The Director shall notify the agency to which application has been made within the time period allowed for comment on the application of whether he or she has an objection to issuance or what terms and conditions he or she determines such lease, license, permit, approval, or other authorization must contain in order to protect Sanctuary resources and Sanctuary qualities.

(f) If the Director fails to notify the agency to which application has been made within the time period allowed by that agency for comment on the application of his or her objection to issuance or of the terms and conditions he or she has determined such lease, license, permit, approval, other authorization or right must contain, then his or her concurrence to issuance without terms or conditions to protect Sanctuary resources and Sanctuary qualities shall be presumed.

(g) The applicant may appeal any objection by, or terms or conditions imposed by, the Director to the Assistant Administrator or designate in accordance with the procedure set forth in section 944.11.

§ 944.11 Appeals of administrative action.

(a) Except for permit actions taken for enforcement reasons (see Subpart D of 15 CFR Part 904 for applicable procedures), an applicant for a section 944.8 permit, a section 944.8 permittee, a section 944.9 certification requester, or a section 944.10 applicant (hereinafter appellant) may appeal to the Assistant Administrator or designate: 1) the grant, conditioning, amendment, denial, suspension or revocation of a National Marine Sanctuary permit by the Director under section 944.8; 2) the conditioning, amendment, or revocation of a certification under section 944.9; or 3) the objection to issuance or the imposition of terms and conditions under section 944.10. Such appeal must be in writing, state the action(s) appealed and the reason(s)

therefor, and be received within 30 days of the action(s) by the Director. Appeals must be addressed to the Assistant Administrator, National Ocean Service; ATTN: Marine and Estuarine Management Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, N.W., Washington, D.C. 20235.

While the appeal is pending appellants requesting certification pursuant to and otherwise in adherence with section 944.9 may continue to conduct their activities without being in violation of the prohibitions in section 944.5(a)(2)-(7). All other appellants may not conduct their activities without being subject to the prohibitions in section 944.5(a)(2)-(7).

(b) Within 30 days of receipt of an appeal, the Assistant Administrator or his or her designate may request the appellant or any person to submit such information as the Assistant Administrator or his or her designate deems necessary in order for him or her to decide the appeal. The appellant shall then have 30 days from receipt of the request for additional information from the Assistant Administrator or his or her designate to supply the additional information. The Assistant Administrator or his or her designate, at his or her discretion, may hold an informal hearing on the appeal. If the Assistant Administrator or his or her designate determines that an informal hearing should be held, he or she may designate an officer before whom the hearing shall be held. Notice of the time, place, and

subject matter of the hearing shall be published in the Federal Register within 120 days of receipt of the appeal. Such hearing shall 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 he or she deems equitable. The appellant and the Director may appear personally or by counsel at the hearing and submit such material and present such arguments as deemed appropriate by the hearing officer. Within 60 days after the record for the hearing closes, the hearing officer shall recommend a decision in writing to the Assistant Administrator or his or her designate.

(c) The Assistant Administrator or his or her designate shall decide the appeal based on the record before the Director and the record of the appeal. If a hearing has been held before a hearing officer, the Assistant Administrator or his or her designate may adopt the hearing officer's recommended decision, in whole or in part, or reject or modify it. In any event, if a hearing is held, the Assistant Administrator or his or her designate shall notify the appellant and other interested persons of his or her decision and the reason(s) therefor in writing within 60 days of receipt of the recommended decision of the hearing officer. If an informal hearing is not held, the Assistant Administrator or his or her designate shall notify the appellant and other interested persons of the final decision and the reason(s) therefor in writing, normally within 60 days of the date of the receipt of adequate information to make the decision.

The Assistant Administrator's or his or her designate's decision shall constitute final agency action for the purposes of the Administrative Procedure Act.

(d) Any time limit prescribed in this section may be extended by the Assistant Administrator or his or her designate for good cause for a period not to exceed 30 days, either upon his or her own initiative or upon written request from the appellant stating the reason(s) therefor.

Appendix I. Proposed Monterey Bay National Marine Sanctuary Boundary Coordinates.

(Appendix I will set forth the precise boundaries based on the comments received on the DEIS/MP).

APPENDIX 2: STATE AND FEDERAL AUTHORITIES APPLICABLE TO THE MONTEREY BAY AREA

State and Federal Authorities Applicable to the Monterey Bay Area

Introduction

Presented below is an overview of the various State and Federal management authorities which have statutory responsibility for protecting marine resources in the proposed Monterey Bay National Marine Sanctuary study area (See Table 14 for a Summary). This discussion includes a description of relevant legislative mandates as well as administrative measures taken to accomplish them.

State Authorities

The State's jurisdiction in the area under consideration extends 3nm (5.6 km) offshore from the mean high 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 specific resources. The authorities with broad jurisdiction are described first, followed by those addressing a specific threat or resource, respectively.

The California Coastal Act of 1976 [Cal. Pub. Res. 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 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 (3.0 nm or 5.6 km), including all offshore islands), and extending inland generally 1,000 yards from the mean tide line. In significant coastal, estuarine, habitat, and recreational area, it extends inland to the first major ridge line or 5nm (8km) from the 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 activities directly affecting the coastal zone must be conducted in a manner which is consistent with these policies to the maximum extent practicable and activities which require a federal license or permit must be conducted in a manner consistent with these policies (16 U.S.C. § 1456)

Provisions of the CCA which address activities or concerns relevant to the consideration of a marine sanctuary include:

1) Article 4, Section 30230 granting "special protection to" areas and species of special biological or economic significance and requiring uses of the marine environment to be carried out so as to maintain biological productivity.
2) Article 4, Section 30233 limiting dredging and filling in

coastal waters to situations where "there is no feasible less environmentally damaging alternative" and the activities are related to specific listed purposes.

3) Article 5, Section 30240 protecting sensitive habitat areas against "any significant disruption of habitat values" and against impacts from adjacent development which would "significantly degrade" the area.

4) Article 7, Section 30262, regulating oil and gas development.

The CCA establishes the State Coastal Commission to implement the Act, granting it permit authority until such time as local governments adopt local plans approved by the Commission. In marine areas the Commission will continue to be the State permitting agency and be responsible for reviewing consistency for Federal activities and Federally licensed activities including OCS activities, which are of particular importance to the area under consideration. Local governments with jurisdiction over areas affected by OCS activity are invited by the CCC to participate in the public hearing process, and CCC deliberations, and to present determinations of whether OCS activity is consistent with the local coastal plan. Local coastal plans are presently being prepared throughout the study area. Most of the counties and cities within the study area have fully certified local coastal plans. These include San Mateo, Santa Cruz and Monterey Counties, and Santa Cruz, Capitola, Watsonville, Marina, and Sand City. Communities still requiring certification for portions of their plans include

Seaside, Monterey, Pacific Grove and Carmel.

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 State waters, including ocean waters, under the jurisdiction of the state. The State Water Resource 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 Oceans Waters of California (1978), which set standards for water quality characteristics for ocean waters within state jurisdiction, places 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). Wastes must be discharged a sufficient distance from designated ASBSs to ensure that natural water quality conditions within the area are maintained. 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 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. To facilitate early containment of an oil spill, the CCC has required one lease holder (Exxon, for exploratory drilling on certain tracts in the Santa Barbara Channel) to have certain minimum oil spill containment and cleanup equipment on drillships or at the site at all times, e.g.,: 1) 1500 feet of open ocean containment boom and a boat capable of deploying the boom, 2) one oil skimming device capable of open use, and 3) fifteen bales of oil sorbent material. Also, the CCC has determined that, for reasons of navigation safety and environmental protection, the placement of drillships in or within 500 meters of sea lanes established by the U.S. Coast Guard is inconsistent with the Coastal Plan.

With regard to public trust lands, i.e. State tidelands and submerged lands, a significant role is also played by the State Lands Commission (SLC). Prior to certification, the SLC may review and comment on any aspect of a proposed Local Coastal Plan that could affect State lands (Cal. Pub. Res. Code § 30415). In addition, as the State agency with sole responsibility for administering the trust, the SLC has adopted regulations for the protection and use of public trust lands in the coastal zone.

The CCA also requires that diking, filling or dredging in open coastal waters, wetlands, or estuaries shall be permitted only for certain listed purposes, and only where there is no feasible less environmentally damaging alternative, and where mitigation measures have been provided (California Coastal Act §30233). Finally the CCA requires the CCC to designate "Sensitive Coastal Resource Areas", which must then be acted upon by the Legislature within two years.

State Refuges and Reserves

Several refuges and reserves for the protection of marine life have been established in the proposed sanctuary area by the California Department of Fish and Game (see Table 10). These areas fall into five general categories (ecological reserves, marine life refuges, fish refuges, game refuges, and reserves) providing different types of protection to the resources found there. The general authority exercised by the Department of Fish and Game within each category and within specific refuges or reserves in the study area is as follows:

-Ecological Reserves (California Fish and Game Code § 1580 et. seq.) Of the categories of refuges and reserves administered by the Department of Fish and Game, ecological reserves provide the most comprehensive protection. Within these ecological reserves, the California Department of Fish and Game has the authority to

prohibit any activity which may harm the resources, including: fishing, collecting, swimming, boating, low-flying aircraft, and public entry (14 California Administrative Code § 630 (a)). General regulations provide that "no person shall disturb geological reserves, formations or archaeological artifacts or take or disturb any bird or nest, or eggs thereof, or any plant, mammal, fish, mollusk, crustacean...or any other form of plant or animal life in an ecological reserve" (14 California Administrative Code §630(a)(1)). These prohibited activities may, however, be permitted by the Department of Fish and Game in particular reserves or in certain areas of particular concern pursuant to specific regulations.

-Point Lobos Ecological Reserve (14 California Administrative Code § 630 (b)(13))

The Point Lobos Ecological Reserve includes Point Lobos and adjacent ocean waters. Both Point Lobos and Carmel Bay are protected due to the fragility of the prevalent rocky tidepools. The areas are also heavily used by marine mammals and birds. Point Lobos is a favored roosting area for the endangered Brown Pelican (Association of Monterey Bay Area Governments, 1978).

Efforts to protect the resources of Point Lobos reserves, including 750 acres (300 hectares) of underwater area, have been initiated by the California Department of Parks and Recreation (DPR). Because DPR lacks authority to prohibit fishing, however, the area was

established as an ecological reserve rather than park. The reserve is managed primarily by DPR, which maintains a large, on-site staff, with DFG contributing as needed to enforcement efforts. All fishing is prohibited within the reserve. Swimming, boating and other aquatic sports are permitted. Boats, however, may be launched and retrieved only in designated areas and may be anchored only during daylight hours.

--Carmel Bay Ecological Reserve [14 California Administrative Code §630 (b) (26)]

The Carmel Bay Ecological Reserve encompasses ocean waters of Carmel Bay extending approximately .75 sm (1.4 km) from the mean tide line to a line drawn across the bay from Granite Point to Pescadero Point. The reserve also includes the Pinnacles, a series of offshore rocks, and surrounding ocean waters less than 15 fathoms (28.3 meters) in depth. Carmel Bay marks the beginning of the California Sea Otter Refuge. The Bay is an important haulout and foraging area for otters and other marine mammals. The nearshore zone is typical kelp forest habitat, with the attendant abundance of marine life (Association of Monterey Bay Area Governments, 1978). While the DFG is primarily responsible for managing the reserve, DPR enforcement personnel from Point Lobos Ecological Reserve patrol the Bay.

Sport fishing with hook and line, spear gun, or hand-held implements is generally permitted within the reserve. No invertebrates may be taken, however. Swimming, boating, surfing,

skin, and scuba diving are all permitted. Extensive restrictions apply to the harvesting of kelp. If, at any time, the DFG Director finds that the harvesting of kelp will tend to destroy or impair kelp beds, or tend to destroy or impair the supply of food for fish or wildlife, a notice that a particular kelp bed, or part of a bed, will be closed to the harvesting of kelp for period not to exceed one year, must be issued. At least 48 hours notice of the intention to harvest kelp within the reserve must be given the CDFG's regional manager. An observer of the CDFG may accompany the harvester. Other regulations apply to the harvesting of kelp on particular areas of the reserve.

--Game Refuges (California Fish and Game Code § 10500 et seq.)

It is unlawful in general to take or possess any bird or mammal or part thereof, in any game refuge [California Fish and Game Code § 10500]. In addition, 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 prohibited within a game refuge (California Fish and Game Code §10500). The Department of Fish and Game has complete authority to exercise control over all mammals other than marine mammals and birds in any game refuge, including the authority to issue permits for their taking (California Fish and Game Code §10502). In navigable water areas of game refuges, however, general regulations do not prohibit the taking of birds or mammals.

-California Sea Otter Game Refuge

The California Sea Otter Game Refuge covers portions of Monterey and San Luis Obispo Counties between the Carmel River on the north and the Santa Rosa Creek on the south, which lie west of California Highway No. 1 (California Fish and Game Code §10840). The refuge excludes coastal waters. It is the largest refuge in the state covering 86 nm (160 km) of coastline in Monterey County and 30 nm (56 km) in San Luis Obispo County (Association of Monterey Bay Area Governments, 1978). Within its boundaries are several state parks and reserves, including Point Lobos Ecological Reserve and the Julia Pfeiffer Burns State Park, and the entire Big Sur coastline. The refuge was primarily created to protect the threatened California Sea Otter, but it also protects important habitat for numerous marine birds and mammals (Association of Monterey Bay Area Governments, 1978). In addition to the general regulations described above, it is unlawful to fly any aircraft less than 1000 feet above the refuge. Lawful occupants of private lands located within the refuge may take otherwise unprotected birds and mammals on such lands without a permit.

--Marine Life Refuges [California Fish and Game Code §10500(f)]

It is unlawful in a marine life refuge to take or possess any invertebrate or specimen of marine plant life. Such refuges are

generally established to promote research activities.

--Hopkins Marine Life Refuge

The Hopkins Marine Life Refuge includes ocean waters extending 1000 feet from the mean high tide line adjacent to the eastern part of the city of Pacific Grove at the southern end of Monterey Bay (California Fish and Game Code §10901). Both the Hopkins and the Pacific Grove Marine Gardens Fish Refuge (see below) are established principally to protect the richness and sensitivity of the rocky intertidal ecology. The most important feature of both areas is the number of small rocky islands in the nearshore area, which provide resting and nesting places for marine birds and mammals, particularly the California Sea Otter. Associated with these rocky areas are dense beds of giant kelp (Association of Monterey Bay Area Governments, 1978). While the taking of invertebrates and marine plant life specimens is generally prohibited, officers, employees, students, and licensees of Stanford University and the University of California are permitted to do so for scientific purposes without a permit.

-- Fish Refuge [California Fish and Game Code §10500(c)]

The taking and possession of fish or amphibia and the use and possession of any contrivance designed to be used for catching fish are generally prohibited in a fish refuge.

--Pacific Grove Marine Gardens Fish Refuge

The Pacific Grove Marine Gardens Fish Refuge includes ocean waters of Monterey Bay to a depth of 60 ft. (18.1 m) measured from mean low tide adjacent to the City of Pacific Grove. Its western and eastern boundaries correspond to extensions of the western and eastern corporate limits of the city. The Hopkins Marine Life Refuge falls within the boundaries of the fish refuge (California Fish and Game Code § 10801).

For management purposes the refuge is divided into two areas applying different regulations for the taking of fish in each area. In the western half of the refuge, abalone and sea urchin may be taken commercially, except that the area may be closed if it is determined that the depletion of these species will endanger the balance of marine life. Fish, other than mollusks and crustaceans, may be taken throughout the refuge pursuant to a sport fishing license. In addition, marine life may be taken for scientific purposes pursuant to an appropriate permit. Finally, sardines, mackerel, anchovies, squid, and herring may be taken by net or bait in both areas of the refuge.

--Marine Reserves

Marine Reserves are established by the Department of Fish and Game for a wide variety of purposes and, thus, no general regulations exist. Rather specific regulations for each reserve are designed to protect the unique forms of marine life peculiar to it.

--Año Nuevo State Reserve

The Año Nuevo State Reserve consists of mainland areas on Año Nuevo Point, ocean waters stretching 100 ft. (30.4 m) from the low tide mark adjacent to those areas, and Año Nuevo Island. The reserve is managed by the State Department of Parks and Recreation, due to the large numbers of visitors it receives. The entire area of the reserve is owned by the state. The basic purpose for its establishment is to encourage the reintroduction of pinniped populations and to protect them from human disturbance.

Regulations prohibit the taking of invertebrates on the mainland shore between the high tide mark and 100 feet beyond the low tide mark [14 California Administrative Code § 29.05(b)(3)]. In addition, it is unlawful to fly aircraft less than 1,000 feet above the land and water area of the reserve (California Fish and Game Code §10501.5).

Regional Water Quality Control Boards (RWQCBs) are responsible for

integrating ASBS designations into their area wide basin plans, which outline waste discharge prohibitions and restrictions. A routine ASBS reconnaissance survey conducted by the SWRCB provides RWQCBs with detailed resource information as well as data on existing or future uses that are apt to threaten ASBS environmental quality. ASBS surveillance and monitoring by RWQCB's ensure's 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 (see California Water Code, Section 13300).

The following ASBSs have been designated within the study area:

--Año Nuevo Point and Island: This ASBS includes ocean waters extending 3 nm (5.6 km) from the mean high tide line on the mainland coast bounded on the north by a line extending southwest from the San Mateo-Santa Cruz County line. The ASBS thus covers a considerably larger area than the Ano Nuevo State Reserve.
--Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge: This ASBS includes ocean waters contained within the Pacific Grove Marine Gardens Fish Refuge (see above).
--Carmel Bay: This ASBS includes waters contained within the Carmel Bay Ecological Reserve (see above).
--Point Lobos Ecological Reserve: This ASBS includes ocean waters contained within the Point Lobos Ecological Reserve (see above).

--Julia Pfeiffer Burns Underwater Park: This ASBS includes ocean waters contained within the Julia Pfeiffer Burns Underwater Park (see below).

--Ocean Area Surrounding the Mouth of the Salmon Creek: This ASBS includes ocean waters extending from the mean high tide line to the 100-foot isobath or 1000 feet offshore, whichever is greater between the Monterey-San Luis Obispo County line and a point approximately five miles north. This is the only ASBS in the study area that does not correspond to a state refuge, reserve, or underwater park. It was established primarily to protect fragile rocky intertidal and kelp forest habitat.

Fish and Game Code

The California Department of Fish and Game, 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 on the land and in water areas under state jurisdiction. The Department of Fish and Game programs can be placed into four categories: 1) enhancement of environmental quality necessary for the maintenance of fish and game resources, 2) habitat protection through both regulations and property ownership, 3) prohibition of activities which may cause direct harm to individual species, and 4) management of fish and game stocks for commercial and recreational use. Specific programs of relevance to the study area other than ecological reserves (discussed above) are regulation of sport and commercial fishing,

protection of endangered species, protection of migratory birds, and coordination of the oil spill contingency plans.

--Regulations of Sport and Commercial Fishing

The Department of Fish and Game 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 (California Fish and Game Code §7100). Numerous invertebrates are also regulated in certain areas (see Table 15).

Commercial fishing, including the taking of tidal invertebrates for commercial purpose, is also governed by a licensing system. Certain species found in the study area are protected from commercial take; all other species may be taken in season (California Fish and Game Code §8140). Species found in the study area include: striped bass, kelp bass, sand bass, spotted bass, yellowfin croaker, spotfin croaker, sturgeon and California corbina (California Fish and Game Code §§8370-8373). The above species are reserved for recreation taking only. Several other species are subject to minimum size, seasonal and volume limitations. The restrictions applicable to species found in the study are listed in Table 16.

Every person who operates or assists in using any boat or gear to take fish for profit must procure a license (California Fish and Game Code §7580); party boat operators must get special licenses

Table 15. Restrictions on the recreational taking of invertebrates in tide pools or other areas between the high tide mark (California 14 Administrative Code §29.05).

abalones, chitons, 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 <u>other than in</u> State parks, 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 monument and seashores.

Table 16. Catch restrictions for species of commercial fish in the Monterey Bay Area (References are to the California Fish and Game Code).

Sardines	Catch limited to 20,000 tons statewide or as adjusted by the Department proportional to increase in spawning population (§8150.7)
Anchovies	Restricted according to the Pacific Fishery Management Council (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 PFMC Plan.
Crab	Fishery open between the second Tuesday in November and June 30th (§8276).
Abalone	Unlawful to take for commercial purposes except south of line extending due west from Yankee Point where the depth exceeds 20 ft.
Clams	Fishery open year round except in an area between lines extending due west from Pigeon Point and Yankee Point where open between September 1st and April 30th.
Scallops	Unlawful to sell or purchase.
Saltwater/ Anadromous	Striped bass illegal to possess unless releasing from net (§8320); kelp bass,sand bass, and spotted bass may not be sold (§8372); yellow fin and 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 sea bass, barracuda, and yellowtail not less than 28 inches in length may be taken by hook and line at any time.
Mackerel	Catch limited until stock is enhanced (§8388.3)
California Halibut	May be taken at any time (§8391).

(California Fish and Game Code §7920 et seq.). Vessels used in commercial fishing operations must also carry a Department of Fish and Game registration number (California Fish and Game Code §7880). Fishing reports, described in Section 8010 et seq., must be supplied by buyers, processors, and anyone else who receives fish from fishermen. These reports form the basis of Department of Fish and Game statistics used in formulating fishery management policies.

Licenses must also be obtained by any person engaged in the business of mariculture (California Fish and Game Code § 6480) or oyster culture (California Fish and Game Code § 6510). State water bottoms may be leased for this purpose by the Fish and Game Commission.

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

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

The California Department of Fish and Game maintains a list of endangered and threatened species. It is unlawful within the state to take or possess any listed species. "Taking" is defined (California Fish and Game Code §2050 et seq.,) in a manner analogous to the interpretation under the federal act (see below). Listed species found in the study area are the California Clapper Rail, California brown pelican, the California Least tern, the light-footed clapper rail, and the Southern sea otter.

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

In accordance with the Migratory Bird Treaty Act, California has provided protection for migratory birds, their nests and eggs by fixing areas, seasons, and hours plus bag and possession limits by species for migratory game birds (California Fish and Game Code §356). Of the birds found in the study area, the peregrine falcon, brown pelican, California clapper rail, California least tern, light-footed clapper rail and Southern bald eagle (California Fish and Game Code §3511) have all been accorded "fully protected" status, which protects these birds from taking except as authorized for scientific research.

--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" (California Fish and Game §5650). The California Department of Fish and Game together with an Interagency Committee coordinates the state's oil spill contingency plan. Because federal law preempts state regulations 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, State Department of Fish and Game 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.

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

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

of environmental values. The State Lands Commission, together with the Coastal Commission, 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 State Lands Commission enforces requirements similar to those of MMS concerning blowout prevention, drilling practices, production procedures, pollution control, and oil spill prevention, containment and cleanup.

In order to protect particularly sensitive marine areas, the California State Legislature may designate Oil and Gas Sanctuaries in which petroleum development within submerged lands is prohibited. Oil and gas sanctuaries are established in all State waters in the proposed Sanctuary area (California Public Resources Code §6871.2 (d)). Although leasing is normally excluded from the sanctuaries, should underlying oil and gas deposits risk being drained by wells located on adjacent federal lands--thereby threatening the state's proprietary interest in the resource--the state legislature may open up affected sanctuary areas for a drainage sale.

<u>Control of Oil Discharges from Vessels</u> (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.

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 subject to a $6,000 civil penalty (California Harbors 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). The proposed Sanctuary is located partly within the following Air Pollution Control Districts (APCD): Santa Cruz County, Monterey County, and San Mateo County.

Generally, offshore oil and gas development facilities located within state waters must both obtain a permit from the appropriate APCD and meet ARB omission standards. ARB emission standards are also applicable to sources of emissions located beyond state waters that are related to an onshore facility. In essence, the permit for the onshore facility 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.

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.

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. The Commission evaluates and makes recommendations to the State Historic Preservation Officer on nominations to the National Register. The Commission also recommends state registration of sites as landmarks and points of interest to the Public Resources Department which is responsible for maintenance of registered sites (California Public Resources Code §5020.4). Registration as a point of interest is normally accompanied by the placement of informational signs. Landmarks, along with properties listed on the National Register and city or county registers or inventories, become eligible for qualified historic property status for which special protection may be

afforded (California Public Resources Code §5031). At present, no sites within the study area have been registered as either landmarks or points of interest.

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. Point Lobos Ecological Reserve, the first underwater park in the United States, was established in 1960. As described above, while the DPR manages the reserve, it is operated under the legal authority of the Fish and Game Code.

Julia Pfeiffer Burns State Park, on the other hand, is both owned and operated by the DPR. The underwater park contains 2.6 nm (4.9 km) of coastline and adjacent ocean waters and submerged lands between Partington Point and McWay Rock Falls. It is managed in conjunction with the adjacent land-based park. There are no regulations on recreational activities. Instead, visitation is controlled by a permit system; and permits are usually only given to clubs with an experienced diving master. Several other locations are currently under consideration for designation as underwater parks. These include expansions of Point Lobos and Julia Pfeiffer Burns and new parks at Ano Nuevo State Reserve,

Wilder Ranch State Park and Cannery Row.

Moss Landing Harbor District (California General Laws §5118)

The Moss Landing Harbor District was established in 1947 as a special use district of the State of California. The district has been granted title in trust to the Elkhorn Slough tidal lands and shares jurisdiction over the area with the State Lands Commission. It is authorized to regulate and monitor commerce, fisheries, and navigation within its jurisdiction.

Federal Authorities

Like State authorities, Federal programs vary greatly in approach and scope, ranging from fairly broad-based legislation for resource conservation and environmental protection (e.g., The National Environmental Policy Act and Fishery Conservation and Management Act) to regulation of specific activities and resources.

Magnuson Fishery Conservation and Management Act (MFCMA) (16 USC § 1801 et seq.) The FCMA provides for the conservation and management of all fishery resources between 3 and 200 nm (5.6 and 370 km) offshore. The National Marine Fisheries Service (NMFS) is charged with establishing guidelines for and approving fishery management plans (FMPs) prepared by regional fishery management councils for selected fisheries. These plans determine the levels of commercial and sport fishing consistent with achieving and maintaining the optimum yield of each fishery. The waters of the proposed marine sanctuary are within the jurisdiction of the Pacific Fishery Management Council (PFMC).

The PFMC has already completed a management plan for anchovy and salmon and is currently preparing plans for groundfish and jack mackerel -- all of which are found in the study area. The final northern anchovy FMP proposes several fishing area closures, none of which fall within the study area. The final implementing regulations state that commercial fishing for reduction purposes

(e.g., fish meal and oil) may only proceed in two seasons: from August 1 to January 31, and from April 1 to June 30. Nonreduction fishing may take place at any time (50 CFR §662.6).

The salmon FMP 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 restriction are established for commercial and recreational fishing.

The FMPs for groundfish and jack mackerel 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, and numerous rockfish.

Benthic continental shelf fishery resources located outside state waters, such as abalone, lobster, crabs, sea urchins, and corals, are subject to management under the MFCMA. Within Federal waters the MFCMA is enforced by the U.S. Coast Guard (USCG) and the National Marine Fisheries Service (NMFS) within the Department of

Commerce. The Act empowers the Secretary of Commerce to enter into agreements with any State agency for enforcement purposes in State waters. Such an agreement exists between the CDFG and NMFS whereby both parties have been deputized to enforce each other's laws. As a result, PFMC fishery plan enforcement personnel can now enforce State law within 3 nm (5.6km) and State officers can enforce Federal laws between 3 and 200 nm (5.6 and 370 km).

Endangered Species Act (16 USC §§1531-1543)

The Federal Endangered Species program provides protection for listed species of marine mammals, birds, and fish 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 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 attempt to engage in any such conduct" [16 USC §1532(19)]. Fish and Wildlife Service regulations interpret the term take 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 Endangered Species Act also provides for the indirect protection of endangered species and their habitat by establishing 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 Interior) ... to be critical" (16 USC §1536). Critical habitat areas for endangered species are designated by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. The 1978 amendments to the Act establish a Cabinet level committee authorized to exempt Federal agencies (through an elaborate review process) from compliance with their responsibilities in regard to critical habitats upon a finding that there are no reasonable alternatives to the action, and that its benefits outweigh the benefits of other actions consistent with conservation of the species or its critical habitat.

Several species of marine mammals found in the study area are listed as endangered or threatened species. These include: 1) sea otter, 2) grey whale, 3) fin whale, and 4) humpback whale. The blue whale, sei whale, and sperm whale, which have occasionally been sighted in the study area are also listed as endangered or threatened species.

Species of birds listed as endangered or threatened found in the study area include: 1) California brown pelican, 2) California clapper rail, 3) California least tern, 4) Southern bald eagle, and 5) American peregrine falcon 6) short tailed albatross

Marine Mammal Protection Act (MMPA) (16 USC §1361 et seq.)
The MMPA, applies to U.S. citizens in State, contiguous zone and International waters, and to foreign nationals subject to U.S. jurisdiction. It is designed to protect all species of marine mammals. While MMPA allows states to petition for the return of management responsibility over harvest of marine mammals, California has done so only with regard to the sea otter and that petition was later withdrawn.

Provisions of the Act are implemented by the Department of Commerce, National Marine Fisheries Service (NMFS), which is responsible for whales, porpoises, and pinnipeds other than sea lions and walruses, the Department Interior, and 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 "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) protection of populations determined to be "depleted".

MMPA defines "take" broadly to include "harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" [16 USC §1362 (12), 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. The MMPA allows certain exceptions to the moratorium. First, the Secretary of the Interior may make a special waiver of the moratorium on taking for particular species or populations of marine mammals provided that the species or population being considered is at or above its determined optimum sustainable population. No such waiver, however, has been granted concerning any marine mammal found in the area under consideration.

Secondly, the Act directs officials to seek "an optimum sustainable population (of marine mammals)" [16 USC §1361(6)]. Optimum Sustainable Population (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 §1362(9)].

Marine mammal species whose population is determined to be depleted receive additional protection. Except for scientific research purposes, no permit may be issued for the taking of any marine mammal determined to be depleted. Four species of marine mammals sighted within the study area (the fin whale, the southern population of sea otter, the humpback whale, and the grey whale), and three species or populations which are possible transients (the blue whale, the sperm whale, and the sei whale), are treated as

"depleted" based on their listing as endangered or threatened species under the Endangered Species Act.

The MMPA has also recently been amended to include requirments that observors be carried aboard commercial fishing vessels to determine levels of incidental take of marine mammals. Commercial fishing activites are divided into categories on the basis of gear-type and associated levels of potential incidental take of marine mammals. For example it is mandatory for Category 1 vessels such as gillnetters to always carry an observor, whereas Category 3 vessels never have to carry an observor. This observor program has only just been initiated and although the authority for its management is with the NMFS the day-to-day operational management may be delegated to state and local authorities.

Migratory Bird Treaty Act (MBTA) (16 USC §703 *et seq.*)
The essential provision of the Migratory Bird Treaty Act, which implements conventions with Great Britain and Japan makes it unlawful except as permitted by regulations "to pursue, hunt, take, capture, kill... any migratory bird, any part, nest or egg" or any product of any such bird protected by the Convention (16 USC §703). The Secretary of the Interior is charged with determining when, and to what extent, if at all, and by what means to permit these activities. Each treaty establishes a "closed season" during which no hunting is permitted. A distinction is made between game and nongame birds. The closed season for migratory birds other than

game birds is year-round. Of the birds found in the study area only certain species of ducks, geese, coots, gallinules and doves are considered game birds. As specifically permitted by the Act 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 sea, the contiguous zone, and the ocean beyond are subject to requirements of the CWA.

The CWA's chief mechanism for preventing and reducing water pollution is the National Pollutant Discharge Elimination System (NPDES), administered by the Environmental Protection Agency (EPA). Under the NPDES program, a permit is required for the discharge of any pollutant from a point source into the navigable waters of the United States, the waters of the contiguous zone, or ocean waters. Within California state waters, EPA has delegated NPDES permitting authority to the state government.

Since oil and gas development pursuant to Federal lease sales occur on the high seas, an NPDES permit from EPA is required for discharges associated with this activity. EPA generally grants NPDES permits for offshore oil and gas developments based on

published effluent guidelines (40 CFR Part 435). Other conditions beyond these guidelines may, however, be imposed by the Regional 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 and the environment (except discharges outside the territorial sea permitted by the Act to Prevent Pollution from Ships, 1987 (33 USC § 1901 et seq.). When such discharges do take place, the National Contingency Plan (NCP) for the removal of oil and hazardous substance discharges (33 USC §1321(c); EO 11735, August 3, 1973), which is designed to minimize the impacts on marine resources, takes effect.

The USCG, in cooperation with EPA, administers the National Contingency Plan (NCP) which applies to all discharges of oil in the contiguous zone and to activities conducted under the Outer Continental Shelf Lands Act (OCSLA). The latter includes oil and gas activities conducted pursuant to a lease as well as geological and geophysical explorations independent of a lease (43USC §§1337(a), 1340).

The NCP establishes the organizational framework whereby oil spills are to be cleaned up. To carry out the NCP, regional plans have been established; the USCG has issued such a plan for Federal Region IX which encompasses the study area. Under the plan, Coast Guard personnel are to investigate all reported offshore spills, notify the party responsible (if known) of its obligation to clean

up the spill, and supervise the clean-up operation. The Coast Guard 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 Coast Guard may hire private organizations.

The Clean Water Act also requires that publicly owned sewage treatment works meet effluent limitations based on effluent reductions attainable through the application of secondary treatment by July 1, 1977 [33 USC §1311(b)(1)]. EPA does have the authority, however, to waive the July 1, 1977 deadline for secondary treatment for discharges into marine waters under certain circumstances (33 USC §1311(h)). Due to the unusual depth of marine waters off the California coast, some municipal sewage treatment works in California discharging into the ocean have requested waivers from secondary treatment requirements (43 F.R. 17484 (4/25/78)). Several communities in the study area are currently discharging wastes into the ocean (see Part II, Section 2).

Permits from the Army Corps of Engineers, (COE) which are based on EPA guidelines, are required prior to the discharge of dredged materials into navigable waters of the United States (33 USC § 1344). Two sites in Monterey Bay are currently used for dredge disposal. Finally, the CWA requires vessels to comply with marine sanitation regulations issued by EPA and enforced by the USCG (33

USC § 1322).

Rivers and Harbors Act (33 USC §§ 401 et seq.)
Pursuant to the Rivers and Harbors Act, a permit must be obtained from COE prior to any construction, excavation or fill activities in navigable waters of the United States (33 USC 403). COE may refuse to issue permits on the basis of a threat to navigation or potential adverse effects on living marine resources.

Ports and Waterways Safety Act (PWSA) (33 USC §§ 1231 et seq.)
The Ports and Waterways Safety Act (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 waters and in Federal waters out to 200 miles.

The PWSA authorizes the U.S. Coast Guard to establish vessel traffic services and systems for ports, harbors, and other waters subject to congested vessel traffic. The absence of a major harbor in Monterey Bay and the resulting relatively low level of vessel traffic into and out of the Bay has precluded the need for a vessel traffic separation scheme (VTSS) or other formal regulatory mechanisms for ensuring vessel safety.

The U.S. Coast Guard provides two sets of customary vessel traffic lanes on navigational charts for vessels traversing the West coast.

One set of customary traffic lanes is an extension of the Southern VTSS for San Francisco Bay and is intended for vessels traveling north and southbound along the coast. The other is intended primarily for east-bound traffic heading to and from ports further south in California. Adherence to these lanes is strictly voluntary. The lanes merely serve as navigational aids, indicating to mariners who are unfamiliar with the area that vessel traffic historically has followed those patterns, and that the lanes have been found to be safe. In addition to vessel traffic control, the U.S. Coast Guard regulates other navigational and shipping activities. It has promulgated numerous regulations relating to vessel design, construction, and operation designed to minimize the likelihood of an accident and reduce vessel source pollution.

The 1978 amendments of the PWSA establish a comprehensive program for regulating the design, construction, operation, equipping, and banning 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.

The U.S. Coast Guard is also vested with the primary responsibility for maintaining boater safety, including the tasks of conducting routine vessel inspections and coordinating rescue operations.

Act to Prevent Pollution from Ships (APPS) (33 USC §§ 1901 et seq.) The International Convention for the Prevention of Pollution of the Sea by Oil, 1954, and the Oil Pollution Act of 1961 have been superseded by the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the 1978 Protocol relating thereto (MARPOL 73/78) and implemented by the Act to Prevent Pollution from ships, 1980, as amended in 1982, 1987. The APPS regulates discharges of oil or oily mixtures from vessels with the exception of tankers of less than than 150 gross tons and other vessels of less then 500 gross tons. Enforcement of the Act is the responsibility of the USCG.

Except for discharges from machinery space bilges, tankers subject to the Act may not discharge oil or oily mixtures unless they are 50 nautical miles from the nearest land; the total quantity of oil discharges cannot exceed one part in 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 these requirements, discharges by an 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.

The Marine Plastic Pollution Research and Control Act of 1987 (MPPRCA) (33 USC §§ 1901-1903, 1905, 1907-1909, 1912) amends the

APPS to implement Annex V of the International Convention for the Pevention of Pollution from Ships (MARPOL) in the United States. The MPPRCA prohibits dumping plastics at sea and severely restricts dumping other types of ship-generated garbage, both at sea and in the navigable waters of the United States. The Annex V provisions of the MPPRCA apply to all watercraft, including small recreational vessels.

The Federal Aviation Act of 1958 (49 USC §§1301 et. seq.)
The Federal Aviation Act of 1958 establishes the Federal Aviation Administration and gives it broad powers to promote air commerce and to regulate the use of navigable airspace to ensure aircraft safety and efficient use of such airspace. In furtherance of this mandate, the FAA publishes aeronautical charts which provide a variety of information to pilots, including the location of sensitive areas which should be avoided.

Clean Air Act (CAA) (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 for all regions within their boundaries. Thus, as noted above, discharges of air pollutants within California state waters are subject to the control of the California Air Resources Board.

Beyond state waters, in EPA Region IX, which includes the study area, EPA has asserted that the new Prevention of Sigificant Deterioration (PSD) provisions of the CAA apply to new sources on the OCS that can adversely affect air quality over the United States (EPA Office of General Counsel Opinion, April 18, 1978). These regulations would supplement Department of the Interior OCS air quality regulations. However, the U.S. Ninth Circuit Court of Appeals has held that the 1978 Amendments to the OCSLA grant the Secretary of the Interior exclusive authority to promulgate regulations for compliance with ambient air quality standards pursuant to the Clean Air Act (State of California v. Kleppe, Doc. No. 2363 (9th Cir. August 20, 1979).

Outer Continental Shelf Lands Act OSCLA (43 USC §1331 et seq.) The Outer Continental Shelf Lands Act, (OCSLA) as amended in 1978 and 1985, establishes Federal jurisdiction over the mineral resources of the Outer Continental Shelf (OCS) beyond 3 nm (5.6 km) and gives the Secretary of Interior primary responsibility for managing OCS mineral exploration and development. The Secretary's responsibility has been delegated to the Minerals Management Service (MMS).

In unique or special areas, MMS may impose special lease stipulations designed to protect specific geological and biological phenomena. These stipulations may vary among lease sale tracts and

sales. Lessees are required to include, in exploration, development and production plans, specific information concerning emission and their potential impacts on coastal areas. MMS is also charged with supervising OCS operations and enforcing regulations under its supervisory role made pursuant to OCSLA (30 CFR Part 250 and 256) and the enforcement of stipulations applicable to particular leases.

At the present time, the process for Lease sale 119 has just begun with a Call For Information from MMS on November 10, 1988. Lease Sale No. 119, covers an area from 3 to 70 miles (5 to 112km) offshore central and northern California. The Sale includes tracts off the coast of San Mateo, Santa Cruz, Monterey, and San Luis Obispo Counties. All but the tracts off San Luis Obispo County were subsequently dropped from a previous Lease Sale #53 in October 1980. It is unclear which, if any, of the tracts offered in lease sale #119 will be deleted from future consideration.

In addition to DOI, both the Army Corps of Engineers (COE) and the U.S. Coast Guard (USCG) have responsibility over OCS mineral development under the PWSA to the extent that such development affects 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]. USCG ensures that structures on the OCS are properly marked and that safe working conditions are maintained onboard [43

USC § 1333].

Title I of the Marine Protection, Research, and Sanctuaries Act (33 USC §§1401 et seq.).

Title I of the Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the Ocean Dumping Act, addresses the dumping of materials into the territorial sea, the contiguous zone and the ocean beyond. EPA regulates, through the issuance of permits, the dumping of all materials except dredged materials; COE exercises authority over dredged materials.

National Historic Preservation Act (NHPA) (16 USC §§ 470 et seq.)

The National Historic Preservation Act authorizes the Secretary of the Interior to maintain a National Register of "districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, and culture". Sites have been listed on the National Register which include or are composed entirely of ocean waters and submerged lands within state waters or on the Outer Continental Shelf.

Should any sites in the study area be listed on the National Register, any federal agency conducting, licensing, or assisting an undertaking which may affect a listed site must provide the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed action (16 USC §470f). The basic criterion applied by the Council is whether the undertaking will

change the quality of the site's historic, architectural, archeological, or cultural character (36 CFR Part 800).

Los Padres National Forest

The United States Forest Service is responsible for the management of the Los Padres National Forest. The Forest parallels the coast from Mount Carmel (near Point Sur) in the north to the Monterey County-San Luis Obispo County boundary in the south. The Forest includes two coastal areas, one encompassing Cooper Point and Pfeiffer Point at the northern boundary of the Forest and the other extending from the Lucia vicinity (near Lopez Point) to the Monterey County-San Luis Obispo County boundary.

For management purposes, the Forest is divided into several planning units. Both coastal areas of the Forest are included within the Big Sur Coastal Planning Unit. The unit as a whole is 52 sm (83 km) long and varies from 3 to 9 sm (4.8 to 14.4 km) in width. Both coastal areas also fall within the boundaries of the California Sea Otter Game Refuge. Adjoining the Planning Unit are four State Parks, including the Julia Pfeiffer Burns State Park, which is operated in conjunction with the adjacent under-water park, and two ASBSs at Julia Pfeiffer Burns Underwater Park and the ocean area surrounding the mouth of Salmon Creek (see above).

Management policies for the Big-Sur Coastal Planning Unit are described in a recently issued Land Management Plan. The Forest

Service worked closely with many governmental agencies in the formulation of the plan, including, in particular, the CDNR and CDFG, which manage areas directly adjacent to the unit. It is the intent of the plan that all management policies be implemented in harmony with affected agencies.

Specific management policies of the plan which are relevant to the study area include ensuring the protection of the Salmon Creek and Julia Pfeiffer Burns Underwater Park ASBSs prior to proceeding with any resource development, maintaining a high level of water quantity and quality, and ensuring that the management of the Planning Unit is consistent with the California Coastal Plan for the Monterey Coast.

Military Activities

The United States Army maintains an offshore restricted area extending approximately 8,000 yards offshore from its Fort Ord Military Installation. The restricted area functions as a safety buffer to protect the seagoing public from stray firearm rounds escaping from small arms firing ranges at Ford Ord. The ranges are used intermittently throughout the year. While onshore dune backstops contain most stray shots, a certain proportion reach the adjacent ocean area.

Commercial and sport boating and fishing activities are prohibited in the restricted area on days when the ranges are used. A colored

warning flag is flown onshore whenever the ranges are used. The restricted area appears on all nautical charts of the Bay, and schedules for the range are published in the Coastal Pilot. Two U.S. Army patrol boats escort mariners away from the restricted zone on practice firing days. This danger zone also is utilized for Navy mine warefare operations from February through July each year.

APPENDIX 3: ABBREVIATIONS

AMBAG - Association of Monterey Bay Area Governments

APPS - Act to Prevent Pollution from Ships (33 U.S.C. §§ 1901 *et seq.*)

ARB - Air Resources Board

ASBS - Areas of Special Biological Significance

BLM - Bureau of Land Management, Department of the Interior

CBNMS - Cordell Bank National Marine Sanctuary

CCA - California Coastal Act

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act

CDF&G - California Department of Fish and Game

CDP&R - California Department of Parks and Recreation

COE - U.S. Corps of Engineers

CWA - Clean Water Act (33 U.S.C. §§ 1251 *et seq.*)

DOD - Department of Defense

EIS - Environmental Impact Statement

EPA - Environmental Protection Agency

ESA - Endangered Species Act (16 U.S.C. §§ 1531-1543)

ESNERR - Elkhorn Slough National Estuarine Research Reserve

FAA - Federal Aviation Authority

FMP - Fishery Management Plan

FWS - Fish and Wildlife Service, Department of the Interior

GFNMS - Gulf of the Farallones National Marine Sanctuary

GGNRA - Golden Gate National Recreation Area

LRA - List of Recommended Areas

MBNMS - Monterey Bay National Marine Sanctuary

MEMD - Marine and Estuarine Management Division, NOAA, DOC, Previously the Sanctuary Programs Division (SPD)

MFCMA - Magnuson Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.)

MMS - Minerals Management Service, Department of the Interior

MMPA - Marine Mammal Protection Act (16 U.S.C. §§ 1361 et seq.)

MP - Management Plan

MPRSA - Marine Protection, Research, and Sanctuaries Act (33 U.S.C. §§ 1401 et seq. and 16 USC §§ 1431 et seq.)

NAS - National Academy of Sciences

NERR - National Estuarine Research Reserve

NMFS - National Marine Fisheries Service, NOAA, Department of Commerce

NOAA - National Oceanic and Atmospheric Administration, Department of Commerce

NPDES - National Pollutant Discharge Elimination System

NPS - National Park Service, Department of the Interior

NRP - National Research Plan (MEMD)

OCS - Outer Continental Shelf

OCSLA - Outer Continental Shelf Lands Act (43 U.S.C. §§ 1331 et seq.)

PG&E - Pacific Gas and Electric

PFMC - Pacific Fisheries Management Council

PRBO - Point Reyes Bird Observatory

PRNMS - Point Reyes-Farallon Islands National Marine Sanctuary

PRNS - Point Reyes National Seashore

RWQCB - Regional Water Quality Control Board

PWSA - Ports and Waterways Safety Act (33 U.S.C. §§ 1221 et seq.)

RFP - Request for proposals

SAC - Sanctuary Advisory Committee

SEL - Site Evaluation List

SPD - Sanctuary Programs Division, NOAA, Department of Commerce, now called Marine and Estuarine Management Division (MEMD)

SRP - Sanctuary Research Plan

SWRCB - State Water Resources Control Board

USCG - United States Coast Guard, Department of Transportation

VTSS - Vessel Traffic Separation Scheme (USCG)

WDR - Waste Discharge Requirement

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