
Fitzgerald Marine Reserve Master Plan

Final Draft

TABLE OF CONTENTS

PART ONE: THE MASTER PLAN	1
A. INTRODUCTION	1
1. Report Organization	1
2. The Fitzgerald Marine Reserve	2
3. Pillar Point Marsh	3
4. Purpose and Need for the Master Plan	7
5. History of the Reserve	10
6. Planning Process and Public Involvement	11
7. Plan Alternatives Considered	14
8. Regulatory Framework	18
9. Environmental Review Process	34
10. Review and Approval of the Master Plan	35
B. MASTER PLAN CONCEPT	37
1. Goals of the Master Plan	37
2. Master Plan Concept	37
C. NATURAL RESOURCE MANAGEMENT PROGRAM	41
D. VISITOR MANAGEMENT PROGRAM	47
E. USES AND FACILITIES PROGRAM	55
F. IMPLEMENTATION PROGRAM	65
1. Recommended Management and Operations Staff	65
2. Recommended Actions	65
3. Phasing of Implementation	72

Fitzgerald Marine Reserve Master Plan

PART ONE: THE MASTER PLAN

A. INTRODUCTION

1. Report Organization

This report is organized in two parts. The first part is a description of the proposed Master Plan for the Fitzgerald Marine Reserve and it contains goals, policies and actions to accomplish the Master Plan. The term “Reserve” as it is used in this Master Plan refers both to the area known as the Fitzgerald Marine Reserve and the newly acquired Pillar Point Marsh. The second part of the report contains detailed descriptions of existing environmental and physical conditions within the study area. The reader is encouraged to use Part Two as a reference and resource to supplement the more general information provided on the Fitzgerald Marine Reserve and Pillar Point Marsh in Part One.

In addition to Parts One and Two, the document contains the following appendices:

- C *Appendix A. Technical Advisory Committee Members.* A list of Technical Advisory Committee members is provided.
- C *Appendix B. Description of Master Plan Alternatives.* A complete description of Master Plan alternatives considered during the planning process is provided.
- C *Appendix C. Reserve Staff Responsibilities.* A description of current responsibilities of the Fitzgerald Marine Reserve staff members is provided.
- C *Appendix D. Potential Funding Sources.* This appendix contains a table identifying potential funding sources.
- C *Appendix E. List of Comments.* This appendix includes a list of persons who commented in writing or verbally at public hearings during the public review of the Draft Master Plan, with the date the comment was made.

- C *Appendix F: Summary of Comments.* This appendix includes a summary list of topics identified by comments made in letters, e-mails or public hearings, and the persons who commented on each topic.
- C *Appendix G. Copies of Comment Letters.* This appendix contains letters and e-mails submitted during the review period on the Fitzgerald Marine Reserve Draft Master Plan.

2. The Fitzgerald Marine Reserve

The James V. Fitzgerald Marine Reserve (the Reserve) is a 402-acre natural resource area on the north coast of San Mateo County. The Reserve is under joint custodianship of the County of San Mateo Parks and Recreation Division and the California Department of Fish and Game. Its regional location is shown in Figure 1.

Adjacent to the southern boundary of the town of Moss Beach, the site is approximately 7 miles north of Half Moon Bay and 15 miles south of San Francisco via Highway 1. The Reserve extends 3 miles south from Point Montara to the south end of Pillar Point and 1,000 feet west into the ocean from the mean high tide line. As shown in Figure 2, part of the Monterey Bay National Marine Sanctuary, the Reserve includes 370 acres of intertidal and subtidal marine habitat below the high tide line and 32 acres of upland coastal bluffs with elevations up to 100 feet. The intertidal zone, which contains rocky reefs at sea level and pocket beaches, is one of the most biodiverse intertidal regions in the state, renowned for its richness and diversity. Accessible at low tide, the reefs receive high levels of use because of their close proximity to the San Francisco Bay Area's dense population centers. The reefs within the Reserve form ten distinct areas, but are generally referred to as Moss Beach Reef to the north and Frenchman's Reef to the south. (For more detailed information on the intertidal zone and shoreline areas, see Part Two, Chapter D of this report.)



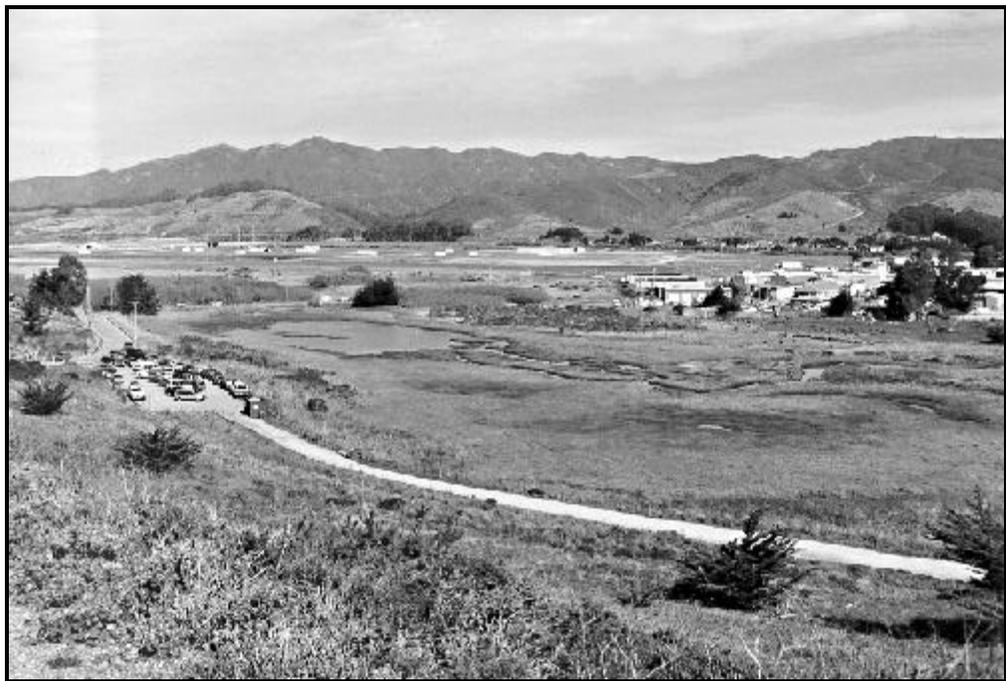
The northern uplands area of the Reserve is distinguished by a 75-year old grove of Monterey cypress, originally planted as a wind break. To the north and south of this grove, the Reserve is a broad band of shoreline with intermittent beaches and coastal bluffs.

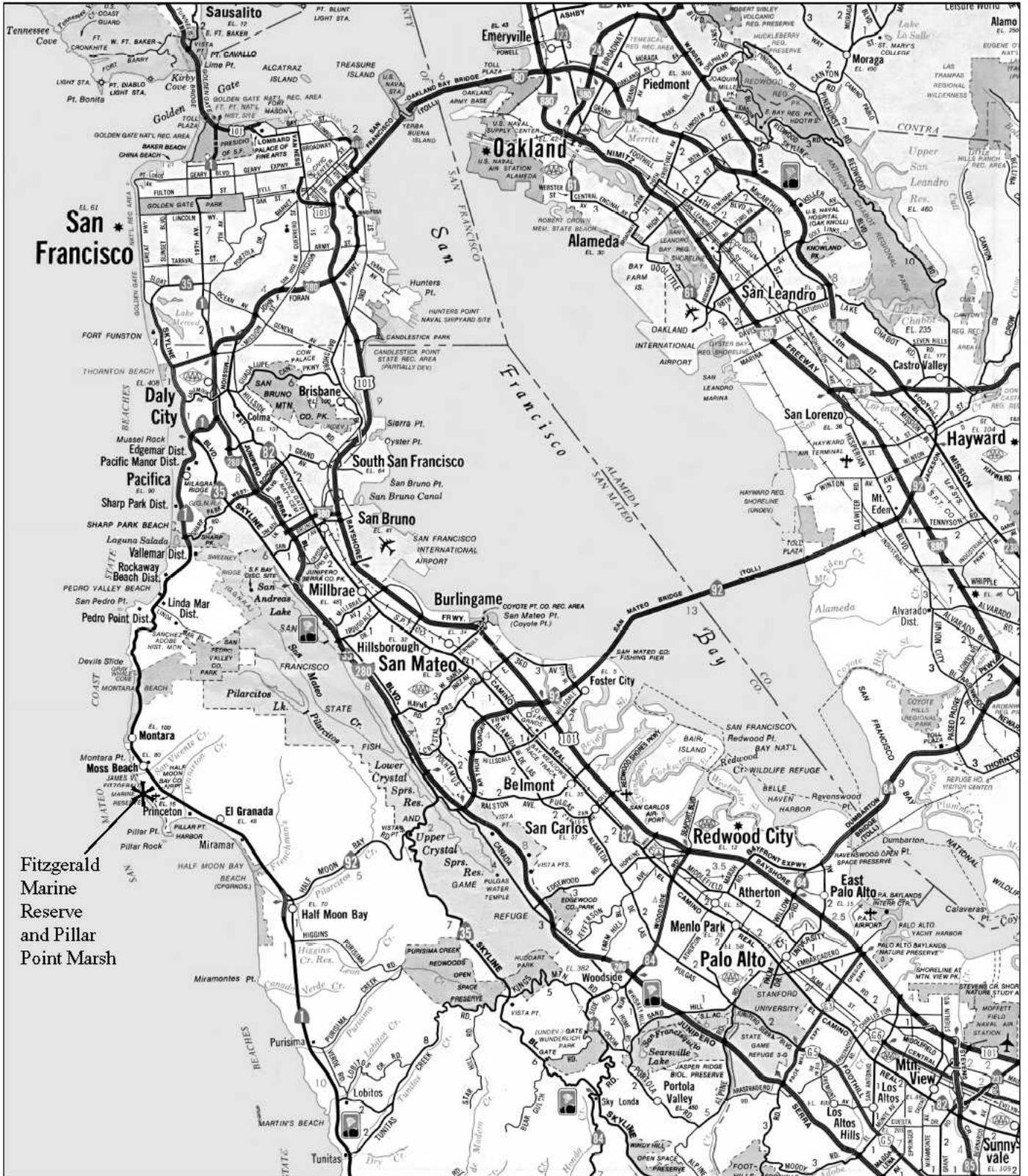


A small visitor center/office and a parking area are located on North Lake Street within the Moss Beach neighborhood, adjacent to the Moss Beach reef. The parking area can accommodate 42 cars; an unpaved parking overflow area can accommodate 20 cars or eight buses. The visitor center, a 200 square-foot building, serves as an office and interpretive center. Restroom facilities, with a total of four stalls, and picnic tables are set in a grove of Monterey cypress trees.

3. Pillar Point Marsh

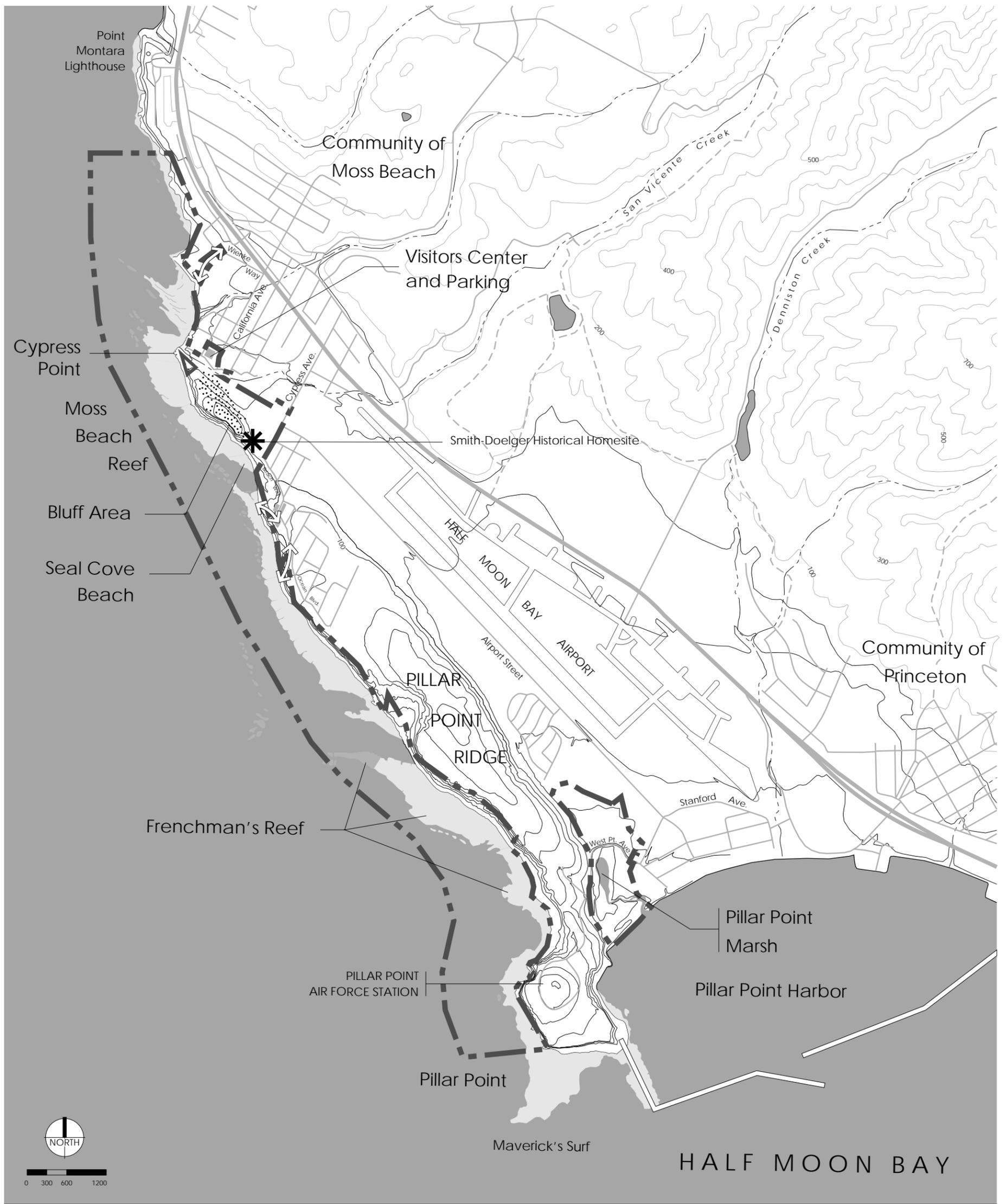
Pillar Point Marsh (Marsh) is a recent addition to the Reserve, having been acquired in 1997 with funds from the County and the State of California through the Wildlife Protection Act. As shown in Figure 2, the 41-acre Marsh is located at the south end of the Reserve, separated by the Pillar Point Ridge. The Marsh is bordered on the south by the community of Princeton and Pillar Point Harbor, and on the west by the





FITZGERALD MARINE RESERVE MASTER PLAN

Figure 1
REGIONAL LOCATION



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 2:

SITE LOCATIONS

-  Existing Trail Easements
-  Cypress Grove
-  Intertidal Zone
-  Existing Boundary, Fitzgerald Marine Reserve



U.S. Air Force radar station and an undeveloped 22-acre parcel of private land. West Point Avenue crosses the Marsh, providing access to the tracking station and Harbor District's parking lot, which receives a high level of use from surfers and other recreationists.

Pillar Point Marsh is one of the largest principal wetland/riparian areas along the San Mateo County coast. In addition to supporting a wide variety of plant and animal species, the Marsh functions as a water purifier and sediment basin. The Marsh consists of 23.5 acres of upper freshwater marsh to the northeast of West Point Avenue and 17.5 acres of lower salt marsh and beach to the southwest of the road.



4. Purpose and Need for the Master Plan

The mission of the Reserve is to preserve, protect and interpret the resources within the Reserve for the people of the State of California. The Reserve is both a "Marine Life Refuge" and an "Area of Special Biological Significance" (ASBS), designated by the State of California. The concept of "special biological significance" recognizes that certain biological communities, because of their value or fragility, deserve very special protection, consisting of preservation and maintenance of natural water quality conditions to the extent practicable. As a joint custodian of the Reserve with the California Department of Fish and Game, San Mateo County has the responsibility to manage resources within the Reserve.

The Fitzgerald Marine Reserve is an important educational resource, and is used as a primary educational site by schools in San Mateo County and surrounding areas. Visitor use plays an important role in meeting the educational mission of the Reserve. However, high levels of visitor use for education and recreation activities are also



the primary cause of the deterioration of the natural resources, especially those in the intertidal zone. Access to the Reserve is currently unrestricted, except for groups of 20 or more. Visitor use tends to be concentrated during periods of low tide on weekends, when more than 2,000 visitors per day may visit the reefs. In 1993, the peak year for visitation recorded by Reserve staff, more than 135,000 visitors came to the Reserve. Visitor use is concentrated in the northern part of the reserve at Moss Beach Reef; consequently this portion of the Reserve's intertidal zone is the most heavily impacted, as indicated by significant reductions in biodiversity and species populations. In the judgment of most scientists familiar with the Reserve, many groups of organisms are greatly under-represented or missing altogether from the intertidal biota on this reef.



There are a variety of specific human activities that impact intertidal marine life. Foremost among these are the trampling of delicate algae and invertebrates, continued illegal collection of animals, displacement of animals, and turning rocks without replacement. Fishing and abalone harvesting also remove some animals from the area, but it is not known with much certainty whether these activities have had a long-term negative impact on the eel and abalone populations.



A high degree of scientific certainty in distinguishing human impacts from natural variability is difficult to achieve due to the lack of baseline data on pre-impact conditions, which probably existed around the turn of the century. However, data from a monitoring program instituted in April 1994 indicates that in areas protected from human impact on Moss Beach Reef, biological diversity has improved.

In 1997, Pillar Point Marsh was acquired and added to the Reserve with funds from the County and the State of California through the Wildlife Preservation Act. Although the Marsh has not been well known to the general public, visitor use at the Marsh is growing. The Marsh is a destination for birders, who know the Marsh as habitat for shorebirds, waterfowl, and raptorial birds; and surfers, who come to surf the world famous Maverick's off nearby Pillar Point.

In 1997, following acquisition of Pillar Point Marsh, the County determined that a Master Plan was needed to balance the education and resource protection missions of the Reserve, to address problems of high levels of visitation on the intertidal reefs at Fitzgerald Marine Reserve, and to integrate Pillar Point Marsh into the Reserve.

5. History of the Reserve

The shoreline and bluffs of the Reserve were first visited and settled by Native Americans, as evidenced by three of the four remaining cultural resource sites. In 1769, Portola and his expedition were fed by Native Americans near Pillar Point. The landscaping at the Smith-Dolger homesite, dating back to the early 1900s, remains as the only documented historical site within the Reserve.

The shoreline and reefs within the Fitzgerald Marine Reserve have been of interest for many years to marine biologists, preservationists and collectors. At least since 1908, when the Ocean Shore Railroad was extended into the area, Moss Beach had been used extensively as a resort and by people gathering food from the reef. It has long been known to biologists and teachers as one of the best places for collecting intertidal invertebrates. As early as 1911, Dr. S. F. Light brought his zoology classes from the University of California. Due to its popularity, the resource was being depleted, and in the 1960s, San Mateo County proposed that the State of California acquire the area as a state reserve. On August 5, 1969, the Governor of California approved state legislation (Fish and Game Code, Section 10909) that identified properties to constitute a “marine life refuge” and designated these properties the “James V. Fitzgerald Marine Reserve.” At the same time legislation was approved that amended the Fish and Game Code (Section 10666) to identify those species of marine life in the Reserve that could be taken under the authority of a sport fishing license without a written permit from the Fish and Game Department.

Since its inception, the Reserve has been managed for multiple purposes, including education, research and scientific study, recreation, collecting and fishing. The County passed a resolution in 1983, urging the California Fish and Game Commission to approve Biological Reserve status for Fitzgerald Reserve. However, six attempts by the County to establish an Ecological Preserve have failed, mainly due to opposition by fishing interests.

In 1999 the California State Legislature passed Assembly Bill 993 (AB993) which recognizes the need for organization into a coherent system an existing array of marine protected areas. As a result, sections have been added to the California Fish and Game code which address these issues by outlining a program for reexamining and redefining the state’s current marine protected areas (MPA) system. An essential element of this new system is the establishment and designation of “Marine Life Reserves” (MLR). An MLR is an MPA in which all extractive activities,

Publication of the Fitzgerald Draft Master Plan in August, 1999 was followed by a public review period, which extended from September 13 to October 12, 1999. The last three public meetings/workshops and the last Technical Advisory Committee meeting were held during this public review period. During the public review period for the Fitzgerald Marine Reserve Master Plan, comments were received from members of the public, public agencies, and interested groups and organizations. These comments were received in the form of letters, e-mails, and verbal comments made at public hearings and meetings. The comments are listed in Appendix E of this report, with the commentor's name and date of comment. Issues or topics identified in the comments are summarized in Appendix F, and each comment addressing an issue or topic is identified by name and date. Copies of comment letters are included in Appendix G.

Following the public review period on the Draft Master Plan, a report entitled *Addendum to the Fitzgerald Marine Reserve Master Plan*, January 2001 was prepared to respond to general topics and issues raised in comments made during the public review of the Draft Master Plan, and where necessary to clarify or correct specific information in the Draft Master Plan. This Final Master Plan document includes those revisions made to the Draft Master Plan in response to comments or questions.

Technical Advisory Committee

The Technical Advisory Committee (TAC) was comprised of representatives of organizations and agencies with interest or jurisdiction in the Reserve. The membership list is included in Appendix A. The role of the TAC was to review information developed by the consultant team and advise on technical issues and overall direction of the study. Four meetings were held with the Technical Advisory Committee.

TAC Meeting #1, December 8, 1997. The purpose of the first meeting was to review existing conditions information that had been developed by the consultant team; to identify and prioritize issues, and to review the preliminary goals and objectives for the Master Plan. Potential themes for alternatives for the Plan were discussed.

TAC Meeting #2, February 18, 1998. The purpose of the second meeting was to review Master Plan objectives and proposed alternatives, and to provide input on key issues of concern identified by the public during public workshops.

TAC Meeting #3, November 20, 1998. The purpose of the third meeting was to review refinements made to the alternatives, to provide technical input and direction on outstanding issues, and to identify the preferred alternative.

TAC Meeting #4, August 3, 1990. The purpose of the fourth meeting was to review the Draft Master Plan, and provide comments to the County and consultant team.

Public Meetings

A series of seven public meetings were held to inform the public during the course of the Master Plan process. The meetings were open to the general public and were held in various venues in the study area. Format for the meetings included interactive workshops, with the consultant team presenting information and the public invited to participate in identifying issues and making choices regarding Master Plan objectives and alternatives.

Public Meeting #1, December 4, 1997. The first meeting was held to introduce the project team (including County staff, Reserve staff and consultant team); to review the purpose, scope, and schedule of the Master Plan process; to present existing conditions information that had been developed by the project team; and to identify and prioritize issues for the Master Plan.

Public Meeting #2, February 28, 1998. At the second meeting, issues identified by the public and the TAC were reviewed; the general objectives for the Master Plan and Master Plan alternatives were presented. Attendees were organized into small groups to provide graphic and verbal comments on the alternatives, and to rank the alternatives. Each group then presented its conclusions to the larger group. Comments and views on the objectives and the alternatives were solicited.

Public Meeting #3, May 6, 1998. Following the second meeting, the public requested additional opportunity to comment on the Master Plan alternatives. This meeting was held to clarify various approaches of the alternatives to facilities development and management of the Reserve, and to solicit comments and views on the alternatives. Issues focused on the most appropriate level of visitor use at the Moss Beach Reef, the location of visitor facilities (Education/Interpretive Center), and the relative disadvantages and benefits of each alternative.

Public Meeting #4, September 24, 1998. Based on input from meetings #2 and #3, the alternatives were reduced in number from six to three, and refined to reflect public concerns. This public workshop was held to answer previously asked technical questions on the alternatives, and to review a comparative analysis of the revised alternatives with the public.

Public Meeting #5, September 16, 1999. The purpose of this meeting was to present the Draft Master Plan and to solicit comments and questions on the document. The meeting was held by the Park and Recreation Committee of the Mid-Coast Community Council.

Public Meeting #6, September 22, 1999. A second meeting was held by the Mid-Coast Community Council to review the Draft Master Plan.

Public Meeting #7, October 7, 1999. A meeting to review the Draft Master Plan was held before the San Mateo County Parks and Recreation Commission.

Public Meeting #8, February 5, 2001. The Addendum to the Draft Master Plan was presented to the Mid-Coast Community Council Park and Recreation Committee.

Public Meeting #9, February 13, 2001. The Addendum to the Draft Master Plan was presented to the Princeton Citizens Homeowner's Association.

Public Meeting #10, February 14, 2001. The Addendum to the Draft Master Plan was presented to the Mid-Coast Community Council.

Public Meeting #11, March 13, 2001. The Addendum to the Draft Master Plan was presented to the Friends of Fitzgerald Marine Reserve.

Public Meeting #12, April 24, 2001. The San Mateo County Parks and Recreation Commission reviewed the Addendum to the Draft Master Plan, and recommended to the Board of Supervisors that: 1) the Draft Fitzgerald Marine Reserve Master Plan be conceptually approved, and 2) the County Parks Division be directed to proceed with environmental review so that the Final Master Plan could be adopted.

Public Meeting #13, June 19, 2001. The San Mateo County Board of Supervisors approved conceptually with revisions the Draft Fitzgerald Marine Reserve Master Plan, and directed staff to proceed with environmental review.

7. Master Plan Alternatives Considered

Initially a series of six alternative approaches to the Master Plan were developed. The purpose of these alternatives was to test the feasibility and effectiveness of various levels of management and facilities development. The initial set of six alternatives were distinguished primarily by location of visitor facilities (the existing Moss Beach site, a new Cypress Avenue site, or a new Pillar Point Marsh site); carrying capacity on the reef; and limitations on uses allowed in the Reserve. These alternatives were subjected to technical analysis by the consultant team and the TAC, and were reviewed by the public. Information provided to the public and the TAC on the initial set of six alternatives is contained in Appendix B in this report.

Based on input from the public and the TAC, the alternatives were narrowed to three. The location of these three alternatives is shown in Figure 3. The first of these, the Moss Beach alternative, proposed locating visitor facilities at the existing

Moss Beach site, and providing minimal facilities development at the Pillar Point location. The second, the Cypress alternative, proposed locating visitor facilities at the Cypress site, and the third proposed development of visitor facilities at the Pillar Point Marsh site. Management activities varied for each of the alternatives, depending on the location of the visitor facilities.

After careful consideration of input from the public and the Technical Advisory Committee, and environmental impacts of the alternatives on natural resources and on residents surrounding the Reserve, the Moss Beach alternative was selected for further refinement and review. The Moss Beach alternative was chosen as the alternative that: 1) would meet project objectives with the lowest level of environmental impact on natural resources; 2) would result in the lowest cost for infrastructure and upgrading of facilities; 3) would have the least impact on residents in the vicinity of the Reserve; and 4) would provide the best opportunities for management at the most impacted site. The Moss Beach alternative has been refined as the proposed Master Plan described in this Draft Master Plan report, which will be reviewed by the Technical Advisory Committee, the Mid-Coast Coordinating Council, the San Mateo County Parks and Recreation Commission, the San Mateo County Board of Supervisors, and the public.



8. Regulatory Framework

This section describes the policies and guidelines that apply to the Fitzgerald Marine Reserve and Pillar Point Marsh, the agencies which have jurisdiction, and the permits and review required for approval and implementation of the Master Plan. The following policies and guidelines have been taken into consideration in the planning process and development of the Master Plan. Table 1-1 summarizes the role and responsibilities of agencies with jurisdiction or interest in Fitzgerald.

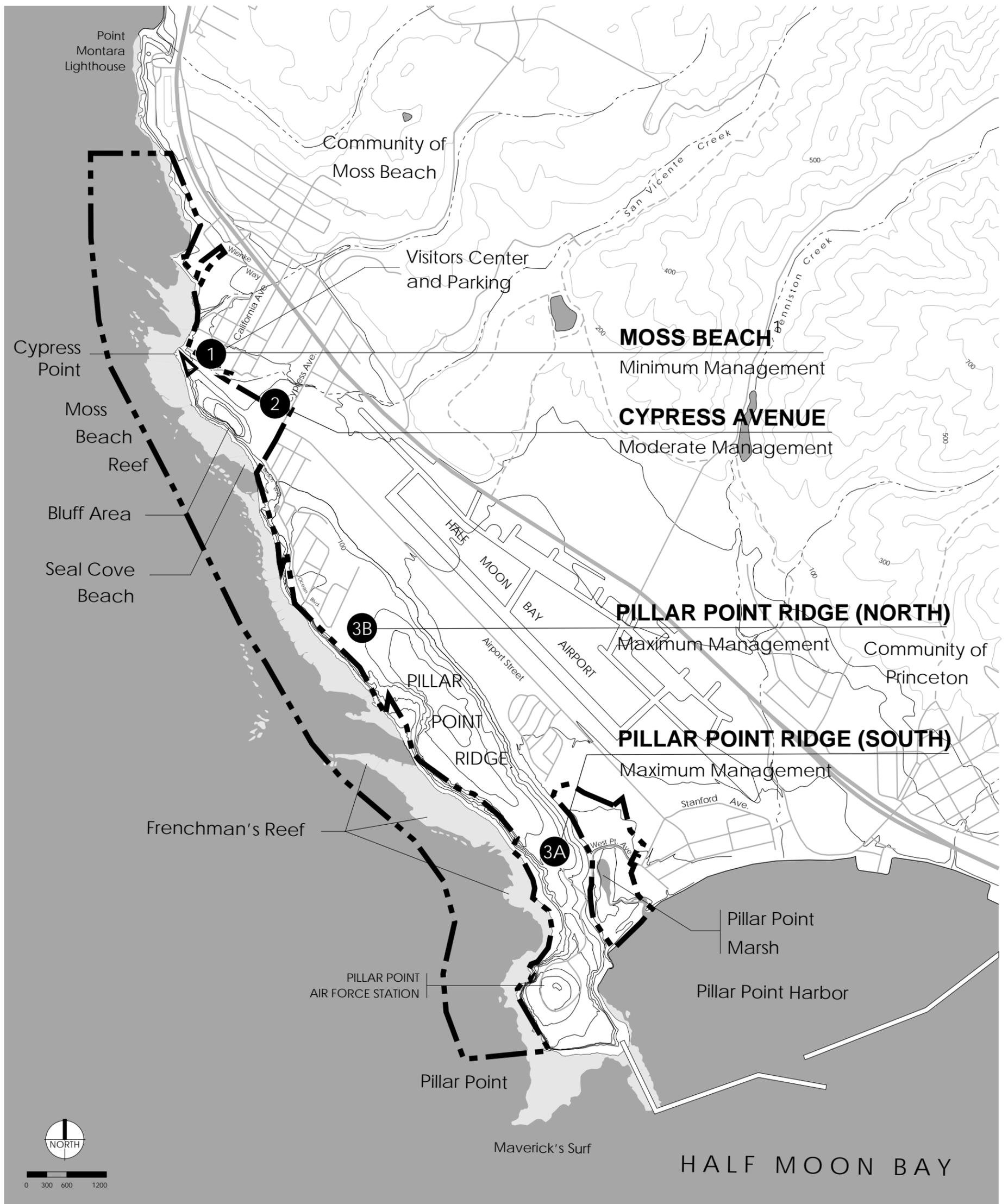
The Reserve below the average high tide is under the jurisdiction of the Monterey Bay National Marine Sanctuary and the Gulf of Farallones National Marine Sanctuary¹ and is classified as a Marine Life Refuge under the State Water Resources Control Board's designation as an Area of Special Biological Significance. The California Department of Fish and Game has management responsibility over waters below the average high tide line, and the County of San Mateo has management responsibility over areas above high tide line. The area above the average high tide is currently classified as a County Park. Any limitations beyond those in place for marine life refuges (described in Section 8.a.1, below) on access or fishing and gathering activities within the tidal zone or coastal waters would require approval of several entities, including the County Park and Recreation Commission, the County Board of Supervisors, and the California Department of Fish and Game. The County would coordinate with the Department of Fish and Game to implement such limitations.

a. Applicable Policies and Guidelines.

(1) Marine Life Refuge Regulations. As a State-designated marine life refuge, the California Department of Fish and Game is the primary agency responsible for management of Fitzgerald. The County of San Mateo has accepted responsibility for day-to-day operations and management of the Reserve.

California Department of Fish and Game regulations for Marine Life Refuges include the following:

¹ When the Monterey Bay National Marine Sanctuary (MBNMS) was formed in 1992, San Mateo County successfully lobbied for inclusion in the sanctuary in order to protect the San Mateo County coast. The Gulf of the Farallones National Marine Sanctuary (GFNMS) was already in existence and an agreement was struck between the National Marine Sanctuaries for joint management of the San Mateo County coast. The two National Marine Sanctuaries have jointly shared responsibility for the San Mateo County coast to this time.



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 3:

ALTERNATIVES

1. Alternatives 4A and 4B would consist of the existing Moss Beach visitor facilities in conjunction with new facilities at alternative locations 3A or 3B, and maximum management.

--- Existing Boundary, Fitzgerald Marine Reserve

**Table 1-1
AGENCIES WITH RESPONSIBILITY AND/OR JURISDICTION IN FITZGERALD MARINE RESERVE**

Agency	Jurisdiction	Programs/Responsibilities/Regulations
Golden Gate National Recreation Area (GGNRA)	As part of the U.S. National Park System, GGNRA is the largest urban national park in the world. The total park area is 74,000 acres of land and water. Approximately 28 miles of coastline lie within its boundaries. Portions of FMR are within the legislative boundary of the GGNRA.	GGNRA includes Alcatraz, Marin Headlands, Fort Funston, Fort Mason, as well as Muir Woods National Monument, Fort Point National Historic Site, and the Presidio of San Francisco, and provides natural, cultural, and military history and information for each area.
Gulf of the Farallones National Marine Sanctuary (GFNMS)	Co-manage with MBNMS the area of the MBNMS north of the San Mateo/Santa Cruz County line.	<p>GFNMS has the lead responsibility for the oversight of the following programs: Acoustic Thermometry of Ocean Climate (ATOC), oil spills, beach watch, intertidal monitoring, Sanctuary Education Awareness and Long Term Stewardship (SEALS), Half Moon Bay Harbor, and educational outreach efforts at the Fitzgerald Marine Reserve.</p> <p>Managers of the GFNMS & MBNMS agree to other education research in the northern area in addition to FMR on a case-by-case basis.</p>
Monterey Bay National Marine Sanctuary (MBNMS)	The sanctuary boundary extends from Rocky Point in Marin County in the north to Cambria in San Luis Obispo to the south, encompassing 300 miles of shoreline and 5,322 square miles of ocean.	<p>Provides education, outreach, and research.</p> <p>Involved in resource protection efforts through a Water Quality Protection Plan, which addresses urban stormwater runoff, regional monitoring, harbors and marinas, and agricultural and rural lands.</p> <p>Maintains a Sanctuary Advisory Council, which provides the opportunity for public participation in decisions affecting the Sanctuary.</p> <p>Involved in research projects, including kelp harvesting, desalinization plants, and invasive species.</p> <p>Involved in negotiations with the shipping industry regarding diversion offshore oil tanker routes to avert disasters to the San Mateo County coast as a result of an oil spill.</p>

Table 1-1 *continued*

Agency	Jurisdiction	Programs/Responsibilities/Regulations
National Marine Fisheries Service (NMFS)	Marine fisheries nationwide.	NMFS administers NOAA's programs which support the domestic and international conservation and management of living marine resources. NMFS provides services and products to support domestic and international fisheries management operations, fisheries development, trade and industry assistance activities, enforcement, protected species and habitat conservation operations, and the scientific and technical aspects of NOAA's marine fisheries program. In June 2000 the NMFS adopted a rule prohibiting the "take" of 14 groups of salmon and steelhead listed as threatened under the Endangered Species Act (ESA). This rule protects 14 Evolutionarily Significant Units (ESUs) of salmon and steelhead, which includes San Mateo County. San Vicente Creek provided steelhead and salmon habitat in the past.
U.S. Army Corps of Engineers	The scope of jurisdiction in the San Francisco district (Oregon border to south of Monterey) includes: tidelands, coastal wetlands, freshwater wetlands, freshwater swamps and marshes, and riparian corridors.	The San Francisco District's regulatory branch is concerned with regulating development to conform to applicable environmental standards. Permits are required for any development activities which results in discharge of dredged or fill material into waterbodies, deposition of dredged material into ocean waters, obstruction or alteration of navigable waters.
U.S. Fish and Wildlife	The service manages the 93-million acre National Wildlife Refuge System which encompasses 525 national wildlife refuges, thousands of small wetlands and other special management areas. It also operates 66 national fish hatcheries, 64 fishery resource offices and 78 ecological services field stations.	The agency enforces wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state and wildlife agencies. In September 2000, the U.S. Fish and Wildlife Service designated critical habitat pursuant to the Endangered Species Act of 1973, as amended, for the California red-legged frog (<i>Rana aurora draytonii</i>). Habitat areas included Unit 14 consists of coastal watersheds within San Mateo County and Northern Santa Cruz County that drain into the Pacific Ocean, which by definition, includes the Reserve.

Table 1-1 *continued*

Agency	Jurisdiction	Programs/Responsibilities/Regulations
California Coastal Commission	The CCC has authority over federal activities or federally licensed or assisted activities in the California coastal zone other than the San Francisco Bay. The coastal zone (a specifically mapped area established by the Legislature, which is larger than the State of Rhode Island) extends three miles seaward and generally about 1,000 yards inland.	The CCC is the lead agency responsible for carrying out California's coastal management program. The CCC plans and regulates development in the coastal zone consistent with the policies of the California Coastal Act. The policies of the Coastal Act deal with public access to the coast, coastal recreation, the marine environment, coastal land resources, and coastal development of various types, including energy facilities ports, and other industrial development. In order to carry out the policies of the Coastal Act, each of the 73 cities and counties in the coastal zone is required to prepare a local coastal program (LCP) for the portion of its jurisdiction within the coastal zone and to submit the LCP to the Commission for certification.
California State Lands Commission	State lands from mean low water extending seaward.	Reviews applications for use or lease of State lands.
California Department of Fish and Game	<p>DFG is concerned with any work that occurs in the area of a stream course and associated riparian zone.</p> <ul style="list-style-type: none"> • responsibility for ESA; wetlands • determines the State designation of Reserve; • enforcement against illegal activities below high tide; • joint custodians of Fitzgerald Marine Reserve with San Mateo County. 	DFG requires a Streambed Alteration Agreement (SAA) for projects that will divert or obstruct the natural flow of water, change the bed, channel or bank of any stream, or propose to use any material from a streambed.
California Academy of Sciences	N/A	<p>Systematic biology is the focus of the Academy's research. Staff conducts original research, develops and maintain collections, and is directly involved in all educational and outreach activities of the institution. The research department of Aquatic Biology has addressed industrial problems and concerns of state and federal agencies which have resulted in legislation.</p> <p>Studies are performed by research associates and other outside scientists, with support from grants or by funds from their home institutions, and by Academy staff.</p>

Table 1-1 *continued*

Agency	Jurisdiction	Programs/Responsibilities/Regulations
Central California Coast International Biosphere Reserve	The Central California Coast Biosphere Reserve is an association of 13 management units encompassing terrestrial, coastal, and marine environments. The FMR is within the CCCBR.	The CCCBR is part of the Man and the Biosphere Program (MAB) of the United Nations Scientific, Educational, and Cultural Organization (UNESCO). Functionally, BRs implement the MAB concept through: in situ conservation of the diversity of natural and semi-natural ecosystems and landscapes, establishment of demonstration areas for ecologically sustainable land and resource use, provision of logistic support for research, monitoring, education, and training related to conservation and sustainable development.
State Water Resources Control Board	Has jurisdiction over water resources for the state of California and over Areas of Special Biological Significance (ASBS), including Fitzgerald. (See also San Francisco Regional Water Resources Control Board.)	The mission of the SWRCB is to ensure the highest reasonable quality of waters of the state, while allocating those waters to achieve the optimum balance of beneficial uses. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's waters. Responsible for maintenance of water quality in ASBS.
San Francisco Regional Water Quality Control Board	Has jurisdiction over the water resources of all or parts of Alameda, Contra Costa, Napa, San Mateo, Santa Clara, San Francisco, and Solano counties.	Regulate activities or discharges which potentially affect California's surface, coastal, or ground waters within their district. The mission of the RWQCB is to develop and enforce water quality objectives and implementation plans which will best protect the beneficial uses of the State's waters, recognizing local differences in climate, topography, geology and hydrology. Regional Boards develop "basin plans" for their hydrologic areas, issue waste discharge requirements, take enforcement action against violators, and monitor water quality. San Mateo County Parks participates in countywide Stormwater Pollution Prevention Program (STWPPP).

Table 1-1 *continued*

Agency	Jurisdiction	Programs/Responsibilities/Regulations
San Mateo County Departments and Offices		
Board of Supervisors	San Mateo County	General responsibility for land use decisions. Changes in Reserve status, limitations or prohibitions on access, fishing or gathering, land acquisition and any recommended infrastructure improvements or parking restrictions in the area surrounding the Fitzgerald Marine Reserve or Pillar Point Marsh will require approval of the Board of Supervisors.
San Mateo County Planning Commission	The Planning Commission is established by County ordinance to review the County General Plans, Local Coastal Program and various development regulations and make recommendations on their adoption or amendment by the County Board of Supervisors. The Commission is also charged with reviewing and acting upon various development permits issued by the County.	Will review environmental assessment of Master Plan and conformance with General Plan and Local Coastal Program before Board of Supervisors approves Master Plan. The Planning Commission will consider Coastal Development Permits, required for any project that implements goals of Master Plan.
Parks and Recreation Division	All parks and recreation areas within San Mateo County Park system. Joint custodians of Fitzgerald Marine Reserve with California Department of Fish and Game. Lead agency managing the Fitzgerald Marine Reserve and Pillar Point Marsh. The Parks Dept. has jurisdiction over activities within the Reserve to the high tide line, and for the Pillar Point Marsh.	The Parks and Recreation Division provides residents, visitors and organized user groups access to recreation areas in parks by managing resources, sustaining historic preservation, protecting and enhancing wildlife and habitats, and ensuring safe, well maintained facilities.
Public Works Department	Manages County roadways, sidewalks, channels, and storm drains. Manages the Half Moon Bay Airport, which drains into the Pillar Point Marsh.	Responsible for the infrastructure and maintenance of County roadways, sidewalks, channels, and storm drains.
Planning and Building Division	Supervises unincorporated County areas.	Reviews all new development projects in unincorporated County areas, which includes the entire areas surrounding the Fitzgerald Marine Reserve and Pillar Point Marsh.
Sheriff's Department	Lead law enforcement agency in unincorporated County areas including the areas surrounding the Fitzgerald Marine Reserve, and Pillar Point Marsh.	Works in cooperation with the CHP, enforcing speed limits along Highway 1. Would be responsible for enforcing parking restrictions should they be proposed in the project area.

Table 1-1 *continued*

Agency	Jurisdiction	Programs/Responsibilities/Regulations
Environmental Health Division	Supervise public health prevention activities and hazardous waste materials for the County.	<p>Manages a wide variety of core public health prevention activities for food, housing, vector control, water, land use and recreational facilities including inspections, permits, and enforcement activities.</p> <p>Manages monitoring and inspection services for hazardous materials and hazardous waste generation, emergency response, underground fuel tanks, and solid and infectious wastes.</p> <p>Responsible for notifying the public regarding unsafe water quality conditions at the Fitzgerald Marine Reserve when conditions are warranted.</p>
Agricultural Commissioner	Administers agricultural laws and regulations within the county.	<p>The AC enforces agricultural and weights and measures laws and regulations to prevent the introduction or establishment of economically harmful pests, protect the health and safety of agricultural workers and the public, safeguard the environment, and protect the consumer from fraud and deception.</p> <p>The AC regulates the application of pesticides, herbicides, fungicides, on agricultural lands within the San Vicente and Denniston Creek watersheds, which drain into the Fitzgerald Marine Reserve and Pillar Point Marsh.</p>
Resource Conservation District	Conservation of soil, water and related resources in San Mateo County.	The RCD provides technical, financial and educational resources to local land users and communities.
Montara Sanitary District	Provision of sanitary service within service district.	The District provides and maintains sanitary sewer collection and treatment service.

General: **Commercial and Recreational:**
Except under a permit or specific authorization, it is unlawful: (f) to take or possess any invertebrate or specimen of marine plant life in a marine life refuge. (Fish and Game Code 10500)

Commercial:
To 1,000 feet offshore, no mollusks, crustaceans or other invertebrates may be taken. (14 California Code of Regulations 123 (d)) Due to permit exemption, lobster, abalone, and crab may be taken. (14 California Code of Regulations 123 (d))

Site Specific: **Commercial and Recreational**
The following fish, mollusks, and crustaceans may be taken under the authority of a sportfishing license, as authorized by this code: Rockfish (*Sebastes*), lingcod surfperch (*Embiotocidae*), monkeyface eel, rock eel, white croaker, halibut, cabezon (*Scorpaenichthys marmoratus*), kept greenling (*Hexagrammos decagrammus*), and smelt (*Osmeridae* and *Antherinidae*). No such fish having fins may be taken, except by hook-and-line or by spearfishing. All other fish and forms of aquatic life are protected and may not be taken without a special permit from the CDFG (Fish and Game Code 10666).

Kelp Harvest: The Monterey Bay National Marine Sanctuary (MBNMS) has proposed the following regulations to limit kelp harvest, which are being considered by the California Department of Fish and Game.

Recreational:
Prohibited. Marine aquatic plants may not be cut or harvested in marine life refuges (14 California Code of Regulations 30.00) Moreover, except under a permit or specific regulations, it is unlawful: (f) to take or possess any invertebrate or specimen of marine plant life in a marine life refuge. (Fish and Game Code 10500).

Commercial:
Prohibited, except under a permit or specific authorization, it is unlawful: (f) To take or possess any invertebrate or specimen of marine plant life in a marine life refuge. (Fish and Game Code 10500).

In 1974, Fitzgerald was also designated as an “Area of Special Biological Significance” (ASBS) by the State Water Resources Control Board. General regulations accompany the ASBS designation; however, there are no recreational or commercial

fishing or kelp harvesting regulations. In May 1997 the California Department of Fish and Game prohibited both commercial and recreational fishing for all abalone species south of San Francisco.

(2) Local Coastal Program (LCP). The LCP is the applicable General Plan for development within the Coastal Zone of San Mateo County, where the Reserve and Marsh are located, and applies to all areas located above high-tide. Through the LCP, San Mateo County assumes responsibility for implementing the State Coastal Act administered by the California Coastal Commission. All development in the Coastal Zone requires a Coastal Development Permit or a certificate of exemption. The Reserve is considered “Sensitive Habitat” under the LCP. Applicable policies and guidelines include:

Sensitive Habitats:

- *7.3 Protection of Sensitive Habitats: (a) Prohibit any land use or development which would have significant adverse impact on sensitive habitat areas; (b) Development in areas adjacent to sensitive habitats shall be sited and designed to prevent impacts that could significantly degrade the sensitive habitats. All uses shall be compatible with the maintenance of biologic productivity of the habitats.*
- *7.4 Permitted Uses in Sensitive Habitats: (a) Permit only resource dependent uses in sensitive habitats. Resource dependent uses for riparian corridors, wetlands, marine habitats, sand dunes, sea cliffs and habitats supporting rare, endangered, and unique species shall be the uses permitted in Policies 7.9, 7.16, 7.23, 7.26, 7.30, 7.33, and 7.44, respectively, of the County Local Coastal Program on March 25, 1986; (b) In sensitive habitats, require that all permitted uses comply with U.S. Fish and Wildlife and State Department of Fish and Game regulations.*
- *7.15 Designation of Wetlands: (a) Designate the following as wetlands requiring protection: Pescadero Marsh, Pillar Point Marsh, marshy areas at Tunitas Creek, San Gregorio Creek and Gazos Creek, and any other wetland meeting the definition in Policy 7.14; (b) At the time a development application is submitted, consider modifying the boundary of Pillar Point Marsh if a report by a qualified professional, selected jointly by the County and the applicant, can demonstrate that land within the boundary does not meet the definition of wetland.*
- *7.23 Permitted Uses in Marine and Estuarine Habitats: In marine and estuarine habitats, permit only the following uses: (1) nature education and research; (2) consumptive uses as provided for in the Fish and Game Code and Title 14 of the California Administrative Code; (3) fishing; and (4) fish and wildlife management.*

- *7.33 Rare and Endangered Species Permitted Uses: (a) Permit only the following uses: (1) education and research, (2) hunting, fishing, pedestrian and equestrian trails that have no adverse impact on the species or its habitat, and (3) fish and wildlife management to restore damaged habitats and to protect and encourage the survival of rare and endangered species; (b) If the critical habitat has been identified by the Federal Office of Endangered Species, permit only those uses deemed compatible by the U.S. Fish and Wildlife Service in accordance with the provisions of the Endangered Species Act of 1973, as amended, meet the definition of wetland.*
- *7.5 Permit Conditions: (a) As part of the development review process, require the applicant to demonstrate that there will be no significant impact on sensitive habitats. When it is determined that significant impacts may occur, require the applicant to provide a report prepared by a qualified professional which provides: (1) mitigation measures which protect resources and comply with the policies of the Shoreline Access, Recreation/Visitor-Serving Facilities and Sensitive Habitats Components; and (2) a program for monitoring and evaluating the effectiveness of mitigation measures. Develop an appropriate program to inspect the adequacy of the applicant's mitigation measures: (b) When applicable, require as a condition of permit approval the restoration of damaged habitat(s) when in the judgment of the Planning Director restoration is partially or wholly feasible.*

Visual Resources:

- *8.4 Cliffs and Bluffs: (a) Prohibit development on bluff faces except public access stairways where deemed necessary and erosion control structures which are in conformity with coastal policies on access and erosion; (b) Set back bluff top development and landscaping from the bluff edge (i.e., decks, patios, structures, trees, shrubs, etc.) sufficiently far to ensure it is not visually obtrusive when viewed from the shoreline except in highly developed areas where adjoining development is nearer the bluff edge, or in special cases where a public facility is required to serve the public safety, health, and welfare.*
- *8.5 Location of Development:*
 - (a) *Require that new development be located on a portion of a parcel where the development: (1) is least visible from State and County Scenic Roads; (2) is least likely to significantly impact views from public viewpoints; and (3) is consistent with all other LCP requirements, best preserves the visual and open space qualities of the parcel overall. Where conflict in complying with this requirement occur, resolve them in a manner which on balance most protects significant coastal resources on the parcel, consistent with Coastal Act Section 30007.5.*

Public viewpoints include, but are not limited to, coastal roads, roadside rests and vista points, recreation areas, trails, coastal accessways and beaches.

This provision does not apply to enlargement of existing structures, provided that the size of the structure after enlargement does not exceed 150 percent of the pre-existing floor area, or 2,000 square feet, whichever is greater.

This provision does not apply to agricultural development to the extent that application of the provision would impair any agricultural use or operation on the parcel. In such cases, agricultural development shall use appropriate building materials, colors, landscaping and screening to eliminate or minimize the visual impact of the development.

- (b) Require, including by clustering if necessary, that new parcels have building sites that are not visible from State and County scenic roads and will not significantly impact views from other public viewpoints. If the entire property being subdivided is visible from State and County scenic roads or other public viewpoints, then require that new parcels have building sites that minimize visibility from those roads and other public viewpoints.*
- *8.6 Streams, Wetlands and Estuaries: (d) Retain wetlands intact except for public access ways designed to respect the visual and ecological fragility of the area and adjacent land.*

Shoreline Access Component:

- *10.9. Public Safety: (a) Provide safe access to the following shoreline destinations which are large enough to accommodate public safety improvements and public use: (1) beaches which are large enough to provide space for easy retreat from normal tidal action, (2) bluffs which are large enough and of a physical character to accommodate safety improvements and which provide room for public use as a vista point, and (3) beaches and bluffs designated appropriate for public use in the Site Specific Recommendations for Shoreline Destinations (Table 10.6).*
- *10.10 Fragile Resources (Sensitive Habitats): (a) Require the establishment of public access to sensitive habitats or their buffer zones, through grants or dedications of easements or other means, at the time a Coastal Development Permit is processed. Open the access in sensitive habitats or their buffer zones for public use only when development standards and management practices are adequate to protect the resources (see Sensitive Habitats Component and Policies 10.23 and 10.25); (b) Discourage public use of existing established access trails if the present level of use is causing the deterioration of a sensitive habitat. Specifically: (1) Close such trails*

when an existing or potential alternative trail is available for the same beach or bluff area; (2) When no alternative is available, mitigate the access impact through improved management and design consistent with Policies 10.25 and 10.26, wherever possible. Close trails only if permanent, irreversible damage to a habitat is causing its destruction; (3) Where a trail to the beach is closed, provide a bluff top access point or trail for public viewing of the shoreline consistent with Policy 10.9(a); (4) Prohibit development that would prevent the future provision of improved access; (5) Allow closely monitored access for scientific and educational research by organized study groups.

- *10.14 Military Sites: Encourage the establishment and improvement of vertical (trails) and lateral (shoreline destinations) public access in military facilities when not used for high security activities.*
- *10.17 Minimum Development Standards for Lateral Access (Shoreline Destinations) with Coastal Bluffs: (a) Provide access for the general public between the mean high tide line and the base of the bluff where there is adequate room for public use; (b) Because of scenic or recreational value, provide a pathway with a right-of-way at least 25 feet in width, which allows feasible unobstructed public access along the top of the bluff when no public access will be provided to the area between the mean high tide line and the base of the bluff because of safety and/or other considerations, and/or when the Site Specific Recommendations for Shoreline Destinations (Table 10.6) requires one; (c) Require bluff top setbacks, based upon site specific geologic and erosion conditions, to ensure safe and continued use.*
- *10.37 Fitzgerald Marine Reserve: Continue to provide for the improvement, expansion, and maintenance of access to the Fitzgerald Marine Reserve according to Table 10.6, Site Specific Recommendations. Accept dedications of access easements or fee interests which provide access to or expand the size of the Reserve.*

Table 10.6: Site Specific Recommendations for Shoreline Destinations:

- *Fitzgerald Marine Reserve: Develop access along the bluffs and to the beaches of the Fitzgerald Marine Reserve in stages as public funding is available to adequately improve and manage the access and protect the resources. The access should be oriented to education and nature viewing and interpretation, particularly in the northern and central sections (special consideration).*
- *Fitzgerald Marine Reserve: Begin improvements and acquisitions for access in the northern section of the Reserve and focus on improvement of the established access point at North Lake Street and bluffs above the beaches (special consideration).*

-
- *Beach between Reef Point Road and North Lake Street: Expand the permanent exhibit to more thoroughly instruct the public on the special qualities of the reserve and how their behavior can damage this resource; Distribute brochures describing in greater detail the marine life of the Reserve; Schedule tours for the general public; Develop parking for bicycles.*
 - *Bluff Area North Lake Street to Cypress Avenue: Consolidate trails into several established trails along the bluff connecting with viewpoints and an eventual continuous trail along the bluff above the Fitzgerald Marine Reserve; Develop educational displays at viewpoints along the trail. Encourage establishment of the Marine Biological Exhibit Center; Pave sections, at least of trails for wheelchair accessibility. Provide designated disabled parking spaces near the trailhead.*
 - *Bluff Parallel to Vallemar Street: Develop an interpretive trail along the bluff parallel to Vallemar Street; Access to the beaches, with priority given to the beach at the end of Wienke Way, could be improved at a later stage than the bluff trail. Some provision to either close off the beaches or sign the trails should be provided at the time the bluff trail is improved to protect public safety and the beaches' natural resources; Develop access parking on the vacant lot at the corner of Vallemar Street and Juliana Avenue, including bicycle parking; Sign and improve access to the bluff from the end of Juliana Avenue and Wienke Way. This will be the major public access to the bluff. The other trails along Vallemar Street should remain open, however.*
 - *Reef Point Road and Arbor Way Viewpoint: Develop the existing access easement along Reef Point Road to connect via Wienke Way with the path along the bluff parallel to Vallemar Street; Improve the existing scenic easement at the end of Arbor Way as a viewpoint; Build a staircase, though it could be delayed to a later stage, to provide access to the beach between Reef Point Road and North Lake Street and a connection for a continuous trail from the north which would cross this beach and continue along the bluff at North Lake Street;*
 - *Beach and Bluff North of the Pillar Point Radar Station: Acquire and improve the access trail from the Radar Station Road to the beach as shown in the County Parks and Recreation Division Concept Plan; Develop a trail along the bluff linking to the beach trail and leading north to Moss Beach.*
 - *Beach and Bluff North of the Pillar Point Radar Station: Undertake the second phase of acquisition and improvements for access to the Reserve in the southern section near Pillar Point. The trail to the beach should be the first priority for improvement; the bluff trail could be developed later (special consideration).*
-

- *Beaches in the Central Section of the Fitzgerald Marine Reserve: Develop beach access parking on undeveloped land; Establish a trail along the bluff to connect these beaches to and complete a continuous trail through the Reserve;*
- *Beaches in the Central Section of the Fitzgerald Marine Reserve: Acquire and improve access to the beaches in the central section as the final stage of establishing access to the Reserve. Access should be improved to the northern beach as the first priority, and the southern beaches as use of other Reserve beaches increases and funds become available (special considerations);*
- *Pillar Point Harbor-South and East Areas of Pillar Point: Establish access trails to allow viewing of, but not intrusion, into the marsh; Develop an entrance to the expanded Reserve as shown in the Department of Parks area and distribute brochures describing sensitive marsh and tidepool habitats at the entrance; Tours should eventually be established. Before they are, tour groups should be directed to tours at the North Lake Street entrance; Develop parking for the disabled and bicycles; Provide a paved trail for wheelchair access to the beach from the parking lot.*

Recreation/Visitor Serving Facilities:

- *11.4 Recreation and Visitor Serving Facilities Permitted in the Coastal Zone: Permit the following facilities in the Coastal Zone: (1) necessary visitor serving facilities as defined in Policy 11.1, and (2) commercial recreation and public recreation facilities which (a) are designed to enhance public opportunities for coastal recreation, (b) do not substantially alter the natural environment...*
- *11.9 Ocean Front Land in Urban and Rural Areas: (b) Permit facilities which require or are enhanced by an ocean front site to locate adjacent to the shoreline. Require the facilities: (1) comply with Sensitive Habitats Component Policies, (2) not substantially alter the natural environment through the removal of vegetation or alteration of the natural topography, (3) not require structures which obstruct or detract from existing ocean views in rural areas, and (4) minimize impacts on ocean views in urban areas; (c) Prohibit the following from locating adjacent to the shoreline: (1) view obstructing recreation and visitor serving structures which are not significantly enhanced by an ocean front site, such as tennis courts, auto service stations, specialty shops, and (2) recreation and visitor serving facilities which require substantial removal of vegetation or alteration of the natural topography, such as golf courses.*
- *11.12 Sensitive Habitats: (a) Permit recreation and visitor serving facilities to locate on lands adjacent to sensitive habitats only when: (1) there is adequate distance or separation by barriers such as fences, (2) the habitat is not threatened, and (3) there would not be substantial impacts on*

habitat, topography, and water resources; (b) Permit recreation or visitor serving facilities to locate adjacent to sensitive habitats only when development standards and management practices are adequate to protect the resources, consistent with Policy 11.18 and the Sensitive Habitats Component; (c) Discourage the expansion of public recreation into locations within or adjacent to sensitive habitats until the level of improvement and management of existing public recreation areas within or adjacent to sensitive habitats are consistent with the Sensitive Habitats Component.

- *11.13 Trails: (a) Establish a trails program for the Coastal Zone with the objective of: (1) Connecting major shoreline to inland park and recreation facilities and trails; (c) Require, when feasible, the use of existing road rights-of-way and immediately adjacent areas in determining the alignments for trails. Where existing road rights-of-way are infeasible, require that trail alignments be sited along property lines and be consistent with the Policy 11.11 on agriculture.*
- *11.14 Public Recreation Facilities: (a) Use the locational and development standards included throughout this component, the Agriculture Component and the applicable standards and planning and management guidelines of the County's Parks and Recreation Element as the development and management standards for public recreation facilities, including trails. LCP policies must predominate if there are conflicts. Seek any modifications in the classification of State Park Units which will conform their purposes and uses more closely to the policies of the LCP; (b) Use development standards of this component, the County's Parks and Recreation Element standards and the criteria for trail development management contained in Appendix 11.A when constructing trails; (c) When the route of a bike path in the County's Bikeways Plan corresponds to the route of a trail included in the LCP trail program, construct the trail to accommodate both bicycle and pedestrian use, wherever possible; (d) Permit the following recreational facilities on lands designated medium intensity public recreation: all low intensity facilities, plus permanent restrooms, other forms of camping, group picnicking and parking not exceeding one auto space per 25 linear feet of beach or 10 acres of upland recreation.*
- *11.18 Sensitive Habitats: (a) Conduct studies by a qualified person agreed by the County and the applicant during the planning and design phases of facilities located within or near sensitive habitats and archaeological/paleontological resources to determine the least disruptive locations for improvements and the methods of construction. These studies should consider the appropriate intensity of use, improvements and management to protect the resources and reduce or mitigate impacts; (b) Provide improvements and management adequate to protect sensitive*

habitats. These may include, but are not limited to, the following: (1) informative displays, brochures, and signs to minimize public intrusion and impact, (2) organized tours of sensitive areas, (3) landscaped buffers or fences, and (4) staff to maintain improvements and manage the use of sensitive habitats.

- *11.20 Utilities: (b) Encourage sites for recreation or visitor serving facilities to develop public restrooms, drinking water and telephones; (c) Require recreation and visitor-serving facilities to connect to public or community water and sewer systems wherever those exist.*
- *11.23 Low Cost Facilities: (a) Provide low cost or no cost visitor serving and public recreation facilities in public facilities.*
- *11.26 Requirements for Trails and Recreation Development: (a) Require the dedication by public agencies of trail easements along the routes of the Gregorio/Murphy and LCP Trail Programs, including the Pacific Ocean Corridor Trail after submission by the State Department of Parks and Recreation of an acceptable alignment.*
- *11.27 Improvement, Expansion and Maintenance of Public Recreation: (a) Continue to provide for the improvement, expansion and maintenance of the Fitzgerald Marine Reserve and San Pedro Valley Park.*

Appendix 11.A:

- *Natural Preserve Planning and Management Guidelines: (1) The prime resource of the area should be determined. Preservation and enhancement of the prime resource should be the most important management objective. Interpretation and enjoyment should be secondary management objectives; (2) Development should be limited to foot trails, protective barriers, regeneration of indigenous vegetation, overlooks, signs, sanitary facilities, parking areas, interpretive center and other minimal service facilities as may be required; (3) Emphasis should be placed on the protection of rare, endangered, unusual or educationally important natural resources; (4) Access should be controlled to provide adequate resource protection and sufficient buffers from adjacent environment should be provided within its boundaries.*

b. San Mateo County Zoning Regulations. The upland part of the Reserve is zoned RM-CZ/DR/CD. Pillar Point Marsh is zoned RM-CZ/DR/CD.

The purpose of the Resource Management/Coastal Zone (RM-CZ) District is to implement the objectives and policies of the elements of the San Mateo County General Plan and to meet the requirements of Section 65910 of the Government Code of the State of California requiring formulation of an open space zoning ordinance. All development with the RM-CZ district shall require a permit.

Permitted uses include public recreation. Development standards include minimum yard setbacks of 50 feet in the front and 20 feet to the side and rear.

The Design Review (DR) Zoning Ordinance was implemented to provide a method by which the County could encourage the preservation and enhancement of property values and the visual character of communities and natural resources.

Before issuance of a permit within a Design Review Combining District, proposed projects must conform to the following standards: grading must not create problems of drainage or erosion on the site or adjacent property; trees and other vegetative cover are to be removed only where necessary for development in order to reduce erosion and impacts on natural drainage channels, and to maintain surface runoff at an acceptable level; and paved areas are to be integrated into the site, related to their structure and landscaped to reduce visual impact from residential areas and from roadways.

The purpose of Coastal Development (CD) District is to implement the Coastal Act of 1976 in accordance with the Local Coastal Program of the County. The CD is an overlay district which applies in addition to other applicable districts. Development which requires a permit includes any significant alteration of the land including removal or placement of vegetation on a beach, wetland or sand dune, or within 50 feet of the edge of a coastal bluff, or stream or in areas of natural vegetation designated as sensitive habitat (FEIR, 1986).

c. Permitting and Review Agencies. Table 1-1 summarizes the jurisdictions and responsibilities of federal, state, and local agencies whose policies affect the management of the Fitzgerald Marine Reserve.

9. Environmental Review Process

This Master Plan will be subject to environmental review in order to comply with the requirements of the California Environmental Quality Act (CEQA). The County will prepare an environmental checklist to determine whether or not the Master Plan will require preparation of an Environmental Impact Report (EIR) or Initial Study/Negative Declaration. According to CEQA, lead agencies are required to consult with public agencies having jurisdiction over a proposed project, and to provide the general public with an opportunity to comment on the EIR (or other environmental documentation). The environmental review will identify the likely environmental consequences associated with implementation of the proposed Master Plan, and recommend mitigation measures to reduce potentially significant impacts. If an EIR is prepared, a 45-day public review period on the Draft EIR will be followed by preparation of the Final EIR (which is comprised of the Draft EIR and a Responses to Comments document).

10. Review and Approval of the Master Plan

The Master Plan and EIR will be submitted for review to the San Mateo County Parks and Recreation Commission. The Master Plan will be revised as directed by the Commission.

The Master Plan and EIR will be submitted to the San Mateo County Board of Supervisors for review and consideration. The Board will determine whether to certify the environmental document as complete and will consider approval of the Master Plan.

Table of Contents *continued*

PART TWO: ENVIRONMENTAL SETTING	75
A. LOCATION AND SETTING	75
1. Fitzgerald Marine Reserve	75
2. Pillar Point Reserve	76
B. VISITOR USE AND PROGRAMS	77
1. Visitor Use	77
2. Programs	78
3. Utilities	79
4. Visitor Use Problems	79
C. ACCESS	81
1. Vehicular Access	81
2. Pedestrian Access	81
D. INTERTIDAL ZONE AND SHORELINE AREA	83
1. Marine Resources and Resource Conditions	83
2. Visitor Use Management and Carrying Capacity	91
3. Other Coastal Reserves	91
E. UPLAND AND MARSH BIOLOGY	93
1. Plant Communities and Plant Species	93
2. Special Status Plant Communities and Species	102
3. Invasive Non-Native Plant Species	107
4. General Wildlife Habitats and Species	112
5. Sensitive Wildlife Resources	118
F. HYDROLOGY	129
1. Setting	129
2. San Vicente Creek	131
3. Pillar Point Marsh	134
4. Regulatory Agencies	140

Table of Contents *continued*

PART TWO: ENVIRONMENTAL SETTING (*continued*)

G.	GEOLOGICAL/GEOTECHNICAL CONDITIONS	143
1.	Geology	143
2.	San Gregorio Fault (SGF)	143
3.	Coastal Bluff Retreat	148
4.	Soil Erosion	150
H.	CULTURAL RESOURCES	153
1.	Setting	153
2.	Archaeological Resources	154
	BIBLIOGRAPHY AND REFERENCES	157
	LIST OF PREPARERS	163

APPENDICES

Appendix A.	Technical Advisory Committee Members
Appendix B.	Description of Master Plan Alternatives
B-1	Moss Beach Alternative
B-2	Cypress Avenue Alternative
B-3	Pillar Point Alternative
Appendix C.	Reserve Staff Responsibilities
Appendix D.	Potential Funding Sources
Appendix E.	List of Comments on the Draft Master Plan
Appendix F:	Summary of Comments
Appendix G.	Copies of Draft Master Plan Comment Letters

LIST OF FIGURES

PART ONE: THE MASTER PLAN

1.	Regional Location	4
2.	Site Locations	5
3.	Master Plan Alternatives	17
4.	Fitzgerald Marine Reserve Master Plan	39
5.	Conceptual Site Plan, Fitzgerald Marine Reserve Education Center	56
6.	General Location, Pillar Point Marsh Facilities	64

PART TWO: ENVIRONMENTAL SETTING

7.	Visitor Impacts on Reefs - Northern Area	84
8.	Visitor Impacts on Reefs - Central Area	85
9.	Visitor Impacts on Reefs - Southern Area	86
10.	Plant Communities - Northern Area	96
11.	Plant Communities - Central Area	97
12.	Plant Communities - Southern Area	98
13.	Significant Concentrations of Invasive Non-Native Plants – Northern Area	108
14.	Significant Concentrations of Invasive Non-Native Plants – Central Area	109
15.	Significant Concentrations of Invasive Non-Native Plants – Southern Area	110
16.	Geology	144
17.	Fault Zones	146

LIST OF TABLES

PART ONE: THE MASTER PLAN

1-1	Agencies with Responsibility or Jurisdiction in Fitzgerald Marine Reserve	19
1-2	Fitzgerald Marine Reserve Education Center	57
1-3	Summary of Staff Needs	66
1-4	Recommended Implementation Actions	67

PART TWO: ENVIRONMENTAL SETTING

2-1	Existing Protective Measures in California Marine Protected Areas	93
2-2	List of Special Status Plant Species with the Potential to Occur in the Vicinity of Fitzgerald Marine Reserve and Pillar Point Marsh	104
2-3	Invasive Non-Native Plant Species	111
2-4	Invasive Non-Native Plant Species Observed at Pillar Point Marsh	113
2-5	Special Status Wildlife Species with the Potential to Occur or Known to Occur in Fitzgerald Marine Reserve	119
2-6	Special Status Wildlife Species with the Potential to Occur or Known to Occur in Pillar Point Marsh	124
2-7	Existing and Potential Beneficial Uses of San Vicente Creek, Denniston Creek, and Pillar Point (Princeton) Marsh, San Mateo County	130

B. MASTER PLAN CONCEPT

1. Goals of the Master Plan

Goals of the Master Plan were developed through the public review process, and are based on ecological and environmental conditions within the Reserve, including Pillar Point Marsh. The goals are stated more or less in order of priority, with the primary goal being to preserve the natural resources of the Reserve. These goals provide the foundation for the Master Plan Concept which follows.

- Preserve and Enhance Natural Resources
- Provide Educational and Interpretive Opportunities
- Ensure Adequate and Well-Trained Staff
- Improve Baseline Information
- Improve Visitor Management
- Improve Visitor Facilities
- Minimize Impacts to Neighbors
- Protect Cultural Resources
- Provide Recreation Opportunities
- Seek Funding Opportunities

2. Master Plan Concept

The fundamental concept underlying the Master Plan is that protection of the outstanding natural resources of the Fitzgerald Marine Reserve will require a new approach to management of ecological systems and visitors in future years, and that the best way to accomplish this goal is to

emphasize the sensitivity of the resource, to enhance the educational value of the Reserve, to manage visitation, and to limit use of the Reserve as a recreation destination. In the initial years of Plan implementation, preservation of the area's resources will take precedence over educational objectives, with the expectation that enhancement of the resource that will result from preservation activities will eventually enhance the quality of the educational experience.



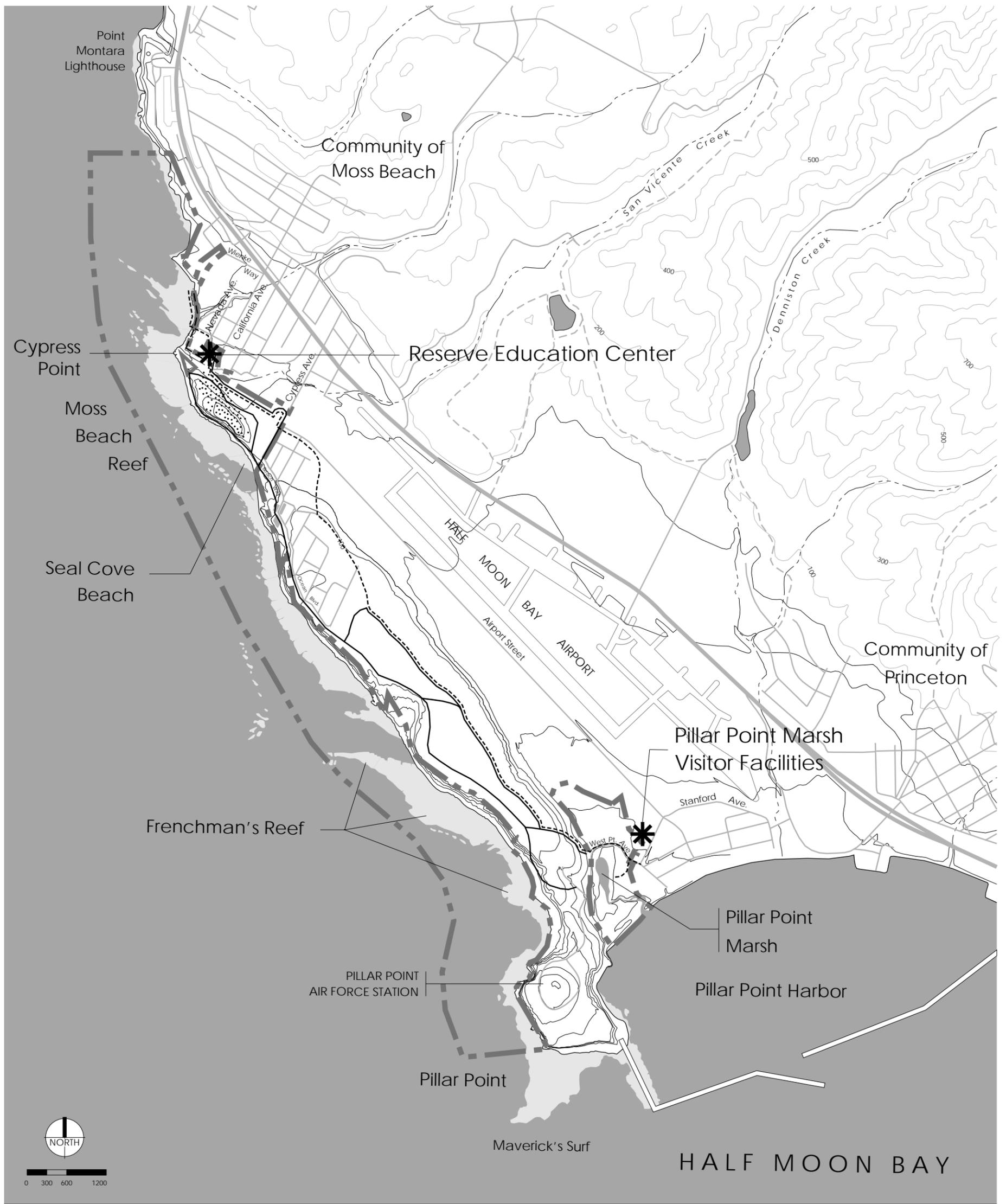
The proposals contained in this Master Plan are intended to integrate the Pillar Point Marsh into the Fitzgerald Marine Reserve, and to implement policies, activities and programs that apply to both areas. The term “Reserve” as it is used in the Master Plan refers both to the area known as the Fitzgerald Marine Reserve and the newly acquired Pillar Point Marsh.

The Master Plan has three main components:

- Natural Resource Management Program
- Visitor Management Program
- Uses and Facilities Program

Policies for each of these programs are described, and where appropriate, mapped and illustrated, in the following section of the report. Figure 4 illustrates proposed Master Plan concepts. Some policies apply to specific areas of the Reserve, such as the Moss Beach Reef or the Pillar Point Marsh. In these cases, the specific area is identified. Otherwise, policies apply to the entire Reserve. Actions that are required to implement these policies are contained in Section F. Implementation, of this report.





FITZGERALD MARINE RESERVE MASTER PLAN

Figure 4:

PROPOSED MASTER PLAN

- Existing Boundary, Fitzgerald Marine Reserve
- Existing Trails
- ... Proposed Trails
- .-.- Proposed California Coastal Trail
- ▨ Cypress Grove
- Intertidal Zone

C. NATURAL RESOURCE MANAGEMENT PROGRAM

The primary goal of the Master Plan is to preserve the natural resources of the Reserve, and to enhance them through careful management. Policies and activities that would accomplish this goal are described below.

Policy 1. Natural resources within the Fitzgerald Marine Reserve will be protected and restored through development and implementation of resource management policies and programs.

Policy 2. Visitor management policies and programs will focus on education, one of the priority missions of the Reserve.



Policy 3. The Moss Beach Reef and Frenchman's Reef will be continuously monitored over a minimum period of 10 years to develop baseline information on the ecological system, to determine the rate and degree of recovery, and to determine the effectiveness of Master Plan policies limiting visitor use.

Biological monitoring has been conducted by Reserve staff and volunteers between 1973 and the present, and the Reserve now participates in a joint research program with San Francisco State University. However, additional monitoring and scientific investigations are needed to establish baseline information from which to develop effective monitoring programs and long term management strategies. This Plan proposes that a program for monitoring be developed jointly by the County of San Mateo and the State of California Department of Fish and Game, with participation

by the Monterey Bay National Marine Sanctuary, that will meet the purposes stated in Policy 3, above. This information will be used to meet scientific and research objectives as well as to evaluate the effectiveness of management programs in achieving reef recovery and conservation goals. A monitoring report will be provided every two years to evaluate effectiveness of reef recovery measures and visitor management programs.

Policy 4. Portions of the Moss Beach Reef may be closed to visitors as warranted by environmental conditions, research objectives, and monitoring activities.

In order to conduct monitoring activities and scientific investigations of the Moss Beach Reef, portions of the reef may require closure to all visitors from time to time. Configuration of such closures, and the appropriate techniques for closure, would be determined by the Reserve Manager, as part of the adaptive management program for the Reserve.



Policy 5. The Feasibility of Restoring Tidal Action to the Freshwater Marsh across West Point Avenue to the northeast of the existing saltwater marsh will be determined.

Expansion of the saltwater marsh would be accomplished by creating channels for tidal flows through the area that was filled to create West Point Drive, and with dredging of fills placed in this area. Hydrologic and biological studies should be undertaken to determine whether restoration of a saltwater marsh is feasible, and the

relative environmental impacts and benefits of replacing the freshwater (seasonal) marsh that exists in this area now with tidal saltwater marsh.

Policy 6. Water quality improvements in San Vicente Creek and Pillar Point Marsh will be undertaken.

The program shall include drainage improvements, removal of fill in the San Vicente Creek drainage, implementation of Best Management Practices (BMPs), and enforcement of non-point source water quality regulations. The County will coordinate with surrounding landowners to implement



BMPs to improve upstream water quality. Specifically, the County will coordinate with the Half Moon Bay Airport to develop detention basins and vegetation buffers within the Airport's drainage system to minimize impacts to the water quality of the Pillar Point Marsh, and will work with local landowners, the surrounding communities of Princeton, Half Moon Bay and Moss Beach, and the local resource agencies, such as the Farm Bureau, San Mateo County Resource Conservation Service and the Regional Water Quality Control Board to develop best management practices to improve water quality in the San Vicente, Denniston Creek and other drainages upstream from the Reserve.

Policy 7. Special status wildlife and plant species shall be protected within the Reserve, and habitat management plans shall be developed to protect and restore all identified special status species.

During implementation of the Master Plan, all areas where work is to be conducted shall be surveyed for special status wildlife and plant species prior to commencement of work. Habitat management programs shall be undertaken when special status species are identified, and impacts to such species shall be avoided or mitigated, as required by State and federal law.

Improvements to the San Vicente Creek and Pillar Point Marsh shall include creation and protection of habitat for the red-legged frog, a federally listed threatened species. A habitat management plan for the red-legged frog shall be implemented within the San Vicente Creek corridor and Pillar Point Marsh.

Policy 8. A vegetation management program will be developed to restore and protect native plant communities.

Specific objectives of this program will be to maintain the grove of Monterey cypress trees and to restore native vegetation to the San Vicente Creek channel, to upland areas and the Pillar Point Marsh. Non-native vegetation will be removed from the San Vicente Creek channel and the Pillar Point Marsh, and in the upland areas. The Monterey cypress grove will be thinned to improve the health of the forest and understory plants, and to remove eucalyptus trees, hazardous limbs and trees, and young cypress trees invading adjacent native habitat.



Policy 9. Maintain the historic character and health of the plant community at the Smith-Dolger historic site.

The landscape surrounding the historic Smith-Dolger home contributes to the historic character of the site. Some of the plants, such as the palm trees, are not native, but are typical of early California residential settlements of this period. This landscape should be protected and maintained.



Invasive non-native plants that are not part of the historic landscape should be removed from around the home and archaeological site; other non-natives should be maintained as needed to protect the historic character of the site.

Policy 10. Acquire land in the vicinity of Pillar Point Marsh and lands adjacent to the Reserve, as it becomes available, to add to the ecological system of the

Reserve. Establish a working committee of the County Park and Recreation Commission and Board of Supervisors to coordinate and facilitate acquisitions.

The Pillar Point Marsh land is now separated from the main body of the Reserve. The County should acquire land as it becomes available in order to connect Pillar Point Marsh with the Reserve, to expand the ecological system of the Reserve, to provide opportunities for future educational activities, and to avoid potential land use impacts that could result from management practices on adjacent lands in different ownership. Acquisition efforts should focus on land between the Reserve and Airport Street to the east, land between Pillar Point Marsh and the Reserve, and lands inland of Pillar Point, including the



Pillar Point Air Force Station, should it become available at any time in the future.

Policy 11. Introduction and possession of domestic and feral animals, including dogs, cats, ducks and any exotic, non-naturalized species are prohibited in the Reserve.

Due to the potential for impacts to biological resources from predation or disease, dogs and other non-native species are not allowed within the Reserve. This policy will be implemented and enforced to prevent interference with and mortality of native species. Dogs will be allowed only on leash on the California Coastal Trail. Actions to reduce or remove existing populations of domestic and feral animals will be implemented by Reserve staff. This policy is consistent with County Code Section 3.68.080(i).



Policy 12. Recreational hunting, gathering and collecting are prohibited within the Reserve because of the potential risks to public safety and biological resources.

California Department of Fish and Game regulations for Marine Life Refuges limit taking and possession of species (see Part One, Section 8.a.1 of this report). However, gathering of species has been a common recreational activity within the Reef and has been responsible for impacts on the biodiversity of the Reef. Hunting has occurred in the bluff area of the Reserve, although infrequently. Subsistence gathering has also occurred on the Reef. These illegal activities have been discouraged through education and outreach by Reserve staff and volunteers; however, many of the Reef resources have been depleted through these activities. As a result, efforts are underway to establish the Reserve as a Marine Life Reserve (for additional discussion, see Part One, Chapter A.5 of this report). The Reserve Manager will be responsible for enforcement of this policy as part of the adaptive management program. This requirement is consistent with County Code Section 3.68.080(d), (g), (h) and (n).

D. VISITOR MANAGEMENT PROGRAM

Policy 1. Visitor use of the Reserve will be managed and limited to the number of persons that can be accommodated without damage to resources.

Visitor use of the Moss Beach Reef will be limited to a maximum of 300 persons at one time for a minimum period of ten years. The Moss Beach Reef is the area most accessible to visitors, and therefore the most impacted and vulnerable. Highest levels of visitation occur during low tide, when the reef is accessible by foot and most visible. Visitors to the Moss Beach Reef will be limited to a maximum of 300 persons at one time, with a target goal of no more than 500 persons in one day. As part of the Reserve's adaptive management program, the number of visitors can be lowered at the discretion of the Reserve Manager, if the resource remains impacted by visitation.

Visitor use of Frenchman's Reef will be limited to a maximum of 200 persons at one time for a minimum period of ten years. The areas of the reef referred to generally as Frenchman's Reef (zones V, VI and VII shown on Figures 8 and 9) are much less accessible to visitors, and are less well known than the Moss Beach Reef. Access to these reefs from the south is limited by the Pillar Point landform, which makes direct beach access difficult except at very low tides, and the lack of trails leading to the beach from the bluffs. Impacts on these areas of the reef have been very light, as compared to the heavier impacts on areas to the north at Moss Beach and to the south at Pillar Point. The objective of limiting visitor use on these areas of the reef is to preserve their relatively pristine quality, biodiversity and richness. These areas will be used as a control for evaluating the degree and rate of recovery of the Moss Beach Reef.

The Pillar Point Marsh is one of the principal wetland-riparian areas along the San Mateo County coast, habitat for numerous special status species and a refuge for migrating waterfowl. Recreation use in the Pillar Point Marsh area will occur in designated areas, and will be discouraged in the Marsh itself.

Policy 2. The primary purpose of visitor use of the Reserve will be education.

Informational materials, visitor orientations, signage and interpretive programs and materials will emphasize the educational mission of the Reserve. Recreational use of the intertidal reefs and Pillar Point marsh should be explicitly discouraged. Use restrictions should be clearly posted and enforced.

Policy 3. All groups are required to make advance reservations to go onto the reef.

The Reserve is currently open to the public from sunrise to sunset, and access to the reef is not restricted, except for groups of 20 or more who are required to make reservations. The reservation system will be expanded to require reservations for all groups. The reservation system will be one of the ways that visitor use of the Reserve is limited to 300 persons at one time. A “group” is defined as more than four persons.

Policy 4. Each group will be limited to no more than 100 individuals.

Due to the difficulty of monitoring activities of large groups, smaller groups are preferred. Size of groups will be controlled through the reservations system.

Policy 5. Any group of 20 or more individuals must be lead by a staff member, docent or other qualified leader to be on the reef.

Docents and qualified leaders are those who have been trained by the Reserve staff, or have other specific qualifications that meet Reserve criteria.



Policy 6. Visitor fees will be charged for access, visitor services and/or parking.

On weekends, visitor levels exceed the capacity of parking areas and visitor facilities. Charging fees for services and parking is a way of controlling casual recreational access to the reef, and discouraging recreational use in favor of educational use. Fees will be set by the County Department of Parks and Recreation Division and will be consistent with fees charged at other County and State-managed public open space reserves. This policy is consistent with County Code Section 3.68.040(a), (b) and (c).

Policy 7. Parking regulations will be clearly signed and strictly enforced in residential areas surrounding the Reserve.

This policy is essential to minimize overflow parking on neighborhood streets, and in turn, impacts on neighborhood residents, especially on weekends when vehicles will be charged for parking in Reserve parking areas. The Moss Beach neighborhood has been the most impacted by overflow parking on residential streets. The County Parks and Recreation Division will work cooperatively with the County Sheriff's Department to enforce County parking regulations.

Policy 8. Parking and driving on West Point Avenue leading to Pillar Point will be discouraged through parking regulations, development of a new parking area at an alternative location, signage and provisions for a turn-around and drop-off area in the existing Harbor District parking area at Pillar Point.

The parking area owned by the Pillar Point Harbor District attracts large numbers of recreationists, including dog owners and surfers. The parking area is already over capacity during peak use periods, and overflow parking occurs along West Point Drive in the Pillar Point Marsh. This policy is intended to relocate parking to a site south of the Half Moon Bay Airport and east of the Pillar Point Marsh, to meet the objective of reducing impacts on the Marsh. The County Parks and Recreation Division will work cooperatively with the Harbor District to resolve issues at the Harbor District parking area. Potential solutions to overcrowding and impacts related to parking include use of the Harbor District area only for handicapped parking, with short-term stays for drop-offs and loading/unloading, and services, including emergency access.

Policy 9. As part of the adaptive management program, access and fishing may be limited or prohibited on the reef, if such limitations or prohibitions are warranted by findings of the Monitoring Program (Resource Management Program Recommended Implementation Action 2). Such actions would require authorization by the San Mateo County Park and Recreation Commission, County Board of Supervisors and the California Department of Fish and Game.

The Reserve policy has been to allow fishing, as provided for by California State Fish and Game Code. Fishing may have been responsible for losses and degradation of fish habitat in the reef. Subject to the findings of the Monitoring Program, required as Resource Management Program Recommended Action #2 and shown in Table 1-4, access and fishing activities may be limited or prohibited.

In the Fitzgerald Marine Reserve area, the California Department of Fish and Game has management responsibility over waters below the average high tide line, and the County of San Mateo has management responsibility over areas above high tide line. Any limitations on access or fishing activities within the tidal zone or coastal waters would require approval of several entities, including the County Park and Recreation Commission, the County Board of Supervisors, and the California Department of Fish and Game. The County would coordinate with the Department of Fish and Game to implement such limitations.

During preparation of the Fitzgerald Master Plan, the consultant team² recommended that the Moss Beach Reef, in particular, had been severely impacted by high levels of visitation and fishing, and that restoration of the reef would be most effectively achieved by temporary closures, as needed, to protect the reef from both recreation and fishing impacts.

During public review of the Draft Master Plan, commentors questioned the need for limitations on fishing in the reef. In order to respond to the issue of the status and impact of fishing on the resource, the consultant team reviewed additional information available since the period when initial investigations were conducted. The conclusion was that there have been decreases in marine resources along the California coast, as documented by two Department of Fish and Game bulletins.³

The earlier study of the rocky reefs and the associated biota of the Fitzgerald Reserve by Dr. E.H. Smith,⁴ cited in the Fitzgerald Marine Draft Master Plan, presented data that indicated decline of underrock eels (specifically the prickleback and monkeyfaced eel) based on a decline in catch per unit effort.

The decline in fish resources may be due to changes in climate and productivity in the California Current, overfishing, or a combination of these and other factors. With

² Applied Marine Sciences, Inc., marine biologists, were members of the consultant team and performed review of existing information, including available monitoring data, and field investigations of the Moss Beach Reef, as well as the other reefs in the Fitzgerald Master Plan study area.

³ Konstantin A. Karpov, John J. Geibel, and Philip M. Law. *Relative Abundance and Size Composition of Subtidal Abalone, Haliotis spp. Sea Urchin, Strongylocentrotus spp., and Abundance of Sea Stars off Fitzgerald Marine Reserve, September 1993*. Marine Resources Division Administrative Report 97-1, 1997.

Konstantin A. Karpov, Douglas P. Albin and Wade H. Van Buskirk. 1995. The marine recreational fishery in Northern and Central California: A historical comparison (1958-86), status of stocks (1980-86), and effects of changes in the California Current. Fish Bulletin 176, Department of Fish and Game, The Resources Agency, State of California.

⁴ Harding Lawson and Associates, *Fitzgerald Marine Reserve Baseline and Carrying Capacity Study*, Novato, California, August 1993.

marine resources, declines and their causes are typically difficult to prove, and prudent management argues in favor of a precautionary approach to protecting the resource rather than waiting until impacts can be proven, often too late to protect the resource. Although data are insufficient to identify specifically the cause of the declines, indications are that declines in nearshore stocks warrant some measures of further protection. A “precautionary approach” to protecting marine resources is advised.

Fitzgerald Marine Reserve supports fisheries for several species of near-shore marine fish. Many of the depressed species are particularly sensitive to impacts from over-fishing due to unique aspects of their life-histories; including long lives and extended juvenile phases, homing behavior, highly variable juvenile recruitment, and reliance on limited and easily exploited near-shore environments during some or all of their life histories.

Due to the sensitive nature of the intertidal environment, the easily exploitable nature of the populations of harvest marine organisms, and the recent significant reductions in sport and commercial harvest levels of near-shore fishes, assessments to determine the impacts of current levels of fishing on the Reserve should be undertaken. This assessment would be conducted as part of the Monitoring Program recommended in the Fitzgerald Master Plan (Resource Management Program Recommended Implementation Action 2). It would be the responsibility of San Mateo County during Phase One of the Implementation Program for the Reserve. A work program would be prepared by the County for conduct of the assessment. It is anticipated that the following general tasks, at a minimum, would be included in the assessment to address fishing issues:

- Task 1. Utilizing testable hypotheses, determine how fishing is impacting abundance and/or diversity of marine organisms at Fitzgerald Marine Reserve and compare potential impacts to those occurring elsewhere in California.

Review all available data from the California Department of Fish and Game, California Department of Parks and Recreation, and other sources, including university research and consultant efforts) regarding the topic. Determine if additional studies and/or field investigations are necessary to adequately determine the impacts of fishing at Fitzgerald Marine Reserve.

The assessment should include the following areas of investigation: the effects of removal of fish and invertebrates by fishers, including removal of mussels, worms and other organisms for use as bait, and the effects of fisher traffic through intertidal areas (which are sensitive to trampling) in accessing fishing areas.

- **Task 2.** Evaluate alternative management actions to lessen or eliminate identified impacts. Potential ameliorations to be considered should include: reduction of allowable catch, reduction of illegal catch, regional closure of areas to fishing to allow impacted populations to rebound; monitoring and control of fishing and other measures.
- **Task 3.** Recommend actions to be undertaken to lessen or eliminate identified impacts. The recommended actions would include identified responsibilities and schedules for implementation and completion.

Policy 10. No picnicking will be allowed on the beach.

Importation of food and drink into the beach areas can affect aquatic resources in the reef. Picnicking will be allowed in upland areas, but prohibited on the beaches, which are adjacent to the reef. The Reserve Manager will be responsible for enforcement of this policy as part of the adaptive management program.

Policy 11. Horseback riding, bicycling, and dog walking will be permitted only on the California Coastal Trail within the Reserve.

The California Coastal Trail is a multi-use trail that extends along the coastline, connecting the cities of Half Moon Bay and Pacifica in this part of the coast. A segment of the California Coastal Trail would pass through the Reserve on an easement located on the inland eastern side, and the Trail would accommodate pedestrians (hikers), dog walkers, bicyclists and equestrians. The Trail alignment is intended to avoid conflicts between protection of resources and trail users in the reef, beach and marsh areas. The Trail would be separated from the Reserve by fencing and gates, and signed to indicate pedestrian-only use in the Reserve. (See also Section E. Uses and Facilities Program).

Policy 12. The County of San Mateo Code of Ordinances, Sections 3.68.080 through 3.68.170, shall apply to activities within the Fitzgerald Marine Reserve and Pillar Point Marsh.

- a. Motorized off-road vehicles are prohibited within the Reserve in order to avoid the risk of erosion, water quality degradation, safety hazards and excessive noise.
- b. Motor vehicles shall be restricted to designated parking areas and paved public roads.

- c. Park rules, including hours of operation, shall be made available to park visitors at entrance gates, at the Education Center, at the Pillar Point Marsh, and on maps and brochures. Park visitors shall be responsible for knowing and following park rules.
- d. To protect the public health and safety and water quality, alcoholic beverages shall not be permitted within the Reserve.
- e. Smoking of cigarettes and other tobacco products shall be permitted only in designated areas.

Trash and cigarette receptacles shall be conveniently located at solid waste disposal collection points readily serviceable by solid waste disposal contractors within developed facilities to encourage appropriate waste disposal. A “pack it in and pack it out” waste disposal policy shall be in effect for trails and remote vista points.

- f. Fireworks shall not be permitted on Reserve lands at any time in order to protect public safety and avoid environmental impacts.
- g. Special events, (for example, weddings, assemblies, performances, and live entertainment), may be held at the Fitzgerald Marine Reserve through the County Parks and Recreation Division special event process on the condition that the special event conforms with the goals of the Master Plan’s resource and visitor management policies so as not to have an adverse impact on resources, facilities or programs.

Policy 13. Because the Reserve has no fire suppression capability, other fire control agencies will continue to be relied upon to provide that service.

To ensure adequate protection from fire risks, the County Parks and Recreation Division shall meet annually with responding fire agencies to coordinate responsibilities, to review implementation plans, and to identify future actions.

To reduce the potential for wildfires, uncontrolled parking along the side of roads will not be permitted. Portable barbeques will not be permitted and areas around the picnic sites shall be maintained in a manner so as to reduce the potential for fire ignition.

Policy 14. In compliance with the Americans with Disabilities Act (ADA), accommodations shall be made for disabled persons where feasible at

selected areas and sites within the Reserve. Access provisions and facilities will be designed to encourage use by the disabled where feasible.

Site development specifications for disabled persons shall be researched and incorporated into the design and construction phases for recreation facilities. Reserve management shall clearly identify those recreation facilities that are ADA-accessible.

E. USES AND FACILITIES PROGRAM

Policies that will guide the program for uses and facilities are set forth below, followed by program recommendations for specific facilities and improvements.

Policy 1. Uses and activities will be consistent with the primary missions of the Reserve, to preserve and enhance natural resources, and to provide educational opportunities.

Uses within the Reserve will include activities related to education and interpretation of natural resources, including the ecological systems of the intertidal reef, and the beach, uplands and marsh/wetlands complex, and recreational activities, such as walking, nature study and picnicking, that are compatible with protection of natural resources. Educational and interpretive activities will include (but not be limited to) tours led by Reserve staff, docents and trained volunteers; workshops, seminars and classes; and training for docents, volunteers, and tour leaders. Horseback riding, dog walking, and bicycling will be restricted to the California Coastal Trail.

Policy 2. Physical improvements will be adequate to accommodate education and interpretive uses, management activities and visitor services commensurate with Master Plan goals and policies.

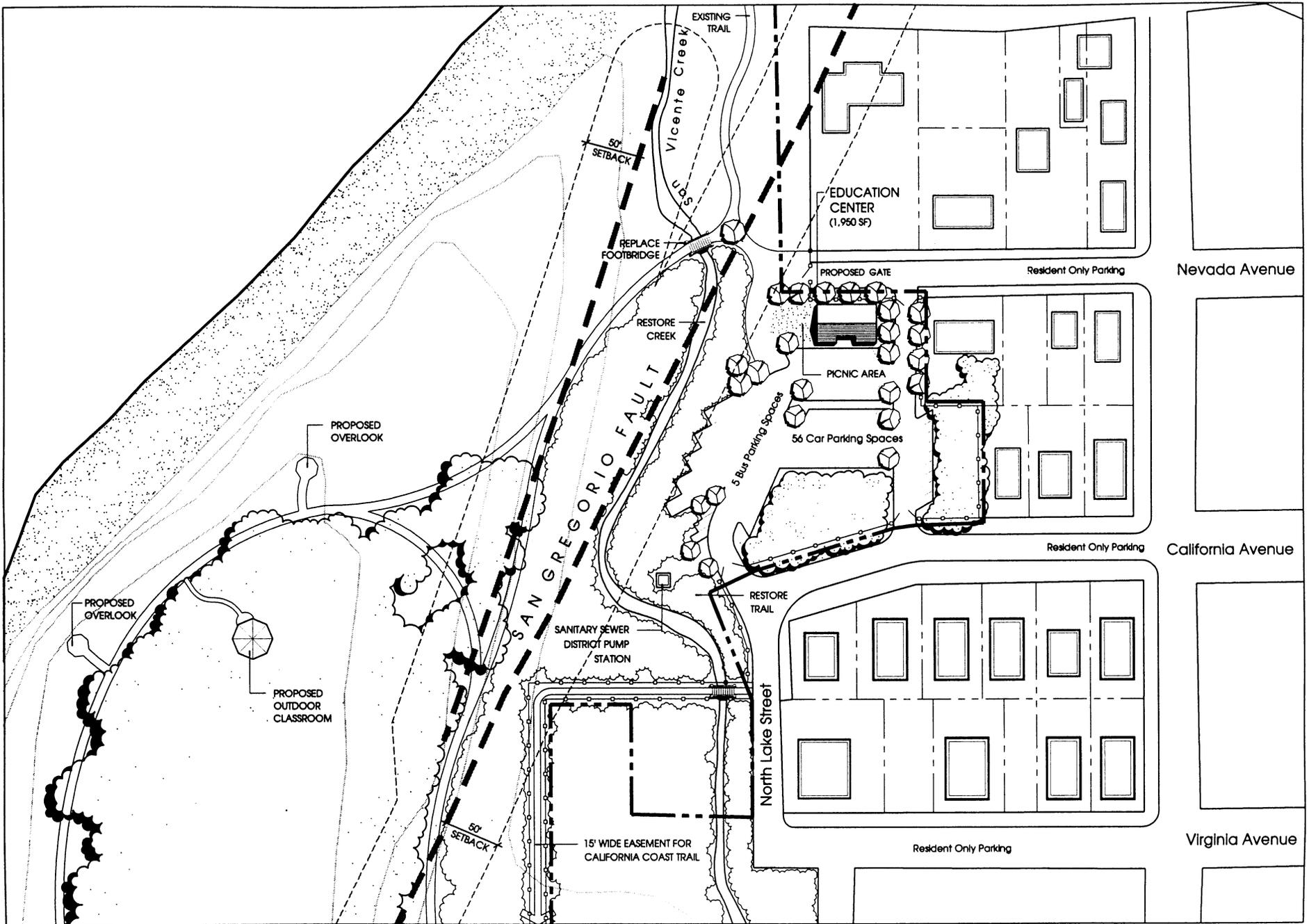
Facilities developed to accommodate these uses will include an Education Center at the site of the existing Moss Beach visitor's center, near the Moss Beach Reef, and parking, picnic and restroom facilities near the Pillar Point Marsh. The existing trails network will be improved and will connect facilities at the north and south end of the Reserve.

FACILITIES PROGRAM

Education Center. An Education Center will be constructed at the existing Moss Beach site that will serve as the main educational and meeting site for visitors who wish to learn about the Reserve, and for



management and administration activities. A conceptual illustrative site plan for the Education Center is shown in Figure 5.



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 5
CONCEPTUAL SITE PLAN, EDUCATION CENTER

The education center will supply information, maps and brochures to visitors, and will accommodate interpretive and educational programs, displays and nature exhibits, a multi-purpose room for organized group orientation and classes, and outdoor area for group meetings. Field-based tours will be organized from this center, and educational activities will be conducted in this building. It will house the Reserve management staff, and administration of the Reserve will be conducted from this building.

The building will be located at the northern boundary of the Reserve, adjacent to Nevada Avenue. The building will be oriented to the southeast for energy efficiency, with an outdoor picnic and gathering area to take maximum advantage of views of the Reef.

Although the education center building itself will be modest in size, it will serve as the focal point for all educational and management activities in the Reserve. The specific program for the Education Center is shown in Table 1-2.

Table 1-2
FITZGERALD MARINE RESERVE EDUCATION CENTER

	Size/Area (sq. ft.)	Purpose	Estimated Cost Range ^a
Education Facility		Education, Administration and Management	
Classroom	900	Education Classes, Tour Orientations, Meetings, Displays	
Restrooms	400	Eight Stalls and Lavatory	
Office space	300	Administration, Management	
Storage/mechanical space	250	Equipment Storage, Building Mechanics	
Entry	100	Reception Area, Displays	
Total Building Area	1,950		

^a Estimated cost range is for the Education Center building and parking area only, and includes design, site preparation, landscaping, utilities, paving and building construction costs. Actual costs will depend on the design and phasing of construction. Other costs associated with the Education Center, including overlooks, paths, outdoor classroom, site and interior furnishings, educational/interpretive displays and restoration work are not included in this estimated range.

Education Center Parking Area. A parking area adjacent to the Education Center will accommodate parking for individuals and group visitors, management staff and docents and volunteers.

The parking area will accommodate 56 passenger vehicles, an increase of 14 over the existing 42 parking spaces, and five buses or vans. Assuming an average of two persons per passenger vehicle and 44 persons per bus or van, the parking area will accommodate 332 persons at peak capacity. With a limit of 300 persons at one time (PAOT) in the Reef, it is anticipated that the parking will be adequate to serve the maximum number of visitors, management staff and docents and volunteers.

Access to the parking area will be from Nevada Avenue and California Avenue. Bus access will be only from Nevada Avenue. The parking area will be gated to control access.

Outdoor Area/Picnic Shelter. A picnic shelter will be located adjacent to the Education Center, on the southwest side of the Education Facility with views over the reefs. Picnic tables and benches will be provided.

Landscaping. The Monterey cypress grove and other areas of native vegetation will be restored and maintained. The site of the existing visitor's center within the Monterey cypress grove will be restored to a natural area. The Monterey cypress grove at this location will serve as a visual buffer to screen the parking area from surrounding properties. The existing restrooms and paths will be removed.

The Education Center site will be landscaped to screen the parking area from off-site views, and to enhance the site as appropriate for the primary visitor's destination in the Reserve. Perimeter landscaping with native plants will be provided adjacent to Nevada Avenue and California Avenue, and around the Education Center building. The bank above San Vicente Creek, and the areas along paths leading to the reef will be replanted with native landscaping.

Outdoor Classroom. An outdoor classroom will be located within the Monterey cypress grove on the bluff overlooking the intertidal reefs in the location shown in Figure 5. The outdoor classroom will be open air, with a base formed of a pervious material, such as decomposed and compacted gravel, under a canopy that will protect users from inclement weather. Classroom size will be about 1,000 to 1,500 square feet. (Size and specific dimensions of the classroom area may vary, depending on specific site conditions.) Paths leading to the classroom area will be surfaced with pervious materials.

Overlook Areas. On the bluff overlooking the Reef, two point access overlook areas will be defined with pervious surface paths leading to them. The overlook areas will have benches, and a pervious surface ground treatment consistent with the path surfacing. They will be small, about 20 feet in circumference, and defined by low wood fences to keep users away from eroding areas of the bluff.

Benches. Memorial benches shall be limited to one bench at each of the following locations: 1) the entrance to the Education Center; 2) the two overlook areas on the bluff adjacent to the cypress grove; 3) the picnic site at the Pillar Point Marsh Visitor Facilities; and 4) on the bluff trail at the end of Cypress Avenue, above Seal Cove Beach. Memorial bench donations shall conform with San Mateo County Division of Parks and Recreation Code of Ordinances, Policy 307H, 1-5.

San Vicente Creek Footbridge. A new footbridge will be constructed across San Vicente Creek to connect trails within the Reserve. The location of the new footbridge will be determined in coordination with the San Vicente Creek Restoration Plan (see pages 45 and 47 of the Implementation Program in this report).

Educational and Interpretive Program. The County will develop an educational and interpretive program for the Reserve. Interpretation of Reserve resources shall be incorporated into the design of the Education Center. The program will display exhibits within the Education Center, and may also use freestanding small structures for exhibits and displays sited throughout the Reserve. Interpretive exhibits and displays should be consistent in design with the Education Center and other Reserve facilities, and should be integrated into the signage program, described below.

Signage. A consistent and clear interpretive and directional signage program will be provided throughout the Reserve to assist visitors and emergency personnel in locating areas, and to educate visitors regarding natural resources and processes. A signage program will be developed that is unique to the Reserve. Signage should serve a dual purpose of educating and guiding visitors. Signage should in some cases limit visitor activities; for instance, in areas where vegetation restoration programs are in place, or along the bluff faces where erosion causes hazardous conditions. The program shall identify sign materials, design, font styles, and sign locations. Trail signs shall indicate trail names and use restrictions. Both Nevada Avenue and California Avenue will be signed for resident parking only.

Fencing. New wood rail fencing will be installed to define areas of visitor use, and to control access during times when visitor levels at the Reserve are at capacity.

- **Bluff Fence.** A new wood rail fence, no higher than 3 feet, will be installed no less than 15 feet from the edge of the bluffs the length of the Reserve. The purpose of this fence will be to define those areas where hazardous conditions occur and visitor access is prohibited.
- **California Coastside Trail Fence.** The 15 foot wide easement for the California Coastside Trail on the eastern edge of the Reserve will be fenced on either side with a low wood rail fence.

- **Reserve Boundary Fence.** The boundary of the Reserve will be fenced around its perimeter with a wood rail fence to control access to the Reserve. The fence will be gated at strategic points to allow pedestrian access.

Trails. New trails will include the California Coastside Trail, beach access trails, and the Pillar Point Marsh trails. Realignment and restoration of existing trails will occur throughout the Reserve to protect both resources and visitors.

Most of the trails in the Reserve will require rebuilding, resurfacing and replanting along their alignments. All trails and paths, with the exception of those immediately adjacent to the Moss Beach Education Center building and parking area, should be surfaced with pervious materials, such as decomposed



granite. Replanting should be with native vegetation. Widths of most trails will vary, depending on site conditions. Trail design will be generally consistent with design standards contained in the San Mateo County Trails Plan. Existing and proposed trail alignments are shown in Figure 4 and Figure 5.

- **The California Coastside Trail** will be extended north-south through the Reserve within a 15-foot easement along the eastern boundary.

The California Coastal Trail is a multi-use trail that extends along the coastline, connecting the cities of Half Moon Bay and Pacifica in this part of the coast. A segment of the California Coastal Trail would pass through the Reserve partly on an easement located on the inland eastern boundary, and partly to the east of the Reserve along airport road. The proposed trail alignment is shown in Figure 4 and Figure 5. The Trail would accommodate pedestrians (hikers), dog walkers, bicyclists and equestrians. The Trail alignment is intended to avoid conflicts between protection of resources and trail users in the reef, beach and marsh areas. The trail would be fenced to avoid access to the Reserve by all except pedestrians, and would be signed to discourage other users from entering the Reserve.



- **The trail to Moss Beach Reef** from the Education Center parking area will be restored and replanted. Its current configuration is due to the placement of large boulders to forestall bank erosion. The trail has been eroded and shored up. It will require reconfiguration, regrading and planting.
- **The Leeb parcel public access trail** has been proposed by the County to extend from the Distillery Restaurant parking area to the beach. Five parking spaces in the parking area are owned by the County and should be clearly signed as designated public access parking.
- **Bluff and interior trails** within the Reserve will be rebuilt, resurfaced and replanted in many locations, due to ongoing erosion and overuse. The bluff trail will be adjacent to a low wood rail fence, no higher than 3 feet, on the ocean side. Signage will warn users of the need to stay well back from the bluff.
- **The trail to Seal Cove Beach** will be reconstructed to provide access to the beach. The slope at this location is extremely steep, and has been subject to bluff erosion. A stepped path would be the most appropriate design for this trail, given the constraints of the alignment. Disabled access is not feasible at this location without major grading and substantial cost. If at a future date disabled access to Seal Cove Beach is determined to be a priority, a feasibility analysis to determine the best location and the cost and design requirements for disabled access should be undertaken.
- **A trail from Wienke Way** on the north side of the Reserve will be constructed to provide gated access from residential streets down the bluff into the Reserve. Heavy use of this access point has caused erosion problems; development of a trail at this location will reduce the frequency of off-trail use and reduce erosion. Easements may have to be acquired to implement this trail segment. This access trail is being designed by the County as part of its San Mateo County Trails Plan, and will be coordinated with interested parties and landowners.
- **The Pillar Point Marsh trail** will extend from the proposed parking area on the northeast side of the Marsh along West Point Avenue to connect to the trail leading from the Harbor District parking area to the beach. The trail is now and would remain a single lane paved road, providing disabled, loading/unloading and service/emergency access to the Harbor District parking area. This trail will also serve as a link in the California Coastal Trail, leading from the community of Princeton northward through the Reserve.
- **The Pillar Point Spur Trail** is proposed to provide point access to the Marsh. The spur trail would originate from the Pillar Point Marsh Trail (West Point

Avenue) and extend southward into the Pillar Point Marsh. Studies would be required to determine its feasibility and potential impacts on habitats in the Marsh. If determined to be feasible and environmentally acceptable, this trail could include a bird blind suitable for bird watchers to conduct bird counts and to observe birds and other wildlife.



Pillar Point Marsh Parking Facility. A new parking area will be developed to the east of Pillar Point Marsh to accommodate parking for individual visitors, groups and Reserve staff. A general location plan of this facility is shown in Figure 6.

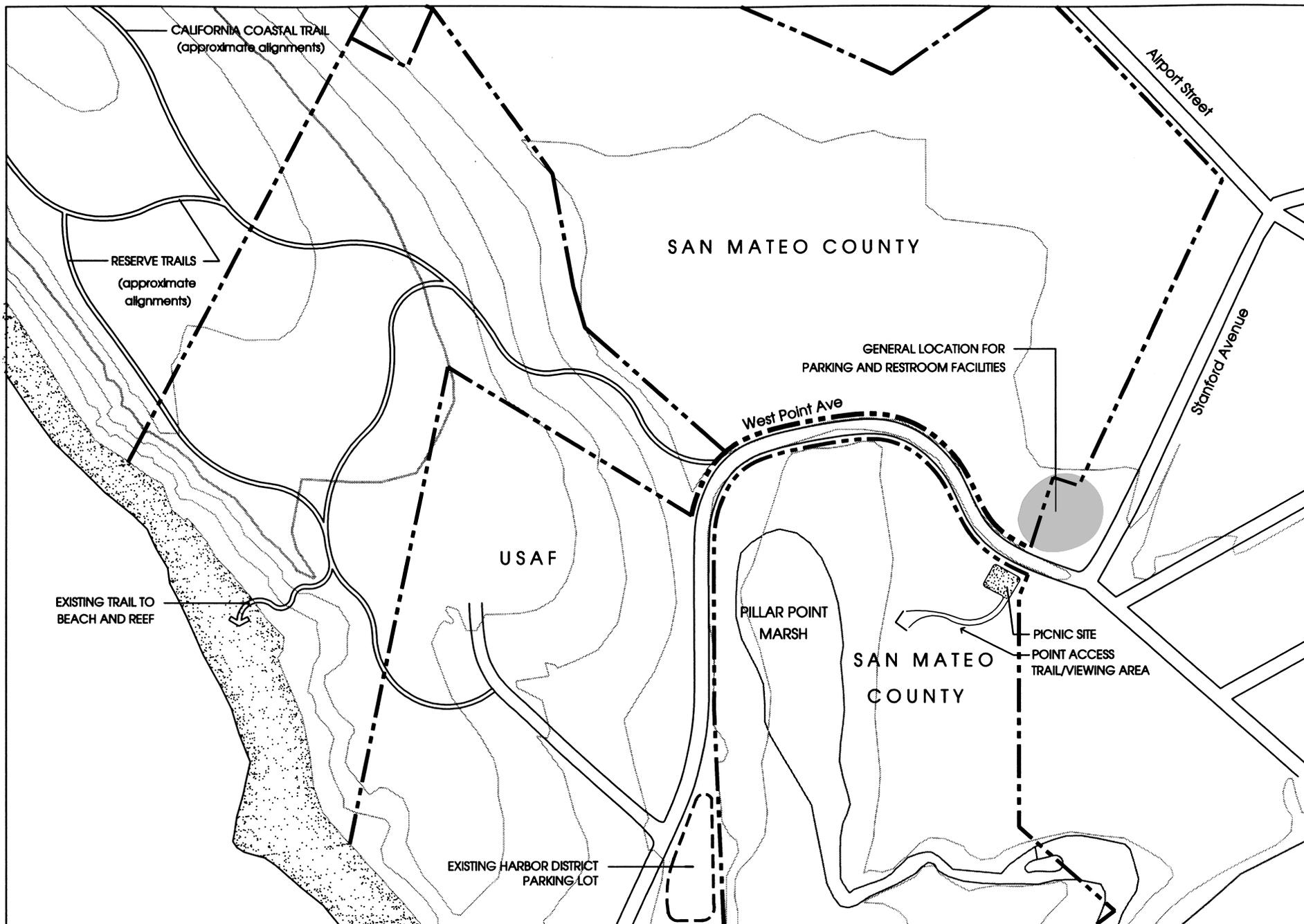
The parking area will accommodate up to 40 passenger vehicle spaces and three bus spaces. Assuming an average of two persons per passenger vehicle and 44 persons per bus, the parking area will accommodate 212 persons at peak capacity. With a limit of 200 persons at one time (PAOT) in the Reef, it is anticipated that the parking will be adequate to serve users. The Harbor District parking area now accommodates up to 20 cars, and is over capacity during peak visitor periods. As the site becomes better known, there may be times when the proposed amount of parking is inadequate to serve all visitors; however, it is anticipated that these peak times would be relatively few, since visitation is now staggered seasonally (surfing during winter, beach use during the summer, and birding in the spring and fall) and that visitors will adjust by planning visits during non-peak times. The parking area will

be designed with drainage improvements to avoid water quality impacts on the Marsh.



West Point Avenue, which is owned by the U.S. Air Force, will remain as access to the U.S. Air Force radar tracking station on Pillar Point. It will also serve as trail access to the Pillar Point area, to connect with the California Coastal Trail, and will serve as access to the Harbor District parking area for disabled, passenger drop-off, and loading/unloading, service and emergency vehicle use. Restrooms will be provided at the parking area.

Pillar Point Marsh Picnic Facilities. A picnic area will be developed near the parking area at Pillar Point Marsh. The area will be sited and landscaped to provide views of the Marsh, and screened from vehicular activity associated with parking.



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 6
GENERAL LOCATION, PILLAR POINT MARSH FACILITIES

F. IMPLEMENTATION PROGRAM

1. Recommended Management and Operations Staff

The Reserve staff has implemented a resource management model at the Reserve described as adaptive resources management.⁵ The adaptive resources management model is a triangular feedback loop that includes monitoring, community involvement, and resources management policy. This model has been successful in developing programs for scientific research and education; however, current staffing, which includes three full-time equivalent staff, is inadequate to manage the high levels of visitor use at the Reserve, and to fully implement the model. In order to effectively implement the adaptive management model, Reserve staff must be formally trained in marine biology, and additional staff is needed, in addition to on-going support from volunteer organizations and partnerships with educational and research institutions. Appendix C contains a list of tasks that have been undertaken by Reserve staff in its efforts to protect and monitor the marine life in the Reserve. It is anticipated that the Reserve Manager will also pursue supplemental funding for resource management, research and scientific programs identified in the Master Plan.

The projected staffing required to manage and operate the Reserve with implementation of the Master Plan is summarized in Table 1-3. It is recommended that staffing increase to six full-time positions. The applicable County personnel categories and the title are shown for each position. Minimum educational and professional qualifications are listed. The staffing profile assumes that, in addition to its regular activities of daily management, Reserve staff will oversee law enforcement and emergency response provided by County of San Mateo agencies other than the Parks and Recreation Division; oversee recreation partnership agreements with interested trail users for trail patrol and maintenance; and will supervise volunteer staff for the Education Center.

2. Recommended Actions

Recommended actions are listed below to implement the Visitor Management Program, the Resource Management Program and the Uses and Facilities Program. Table 1-4 lists these actions in order of priority.

⁵ This model is based on the "Reactive Resources Management" model developed by the National Park Service to manage National Park systems.

**Table 1-3
 SUMMARY OF STAFFING NEEDS**

Title	Estimated Annual Hours	Full-Time Equivalent Staff	Minimum Qualifications
Supervising Naturalist	2,080	1.0	Advanced degree in Marine Biology or equivalent subject; four years experience in park mgmt. w/ one year supervisory experience; First Aid & CPR certification
Marine Biologist	2,080	1.0	Advanced degree in Marine Biology or equivalent subject; three years experience in park facility mgmt.; First Aid & CPR certification
Naturalists	4,160	2.0	Undergraduate degree in Marine Biology or equivalent subject; First Aid & CPR certification
Park Ranger	2,080	1.0	First Aid & CPR certification; Peace Officer Certification
Naturalists Aide	2,080	1.0	First Aid & CPR certification
Total	12,400	6.0	

The County is responsible for all management activities; this table lists those entities that would assist the County in implementation of each action. Consultants with special expertise may be required for specific tasks, as noted in the table.

Visitor Management Program

Most policies of the Visitor Management Program focus on restructuring and limiting the levels of visitation, and enforcing restrictions on visitor numbers and activities in the Reserve. These activities should be undertaken immediately. Table 1-3 lists those policies that should be enforced as soon as staff capabilities permit.

Resource Management Program Recommended Actions

1. The Reserve staff should be expanded, as described above, to manage and operate the Reserve, and control visitation levels.
2. San Mateo County and the California Department of Fish and Game, with participation by the Gulf of the Farallones National Marine Sanctuary and the Monterey Bay National Marine Sanctuary, will jointly develop a monitoring program for the Fitzgerald Marine Reserve that will achieve the following objectives: 1) provide information to establish a baseline for future scientific, research and monitoring activities; 2) monitor effectiveness of the Fitzgerald Marine Reserve Master Plan; 3) to determine impacts on intertidal reefs related to access, fishing and gathering activities and to implement

**Table 1-4
RECOMMENDED IMPLEMENTATION ACTIONS**

Action	Responsibility	Phasing
<i>Visitor Management Program Actions</i>		
1. Limit Visitor Use (Policies 1-5)	Reserve staff	Phase One
2. Enforce Parking Regulations (Policies 6-8 & 16)	Board of Supervisors; County Public Works; County Sheriff; Reserve Staff	Phase One
3. Limit Visitor Activities (Policies 9-19)	County Sheriff; Reserve Staff	Phase One
<i>Resource Management Program Actions</i>		
1. Expand Reserve Staff	County Department of Parks and Recreation (P&R); Reserve Manager	Phase One
2. Prepare Monitoring Program to determine impacts of visitation, fishing and gathering on resources	P&R; Reserve Manager; California Department of Fish and Game (F&G); National Marine Sanctuary (NMS)	Phase One
3. Develop Closure Plan (as needed)	F&G; P&R; County Park and Recreation Commission; County Board of Supervisors; F&G Consultants (marine biologists)	Phase One: as needed
4. Expand Reservation System	Reserve Manager	Phase One
5. Qualifications for Leaders	Reserve Manager; County Park and Recreation Commission; County Board of Supervisors; County Employee and Public Services Department	Phase One
6. Acquisition Program	P&R; County Park & Recreation Commission; County Board of Supervisors; California Coastal Conservancy; other non-profit organizations	Phase One
7. Partnerships Program	Reserve Manager and staff; Friends of Fitzgerald	Phase One & On-going
8. County Coordination	P&R	Phase One & On-going
9. Identify Funding Sources for Resource Management Programs	P&R; Reserve staff; Friends of Fitzgerald	Phase One
10. Prepare San Vicente Creek Restoration Plan	P&R; Reserve Manager; Consultants (hydrology, landscape architects)	Phase Two
11. Develop Habitat Management Plan for Red-legged Frog	P&R; Reserve Manager; Consultants (biologists)	Phase Two
12. Prepare Water Quality Plan (to improve water quality in drainages and reduce erosion)	P&R; Reserve Manager; Consultants (hydrologists, engineers)	Phase Two
13. Prepare Vegetation Management Plan	P&R; Reserve Manager; Consultants (biologists)	Phase Two

Table 1-4 *continued*

Action	Responsibility	Phasing
14. Marsh Restoration Study	P&R; Reserve Manager; Consultants (biologists, hydrologists)	Phase Two
15. Develop Cultural Resources Management Plan	P&R; Reserve Manager; Consultants (cultural resources, historian)	Phase Two
16. Seek Marine Life Reserve Status	P&R; County Parks & Recreation Commission; County Board of Supervisors; F&G	On-going
<i>Uses and Facilities Program Actions</i>		
1. Identify Funding Sources for Capital Improvements	P&R; Reserve staff	Phase One
2. Facilities Development Program. Includes site and design studies for parking and restroom facilities (includes coordination with Harbor District)	P&R; Reserve staff; Consultants (landscape architects, architects, engineers)	Phase Three
3. Master Landscape and Trails Plan	P&R; Reserve staff; Consultants (landscape architects)	Phase Three
4. Educational & Interpretive Program	P&R; Reserve staff; Consultants (environmental education; graphic)	Phase Three
5. Sign Program	P&R; Reserve staff; Consultants (environmental education; graphic)	Phase Three

appropriate actions, and 4) to inform future decisions regarding Reserve management.

3. Reserve staff should develop a Closure Plan for Moss Beach Reef.

Closure normally requires construction of obstacles or barriers that will keep visitors away from sensitive areas. Currently, portions of the Moss Beach Reef are roped off each day at low tide as control areas to monitor the impacts of visitor access. This strategy appears to be effective in keeping visitors out of portions of the reef.

While a permanent barrier in the intertidal zone is difficult from an engineering perspective and visually unattractive, a temporary barrier can be erected during low tides; as an example, permanent anchors can be placed by sinking small-diameter holes into the reef, lining these with casings and capping them off. At low tides, the plastic caps would be removed and a temporary pole erected to support a fence of plastic netting. Corridors can remain open between closed areas where visitors may pass.

4. The County Department of Parks and Recreation will review and expand the reservations system for the Reserve as needed to implement policies that limit number of visitors.
5. The Reserve staff should develop a list of criteria and a protocol for applying the criteria by which to qualify group leaders for the Moss Beach Reef.
6. Develop a land acquisition program, in conjunction with the California Coastal Conservancy and other non-profit groups, to expand the Reserve boundary. A working committee of the County Park and Recreation Commission and Board of Supervisors should be established to coordinate efforts to acquire these lands for inclusion into the Reserve. The committee may include members of governmental agencies with jurisdiction in Fitzgerald and non-profit agencies organizations that may facilitate or fund acquisitions.
7. To reduce operations and management costs, the County shall continue to pursue and establish partnerships with volunteer groups, adjacent recreation areas, research and scientific institutions, adjacent landowners, and non-profit organizations for the operation and management of the Reserve.

The United States Air Force, which owns the radar tracking facility controlled by Vandenburg Air Force Base, prepared the Integrated Natural Resources Management Plan for the Vandenburg Air Force Base: Supplement, Pillar Point Station for Plan Period July 2001-July 2006. The Plan contains management goals for the Pillar Point Station. In response to the Air Force Integrated Resources Management Plan, the County of San Mateo Parks and Recreation Division suggests a Cooperative Agreement between the County and the Air Force as it relates to 1) trails and public access; 2) development of interpretation along bluff top trails; 3) red-legged frog habitat management in the Pillar Point Marsh; 4) control of dogs on the beach to just the upland areas on leash; 5) invasive vegetation species control, and 6) vegetation management along rights-of-way.⁶

8. The County Division of Parks and Recreation shall coordinate with other agencies and government entities, including departments, divisions and agencies of San Mateo County, as needed to implement the Plan.
9. Identify funding opportunities for resource management programs. Such opportunities may include grants and funds for scientific research and

⁶ Letter dated January 15, 2002 from Mary E. Burns, Director of the County of San Mateo Parks and Recreation Division. The letter is included in Appendix G of this report.

education development and special state, federal and local programs for marine life, wildlife and resource protection.

An example of such funding is the Coastal Impact Assistance Program grant from the State of California. The County has secured funding under this program for year 2002 to develop and implement a resource assessment program for the Fitzgerald Marine Reserve. The program will determine the amount of resource degradation (if any) from visitation, fishing and gathering, and propose actions that can best protect the Reserve's natural resources. The program will also evaluate the effect of the proposed actions.

10. Prepare a creek restoration plan for San Vicente Creek that will arrest creek erosion to the extent possible, remove fill within the creek drainage, and revegetate the creek channel and banks.
11. Develop a habitat management plan for the red-legged frog in San Vicente Creek and Pillar Point Marsh.
12. Prepare a water quality management plan for San Vicente Creek, the Sunshine Valley Creek drainage, Denniston Creek and Pillar Point Marsh that will include drainage improvements, BMPs, and enforcement of non-point source water quality regulations. The County should coordinate the Plan with local landowners, and the surrounding communities of Half Moon Bay, Moss Beach and Princeton.
13. Prepare a vegetation management plan to maintain and restore the Monterey Cypress grove and to protect native plant communities throughout the Reserve and Pillar Point Marsh. The Plan will include removal of non-native vegetation where feasible and appropriate.
14. Undertake a study to determine the feasibility of expanding the tidal marsh at Pillar Point Marsh across and north of West Point Avenue, into the area that is now freshwater marsh. The study should evaluate the potential impacts to plant communities and wildlife habitats that now exist in the freshwater marsh.
15. Develop a Cultural Resources Management Plan to guide management of cultural resources within the Reserve. These resources include the four identified archaeological sites and the Smith-Dolger home site. The Cultural Resources Management Plan should assess the presence of and potential for cultural resources, including prehistoric and historic archaeological sites, historic structures and buildings. The Cultural Resources Management Plan should provide for protection of the sites while allowing expanded interpretive and educational opportunities for visitors to the Reserve.

16. The County will continue to seek Marine Life Reserve status for the Fitzgerald Marine Reserve.

Changing the designation of the Reserve from an area of special biological significance (ASBS) and a Marine Reserve (Marine Life Refuge) to a Marine Life Reserve would be made as part of a new Master Plan for marine protected areas. (See discussion in Part I.A, #5 “History of the Preserve”.) This will depend on results of studies to monitor impacts to the Reserve’s resources (Resource Management Program Implementation Action #2) and funding for these studies is not yet available. In the Fitzgerald Marine Reserve area, the California Department of Fish and Game has management responsibility over waters below the average high tide line, and the County of San Mateo has management responsibility over areas above high tide line. Any limitations on access or fishing and gathering activities within the tidal zone or coastal waters would require approval of several entities, including the County Park and Recreation Commission, the County Board of Supervisors, and the California Department of Fish and Game. The County would coordinate with the Department of Fish and Game to implement such limitations.

Use and Facilities Program Recommended Actions

Program recommendations for specific facilities and improvements are set forth below.

1. Undertake a Facilities Development Program to design and construct the Reserve facilities, including the following:
 - Education Center building and associated facilities, including the parking area, entries, picnic area, and restrooms. This program should include a site landscape plan and infrastructure/services plan.
 - Pillar Point Marsh facilities, including the parking area, restrooms, and parking area. Current proposal is conceptual only. Additional siting and design studies to be undertaken by County as part of the San Mateo County Trails Plan (see also Topic 7: Access and Trails). The County should coordinate this effort with the Harbor District, the County of San Mateo, Half Moon Bay Airport and the community of Princeton.

The County will coordinate the design of the Education Center, Pillar Point Marsh facilities, and other facilities with the public and the community.

2. Develop a Master Landscape and Trails Plan for the Reserve that would include the Overlook Areas; the San Vicente Creek footbridge; fencing locations and designs; and trail system design and alignments. The trails

component of this Plan may require acquisition of land or trail easements (for example, to complete the link to Wienke Way).

The Master Landscape and Trails Plan will be coordinated with the San Mateo County Trails Plan to ensure that trails located within the Reserve are linked with surrounding public trails, and that the design is consistent with County standards. The San Mateo County Trails Plan will include the following components:

- Inventory of existing formal and informal trails, and service roads.
- Evaluation of existing trails, trailheads and parking needs.
- Specific trail use policies.
- Criteria for trail use by multiple users.
- Design and management guidelines to include guidelines for signage, parking, trail design, and construction and maintenance guidelines for trails.

The San Mateo County Trails Plan will be developed in a public planning process with input from the public and coordination with other agencies.

3. Develop an educational and interpretive program for the Reserve that includes the intertidal reefs, the uplands, the Marsh, the archaeological resources and the Smith-Dolger homesite. The program should be centered at the Moss Beach Education Center, but include all areas of the Reserve.
4. Develop an informational and directional signage program to inform the public of use restrictions at the Reserve, and to educate the public regarding natural and cultural resources.
5. Identify funding opportunities for capital improvements. Such opportunities may include grants and funds for recreation and education development and special State, federal and local programs for wildlife and resource protection. These funding sources often require local matching funds.

3. Phasing of Implementation

Phasing of the plan should occur in three phases, as described below and shown in Table 1-3.

Phase One (Year One). This phase includes those actions that should be undertaken immediately upon adoption of the Plan by the County. The first and most pressing of these actions is to expand Reserve staff so that the level of visitation can be controlled. All Visitor Management Program actions will be undertaken during this

phase, although some of them may not be fully implemented before actions associated with the Resource Management Programs and Use and Facilities are completed.

Phase Two (Year Two). This phase could be undertaken during the first year, or it could follow Phase One. Actions recommended for this phase will require funding and team organization to accomplish. Ideally they could be implemented in an integrated effort with design and development of uses and facilities in a Resource Management and Facilities Plan process; however, if resources are limited, these actions should occur before development of facilities.

Phase Three (Years Three through Five). This phase will include physical development of facilities and completion of the educational and interpretive program. Funding must be identified for this phase, and resource management and visitor management programs will be underway prior to its completion.

Fitzgerald Marine Reserve Draft Master Plan

PART TWO: ENVIRONMENTAL SETTING

A. LOCATION AND SETTING

This section describes the location and physical setting for the Fitzgerald Marine Reserve and the Pillar Point Marsh.

1. Fitzgerald Marine Reserve

The Fitzgerald Marine Reserve (Reserve) is managed by the County of San Mateo Parks and Recreation Division. As shown in Part One, Figure 1, it is located adjacent to the town of Moss Beach, on the north coast of San Mateo County. The site is approximately 7 miles north of Half Moon Bay and 15 miles south of San Francisco via Highway 1. It is approximately one-quarter mile west of the highway and is bordered around the north end by the Moss Beach and Seal Cove residential neighborhoods and around the south end by a mix of undeveloped and developed property. The Montara Light Station, owned by the U.S. Coast Guard, and a Mid-Coast Sanitary District pump station are located to the north of the Reserve. Near the south end is the Half Moon Bay Airport; a Pillar Point Station, radar tracking facility controlled by Vandenberg Air Force Base;⁷ and Pillar Point Harbor. The Moss Beach Distillery Restaurant and a bed and breakfast are located adjacent to the central portion of the Reserve in the Seal Cove area. Residential development extends south to the terminus of Ocean Boulevard, approximately at the mid-point of the length of the Reserve, beyond which are several parcels of vacant property. The site and surrounding areas are shown in Part One, Figure 2.

The Reserve extends 3 miles south from Point Montara (at the northern end of Vallemar Street) to the south end of Pillar Point and 1,000 feet west into the ocean from the mean high tide line. The Reserve covers 402 acres, including 370 acres of

⁷ The United States Air Force, which owns the radar tracking facility controlled by Vandenberg Air Force Base, prepared the Integrated Natural Resources Management Plan for the Vandenberg Air Force Base: Supplement, Pillar Point Station for Plan Period July 2001 - July 2006. The Plan contains management goals for the Pillar Point Station.

intertidal and subtidal marine habitat below the high tide line and 32 acres of upland coastal bluffs with elevations ranging between 0 and 100 feet. The facilities and parking lot are on North Lake Street within the Moss Beach neighborhood, off to the east side of the main body of the Reserve, which is dominated by a 75-year old grove of Monterey cypress originally planted as a wind break. To the north and south of this area, the Reserve is essentially a narrow band of shoreline consisting of intermittent beaches, coastal bluffs, and intertidal reefs. The intertidal zone is one of the most biodiverse intertidal regions in the state accessible at low tide. Most of the reefs are accessible only during low tide periods. The reefs receive high levels of use primarily because of their close proximity to the San Francisco Bay Area's dense population centers.

2. Pillar Point Marsh

Pillar Point Marsh (Marsh) is located near the south end of the Reserve, separated by the Pillar Point Ridge. The Marsh is bordered on the north by a mobile home park, on the east by the airport, on the south by light industrial and residential property in Princeton and Pillar Point Harbor, and on the west by the U.S. Air Force radar station and an undeveloped 22-acre parcel of private land. West Point Avenue crosses the Marsh, providing access to the tracking station and Harbor District's parking lot, which receives a high level of use from surfers and other recreationists.

B. VISITOR USE AND PROGRAMS

Visitor use plays an important role in meeting the educational mission of the Reserve. However, visitor use is also the primary cause of the deterioration of the natural resources, especially those in the intertidal zone. Since preservation is the other mission of the Reserve, the right balance between the two missions is essential.

1. Visitor Use

a. Reserve. Although there are annual fluctuations, the general trend in visitor use is toward steadily increasing use. The Reserve had approximately 79,000 visitors in 1970 (the first full year of operation) as compared to 135,540 visitors in 1993 (the peak use year to date), an almost two-fold increase in visitors. Approximately 128,000 visitors explored the Reserve in 1996.

Peak seasonal use at the Reserve is during the spring low tides (March through May) and during the summer months, when the weather is fair. During these periods, up to 15,000 people may visit the Reserve in a month, at an average of approximately 500 people per day. This use tends to be concentrated during low tide weekends with up to 2,000 visitors per day. Conversely, the winter months draw the smallest crowds, with less than 5,000 visitors during the low use month of December.

School groups, including elementary, high school, and college classes, constitute a large group percentage of the visitors to the Reserve. Twenty-one percent of all visitors to the Reserve in 1996 were school groups (27,000 students in all). May is the peak month for groups because school is still in session, the weather is appropriate for outdoor field trips, and seasonal low tides occur. In 1996, a total of 103 groups (5,870 students) visited during the month of May. Elementary students are more likely to visit the beach and portions of the reef exposed during higher tides, whereas high school and college students are more likely to explore the outer reef exposed only at lower tides.

Visitor use is concentrated in the north end of the Reserve at Moss Beach Reef, the reef most accessible from the existing parking lot and visitors center on North Lake Street. Consequently, this portion of the Reserve's intertidal zone is the most heavily impacted, as indicated by significant reductions in biodiversity and species populations.

The reserve is open to the public from sunrise to sunset. Access to the Reserve is not restricted except for groups of 20 or more who are required to make reservations through the Coyote Point Museum in the City of San Mateo.

In 1993, Harding Lawson Associates produced a study to assess the impacts of visitor use on the Reserve's marine resources. Based on a limited amount of scientific data, the study concluded that in order to protect the Moss Beach Reef from further degradation, the carrying capacity of the reef, or the number of visitors allowed on the reef in any one day, should be restricted to 300 to 500 individuals. In response to this recommendation a limit of 500 persons per day was informally adopted. In general, this carrying capacity is exceeded on the weekends when the Reserve is visited by the public at large. It is occasionally exceeded during the week when additional groups who do not have reservations appear at the Reserve.

b. Marsh. Primarily because of its inaccessibility, the Marsh receives little use except from occasional bird watchers. However, visitor use of the Pillar Point area has also been growing as tourist facilities along the coast have developed and waves at Maverick's off Pillar Point have been discovered internationally by surfers. Pillar Point area visitors drive through the Marsh on West Point Avenue to the Harbor District's parking lot on the west side of the salt marsh and park along the road when the parking lot is full, which is most weekends.

2. Programs

a. Reserve. Educational and interpretive programs for the Reserve are sponsored by both the Coyote Point Museum and Friends of Fitzgerald Marine Reserve. The museum sponsors docent training and docent-led tours of the Reserve. There are approximately 60 docents who lead groups on two-hour visits of the Reserve and provide an introduction to the marine biology of the reefs. Docents lead groups out onto the reef and teach stewardship skills while assisting visitors to observe and touch the plants and animals. It is estimated that less than 20 percent of visiting groups take advantage of the docent program (pers. comm., Bob Breen).

On low tide weekends, two roving docents are at the Reserve to answer questions from the general public and lead informal tours. Docents monitor activity at the reef and discourage destructive behavior.

The Friends of Fitzgerald Marine Reserve, a 300-member organization, provide a number of educational services for the Reserve. They have developed a curriculum guide for school groups that is distributed at the Reserve to visiting groups. The Friends also sponsor a marine biology course at Half Moon Bay High School, teacher and docent workshops, programs for the general public, and junior ranger and junior naturalist programs during the summer months for younger students. They publish a quarterly newsletter focusing on the natural history of the Reserve.

b. Marsh. No formal educational programs or tours exist for the Marsh, although groups visit to observe the wildlife and perform bird counts. An annual bird study of Monitoring Avian Productivity and Survivorship (MAPS), an international program to monitor tropical migrating birds, is conducted in the spring and fall in the Pillar Point Marsh.

3. Utilities

The Fitzgerald Marine Reserve and Pillar Point Marsh are located in separate water and sewer districts. The existing Moss Beach visitor facility is located in the Citizens Utilities water district and the Montara Sanitation District. Pillar Point Marsh is located in the Coastside County Water District and the Granada Sanitary District.

The Marine Reserve currently has one water hook-up and one sewer connection at the restrooms near the visitor center. There is an indefinite moratorium on water hook-ups in the Citizens Utilities water district due to a lack of local water supply available to service expanded development in the area. An existing sewer hook-up moratorium is expected to be lifted in December 1998, upon completion of the Montara sewage treatment plant expansion.

Pillar Point Marsh has no existing utilities, and is not adjacent to existing water or sewer mains. The site is eligible for a priority water connection (approximately 1,000 priority water connections are available for County uses such as commercial or recreation services). The Granada Sanitary District also has priority capacity to service county projects. The marsh has one assessment and can have one sewer connection (allowing approximately ten drains).

4. Visitor Use Problems

a. Reserve. With steadily increasing visitor use over the last 28 years, the informally adopted carrying capacity of 500 people per day on the reef is frequently exceeded, especially on weekends and holidays when the tide is low, exacerbating adverse impacts from trampling, handling, and removal of marine resources. Weekend visitors account for about 95 percent of the enforcement incidents at the Reserve. In addition, many visitors use the Reserve for recreation and other purposes unrelated to the established mission of environmental education. Fishing is allowed by State Fish and Game Code regulations for many kinds of fish and abalone. School children are allowed to eat their lunches on the beach, which encourages undisciplined access to the reefs. Constant vigilance of the upland area is also required to keep dogs and bicyclists out, two uses that are specifically prohibited by San Mateo County Park regulations in the Reserve. Even when visitor use is well below the adopted level, existing facilities (the parking lot, visitors center, picnic tables, and restrooms) are inadequate to serve the needs of visitors and to

accommodate staff and docents. Long lines at the restrooms are common occurrences when school groups visit and on spring and summer weekends, and are aggravated on spring and summer weekends. Interpretive facilities and visitor information is lacking.

Visitor use impacts extend beyond the borders of the Reserve, as well. Traffic congestion and parking on the surrounding residential streets is a continuous annoyance to residents, along with trash, trespassing, and other related impacts.

Staffing at the Reserve is limited to the equivalent of three full-time staff members, including one full-time Reserve Manager and part-time park rangers and naturalist's aides, supplemented by docents and volunteers. Current staffing levels are inadequate to maintain and manage the high levels of visitation experienced during weekends and low tide periods.

b. Marsh. The Harbor District's parking lot frequently fills, causing traffic congestion and resulting in parking along the access road through the Marsh to Princeton. Unleashed dogs harass wildlife, and visitors disturb more sensitive species, especially shorebirds in the salt marsh. Growing use of Pillar Point Ridge is creating a maze of informal trails, destroying native vegetation in the process and exacerbating coastal bluff erosion. As more people become acquainted with the trails along the ridge and the extraordinary stretch of beach and reefs below, use of this area will intensify, along with impacts to vegetation and wildlife in the uplands, intertidal zone, and Marsh. Future development of vacant parcels near the Marsh in Princeton will also create adverse impacts. Although staff from the Reserve patrol the Marsh area on an as-needed basis, no permanent staff is assigned to management and maintenance of the area.

C. ACCESS

Access involves roads and parking lots for cars and buses as well as trail access for hikers and other types of trail users.

1. Vehicular Access

a. Reserve. Primary vehicular access from Highway 1 to the existing facilities at the Reserve is via California Street to North Lake Street or Nevada Street. There is a wooden sign marking the Reserve and a center turn lane for northbound traffic at the California Street/highway intersection. The paved parking lot can accommodate 42 cars. Between six and eight buses or 20 cars can park in an adjacent, unimproved overflow area. Secondary access is available from Highway 1 along Cypress Avenue, located several blocks to the south, with limited street parking near the Reserve. Cypress Avenue is not as wide as California Street and includes a narrow bridge over San Vicente Creek.

Adjacent to the Distillery Restaurant, the Leeb parcel has been developed for parking. Within this parking area, five spaces should be designated for public access. The County is planning to provide a trail from this parking area to the beach as part of the Fitzgerald Master Landscape and Trail Plan.

b. Marsh. Primary access to Pillar Point Marsh from Highway 1 is through Princeton-by-the-Sea via Capistrano Avenue, where there is a traffic signal, which leads to Stanford Avenue and West Point Avenue, 2 miles south of the Reserve entrance. West Point Avenue, a U.S. Air Force-owned road, also conveys traffic to the Pillar Point Radar Station and to the Harbor District's 20-car parking lot. West Point Avenue is a two-lane road designated a fire lane, where no parking is allowed. However, the fire lane is frequently blocked by overflow illegal parking from the Harbor parking lot. Airport Street runs parallel to and west of Highway 1, carrying traffic between Cypress Avenue to the north and Stanford Road to the south. Airport Street provides indirect access to the Marsh from the north and direct access between the Marsh and a northern portion of the Reserve.

2. Pedestrian Access

a. Reserve. Pedestrians enter the Reserve from the North Lake Street parking lot and from Cypress Avenue at Beach Way and Airport Street. From the parking lot, the northwestern trail leads to Moss Beach Reef and to blufftop trails above the reef. During the 1997/1998 winter storms, the pedestrian bridge over San Vicente Creek was washed out, prohibiting access to the bluffs from this direction. An informal trail leading southwest from the parking lot crosses the creek where a tree fell during the same winter storms and connects with blufftop trails in the Reserve.

The blufftop trails are heavily impacted from high visitor use, and were severely impaired by coastal erosion during the recent winter storms. Portions of the trailside wood rail fencing have been lost as the blufftop edge has retreated, and other portions are in danger of disappearing with continued erosion.

The trail to the beach from Cypress Avenue descends stairs halfway and a steep and unimproved slope on the remaining lower half. Visitors must step over a rusted pipe at the base.

Informal trails also occur north and south of this area of the Reserve, providing access to the shoreline for locals who are aware of them.

b. Marsh. The salt marsh is generally accessible from a Harbor District trail connected to the parking lot, West Point Avenue, and the beach. The trail is flat and wide. No trail access is available into or around the freshwater marsh, but numerous informal trails exist throughout the adjacent ridge area.

There is a proposed California Coastside Trail connection between Half Moon Bay and Pacifica that passes through or alongside the Reserve and Pillar Point Marsh. The trail would be accessible to bicyclists and equestrians, as well as hikers and dog walkers. Currently, there is no preferred alignment, but an easement for this trail must be provided as part of the Master Plan.

D. INTERTIDAL ZONE AND SHORELINE AREAS

This section describes the geologic and biological character of the Reserve's intertidal zone and shoreline. It also addresses the impacts that visitor use has had on the reef resources, and includes a summary of protective measures which apply to similar marine resource areas along the California coast.

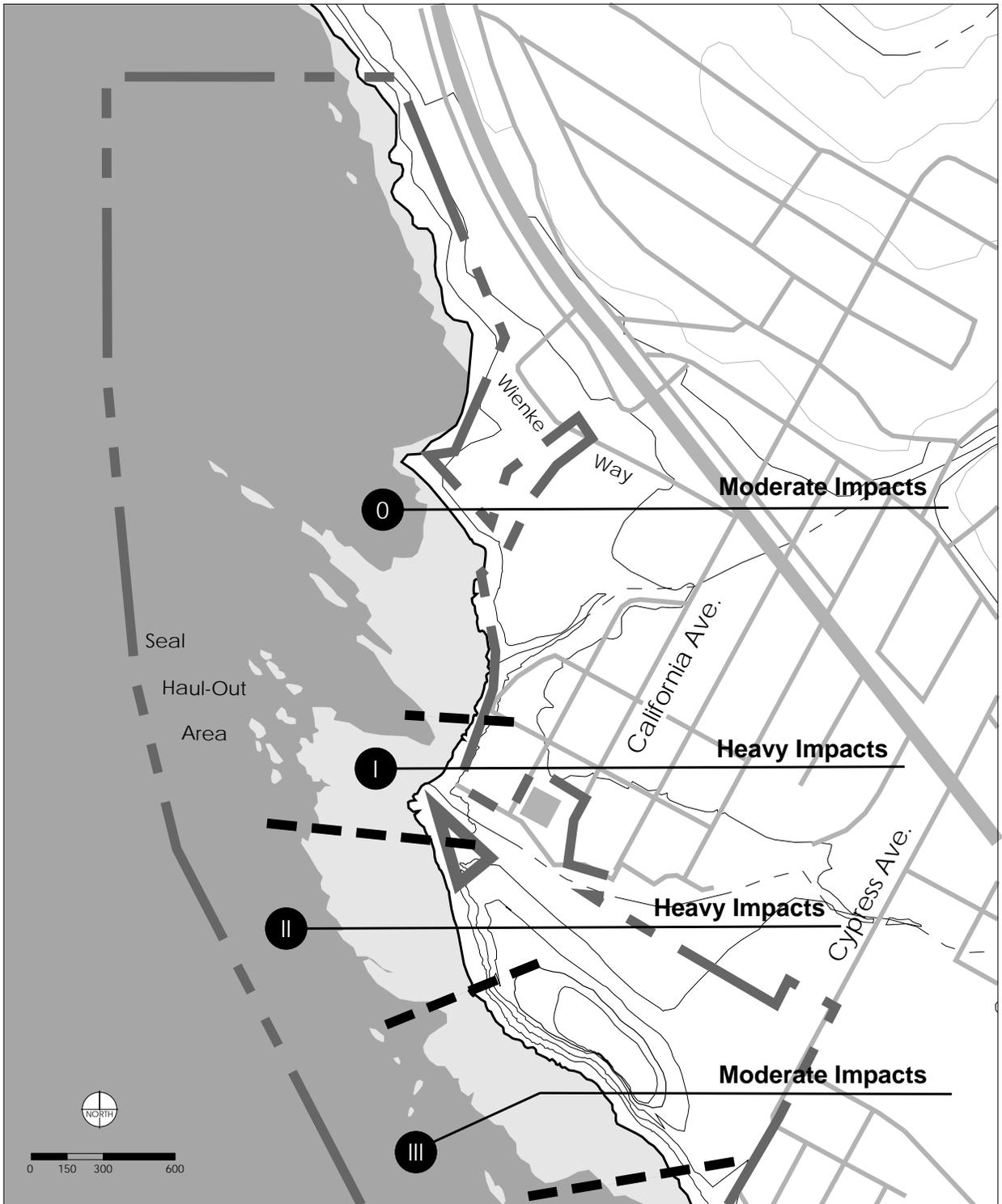
1. Marine Resources and Resource Conditions

The San Mateo Coast has offshore upwelling of nutrient-rich water during the spring and summer, complex geology with offshore rocks, sea level reefs and pocket beaches, and a generally mild and relatively constant marine-dominated climate. These conditions favor abundant and diverse marine life. It is not surprising, therefore, that the intertidal and marine resources within the Fitzgerald Marine Reserve are renown for their richness and diversity.

a. Geological Character. The rocky reefs, habitat of the marine life that is the Reserve's main attraction and source of learning, can be recognized as ten distinct areas along the 3-mile Reserve shoreline (Smith, 1993). These areas are identified as Areas O through IX in Figures 7 through 9, which were created from a variety of maps, aerial photographs, and field reconnaissance to generate a close representation of the Reserve's intertidal area for planning purposes.

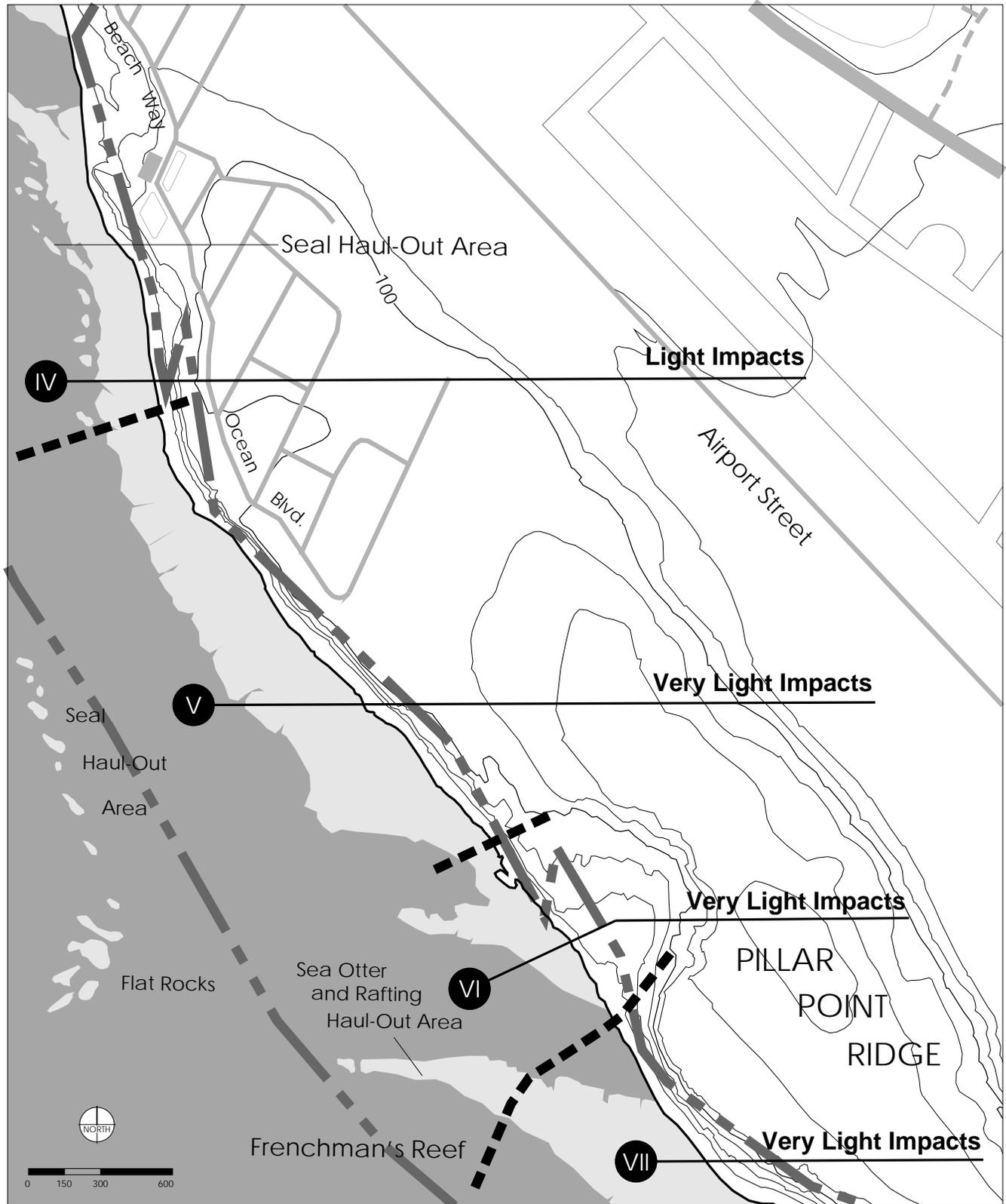
Area O extends from the northern boundary of the Reserve south to just north of San Vicente Creek. The shoreline is characterized by low cliffs, steep granodirite rocks and poorly developed offshore rocks that disperse the energy of incoming waves. The inshore reef in this area is characterized by a series of ridges curving seaward to the northwest from Kelp Cove.

The main Moss Beach Reef and those to the south (Areas I, II and III) consist of the seaward extension of Pliocene sedimentary rocks (sandstone, siltstone and mudstone) that form the bedrock of the high cliffs facing the beach. The northern-most portion of the Moss Beach Reef (Area I) is characterized by high-elevation offshore rocks that disperse wave energy for the lower-elevation inshore reef. The inshore reef is characterized by low-relief ridges, a few surge channels and an extensive lagoon that separates it from Nye's rock offshore. The middle section (Area II) consists of lower offshore rocks and low-relief rock inshore. At the juncture of Areas II and III, the reef is relatively narrow and close to the facing cliff. The southern portion of Moss Beach Reef (Area III) is virtually flat, with a few shallow surge channels cut through it. Area IV is bounded by Seal Cove and has an extensive series of offshore rocks that disperse the incoming wave energy. South of Seal Cove and north of Frenchman's Reef there is an area of shallow outcrops and large boulders (Area V).



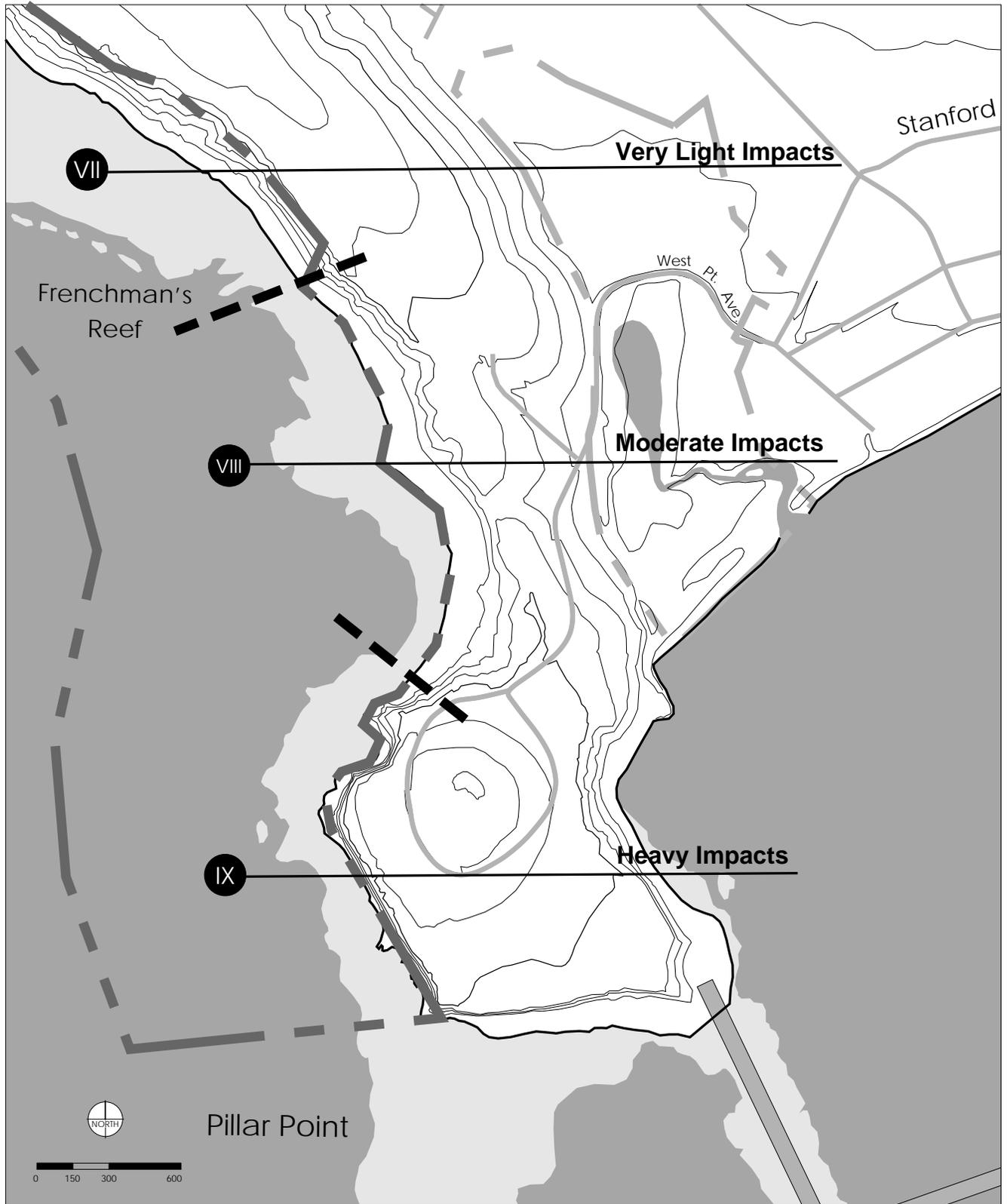
FITZGERALD MARINE RESERVE MASTER PLAN

Figure 7:
VISITOR IMPACTS ON REEF - Northern Area



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 8:
VISITOR IMPACTS ON REEF - Central Area



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 9:
VISITOR IMPACTS ON REEF - Southern Area

This area includes the rocks below the Distillery Restaurant. Further south is Frenchman's Reef. The northern (Area VI) and middle (Area VII) portions of Frenchman's Reef have some protection from wave energy and an area of relatively low profile with deep channels. The southern end of Frenchman's Reef (Area VII) is exposed to high wave energy on the seaward side. It has deep surge channels and a protected inshore area. There are also extensive offshore rocks that lie northwest of the outer tip of Frenchman's Reef and outside the western boundary of the Reserve. An extensive beach lies inshore of the reef in Area VIII. Area IX, which extends around the southern end of Pillar Point, has a steep intertidal reef with high cliffs above the beach.

b. **Biological Resources.** As described above, the intertidal zones form a complex pattern that reflects local topographic irregularities and is influenced by wave action and exposure to air, resulting in a mosaic of habitats. Offshore rocks, such as those off Moss Beach Reef, Seal Cove, and Frenchman's Reef, dampen wave energy and generally allow a greater variety of marine life inshore. Under rocks and ledges, in semi-isolated tide pools, in rock crevices, within dense mussel aggregations, in the holdfasts of algae, and in the root systems of eelgrass, wave energy is dampened even more, promoting an even greater variety of generally more delicate organisms. The reefs are also incised by surge channels where animals that can withstand vigorous water movement (e.g., sea urchins in solution basins) can benefit from the abundant plankton supply. Tidal action contributes to the diversity of the rocky reef environment by creating upper, middle and lower intertidal zones with differing exposure to air. These zones are characterized by distinct associations of animals and plants. The greatest abundance and diversity of marine organisms occur in the lower intertidal zone. The adjacent sandy beaches have relatively few species.

The large, dominant organisms in the upper intertidal zone are rockweed (*Fucus gardneri*), barnacles (e.g., *Balanus* and *Chthalamus*) and limpets (*Lottia* spp., *Acmaea* spp., *Collisella* sp.). In the middle intertidal zone, dominant organisms include California mussels (*Mytilus californianus*), the giant green sea anemone (*Anthopleura xanthogrammica*) and the black turban snail (*Tegula funebris*). The lower intertidal zone has a large variety of organisms but some of the more common dominants include surfgrass (*Phyllospadix torreyi*), the brown turban snail (*Tegula brunnea*) and the ochre star (*Pisaster ochraceus*).

In an analysis of the biological monitoring conducted by Reserve staff and volunteers on Moss Beach Reef between 1973 and 1991, 164 species (or taxa) of invertebrates were identified, and 60 of these were only seen once (Smith, 1993). Some of the most common groups were sea anemones, the molluscs (including snails and limpets),

echinoderms (sea stars), and arthropods (crabs and barnacles). On the nine transects that were regularly sampled, there were only five species that appeared on all transects: the anemone, the hermit crab (*Pagurus samuelis*) and the snails (*Tegula funebris*, *Tegula brunnea* and *Collisella pelta*).

No surveys of the intertidal and subtidal fishes of the Reserve have been conducted, but various blennies, eels and other rocky reef fishes (e.g., *Sebastes* spp) have been observed on the coast.

Overall, algal flora and surfgrass (*Phyllospadix torreyi*), a higher plant with true roots, are rich in the Reserve, with over 134 species identified, although this number may quadruple with more detailed work (Kjeldsen, 1993). Most of the species found on the Monterey Peninsula, which is one of the richest areas on the globe for algae, might be expected to occur in the Reserve. Typical of the entire central California coast, the green brown and red algae are the dominant groups. Common green algae are *Enteromorpha* spp., common brown algae are *Fucus gardneri* and *Laminaria* spp., and common red algae are *Mastocarpus caniculata* and *Iridea splendens*. The eel grass is common in certain areas such as Area III.

Common marine birds in the Reserve include Western, Mew and Herman's gulls; the Merganser, Brandt, surf scoters and white-winged scoters (sea ducks); and black oystercatchers, willets and sanderlings (shorebirds).

The most common marine mammal is the harbor seal. There are seven harbor seal haul-outs in the Reserve: the rocks around Nye's rock; the outer reef in Area IV; and the rocks outside of Reserve near Area V. These are also pupping areas. The pupping season starts in late winter. In the summer, sea lions and sea otters visit the Reserve. Sea otters are now permanent residents of the Reserve, the northern limit of their range. Sea otter rafting and haul-out areas are located around Area VI.

c. Impacts to the Reefs. As discussed in Section B of this memorandum, the Reserve receives extensive use by universities, colleges, high schools and grammar schools for teaching zoology, botany and marine ecology. In addition, fishermen, bird watchers, artists and nature lovers visit the intertidal reefs year-round. Subsistence gathering of invertebrates has a long history on the San Mateo coast and some illegal gathering still occurs at the Reserve. Visitation is not spread evenly throughout the year, but is heaviest from March through June when some very low tides occur during generally clement weather. There may be up to 2,000 people on Moss Beach Reef (Areas I, II, and III), the area that receives the greatest amount of use in the Reserve, for several hours during a low tide on a nice spring day.

While the study of marine animals and plants is an enlightened use of the seashore, naturalists have historically approached the study of marine organisms by collecting animals and plants during low tides and taking them to an inland laboratory or classroom for study. In the recent past, this resulted in depletion of a species, whose final disposition was a jar of formalin, a plant press, or a bucket, where specimens were left to rot.⁸ Indiscriminate collecting was considered acceptable through the first half or so of the 20th Century when the population of California was less than 15 million people. However, as the population doubled, it became clear that limitations were necessary if the abundance and diversity of the rocky intertidal reefs such as Moss Beach Reef and Frenchman's Reef were to be preserved. Outreach and education have reduced species collection.

There are a variety of specific human activities that continue to impact intertidal marine life. Foremost among these are the trampling of delicate algae and invertebrates, continued illegal collection of animals, displacement of animals, and turning rocks without replacement (Smith, 1993). Fishing (mainly for under-rock eels) and abalone harvesting have also removed some animals from the area, but it is not known with much certainty whether these activities have had a long-term negative impact on the eel and abalone populations. In 1999, the California Department of Fish and Game prohibited both commercial and recreational fishing for all species south of San Francisco. This was based on a series of studies that documented the decline of abalone in central and southern California and the importance of protecting deep water refuges (Karpov et. al., 1997,1998).

A high degree of scientific certainty in distinguishing human impacts from natural variability is difficult to achieve due to the lack of baseline data on pre-impact conditions, which probably existed around the turn of the century. However, data from a monitoring program instituted in April 1994 indicates that in areas protected from human impact on Moss Beach Reef, biological diversity has improved (pers. comm., Bob Breen). In the judgment of most scientists familiar with the Reserve, many groups of organisms are greatly under-represented or missing altogether from the intertidal biota on this reef. These include large and conspicuous animals such as crabs, starfish, sea urchins and large gastropods. In unprotected parts of Areas I and

⁸ The assumption that the study of marine animals necessitates their collection is probably best illustrated in *Seashore Animals of the Pacific Coast* written in 1927 by M.E. Johnson and H.E. Snook. The first chapter is dedicated to discussing the location of the best collecting grounds on the Pacific Coast and how to successfully collect marine animals. In the classic books on local marine biology *Intertidal Invertebrates of the Central California Coast* (S.F. Light, 1941) *Lights Manual* and *Between Pacific Tides* (E.G. Ricketts and J. Calvin, 1948), this approach is advocated. Later, the editors of "Light's Manual" revised their approach, saying that it was unnecessary to collect specimens, and removed maps of the Reserve's reefs in later editions.

II, there is a significant depletion of under-rock fauna. Missing components of the under-rock fauna include isopods (*Cirolana* spp.), amphipods (beach hoppers), ophiuroids (brittle stars), porcelain crabs, nemertean (ribbon worms), and sipunculids (peanut worms). Although algal diversity is relatively high and algae are plentiful, many of the leafy algae are missing and the growth forms of some species (e.g., *Cladophora*, *Fucus*) are reduced in height probably from trampling. Missing components of the crevice and under-ledge fauna over the entire Moss Beach Reef include tunicates, bryzoans and sponges. The algae and their holdfasts usually provide a niche that is rich in invertebrates, but a comparison between Frenchman's Reef and Moss Beach Reef revealed the absence of small crustaceans and molluscs in the latter area (Smith, 1993). Also missing were the known associates of specific algae and surfgrass: the isopod *Idotea stenops* on *Egregia*; and the mollusc *Notomacea incessa* on *Egregia*, and *Idotea montereyensis* and *kirchanskii* on *Phyllospadix*.

The increase of diversity in the protected areas supports the view that human collecting, trampling and displacement have had and continue to have a major adverse effect on the marine intertidal community. It is likely that the discharge of San Vicente Creek also has some influence on freshwater-intolerant species because there are too many missing groups in Areas I and II to attribute the effects only to human impacts.

It is also important to note that there is a decline in the numbers of certain invertebrates such as limpets, mussels, and hermit crabs during peak visitor use periods. This is probably due to foot traffic and displacement by visitors. Increases in these invertebrates occurs again in the fall and winter months, due to the protection of higher tides and lower visitor use.

Two species of under-rock eel are harvested by poke pole fishing in the reserve: the rock eel or rock prickleback (*Xiphister mucosa*) and the monkeyfaced eel (*Cebedichthys violaceus*). Available data indicate that the number of eels caught annually within the Reserve declined from levels of 600 to 800 individuals from 1972 through 1978 to levels between 100 to 300 individuals from 1980 through 1992 (Smith, 1993). The total number of eels caught, hours fishing and number of fisherman were roughly proportional each year from 1972 through 1988, when a sharp increase in the number of fishermen and hours fishing occurred without a concomitant increase in the total catch of eels. The decline in catch per hour suggests that the population of eels in the Reserve may be decreasing (Smith, 1993).

Abalone surveys conducted by Smith in 1993 confirmed that the Reserve has an abundance of excellent habitat for both juvenile and emergent abalone. However, few abalone were observed, possibly because of past removal by the few experienced divers and fishermen who account for the majority of the abalone take at the Reserve.

The level of impact (i.e., very light, light, moderate and heavy) on the rocky intertidal reefs in the Reserve is shown in Figures 7 through 9. These are qualitative assessments based on the recent observations and professional judgement of Applied Marine Sciences, with input from Dr. Ed Smith and Reserve Manager Robert Breen. Human impacts on the intertidal communities in the Reserve are currently being monitored, primarily on Moss Beach Reef near the northern entrance to the Reserve. Frenchman's Reef at the southern end of the Reserve and other portions of the coastline are receiving less research attention. The monitoring program is important for measuring change in the biological resources of the reef and determining the impact of visitor access.

2. Visitor Use Management and Carrying Capacity

As mentioned in Section B of this chapter, annual visitorship to the Reserve grew to over 135,000 in 1995. Up until 1971, a limited number of marine organisms were allowed to be removed for scientific study if they were returned to their habitats. However, this policy was not successful. Several arrests for illegal collections were made, which has helped stem much of the activity, but takings still occur. Given the limitations of Reserve staff and volunteers and the large size of the Reserve, it is relatively easy for visitors to pocket and collect invertebrates with only a minor risk of apprehension.

In 1992, a policy was adopted to limit the number of student visitors to 500 per day, following the recommendation that the carrying capacity of the reef be established at 300 to 500 visitors per day (Smith, 1993). However, visitation by the general public continues to be unrestricted, and total visitation usually far exceeds the recommended carrying capacity on spring and summer days with low tides. If the resources of the Moss Beach Reef, in particular, are to be protected from further degradation and/or restored to their former richness, the total number of visitors must not exceed this carrying capacity, and other measures must be taken to minimize the impacts of those who do visit the reef.

3. Other Coastal Reserves

The intertidal zone impacts of the Fitzgerald Marine Reserve are common along the entire coast of California and especially Southern California, although visitor use pressure at the Reserve is among the highest in the state. For example, in the Cabrillo National Monument, there have been recent observed reductions of birds and declines in abalone, sea stars, goose barnacles, owl limpets and other marine life from high visitorship (Engle and Davis, 1996). The establishment of Marine Protected Areas, including Reserves, has not reversed the problem.

Protective measures that have been implemented at other reserves and refuges along the Pacific coast are described in Table 2-1.

**Table 2-1
EXISTING PROTECTIVE MEASURES IN
CALIFORNIA MARINE PROTECTED AREAS (MPA)**

Name of MPA	Type of Restriction					
	Recreational Fishing			Commercial Fishing		
	In General	Fin Fish	Invertebrates	In General	Fin Fish	Invertebrates
Anacapa Island Ecological Reserve	A*	A*	A*	A*	A*	A*
Cabrillo National Monument	A*	A*	P	P	P	P
Catalina Marine Life Refuge	P	P	P	P	P	P
Duxbury Reef Reserve	A*	A*	A*	A	A	A
Farallon Islands Game Refuge	A	A	A	A	A	A
Fitzgerald Marine Reserve	A*	A*	A*	A*	A*	A*
Gerstle Cove Reserve	P	P	P	A*	A	A*
Hopkins Marine Life Refuge	P	P	P	P	P	P
Lover's Cove Reserve, Santa Catalina Island	P	P	P	A*	A	A*
Pismo Invertebrate Reserve	A*	A	P	A*	A	A*
Pacific Grove Marine Gardens Fish Refuge	A*	A	A*	A*	A*	P
Point Lobos Reserve	A*	A	A*	A*	A	A*
Point Loma Reserve	A*	A	P	A*	A	A*
Point Reyes Headlands Reserve	A	A	A	A	A	A

KEY: A = Allowed
A* = Allowed but limited.
P = Prohibited.

Source: Deborah McArdle, *California Marine Protected Areas*, 1997.

E. UPLAND AND MARSH BIOLOGY

This section describes the botanical and wildlife resources in the two project areas, the Reserve and the Marsh. For each topical area, information on the Reserve is presented first, followed by that on the Marsh. The types of information that are discussed include, in order: plant communities and plant species; special status plant communities and species; invasive non-native plant species; general wildlife habitats and species; and sensitive wildlife resources.

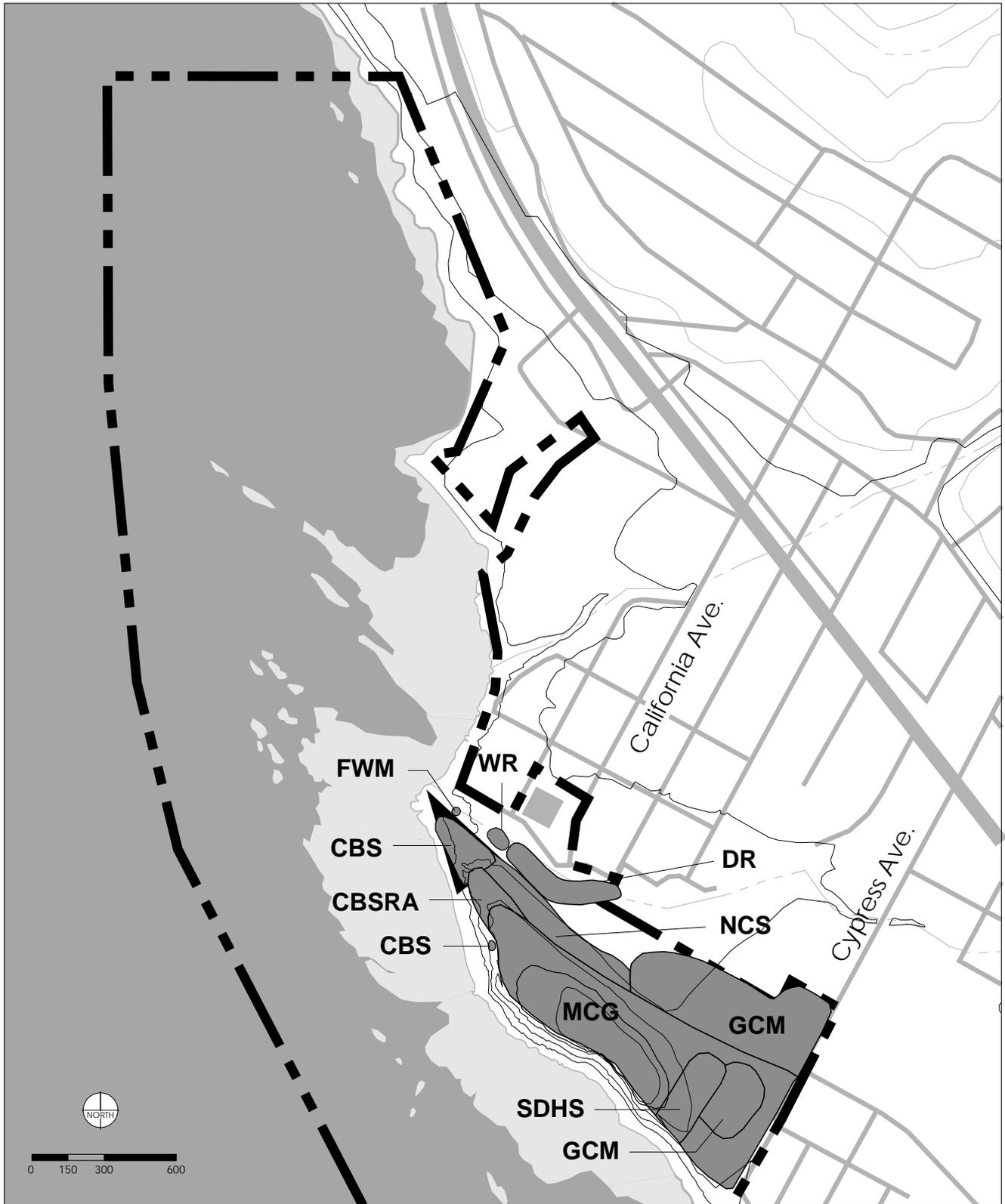
1. Plant Communities and Plant Species

Plant communities found in the Reserve and in and around the Marsh are shown in Figures 10, 11 and 12. The plant species observed during the November 1997 field surveys are listed in Appendix A-1 and A-2, and those observed in the past are listed in A-3 and A-4.

a. Fitzgerald Marine Reserve. The majority of the Reserve is comprised of non-native vegetation, including: Monterey cypress grove(s), invasive non-native species (e.g., German ivy, pampas grass), weedy species, ornamental plantings, and garden escapes. However, three sensitive plant communities are also present: northern coastal bluff scrub, central coast arroyo willow riparian forest, and freshwater marsh. The adjacent coastal bluffs are devoid of vegetation due to soil erosion.

(1) Central Coast Arroyo Willow Riparian Forest (WR). This sensitive plant community occurs as a remnant willow thicket approximately 100 feet long, adjacent to San Vicente Creek near the footbridge. Willow riparian thickets also occur in association with freshwater seeps on the sea cliffs at the southern end of the Reserve, where there is a large erosion “bowl” over 1,000 feet wide. The dominant shrub-like tree is arroyo willow (*Salix lasiolepis*). Additional native species include California blackberry (*Rubus ursinus*), hoary nettle (*Urtica dioica* ssp. *gracilis*), giant horsetail (*Equisetum telmateia* ssp. *braunii*), and California bee plant (*Scrophularia californica*). The herbaceous layer also includes non-native species, including: poison hemlock (*Conium maculatum*), field mustard (*Brassica rapa*), and German ivy (*Senecio mikanioides*). Pampas/jubata grass also occurs in scattered areas in the erosion “bowl”.

(2) Disturbed Riparian Drainage (DR). The native riparian trees and shrubs along the portion of the San Vicente Creek near the parking lot have been displaced by invasive non-native species, primarily German ivy, field mustard, and garden nasturtium (*Tropeolum majus*).

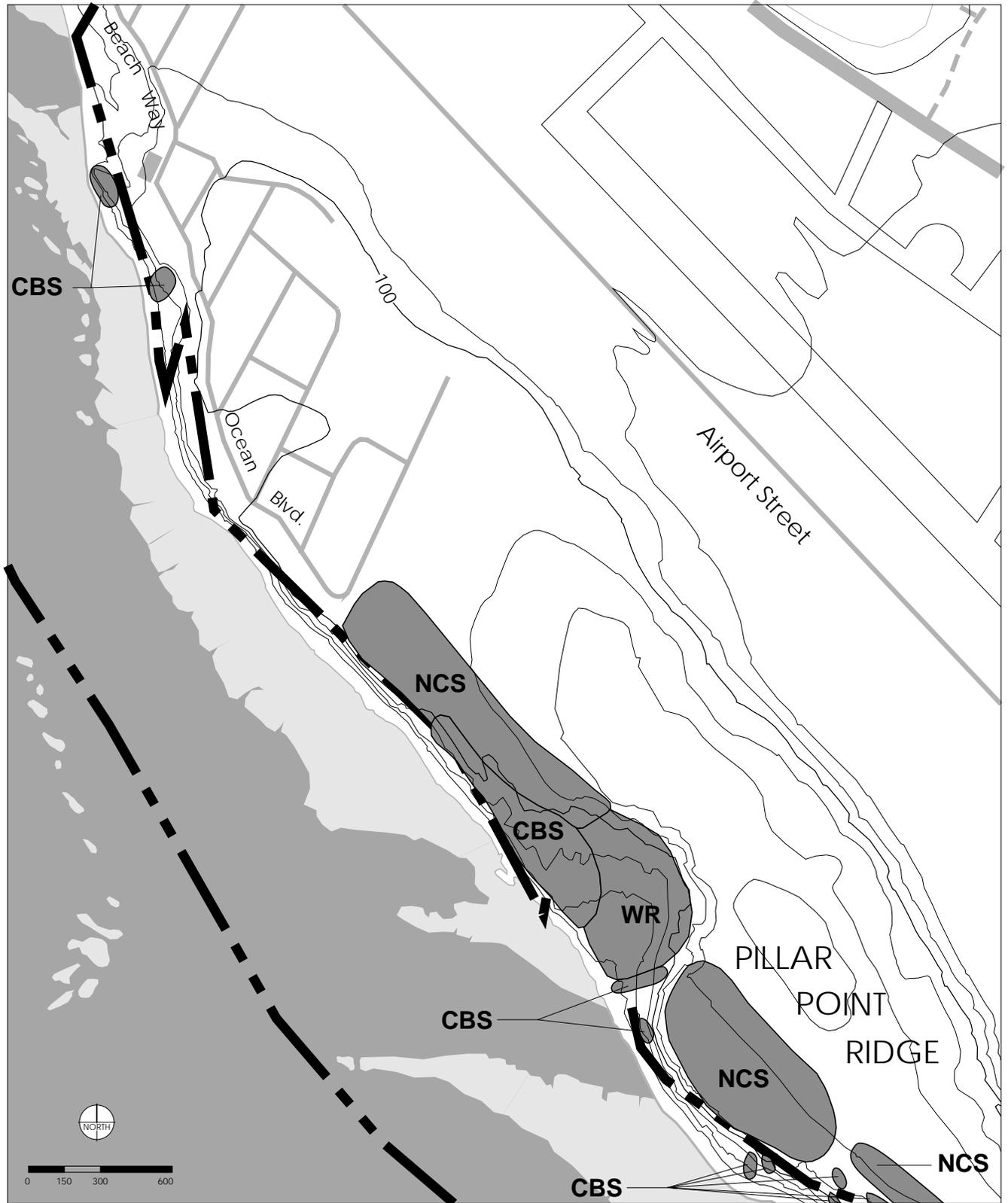


FITZGERALD MARINE RESERVE MASTER PLAN

Figure 10:

PLANT COMMUNITIES - Northern Area

FWM	Freshwater Marsh (Sensitive)	NCS	Northern Coastal Scrub
WR	Central Coast Arroyo Willow Riparian Forest (Sensitive)	MCG	Monterey Cypress Grove
DR	Disturbed Riparian Drainage	GCM	Non-native Grassland / Monterey Cypress Mosaic
CBS	Northern Coastal Bluff Scrub (Sensitive)	SDHS	Smith-Doelger Homesite (Ornamental Landscaping)
CBSRA	Northern Coastal Bluff Scrub Revegetation Area		

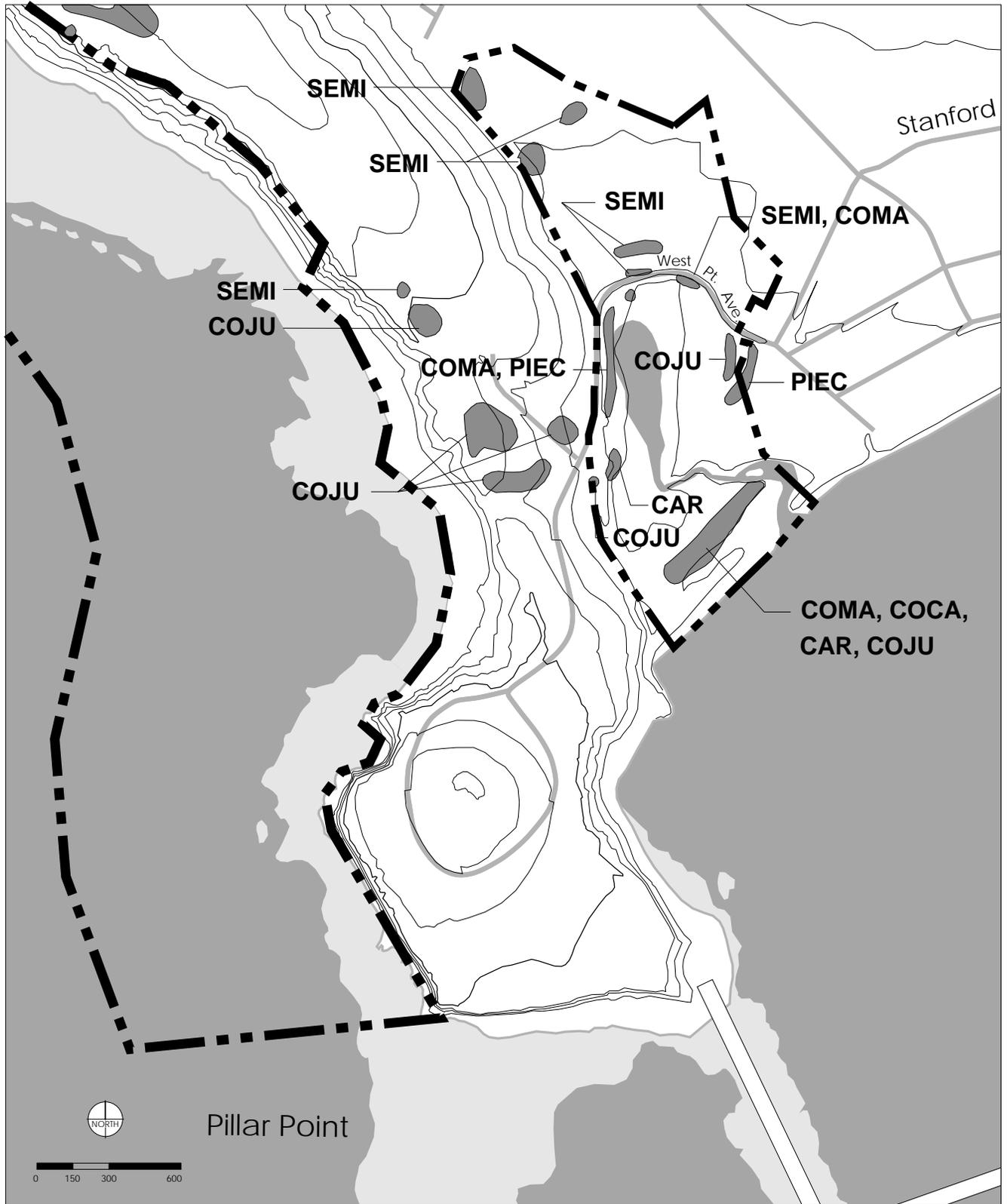


FITZGERALD MARINE RESERVE MASTER PLAN

Figure 11:

PLANT COMMUNITIES -Central Area

- NCS Northern Coastal Scrub
- WR Central Coast Arroyo Willow Riparian Forest (Sensitive)
- CBS Northern Coastal Bluff Scrub (Sensitive)



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 12:
SIGNIFICANT CONCENTRATIONS OF INVASIVE NON-NATIVE PLANTS - Southern Area

- | | | | |
|------|------------------------------------|------|--------------------------------------|
| CAR | Carpobrotus sp. (Sea Fig Iceplant) | PIEC | Picris echioides (Bristly Ox Tongue) |
| COCA | Conyza canadensis (Horseweed) | SEMI | Senecio mikioides (German Ivy) |
| COJU | Cordaderia jubata (Pampas Grass) | | |
| COMA | Conium maculatum (Poison Hemlock) | | |

(3) Freshwater Marsh (FWM). Freshwater marsh occupies a small area less than 30 feet wide and approximately 100 feet long along San Vicente Creek between the beach and downstream of the footbridge. The dominant species is slough sedge (*Carex obnupta*).

(4) Monterey Cypress Grove(s) (MCG). Monterey cypress (*Cupressus macrocarpa*) is the predominant plant community in the upland area of the Reserve. The tree overstory is dense, with little understory vegetation due to the dense shade and acidic leaf litter. Scattered herbaceous species (e.g., seaside daisy [*Erigeron glaucus*]) and non-native grasses grow along the boundaries, where more light is available. A revegetation area was established in 1992 in the northern portion of the Monterey cypress grove. Although many of the plantings failed, Douglas iris (*Iris douglasiana*) and native strawberry (*Fragaria chiloensis*) still remain, probably because they are more shade tolerant than other species planted.

(5) Non-Native Grassland/Monterey Cypress Mosaic (GCM). This plant community occurs along the eastern boundary of the Reserve and in the midden area near Cypress Avenue. It consists of a mosaic of non-native grassland with scattered Monterey cypress trees. The majority of the plant species are non-native herbs and grasses including: velvet grass (*Holcus lanatus*), perennial wild rye (*Lolium perenne*), cut-leaf geranium (*Geranium dissectum*), wild radish (*Raphanus sativus*), and oxalis (*Oxalis* spp.). The grassy field adjacent to the offsite bed and breakfast inn is dominated by non-native grasses and herbs (e.g., perennial wildrye, soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), cut-leaf geranium, and English plantain (*Plantago lanceolata*). Scattered Monterey cypress trees also occur in this field.

(6) Northern Coastal Bluff Scrub (CBS). This sensitive habitat is restricted to coastal bluffs at the Reserve on more gentle slopes and terraces. The most extensive areas of bluff scrub occur on the western slopes of Pillar Point Ridge south of the Reserve. Additional areas occur on the peninsula bluff west of the mouth of San Vicente Creek and on the bluff at the southwest end of Beach Way by the Distillery Restaurant. The majority of the vegetation is composed of low-growing native species, primarily lizard tail (*Eriophyllum staechadifolium*), prostrate coyote brush (*Baccharis pilularis*), poison oak (*Toxicodendron diversilobum*), varicolor lupine (*Lupinus variicolor*), blackberry, seaside daisy, native strawberry, and coast buckwheat (*Eriogonum latifolium*). Additional species include: yellow bush lupine (*Lupinus arboreus*), yarrow (*Achillia millefolium*), Pacific grindelia (*Grindelia stricta* var. *platyphylla*), and Douglas iris. German ivy and pampas grass are invading the coastal bluff scrub located near the corner of Ocean Boulevard and Beach Way.

Attempts have been made to re-establish coastal bluff scrub in an area that was graded for building pads in the 1960s. This area is located on the peninsular bluff west of the mouth of San Vicente Creek. Pacific grindelia has been successfully transplanted into this revegetation area, although many of the revegetation efforts have failed primarily because of the lack of topsoil and the prevalence of gophers.

(7) Northern Coastal Scrub (NCS). This scrub community occurs inland of the coastal bluffs, along portions of the eastern boundary of the Reserve. An area of northern coastal scrub also exists on the north-facing slope at the mouth of San Vicente Creek. Many of these plants are also found in the coastal bluff scrub community. However, the plants are taller than their bluff counterparts, which are exposed to harsher, windier conditions. The dominant species are coyote brush, lizard tail, and California blackberry. Additional species include: yellow bush lupine, California bee plant, poison oak, coast angelica (*Angelica hendersonii*), and native rushes (*Juncus* spp.). A portion of the northern coastal scrub adjacent to Cypress Flower Farms consists of a large patch of blackberry and sword ferns (*Polystichum munitum*).

Portions of the coastal scrub have been damaged by off-road vehicles, motorcycles, and mountain bikes. A highly disturbed area having a network of roads and eroded trails occurs beyond the south end of Ocean Boulevard. Pampas grass is invading these disturbed areas and gullies.

(8) Coastal Strand (CS). Small, scattered patches of coastal strand vegetation occur along the base of the cliffs adjacent to the beaches near Seal Cove and Pillar Point. These areas of coastal strand were observed from the cliffs above due to limited beach access during the field surveys. Plant species expected to occur include iceplant, sea rocket (*Cakile maritima*), coast buckwheat, beach evening primrose (*Camissonia cheiranthifolia*).

b. Pillar Point Marsh. The Marsh is divided by West Point Avenue. The lower coast side south of the road consists of a more saline environment and supports coastal salt marsh. The upper inland side north of the road is dominated by freshwater marsh and central coast arroyo willow riparian forest. German ivy is prevalent in one half of the willow thicket. The coastal salt marsh is relatively free of invasive non-native plant species, although ice plant, pampas grass, mustard, and radish occur there.

(1) Coastal Strand (CS). This plant community is distributed in a narrow band between the active sand dunes and water in the harbor. Woody species are typically not present, and the herbaceous species are salt-adapted. Common native species include American dune grass (*Leymus mollis*), native strawberry (*Fragaria chiloensis*), beach evening primrose (*Camissonia cheiranthifolia*), and beach bur

(*Ambrosia chamissonis*). Invasive non-native plant species include Chilean sea fig (*Carpobrotus chilensis*) and horseweed (*Conyza canadensis*).

(2) Coastal Salt Marsh (CSM). This sensitive plant community is the predominant wetland type at the Marsh and is distributed in areas exposed to salt water south of West Point Avenue. Pickleweed (*Salicornia virginica*) is the dominant plant species. Additional representative species include salt grass (*Distichlis spicata*), alkali heath (*Frankenia grandifolia*), and spear oracle (*Atriplex patula* var. *patula*).

(3) Northern Coastal Scrub (NCS). This community is characterized by low-lying shrubs scattered between grassy openings. It occurs in the more upland areas adjacent to the marsh. The dominant shrub species are coyote brush, coffeeberry (*Rhamnus californica*), and California blackberry (*Rubus ursinus*). The herbaceous layer is dominated by non-native plant species including bristly ox-tongue (*Picris echioides*), soft chess, and field mustard.

(4) Central Coast Arroyo Willow Riparian Forest (WR). This sensitive plant community occurs north of West Point Avenue, primarily in areas influenced by freshwater. Arroyo willow is the dominant woody species and forms large thickets around much of the freshwater marsh. To a limited extent, Coulter's willow (*Salix coulteri*) also occurs in northern portions of the marsh and in drainage ditches from the airport. Common understory species include California blackberry, swamp knotweed (*Polygonum coccineum*), and Pacific silverweed (*Potentilla egedii* var. *grandis*). Within the scrub habitat are patches of rushes (*Juncus* spp.), which are also associated with freshwater marsh habitat. German ivy and poison hemlock (*Conium maculatum*) are invading the willow thicket along West Point Avenue. The riparian forest has increased in extent compared to that observed by P. Flint in 1978.

(5) Freshwater Marsh (FWM). This sensitive plant community also occurs north of West Point Avenue, although there is small patch of freshwater marsh at the upper end of the salt marsh on the downstream side of the culvert beneath the road. Small areas of freshwater marsh also occur in isolated patches within and/or adjacent to the willow thickets growing to the north of the road. The dominant species are cattail (*Typha* spp.), bulrush (*Scirpus* spp.), Pacific silverweed, bog rush (*Juncus effusus* var. *brunneus*), California blackberry, and swamp knotweed. The extent of freshwater marsh has decreased compared to that observed by Flint in 1978 due to the encroachment of willow riparian habitat.

2. Special Status Plant Communities and Species

The plant communities and vegetation types occurring within the project area that are considered sensitive habitats according to the San Mateo County Local Coastal Program (LCP) (1992) and the County of San Mateo General Plan (1986) include: northern coastal bluff scrub and sea cliff vegetation; coastal salt marsh; freshwater marsh; riparian corridors; and central coast riparian woodland, as described above. Sensitive habitats are defined by local, State, or Federal agencies as those habitats that support special status species, provide important habitat values for wildlife, represent areas of unusual or regionally restricted habitat types, and/or provide high biological diversity.

At the State level, riparian plant communities are considered sensitive habitat and have been identified by the California Department of Fish and Game (CDFG) as habitat of special concern (Wetlands Resource Policy, California Department of Fish and Game Commission, 1987). Riparian habitat is valuable because it supports a high density and diversity of wildlife species and because it is a diminishing resource. Riparian vegetation provides forage and nesting habitat for a wide variety of wildlife species, many of which are not found in other habitats. According to the LCP (1992), riparian corridors should contain at least 50 percent cover of the following native plant species: red alder; jaumea; pickleweed; big-leaf maple; narrow-leaf cattail; arroyo willow; broad-leaf cattail; horsetail; creek dogwood; black cottonwood; and box elder.

Riparian and wetland habitats are subject to the San Mateo County grading ordinance and State and Federal regulations under the Section 1601-03 of the California Fish and Game Code and Section 404 of the Federal Clean Water Act. Vegetation removal and stream alteration are subject to one or more permits from the above agencies.

Special status plant species are species that are legally protected under the State and Federal Endangered Species Acts or other laws and regulations, and species considered sufficiently rare by the scientific community so that they may qualify for official protection. As of 1997, no focused surveys for rare, threatened, or endangered plant species had been conducted in the project areas.

Special status plant categories include:

- Plants listed or proposed for listing as threatened or endangered under the Federal Endangered Species Act (50 CFR 17.12 [listed plants] and various notices in the Federal Register [proposed species]);
- Plants listed or proposed for listing by the State of California as threatened or endangered under the California Endangered Species Act (14 CCR 670.5);

- Plants listed under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.);
- Plants that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines, Section 15380);
- Plants considered by CNPS to be “rare, threatened, or endangered in California” (Lists 1b and 2 in Skinner and Pavlik, 1994); and
- Plants listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution (Lists 3 and 4 in Skinner and Pavlik, 1994), which may be included as special-status species on the basis of local significance or recent biological information.

Literature review and searches of the California Natural Diversity Database (CNDDDB) and the CNPS Inventory of Rare Plants resulted in 24 special status plant species that are either known to occur or that have the potential to occur in the two project areas (Table 2-2). The majority of these species are associated with the northern coastal scrub community. The list is based on a review of special status plant species that are listed as occurring in San Mateo County by the CNPS (Skinner and Pavlik, 1994) and an assessment of their elevational distributions, and habitat requirements (i.e. soil type) according to the following references: Munz and Keck (1973), Hickman (1993), and the California Natural Diversity Data Base (CNDDDB, 1996). Table 2-2 lists the scientific name, legal status, and suitable habitat, as applicable for each of these special status plant species. The majority of the status codes/designations are updated as per the CDFG Natural Heritage Division Plant Conservation Program’s List of Endangered, Threatened, and Rare Plants of California (CDFG, 1996).

The CNDDDB Rare Find report resulted in eleven special status plant species that have recorded occurrences in the Montara Mountain quadrangle including San Francisco gumplant (*Grindelia hirsutula* var. *maritima*), Hickman’s cinquefoil (*Potentilla hickmanii*), San Francisco campion (*Silene verecunda* ssp. *verecunda*), and San Francisco owl’s clover (*Triphysaria floribunda*). Hickman’s cinquefoil had a recorded occurrence at Moss Beach in 1933.

Potential and known species of concern and their status codes are also listed in Table 2-2. No special status species were observed within the study area during the November 1997 reconnaissance surveys.

The San Mateo County Local Coastal Program (1992) also recognizes California wild strawberry as a locally unique species, and requires that any development within half-a-mile of the coast either avoid or mitigate against any removal or disturbance to native strawberry plants.

**Table 2-2
LIST OF SPECIAL STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR
IN THE VICINITY OF FITZGERALD MARINE RESERVE AND PILLAR POINT MARSH**

Common Name	Scientific Name	Status	Suitable Habitat in the Study Area	Observed November 1997
Blasdale's Bent Grass	<i>Agrostis blasdalei</i>	CNPS List 1B State none Federal FSC	<ul style="list-style-type: none"> • coastal bluff scrub^a • coastal dunes 	no
Choris's Popcorn Flower	<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	CNPS List 3 State none Federal none	<ul style="list-style-type: none"> • coastal scrub (mesic) 	no
Coast Lily	<i>Lilium maritimum</i>	CNPS List 1B State none Federal C1	<ul style="list-style-type: none"> • coastal scrub 	no
Coast Rock Cress	<i>Arabis blepharophylla</i>	CNPS List 4 State none Federal none	<ul style="list-style-type: none"> • rocky coastal bluffs^a • coastal scrub 	no
Coast Wallflower	<i>Erysimum ammophilum</i>	CNPS List 1B State none Federal FSC	<ul style="list-style-type: none"> • coastal dunes • coastal scrub (sandy) • coastal strand 	no
Fragrant Fritillary	<i>Fritillaria liliacea</i>	CNPS List 1B State none Federal FSC	<ul style="list-style-type: none"> • coastal scrub 	no
Hickman's Cinquefoil	<i>Potentilla hickmanii</i>	CNPS List 1B State CE Federal C1	<ul style="list-style-type: none"> • coastal bluff scrub^a • grassy meadows (vernally mesic) 	no ^b
Kellogg's Horkelia	<i>Horkelia cuneata</i> ssp. <i>sericea</i>	CNPS List 1B State none Federal FSC	<ul style="list-style-type: none"> • coastal scrub 	no
Marin Checkerbloom	<i>Sidalcea hickmanii</i> ssp. <i>viridis</i>	CNPS List 1B State none Federal FSC	<ul style="list-style-type: none"> • coastal scrub 	no
Mexican Mosquito Fern	<i>Azolla mexicana</i>	CNPS List 4 State none Federal none	<ul style="list-style-type: none"> • slow streams • wet ditches • freshwater marshes 	no
Michael's Rein Orchid	<i>Piperia michaelii</i>	CNPS List 4 State none Federal none	<ul style="list-style-type: none"> • coastal scrub • cypress forest¹ 	yes ^c

Table 2-2 *continued*

Common Name	Scientific Name	Status	Suitable Habitat in the Study Area	Observed November 1997
Native Strawberry	<i>Fragaria chiloensis</i>	CNPS none State none Federal none County locally unique	• coastal strand • coastal bluff scrub ¹	yes
Point Reyes Horkelia	<i>Horkelia marinensis</i>	CNPS List 1B State none Federal FSC	• coastal dunes • coastal scrub	no
Point Reyes Meadowfoam	<i>Limnanthes douglasii</i> ssp. <i>sulphurea</i>	CNPS List 1B State CE Federal FSC	• meadows (mesic) • marshes/swamps (freshwater)	no
Robust Spineflower	<i>Chorizanthe robusta robusta</i>	CNPS List 1B State none Federal FE	• coastal scrub • coastal dunes • coastal strand	no
San Francisco Bay Spineflower	<i>Chorizanthe cuspidata cuspidata</i>	CNPS List 1B State none Federal FSC	• coastal bluff scrub ¹ • coastal scrub • coastal dunes	no
San Francisco Campion	<i>Silene verecunda</i> ssp. <i>verecunda</i>	CNPS List 1B State none Federal FSC	• coastal scrub • coastal strand	no
San Francisco Gumplant	<i>Grindelia hirsutula</i> var. <i>maritima</i>	CNPS List 1B State none Federal FSC	• coastal bluff scrub • coastal scrub	no
San Francisco Lessingia	<i>Lessingia germanorum</i>	CNPS List 1B State CE Federal C1	• coastal scrub (sandy)	no
San Francisco Owl's Clover	<i>Triphysaria floribunda</i>	CNPS List 1B State none Federal FSC	• grassland	no
San Mateo Tree Lupine	<i>Lupinus eximius</i>	CNPS List 3 State none Federal FSC	• coastal bluff scrub ¹ • coastal scrub	no
Santa Cruz Microseris	<i>Stebbinososeris decipiens</i>	CNPS List 1B State none Federal FSC	• coastal scrub	no
Slender-leaved Pondweed	<i>Potamogeton filiformis</i>	CNPS List 2 State none Federal none	• shallow, clear freshwater drainage channels • marshes	no

Table 2-2 *continued*

Common Name	Scientific Name	Status	Suitable Habitat in the Study Area	Observed November 1997
Woolly-headed Lessingia	<i>Lessingia hololeuca</i>	CNPS List 3 State none Federal none	<ul style="list-style-type: none"> • coastal scrub • lower montane coniferous forest* 	no

- ^a Habitat not present in Pillar Point Marsh project area.
^b Observed in past: Hickman's cinquefoil, CNDDDB, 1933 at Moss Beach.
^c Orchid seen by Reserve docents under large cypress grove, identification in question.

CNPS Status:

- List 1B: These plants (predominately endemic) are rare through their range and are currently vulnerable or have a high potential for vulnerability due to limited or threatened habitat, few individuals per population, or a limited number of populations. List 1B plants meet the definitions of Section 1901, Chapter 10 of the CDF&G Code.
- List 2: Rare or endangered in California; more common elsewhere.
- List 3: This is a review list of plants which lack sufficient data to assign them to another list.
- List 4: List 4 is a watch list of plants with limited distribution in the state that have low vulnerability and threat at this time. These plants are uncommon, often significant locally, and should be monitored.

State List:

- CE = endangered
 CR = rare
 CT = threatened

Federal List

- FE = endangered
 FT = threatened
 C1 Candidate = sufficient data to support listing
 FSC = Federal species of concern

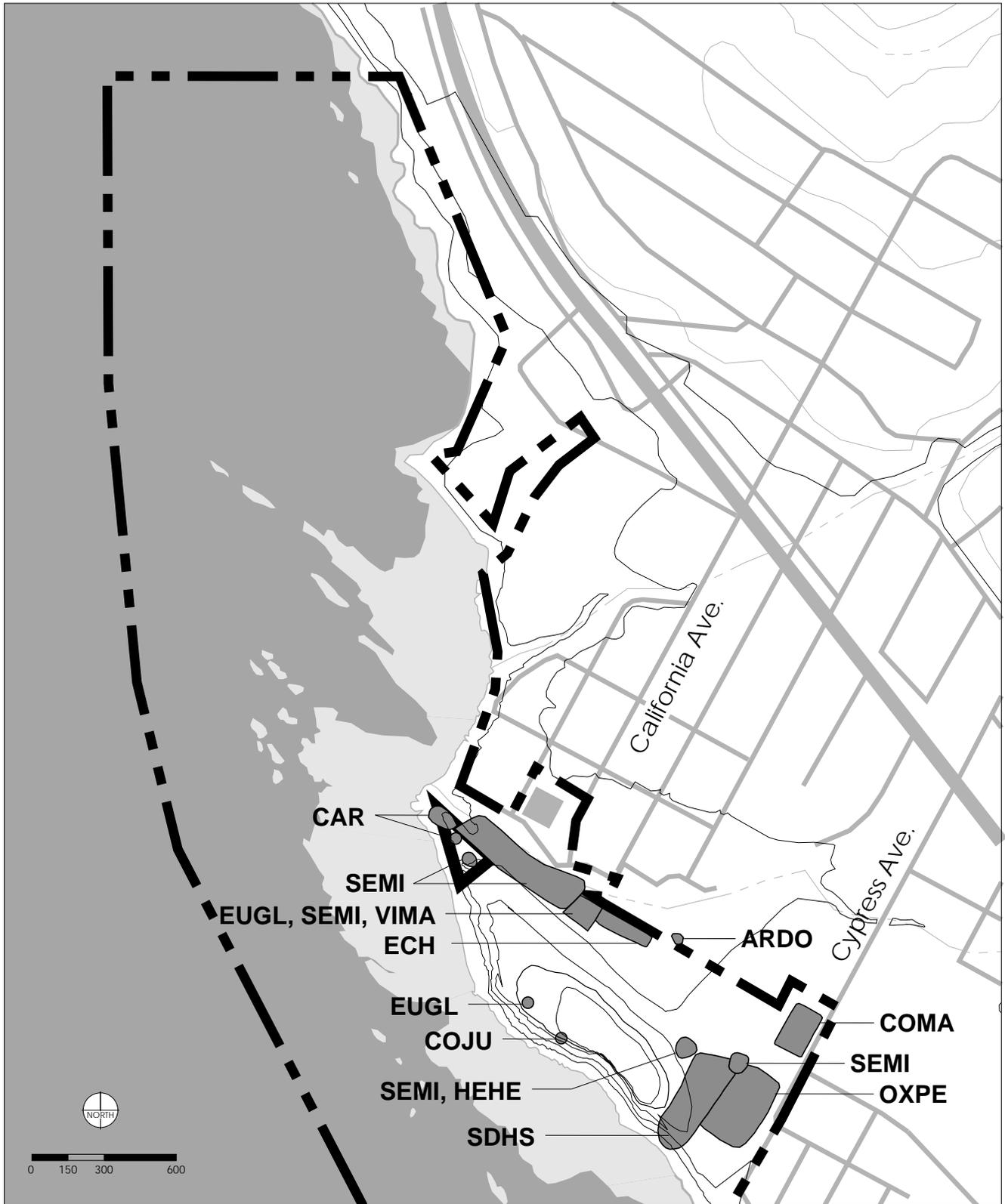
3. Invasive Non-Native Plant Species

The vegetation in the project area, particularly the Reserve, is dominated by invasive non-native vegetation that poses a threat to the natural biodiversity. Invasive non-native species are detrimental to the environment in several ways, including the: 1) exclusion of native flora through direct competition; 2) exclusion of native fauna that have not evolved with exotic plants; and 3) disruption of nutrient cycling. The San Mateo County LCP also encourages the removal of “weedy, undesirable plants”, including populations on private and public lands.

Species having a high priority for control include German ivy (*Senecio mikanioides*), English ivy (*Hedera helix*), pampas grass (*Cortaderia jubata*), poison hemlock (*Conium maculatum*), sea fig iceplant (*Carpobrotus edulis*, *Carpobrotus chilense*), iceplant (*Mesembryanthemum* sp.), periwinkle (*Vinca major*), bristly ox-tongue (*Picris echioides*), Bermuda buttercup (*Oxalis pes-caprae*), and blue-gum eucalyptus (*Eucalyptus globulus*).

a. Fitzgerald Marine Reserve. A list of the invasive non-native species observed during the November surveys is presented in Table 2-3, which also indicates either a high or low priority for removal. Figures 13 through 15 illustrate locations of these in the northern, central, and southern areas of the Reserve and Marsh. Several areas with significant concentrations of invasive non-native plants occur near the Reserve parking lot. The adjacent disturbed riparian drainage has been significantly altered by German ivy and sea fig iceplant. The bluffs surrounding this drainage also have patches of German ivy and sea fig iceplant, as well as large populations of bristly ox-tongue and non-native grasses (e.g., *Bromus diandrus*). Other species observed include nasturtium (*Tropaeolum majus*), *Pittisporum* sp. and mirror plant (*Coprosma* sp.).

Areas supporting Monterey cypress are considered non-native vegetation, as this grove is outside the natural range of the species. However, the grove represents little threat to the surrounding communities. The eastern edge of the grove has been invaded by German ivy, English ivy, and periwinkle. There is also a patch of giant reed (*Arundo donax*) growing on the Cypress Flower Farms parcel across the fence from the grove. Although this species is outside of the project area, it poses a threat to the Reserve. The bluff west of the grove has isolated pampas grass and a large patch of iceplant.

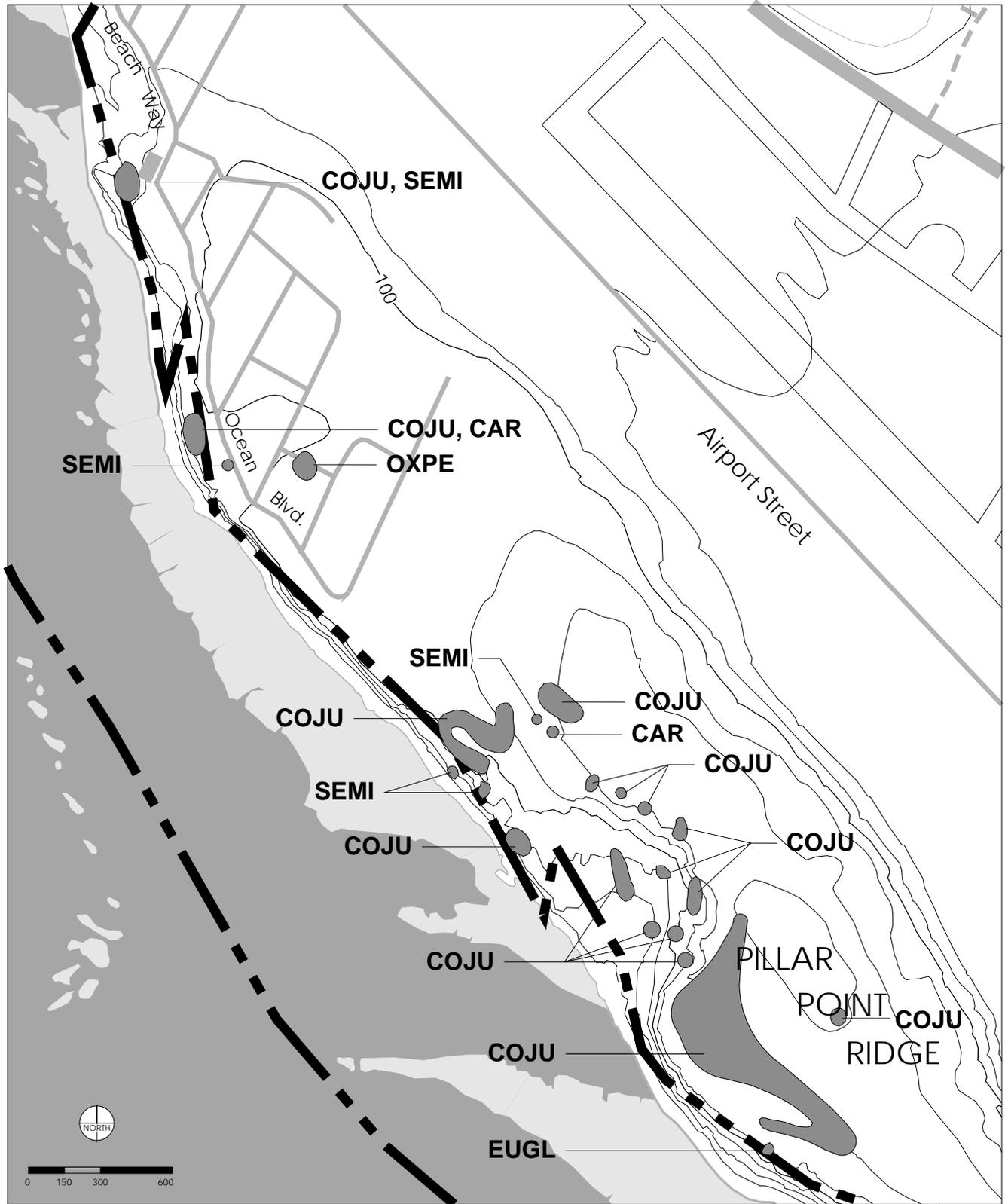


FITZGERALD MARINE RESERVE MASTER PLAN

Figure 13:

SIGNIFICANT CONCENTRATIONS OF INVASIVE NON-NATIVE PLANTS - Northern Area

ARDO	<i>Arundo donax</i>	HEHE	<i>Hedera helix</i> (English Ivy)
CAR	<i>Carpobrotus</i> sp. (Sea Fig Iceplant)	SDHS	Smith-Doelger Homesite (Ornamental Plantings)
COJU	<i>Cordaderia jubata</i> (Pampas Grass)	SEMI	<i>Senecio mikanioides</i> (German Ivy)
COMA	<i>Conium maculatum</i> (Poison Hemlock)	OXPE	<i>Oxalis pes-caprae</i> (Bermuda Buttercup)
ECH	<i>Echium</i> sp. (Viper's Bugloss)	VIMA	<i>Vinca major</i> (Periwinkle)
EUGL	<i>Eucalyptus globulus</i> (Blue-gum)		

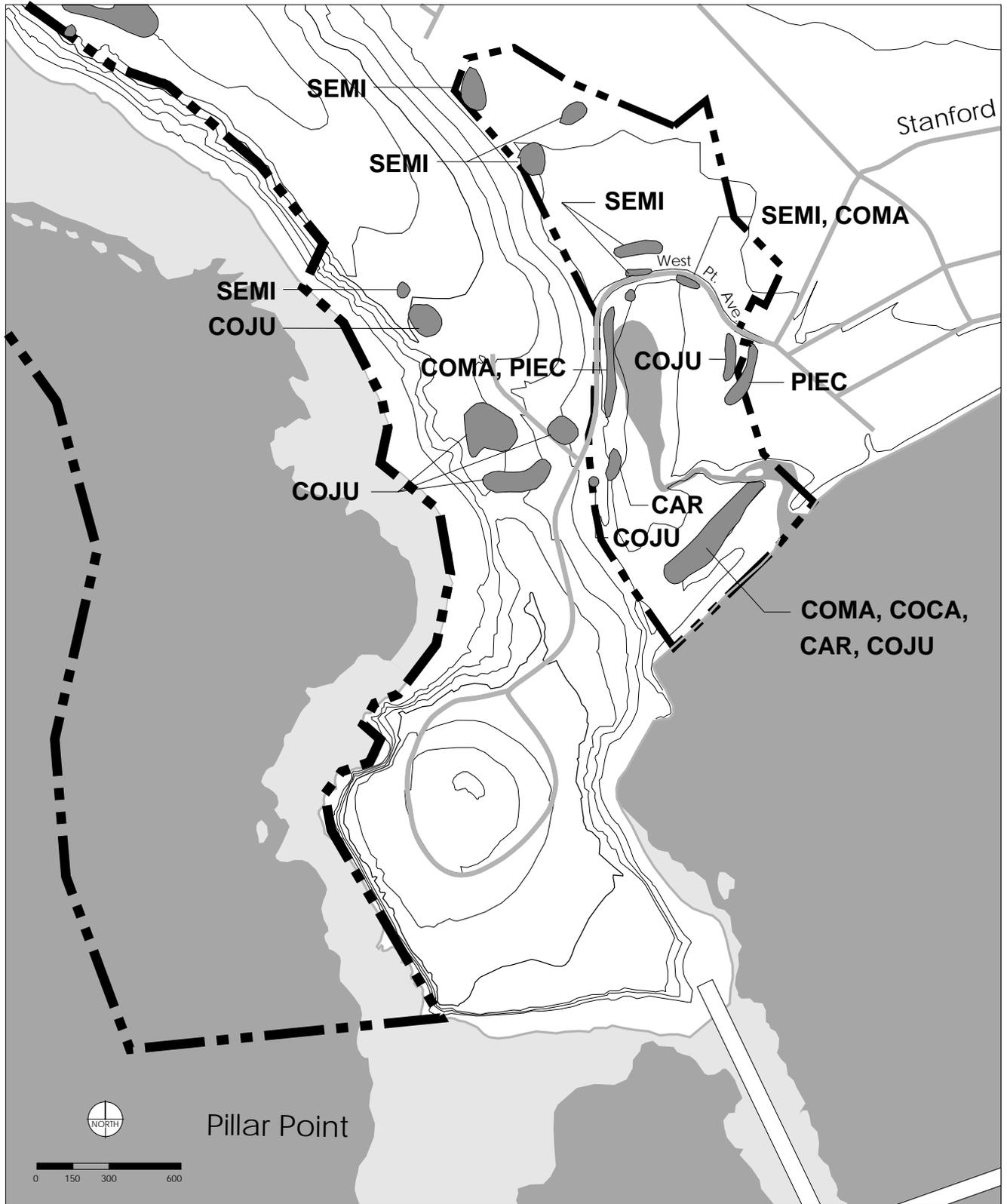


FITZGERALD MARINE RESERVE MASTER PLAN

Figure 14:

SIGNIFICANT CONCENTRATIONS OF INVASIVE NON-NATIVE PLANTS - Central Area

- CAR Carpobrotus sp. (Sea Fig Iceplant)
- COJU Cordaderia jubata (Pampas Grass)
- EUGL Eucalyptus globulus (Blue-gum)
- SEMI Senecio mikanioides (German Ivy)
- OXPE Oxalis pes-caprae (Bermuda Buttercup)



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 15:
SIGNIFICANT CONCENTRATIONS OF INVASIVE NON-NATIVE PLANTS - Southern Area

- | | | | |
|------|------------------------------------|------|--------------------------------------|
| CAR | Carpobrotus sp. (Sea Fig Iceplant) | PIEC | Picris echioides (Bristly Ox Tongue) |
| COCA | Conyza canadensis (Horseweed) | SEMI | Senecio mikiandodes (German Ivy) |
| COJU | Cordaderia jubata (Pampas Grass) | | |
| COMA | Conium maculatum (Poison Hemlock) | | |

**Table 2-3
INVASIVE NON-NATIVE PLANT SPECIES**

Common Name	Scientific Name	Priority for Removal
Bermuda Buttercup	<i>Oxalis pes-caprae</i>	High
Blue-Gum Eucalyptus	<i>Eucalyptus globulus</i>	High
Bull Mallow	<i>Malva nicaeensis</i>	Low
Bull Thistle	<i>Cirsium vulgare</i>	High
Bristly Ox-Tongue	<i>Picris echioides</i>	High
Cheese Weed	<i>Malva parviflora</i>	Low
Cotoneaster	<i>Cotoneaster</i> sp.	High
Canary Island Palm	<i>Phoenix canariensis</i>	Low
English Ivy	<i>Hedera helix</i>	High
French Broom	<i>Genista monspessulansu</i>	High
German Ivy	<i>Senecio mikanoides</i>	High
Giant Reed ¹	<i>Arundo donax</i>	High
Gorse	<i>Ulex europaeus</i>	High
Iceplant	<i>Mesembryanthemum</i> sp.	High
Monterey Cypress	<i>Cupressus macrocarpa</i>	Low
Nasturtium	<i>Tropaeolum majus</i>	High
Pampas/Jubata Grass	<i>Cortaderia jubata</i>	High
Periwinkle	<i>Vinca major</i>	High
Poison Hemlock	<i>Conium maculatum</i>	High
Ripgut Brome	<i>Bromus diandrus</i>	Low
Sea Fig Iceplant	<i>Carpobrotus edulis</i> , <i>Carpobrotus chilense</i>	High
Sweet Alyssum	<i>Alyssum</i> sp.	Low
Viper's Bugloss	<i>Echium</i> sp	High
Wild Mustard	<i>Brassica rapa</i>	Low
Yellow Dock	<i>Rumex crispus</i>	Low

^a Seen on the Cypress Flower Farm just north of the study area.

The area surrounding the Smith-Dolger homesite has many species of non-native plants found nowhere else on the Reserve. Potentially invasive exotic species include cotoneaster (*Cotoneaster* sp.), gorse (*Ulex europaeus*), French broom (*Genista monspessulansu*), and viper's bugloss (*Echium* sp.). Other invasive species of concern are English ivy and periwinkle. Many non-native ornamental plantings also occur at the homesite, including Canary Island palm (*Phoenix canariensis*), Australian Tea Tree (*Leptospermum laevigatum*), red eucalyptus (*Eucalyptus camaldulensis*), and chestnut (*Castanea* sp.). These species are not considered

invasive at the Reserve. The non-native grassland next to the homesite is dominated primarily by Bermuda buttercup. Non-native grasses and poison hemlock also occur.

The sensitive coastal bluff scrub near the corner of Ocean Boulevard and Beach Way is being rapidly overtaken by German ivy. Other invasive exotic plants identified on this bluff were pampas grass, wild mustard (*Brassica rapa*), and sweet alyssum (*Alyssum* sp.). German ivy on this site is of particular concern, given the sensitivity of the native habitat found at this site. The bluff at the end of San Lucas Street is dominated by iceplant and has scattered pampas grass plants.

b. Pillar Point Marsh. Significant concentrations of German ivy, pampas grass, poison hemlock, sea fig iceplant, Italian thistle (*Carduus pycnocephalus*), yellow dock (*Rumex crispus*), and bristly ox-tongue (*Picris echioides*) occur in the Marsh area (Figure 15). These invasive species do not occur in the coastal salt marsh, but are found in the surrounding areas, especially the coastal strand, willow thickets, and northern coastal scrub. The invasive non-native species observed within the Marsh study area are listed in Table 2-4.

The coastal strand plant community along the south end of the marsh is dominated by several patches of sea fig iceplant which are effectively limiting the distribution of native plants. Other species observed in this area include pampas grass, field mustard (*Brassica rapa*), poison hemlock, Italian thistle, horse weed, wild radish (*Raphanus sativa*), and non-native grasses such as ripgut brome (*Bromus diandrus*). Several patches of German ivy and poison hemlock occur along both sides of West Point Avenue, whereas pampas grass dominates the area near the parking lot.

The northern coastal scrub on the southeast edge of the road have been significantly invaded by pampas grass and bristly ox-tongue. Italian thistle and yellow dock were also observed in this area. In the northwest section of the willow thicket there are several patches of German ivy. A large patch of field mustard was also observed in the willow thicket.

4. General Wildlife Habitats and Species

A reconnaissance level survey was conducted in November, 1997 to assess the wildlife habitats in the project areas. During this survey, observations of wildlife species were recorded and wildlife habitat types were delineated on a base map. In addition, the following documents, maps, and databases were reviewed in order to assess existing wildlife conditions and the occurrences of rare species: 1996 Pillar Point Wetlands MAPS Station Summary and Data Sheets (MAPS, 1996); Final Environmental Impact Report, Fitzgerald Marine Reserve (LSA, 1976); California Department of Fish and Game 1996 Natural Diversity Data Base File; James V.

Table 2-4
INVASIVE NON-NATIVE PLANT SPECIES
OBSERVED AT PILLAR POINT MARSH

Common Name	Scientific Name	Priority for Removal
Bristly Ox-Tongue	Picris echioides	High
Field Mustard	Brassica rapa	Low
German Ivy	Senecio mikanioides	High
Horse Weed	Conyza canadensis	High
Italian Thistle	Carduus pycnocephalus	High
Monterey Cypress	Cupressus macrocarpa	Low
Pampas Grass	Cortaderia jubata	High
Poison Hemlock	Conium maculatum	High
Sea Fig Iceplant	Carpobrotus edulis, Carpobrotus chilense	High
Wild Radish	Raphanus sativus	Low
Yellow Dock	Rumex crispus	Low

Fitzgerald Marine Reserve Bird Checklist (Barry Sauppe *et al.*, 1995); Natural Resource Management Plan for Fitzgerald Marine Preserve (San Mateo County Department of Parks and Recreation, 1979); San Mateo County General Policy (County of San Mateo, 1992); Coastside County Water District Environmental Study of the Pillar Point Marsh, Part 1 Baseline Data (Flint, 1977); and Coastside County Water District Environmental Study of the Pillar Point Marsh, Part II Progress Report (Flint, 1978).

a. Fitzgerald Marine Reserve. Wildlife species that potentially occur in the Reserve are described below.

(1) Central Coast Arroyo Willow Riparian Forest. In general, the importance of riparian habitats and wildlife movement corridors cannot be stressed enough. California has lost over 90 percent of all riparian habitats (Harvey *et. al.*, 1992). Riparian habitats provide food, water, protective cover, and most importantly, movement corridors for birds, amphibians, and reptiles as well as terrestrial mammals.

Willows provide habitat nesting habitat and/or foraging habitat for many insects, as well as insect-gleaning birds. However, the willow community along San Vicente Creek is highly degraded due to its small size and proximity to human foot and vehicle traffic. Representative bird species that are known to occur in the willows in nearby areas include: common yellow throat (*Geothlypis trichas*), Bewick's wren (*Thryomanes bewickii*), orange-crowned warbler (*Vermivora celata*), northern

rough-winged swallow (*Stelgidopteryx serripennis*), wrenit (*Chamaea fasciata*), and American gold finch (*Carduelis tristis*) (MAPS, 1996). Removing non-native invasive vegetation (e.g., German ivy) would greatly enhance the wildlife value of this habitat so the willow riparian forest can expand. California meadow mice (*Microtus californicus*) (also known as California vole), deer mice (*Peromyscus maniculatus*), bush rabbits (*Sylvilagus bachmani*), raccoons (*Procyon lotor*), and skunks (*Mephitis mephitis*) are believed to take cover or forage in the willows. The willows also provide cover and moisture for aestivating salamanders and Pacific tree frogs (*Hyla regilla*).

(2) Disturbed Riparian Drainage. The non-native vegetation has overtaken the willows and other native streamside vegetation and reduced the wildlife value of this corridor. The most outstanding problem is the lack of any mid and upper canopy cover. Riparian vegetation normally provides movement corridors and protective cover for mammals and birds seeking surface water. However, the current vegetation is both too low and dense to be used by most birds and mid-to large-sized mammals. The existing vegetation provides no foraging or nesting habitat for raptorial birds or songbirds.

The non-native ivy and periwinkle provide some beneficial nectaring habitat to Monarch butterflies (*Danaus plexippus*), as well as structural cover for some reptiles and amphibians. Amphibians and reptiles expected in this area include California slender salamanders (*Batrachoseps attenuatus*), arboreal salamanders (*Aneides lugubris*), California red-legged frogs (*Rana aurora draytonii*), Pacific tree frogs, garter snakes (*Thamnophis sirtalis*), and gopher snakes (*Pituophis melanoleucus*). California red-legged frogs and garter snakes are expected because of the location of a nearby seasonal pond. The non-native plant species are a threat to the habitat values for the wildlife species in the pond and willow riparian areas immediately adjacent to the disturbed riparian drainage outside of the Reserve's boundaries.

(3) Freshwater Marsh. The freshwater marsh at the mouth of San Vicente Creek is small and characterized by the plant species that are found there; it does not contain pond water. Therefore, this area does not provide the wildlife value that is normally associated with freshwater marshes, or riparian drainages.

(4) Monterey Cypress Groves. The upper canopy layer of the Monterey cypress grove provides night roost and foraging roost for ravens (*Corvus corax*) and American crows (*Corvus brachyrhynchos*), and possibly owls. However, the forest floor is open and mostly barren (except for the dense layer of duff) and provides little wildlife value.

(5) Non-Native Grassland/Monterey Cypress Mosaic. Grasslands provide an important foraging resource for a wide variety of wildlife species. The grasses and forbs produce an abundance of seeds that attract numerous insects and provide food for granivorous and insectivorous wildlife. Sparrows, rabbits, and rodents are commonly found in this habitat. Consequently, grasslands are valuable foraging sites for raptors (e.g., hawks and owls) and other predators such as coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), skunk, and snakes. Aerial foraging species expected to be observed include: bats, American kestrels (*Falco sparverius*), owls, swallows, and red-tailed hawks (*Buteo jamaicensis*). The cypress trees provide night and foraging roost for the previously mentioned aerial foraging species, American crows, and ravens.

Passerine birds observed to forage in the grasslands of the Reserve include Savannah sparrow (*Passerculus sandwichensis*), barn swallows (*Hirundo rustica*), cliff swallows (*Hirundo pyrrhonota*), house finch (*Carpodacus mexicanus*), white-crowned sparrow (*Zonotrichia leucophrys*), California towhee (*Pipilo crissalis*), and American robin (*Turdus migratorius*). These birds forage for invertebrates in the ground and grasses.

Grasslands are productive habitats for small mammals, providing abundant food plants and cover. Other representative mammal species of grasslands include rabbits, Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomy megalotis*), and California meadow mouse. Black-tailed deer (*Odocoileus hemionus*) may be seen browsing in the late evening.

Typical reptile species in this habitat include northern alligator lizard (*Gerrhonotus coeruleus*), western fence (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), western terrestrial garter (*Thamnophis elegens*), and gopher snakes. Amphibians are not generally abundant in grasslands but may occasionally use mammal burrows for cover while traveling between other habitats.

(6) Northern Coastal Bluff Scrub. The northern coastal bluff scrub and coastal scrub plant communities in the Reserve also provide a diversity of flowering plants that are utilized by hummingbirds and butterflies. Buckwheat (*Eriogonum* sp.), plantain, sea rocket, sticky monkey flower, lupin, and *Sedum* sp. were particularly noted as beneficial butterfly plants. A large diversity of rare or endangered butterflies and their host plants are associated with this plant community (Section 5a, below).

(7) Northern Coastal Scrub. The northern coastal scrub and coyote brush scrub provide cover and plentiful foraging habitat for a large diversity of songbirds, rodents, reptiles, falcons, and hawks. Browsers (e.g., deer) rely on scrub habitats for foraging and cover. The dense habitat, especially at the edges of the grasslands,

provides important structural cover for many species which include bobcat (*Lynx rufus*), raccoon, skunk, coyote, California quail (*Callipepla californica*), bush rabbits, and garter snake. Blackberry, twinberry, huckleberry, and elderberry provide an important food and water source for many birds and mammals. Rare and endangered butterflies are also associated with plants in this community (Section 5a, below).

(8) Coastal Strand. Because the coastal strand habitat of the Reserve is extremely small and located at the base of a trail, it has little wildlife habitat value. However, it may be used as a resting location for shorebirds (e.g., plovers, gulls, and turns.) The barren/sandy patches of dunes provide basking places for northern alligator lizards and other reptiles.

b. Pillar Point Marsh. The following wildlife habitat and species that potentially occur in the Marsh are described below.

(1) Coastal Strand. This habitat is likely used as a resting location for shorebirds. The barren/sandy patches of the dunes provide basking places for northern alligator lizards and other reptiles. Because of foot traffic and its location in the Pillar Point Harbor, which obstructs the immediate passage to the open ocean, it is unlikely that this area is utilized by marine mammals.

(2) Coastal Salt Marsh. The coastal salt marsh lacks deep areas of cord grass and wildlife habitat associated with lower tidal levels. However, the dense pickleweed cover in the mid-zone of the marsh provides abundant habitat for the California meadow mouse (*Microtus californicus*). The upper coastal salt marsh zone provides habitat for western harvest mice (*Reithrodontomy megalotis*), brush rabbits (*Sylvilagus bachmani*), and deer mice (*Peromyscus maniculatus*). These rodent species provide an excellent prey base. This has been verified by the observed presence of foraging white-tailed kites (*Elanus caeruleus*), northern harrier hawks (*Circus cyaneus*), American kestrels (*Falco sparverius*), red-shouldered hawks (*Buteo lineatus*), and red-tailed hawks (*Buteo jamaicensis*).

Hérons and snakes will also hunt rodents in the coastal salt marsh habitats. Shorebirds, wading birds, blackbirds (*Agelaius* sp.), wrens, and sparrows frequent this area. Medium-sized mammals expected to occur include raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), bobcats (*Lynx rufus*), and foxes (*Vulpes vulpes* and *Procyon cinereoagenteus*).

(3) Coastal Lagoon (not mapped). The lagoon contains three-spined sticklebacks (*Gasterosteus aculeatus*) and most likely sculpins (*Cottus* sp.). Known invertebrate species include polychaete worms, oligochaetes, amphipods, copepods, cladocerans, and water boatmans (*Trichocorrixa* sp.). The open surface water

provides a landing area and foraging habitat for numerous residential and transient shore and wading birds.

(4) Northern Coastal Scrub. The northern coastal scrub and coyote brush scrub provide cover and plentiful foraging habitat for a large diversity of songbirds, rodents, reptiles, falcons, and hawks. Browsers (e.g., deer [*Odocoileus hemionus*]) rely on scrub habitats for foraging and cover. The dense habitat, especially at the edges of the grasslands, provides important structural cover for many species including bobcat, raccoon, skunk, coyote (*Canis latrans*), California quail (*Callipepla californica*), bush rabbits, and garter snake (*Thamnophis* sp.). Blackberry, twinberry, huckleberry, and elderberry provide an important food and water source for many birds and mammals. Rare and endangered butterflies are associated with plants in this community, as described in Section 5a, below, for the Reserve.

(5) Central Coast Arroyo Willow Riparian Forest. The willow riparian areas provide high value habitat for the dusky footed woodrat (*Neotoma fuscipes*). Twelve woodrat nest were observed on the edge of the willows during the reconnaissance field site visit by HRG and up to 20 nests have been reported in the past (Flint, 1978). California meadow mice, deer mice, bush rabbits, and ornate shrews (*Sorex ornatus*) have been captured in the willow area (Flint, 1978). Raccoons, skunks, long-tailed weasels fox (*Mustela frenata*), bobcats, and deer are expected to take cover or forage in the willows.

Willows provide habitat nesting habitat and/or foraging habitat of many insects, as well as insect-gleaning birds. Representative bird species that are known to occur in the willow include common yellow throat (*Geothlypis trichas*), Bewick's wren (*Thryomanes bewickii*), orange-crowned warbler (*Vermivora celata*), Northern rough-winged swallow (*Stelgidopteryx serripennis*), wrentit (*Chamaea fasciata*), and American gold finch (*Carduelis tristis*) (MAPS, 1996). The willows also provide perching sites for the raptorial birds, herons, and egrets that use adjacent coastal saltmarsh and freshwater marsh habitats. The willows also provide cover and moisture for aestivating salamanders and tree frogs (*Hyla regilla*).

(6) Freshwater Marsh. The upper marsh is seasonal; in some years the surface water dries out except for a small area near the road culverts. Surface water provides wildlife with drinking water and potential breeding areas. This surface water is used by aquatic amphibians (e.g., tree frogs, California newts [*Taricha torosa*], California red-legged frogs [*Rana aurora draytonii*], and western toads [*Bufo boreas*]). Northern rough-wing swallows and bats will forage for insects while on the wing. Raccoons forage adult and larval Pacific tree frogs and sticklebacks as the water dries. Ducks, black-crowned night herons (*Nycticorax nycticorax*), great blue herons (*Arden herodia*), green back herons (*Butorides*

striatus), blackbirds (*Agelaius* sp.), marsh wrens (*Cistothorus palustris*), common garter snakes (*Thamnophis sirtalis*), and San Francisco garter snakes (*Thamnophis sirtalis tetrataenia*) have been observed in this area (Flint, 1977 and 1978). California red-legged frogs were observed in the Marsh in 1997. The adjacent arroyo willow riparian forest and northern coastal scrub habitats benefit from the presence of the available fresh water.

5. Sensitive Wildlife Resources

Sensitive wildlife resources in the project areas of the Reserve and Marsh include habitats that support State and Federally-listed rare and threatened species, as well as wildlife movement corridors. There are several special status species (mostly insects; particularly butterflies) that have the potential to occur, but have not been confirmed. Focused species surveys or focused surveys for host plants need to be conducted before the sensitivity of these habitats can be determined.

a. Fitzgerald Marine Reserve. Known and potential wildlife species of special concern in the Reserve, and their status, are presented in Table 2-5.

(1) Northern Coastal Bluff Scrub. Northern coastal bluff scrub should be considered a sensitive wildlife habitat due to the limited abundance and the high flower nectar value and larval host plants for many insects, especially butterflies. *Lupinus variicolor*, a host plant of the Mission Blue Butterfly (*Icaricia icarioides missionensis*) occurs in this plant community in the Reserve (Corelli, 1997). Potential rare or threatened insect species that may occur in this habitat include:

- Mission Blue Butterfly (*Icaricia icarioides missionensis*)
Designation: Federally Endangered
Host plants: *Lupinus albifrons*, *Lupinus variicolor*, and *Lupinus formosus*
- Mytle's Silverspot Butterfly (*Speyeria zerene myrtleae*)
Designation: Federal Species of Special Concern
Host plant: *Viola adunca*
- Pheres Blue Butterfly (*Plebeajus* [or *Icaricia*] *icarioides pheres*)
Designation: Federal Species of Special Concern
Host plant: *Lupinus chamissonis*

**Table 2-5
SPECIAL STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR OR
KNOWN TO OCCUR IN FITZGERALD MARINE RESERVE**

SPECIES		LEGAL STATUS ^a	OCCURRENCE IN FITZGERALD MARINE RESERVE	KNOWN OCCURRENCE WITHIN THE REGION
Common Name	Species Name	Federal/State	Known or Potential	U.S.G.S. Quad Names
Amphibians and Reptiles				
California Red-Legged Frog	<i>Rana aurora draytonii</i>	FT/--	Known	Año Nuevo Quad Pigeon Point Quad San Gregorio Quad La Honda Quad Franklin Point Quad
San Francisco Garter Snake	<i>Thamnophis sirtalis tetrataenia</i>	FE/SE	Potential	Año Nuevo Quad Pigeon Point Quad San Gregorio Quad La Honda Quad Franklin Point Quad
Insects				
Globose Dune Beetle	<i>Coelus globosus</i>	--SSC	Potential	None
Monarch Butterfly	<i>Danaus plexippus</i>	--/--	Known	Franklin Point Quad Año Nuevo Quad Pigeon Point Quad
San Francisco Lacewing	<i>Notho chrysa californica</i>	SC/--	Potential	Franklin Point Quad
Myrtle's Silverspot Butterfly	<i>Speyeria zerene myrtleae</i>	FE/--	Potential	Franklin Point Quad
Pheres Blue Butterfly	<i>Plebeajus icarioides pheres</i>	SC/--	Potential	Franklin Point Quad
Mission Blue Butterfly	<i>Icaricia icarioides missionensis</i>	FE/--	Potential	Franklin Point Quad
Birds				
Osprey	<i>Pandion haliaetus</i>	--SSC	Nesting Birds Unlikely	None
Merlin	<i>Falco columbarius</i>	--SSC	Nesting Birds Unlikely	None
Bank Swallow	<i>Riparia riparia</i>	--ST		Año Nuevo Quad

Table 2-5 *continued*

SPECIES		LEGAL STATUS ^a	OCCURRENCE IN FITZGERALD MARINE RESERVE	KNOWN OCCURRENCE WITHIN THE REGION
Common Name	Species Name	Federal/State	Known or Potential	U.S.G.S. Quad Names
Black Swift	<i>Cypseloides nigri</i>	-/SSC	Potential	Año Nuevo Quad Franklin Point Quad
Double Crested Cormorant Rookery Site	<i>Phalacrocorax auritus</i>	-/SSC	Known	None
Savannah Sparrow	<i>Amphispiza belli beldingi</i>	-/SE	Potential	None
Yellow Warbler	<i>Dendroica petechia</i>	-/SSC	Potential	None
Great Blue Heron Rookery	<i>Arden herodia</i>	-/SSC	Unlikely	None
Saltmarsh Common Yellowthroat	<i>Geothlypis trichas sinuosa</i>	-/SSC	Potential	San Gregorio Quad
Tri-colored Blackbird	<i>Agelaius tricolor</i>	C2/SSC	Known/Nesting Unlikely	Año Nuevo Quad
Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	-/SSC	Potential	Año Nuevo Quad Franklin Point Quad
Willow Flycatcher	<i>Empidonax traillii</i>	-/SSC	Potential	None
California Gull	<i>Larus californicus</i>	-/SSC	Known	None
White-tailed Kite	<i>Elanus caeruleus</i>	--/FP	Potential	Pescadero Marsh
Short-eared Owl	<i>Asio flammeus</i>	-/SSC	Potential	None
Long-eared Owl	<i>Asio otus</i>	-/SSC	Potential	None
Sharp-shinned Hawk	<i>Accipiter striatus</i>	-/SSC	Potential	None
Cooper's Hawk	<i>Accipiter cooperii</i>	-/SSC	Potential	None
Ferruginous Hawk	<i>Buteo regalis</i>	--/SSC	Potential	None
Mammals				
California Sea Lion	<i>Zalophus californianus</i>	FM/--	Known	Año Nuevo Quad
Harbor Seal	<i>Phoca vitulina</i>	FM/--	known ^b	Año Nuevo Quad
Northern Elephant Seal	<i>Mirounga angustirostris</i>	FM/FP	Known	Año Nuevo Quad
Southern Sea Otter	<i>Enhydra lutris</i>	FT/FP	Known	Año Nuevo Quad Pigeon Point, San Gregorio

Table 2-5 *continued*

SPECIES		LEGAL STATUS ^a	OCCURRENCE IN FITZGERALD MARINE RESERVE	KNOWN OCCURRENCE WITHIN THE REGION
Common Name	Species Name	Federal/State	Known or Potential	U.S.G.S. Quad Names
Steller's Sea Lion	<i>Eumetoplas jubatus</i>	FT, FM/--	Known	Año Nuevo Quad
Yuma Myotis Bat	<i>Myotis yumanensis</i>	--/SSC	Potential	None
Long-eared Myotis Bat	<i>Myotis erotis</i>	--/SSC	Potential	None
Long-legged Myotis Bat	<i>Myotis volans</i>	--/SSC	Potential	None
Fringed Myotis Bat	<i>Myotis thysAñodes</i>	--/SSC	Potential	None
Greater Western Mastiff Bat	<i>Eumops perotis californicus</i>	--/SSC	Potential	None
Pacific Western Big-eared Bat	<i>Plecotus townsendii townsedii</i>	--/SSC	Potential	None
San Francisco Dusky-footed Woodrat	<i>Neotoma fuscipes annectens</i>	--/SSC	Potential	None

^a Status Explanations:

Federal

FE = Listed as endangered under the Federal Endangered Species Act.

FT = Listed as threatened under the Federal Endangered Species Act.

PE = Proposed for Federal listing as endangered under the Federal Endangered Species Act.

C2 = Category 2 candidate for Federal listing. Category 2 includes species for which the U.S. Fish and Wildlife Service has some biological information indicating that listing may be appropriate but for which further biological research and field study are usually needed to clarify the most appropriate status.

FM = Protected under the Federal Marine Mammal Protection Act of 1972.

FS = U.S. Forest Service sensitive species.

State

SE = Listed as endangered under the California Endangered Species Act.

ST = Listed as threatened under the California Endangered Species Act.

FP = Fully protected under the California Fish and Game Code.

SSC = Species of special concern under the California Endangered Species Act.

^b There is currently a breeding colony of Harbor Seals within the Reserve.

Sources: 50 CFR 7.11 and 7.12; Natural Diversity Data Base; Buggy Database 1997; 1996; and Zeiner *et. al.*, 1990.

-
- San Bruno Elfin Blue Butterfly (*Incisalia mossi baysensis*)
Designation: Federally Endangered
Host plant: *Sedum spathulifolium*
 - San Francisco Lacewing (*Notho chrysa californica*)
Designation: Federal Species of Special Concern

(2) Northern Coastal Scrub. This habitat is considered a sensitive wildlife habitat due to the confirmation of *Lupinus variicolor*, a host plant of the Mission Blue Butterfly (*Icaricia icarioides missionensis*) occurs in this plant community in the Reserve (Corelli, 1997). Potential rare or threatened insect species and their host plants that may occur in this habitat include:

- Mission Blue Butterfly (*Icaricia icarioides missionensis*)
Designation: Federally Endangered
Host plants: *Lupinus albifrons*, *Lupinus variicolor*, and *Lupinus formosus*
- Mytle's Silverspot Butterfly (*Speyeria zerene myrtleae*)
Designation: Federal Species of Special Concern
Host plant: *Viola adunca*
- Pheres Blue Butterfly (*Plebeajus* [or *Icaricia*] *icarioides pheres*)
Designation: Federal Species of Special Concern
Host plant: *Lupinus chamissonis*

(3) Central Coast Arroyo Willow Riparian Forest. In general, willow riparian forest is considered sensitive wildlife habitat due to the associated wildlife species diversity, productivity of insects (prey base), and cover for wildlife use and movement. However, as described previously, this area is small and degraded by non-native plants species that have overtaken the drainage. This area is considered sensitive wildlife habitat based on the rare or threatened species that may occur including:

- California Red-legged Frog (*Rana aurora draytonii*)
Designation: Federally Threatened
- San Francisco Lacewing (*Notho chrysa californica*)
Designation: Federal Species of Special Concern
- Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)
Designation: Federal Species of Special Concern

(4) Freshwater Marsh and Disturbed Riparian Drainage. California red-legged frogs also have the potential to occur in the remaining portion of San Vicente Creek that includes the small freshwater marsh and the disturbed riparian drainage. Because there is no middle or upper canopy cover left in the drainage, wildlife is likely to travel through the Monterey cypress grove instead.

b. Pillar Point Marsh. Known and potential wildlife species of special concern in the Marsh, and their status, are presented in Table 2-6.

(1) Coastal Strand. The coastal strand habitat at the Marsh is considered a sensitive wildlife habitat due to the known occurrence of the Federally-threatened western snowy plovers (*Charadrius alexandrinus nivosus*), and the potential occurrence of the globose dune beetle (*Coelus globosus*) and bumblebee beetle (Pacific Sand Bear) (*Charadrius alexandrinus*), both Federal species of special concern.

(2) Coastal Salt Marsh. Coastal salt marshes are considered sensitive wildlife habitats because of the high diversity of wildlife that utilize this habitat type. The coastal salt marsh is a known habitat for a number of nesting and foraging shorebirds, waterfowl, and raptorial birds. The abundance of small mammals (mainly California meadow mice) provides an excellent prey base. State and Federally-listed species confirmed in the coastal salt marsh of Pillar Point Marsh include, but are not limited to:

- White-tailed (or Black-shouldered) Kite (*Elanus caeruleus*)
Designation: State Fully Protected
- Tri-colored Blackbird (*Agelaius tri-color*)
Designation: State Species of Special Concern

(3) Central Coast Arroyo Willow Riparian Forest. The willow riparian habitat at the Marsh provides cover and a movement corridor for amphibians, aquatic snakes, birds, and many middle-to-large-sized mammals. The wildlife species diversity is excellent because of the diversity in willows and presence of fresh water. However, German ivy has invaded the understory habitat. Numerous rare and endangered species are known to occur here including:

- California Red-legged Frog (*Rana aurora draytonii*)
Designation: Federally Threatened

**Table 2-6
SPECIAL STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR
OR KNOWN TO OCCUR IN PILLAR POINT MARSH**

SPECIES		LEGAL STATUS ^a	OCCURRENCE IN PILLAR POINT MARSH	KNOWN OCCURRENCE WITHIN THE REGION
Common Name	Species Name	Federal/State	Known or Potential	U.S.G.S. Quad Names
Amphibians and Reptiles				
California Red-legged Frog	<i>Rana aurora draytonii</i>	FT/--	Known	Año Nuevo Quad Pigeon Point Quad San Gregorio Quad La Honda Quad Franklin Point Quad
San Francisco Garter Snake	<i>Thamnophis sirtalis tetrataenia</i>	FE/SE	Potential	Año Nuevo Quad Pigeon Point Quad San Gregorio Quad La Honda Quad Franklin Point Quad
Western Pond Turtle	<i>Clemmys marmorata pallida</i>	--/SSC	Potential	Año Nuevo Quad Franklin Point Quad
Insects				
Globose Dune Beetle	<i>Coelus globosus</i>	--/SSC	Potential	Franklin Point Quad
Bumblebee (Pacific Sand Bear) Beetle	<i>Lichnanthe ursina</i>	SC /---	Potential	Franklin Point Quad
Monarch Butterfly	<i>Danaus plexippus</i>	--/--	Known	Franklin Point Quad Año Nuevo Quad Pigeon Point Quad
San Francisco Lacewing	<i>Notho chrysa californica</i>	SC/--	Potential	Franklin Point Quad
Myrtle's Silverspot Butterfly	<i>Speyeria zerene myrtleae</i>	FE/--	Potential	Franklin Point Quad
Pheres Blue Butterfly	<i>Plebeajus icariodes pheres</i>	SC/--	Potential	Franklin Point Quad
Mission Blue Butterfly	<i>Icaricia icarioides missionensis</i>	FE/--	Potential	None
California Brackish water snail	<i>Tryonia imitator</i>	---/SSC	Potential	Franklin Point Quad (Historical Record Only) Año Nuevo Quad
Birds				
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	FE/--	Nesting Birds Unlikely	None
Osprey	<i>Pandion haliaetus</i>	--/SSC	Nesting Birds Unlikely	None

Table 2-6 *continued*

SPECIES		LEGAL STATUS ^a	OCCURRENCE IN PILLAR POINT MARSH	KNOWN OCCURRENCE WITHIN THE REGION
Common Name	Species Name	Federal/State	Known or Potential	U.S.G.S. Quad Names
Merlin	<i>Falco columbarius</i>	--/SSC	Nesting Birds Unlikely	None
Bank Swallow	<i>Riparia riparia</i>	--/ST	Known	Año Nuevo Quad
Black Swift	<i>Cypseloides nigr</i>	--/SSC	Potential	Año Nuevo Quad Franklin Point Quad
Savannah Sparrow	<i>Amphispiza belli beldingi</i>	--/SE	Potential	None
Yellow Warbler	<i>Dendroica petechia</i>	--/SSC	known	None
Saltmarsh Common Yellowthroat	<i>Geothlypis trichas sinuosa</i>	--/SSC	known	San Gregorio Quad Franklin Point Quad
Tri-colored Blackbird	<i>Agelaius tricolor</i>	C2/SSC	Known/Nesting Unlikely	Año Nuevo Quad
Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	FE/---	Potential	Año Nuevo Quad Franklin Point Quad
Willow Flycatcher	<i>Empidonax traillii</i>	--/SSC	Potential	None
California Gull	<i>Larus californicus</i>	--/SSC	Known	None
Black Rail	<i>Laterallu jamaicensis</i>	--/ST, FP	Potential	None
White-tailed Kite	<i>Elanus caeruleus</i>	--/FP	Known	None
Northern Harrier Hawk	<i>Elanus caeruleus</i>	--/FP	Known	None
Short-eared Owl	<i>Asio flammeus</i>	--/SSC	Potential	None
Long-eared Owl	<i>Asio otus</i>	--/SSC	Potential	None
Burrowing Owl	<i>Athene cunicularia</i>	--/SSC	Potential	None
Sharp-shinned Hawk	<i>Accipiter striatus</i>	--/SSC	Known	None
Cooper's Hawk	<i>Accipiter cooperii</i>	--/SSC	Potential	None
Ferruginous Hawk	<i>Buteo regalis</i>	--/SSC	Potential	None
Mammals				
Yuma Myotis Bat	<i>Myotis yumanensis</i>	--/SSC	Potential	None
Long-eared Myotis Bat	<i>Myotis erotis</i>	--/SSC	Potential	None
Long-legged Myotis Bat	<i>Myotis volans</i>	--/SSC	Potential	None
Fringed Myotis Bat	<i>Myotis thysAnodes</i>	--/SSC	Potential	None
Greater Western Mastiff Bat	<i>Eumops perotis californicus</i>	--/SSC	Potential	None
Pacific Western Big-eared Bat	<i>Plecotus townsendii townsedii</i>	--/SSC	Potential	None

Table 2-6 *continued*

SPECIES		LEGAL STATUS ^a	OCCURRENCE IN PILLAR POINT MARSH	KNOWN OCCURRENCE WITHIN THE REGION
Common Name	Species Name	Federal/State	Known or Potential	U.S.G.S. Quad Names
San Francisco Dusky-footed Woodrat	<i>Neotoma fuscipes annectens</i>	--/SSC	Potential	None
American Badger	<i>Taxidea taxus</i>	--/SSC	Potential	None
Fish				
Coho Salmon	<i>Oncorhynchus kisutch</i>	--/SE*	Unlikely	Año Nuevo Quad Pigeon Point Quad La Honda Quad Big Basin Quad Franklin Point Quad
Pacific Lamprey	<i>Lampetra tridentata</i>	--/SSC	Unlikely	Año Nuevo Quad Pigeon Point Quad San Gregorio Quad La Honda Quad
Tidewater Goby	<i>Eucyclogobius newberryi</i>	FE/--	Unlikely	Pigeon Point Quad San Gregorio Quad Franklin Point Quad

^a Status Explanations:

Federal

FE = Listed as endangered under the Federal Endangered Species Act.

FT = Listed as threatened under the Federal Endangered Species Act.

PE = Proposed for Federal listing as endangered under the Federal Endangered Species Act.

C2 = Category 2 candidate for Federal listing. Category 2 includes species for which the U.S. Fish and Wildlife Service has some biological information indicating that listing may be appropriate but for which further biological research and field study are usually needed to clarify the most appropriate status.

FM = Protected under the Federal Marine Mammal Protection Act of 1972.

FS = U.S. Forest Service sensitive species.

State

SE = Listed as endangered under the California Endangered Species Act.

ST = Listed as threatened under the California Endangered Species Act.

FP = Fully protected under the California Fish and Game Code.

SSC = Species of special concern under the California Endangered Species Act.

Sources: 50 CFR 7.11 and 7.12; Natural Diversity Data Base, 1996; Buggy Database 1997; and Zeiner *et. al.*, 1990.

- Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)
Designation: Federal Species of Special Concern
- Yellow Warbler (*Dendroica petechia*)
Designation: State Species of Special Concern

Potential rare and endangered species that may also occur in the willow riparian habitat include:

- San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*)
Designation: Federally Endangered
- California Black Rail (*Laterallus jamaicensis*)
Designation: State Threatened
- San Francisco Lacewing (*Northo chrysa californica*)
Designation: Federal Species of Special Concern
- Dusky Footed Woodrat (*Neotoma foscipes annectens*)
Designation: State Species of Special Concern
- Bush Rabbit (*Sylvilagus Beckman rapers*)
Designation: State Species of Special Concern

(4) Freshwater Marsh. The availability of freshwater in this habitat provides a wildlife resource that enhances all adjacent habitat types and is, in-part, directly responsible for both the species richness and abundance. The seasonal standing water is likely to support reproductive success for California red-legged frogs and Pacific tree frogs, although this needs to be confirmed. Aquatic insects, as well as adult and larval amphibians, can provide a prolific foraging source for carnivorous mammals, birds, and garter snakes. Potential rare and endangered species that may occur in the freshwater marsh include:

- San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*) - reportedly, one confirmed sighting was made prior to 1976 (LSA, 1986)
Designation: Federally Threatened
- California Black Rail (*Laterallus gamaicensis*)
Designation: State Threatened

- California Brackish Water Snail (*Tryonia imitator*)
Designation: State Species of Special Concern

Rare and endangered species that are known to occur here include:

- California Red-legged Frog (*Rana aurora draytonii*)
Designation: Federally Threatened
- Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)
Designation: Federal Species of Special Concern
- Yellow Warbler (*Dendroica petechia*)
Designation: State Species of Special Concern
- Tri-color Blackbird (*Agelaius tri-color*)
Designation: State Species of Special Concern
- Bank Swallow (*Riparia riparia*)
Designation: State Threatened
- Copper's Hawk (*Accipiter cooperii*)
Designation: State Species of Special Concern
- Peregrine Falcon (*Falco peregrinus*)
Designation: State Endangered/State Fully Protected
- Sharp-shinned Hawk (*Accipiter striatus*)
Designation: State Species of Special Concern
- Northern Harrier Hawk (*Circus cyaneus*)
Designation: State Species of Special Concern

F. HYDROLOGY

The wetland and stream resources currently managed by the Fitzgerald Marine Reserve are limited to the lowermost riparian corridor and mouth of San Vicente Creek, where it drains into Kelp Cove.

San Vicente Creek, Pillar Point Marsh, and nearby Denniston Creek are all designated by State Water Resources Control Board as having beneficial uses. Both quantity and quality of flows should be consistent with these beneficial uses. The Half Moon Bay Terrace serves as a major groundwater aquifer for the Moss Beach, Princeton, and El Granada area. Surface diversions exist of both San Vicente Creek and Denniston Creek. The different categories of uses recognized by the state are listed in Table 2-7.

1. Setting

San Vicente Creek, Pillar Point Marsh, and neighboring Denniston Creek are the primary hydrologic features of concern. San Vicente Creek flows west, down the flanks of Montara Mountain to Kelp Cove at the main entrance to the Reserve. Denniston Creek flows parallel to San Vicente Creek and empties into Pillar Point Harbor, south of the Reserve. The Pillar Point Marsh lies at the mouth of Denniston Creek and the town of Princeton. Although not directly connected by surface flow, water levels in the marsh are effected by Denniston Creek's recharge, which are described in greater detail below. An unnamed drainage to the northeast of the Reserve parallels Sunshine Valley Road and flows between the intersection of California Avenue and Cove Street to the beach. This drainage is referred to as "Sunshine Valley Creek" for purposes of this report. The drainage is owned by the County. This property was acquired by the County to be incorporated into Fitzgerald Marine Reserve.

Despite the physical distance between the San Vicente stream corridor on the north end of the Reserve and Pillar Point Marsh on the south end, the geomorphology of these two features are both strongly influenced by the San Gregorio fault (SGF), whose location in the vicinity of the Reserve, is described in detail in the Geology section of the Master Plan. Surface water runoff and groundwater flow are both controlled and constrained by the SGF and its resulting offset. In the case of San Vicente Creek, after it flows down from its headwaters in the granitic geology of Montara Mountain, the channel turns abruptly northward as it flows into the fault zone and Reserve. In the case of the Pillar Point Marsh, the SGF constrains groundwater flow through the Half Moon Bay Terrace Formation and overlying alluvium that lies to the east of the fault.

**Table 2-7
 EXISTING (*) AND POTENTIAL (O) BENEFICIAL USES OF
 SAN VICENTE CREEK, DENNISTON CREEK, AND
 PILLAR POINT (PRINCETON) MARSH
 SAN MATEO COUNTY**

	San Vicente Creek	Denniston Creek	Pillar Point Marsh
Municipal supply (MUN)	*	*	
Agricultural supply (AGR)	*	*	
Water-contact recreation (REC-1)	0	*	*
Non-contact water recreation (REC-2)	0	*	*
Warm fresh water habitat (WARM)		*	
Cold fresh water habitat (COLD)	*	*	
Wildlife habitat (WILD)	*	*	*
Preservation of rare and endangered species (RARE)	*	*	
Fish migration (MIGR)	*	*	
Fish spawning (SPWN)	*	*	
Fresh water habitat (FRESH)			*
Brackish water habitat (BRACKISH)			*
Salt water habitat (SALT)			*

The Half Moon Bay Terrace Formation underlies the Half Moon Bay Airport, the agricultural fields both east and west of Highway 1. This formation consists of unconsolidated deposits of sand silt and clay and serves as the principal water bearing zone in the Moss Beach and El Granada area. Regional tectonic activity that has forced the Purisima formation upward at the Reserve and Pillar Point, has in turn resulted in a gradual dropping and down-warping of the coastal terrace formation and granitic basement that lies to the east of the SGF towards Pillar Point Marsh.

The marsh itself is underlain by younger fine grained, organic-rich basin deposits and fine grained alluvial deposits that have been carried by flood waters from Denniston Creek, the airport, and neighboring disturbed uplands.

The general slope of the terrace surface trends subtly downward to the stormwater runoff from the airport's runways, impervious surfaces, and frequently disked fields to the main drainage ditch which outlets to the freshwater portion of the marsh. Likewise, surface runoff from Airport Road and its roadside ditches flows into the marsh on its eastern boundary. The mobile home park and neighboring commercial development have a system of surface and subsurface drains that flow into a concrete lined channel and culvert that outlets into the northern lobe of the marsh, along the SGF zone, at the base of the steep uplifted Pillar Point block.

Geotechnical borings and water wells in the area of the marsh also reveal that flood flows and alluvial sediments from Denniston Creek have periodically been transported to the marsh area. The existing channel alignment of lower Denniston Creek, which has been set by highway and road construction, and the development of Princeton's industrial zone, limits this surface connection.

The Reserve area has a maritime Mediterranean climate with distinct wet and dry seasons. Most of the area's precipitation is recorded during the months of November through April. Virtually all precipitation occurs as rain, although fog accounts for a small percentage. Precipitation in the San Vicente watershed and the Pillar Point Marsh area ranges from approximately 18 inches per year in the lowest elevations to 38 inches per year in the headwaters of San Vicente Creek (Rantz, 1974).

A substantial quantity of the precipitation leaves the watershed and terrace as runoff to the ocean via San Vicente Creek, Half Moon Bay Airport, and the trailer park drainage which flows into Pillar Point Marsh. Using for comparison the runoff coefficients for nearby Pilarcitos Creek and Purisima Creek, upper watershed runoff in San Vicente Creek may be estimated at about 27 percent of the estimated mean annual rainfall. For the developed areas of Moss Beach, El Granada, and Princeton, annual runoff is likely to be 40 percent of annual rainfall (Hecht et. al., 1988 and Knot, 1973). Water that does not flow to the ocean serves to recharge groundwater, supply agricultural and municipal water via diversions and wells, and support water needs of vegetation throughout the watersheds, including Pillar Point Marsh.

In the upper watershed and on the unpaved areas of the terrace, effective runoff of seasonal precipitation occurs after soils have become saturated. Based on local soil types, this typically occurs after the first 7 to 9 inches of rainfall has been absorbed by dry vegetation, duff, and soils surfaces. In paved areas, with roofs, gutters and ditches, both the volume and runoff velocity of local rainfall is increased. Drainage ditches hasten the flow of freshwater off the Half Moon Bay terrace surface and through Pillar Point Marsh. As a result, groundwater recharge is decreased. This trend is worth noting, particularly in light of the potential airport expansion, further development in the El Granada/Princeton area, and along Airport Road, which abuts the marsh to the east.

Evaporation and evapotranspiration rates in project area vary seasonally and with the occurrence of coastal fog.

2. San Vicente Creek

- a. Watershed. San Vicente Creek has a watershed area of approximately 4 square miles. Conceptually, the drainage may be divided in two primary parts, the granitic upper watershed, above the Coastside County Water District diversion, and

the lower alluvial and terrace portion, which is occupied by a stable operation, Highway 1, and the commercially and residentially developed area of Moss Beach immediately around the Reserve's main entrance.

Land use in the watershed is primarily privately owned open space on the steep hillsides, with floriculture, pasture, and stables on the alluvial-valley bottom. The Coastside County Water District has water rights to divert 2 cubic feet per second (cfs), but are not currently actively diverting for municipal use. Cabillo Farms diverts water to two ponds for agricultural use on the coastal terrace along Highway One. The ponds have been identified as significant sources of groundwater recharge.

The lower watershed is urbanized in the vicinity of the Reserve. San Vicente Creek is culverted under Etheldore Road, Highway 1, Marine Boulevard and Cypress Avenue before flowing to the final culvert at the Reserve at Seal Cove. The creek corridor exhibits the effects of this disturbance in both its geomorphology and plant communities. The condition of the riparian corridor at the Reserve is addressed in Section E, Upland and Marsh Biology, while the role of the San Vicente Creek culvert and related gully is described in Section G, Geology/Geotechnical Conditions.

b. Water Quality. Water quality conditions in San Vicente Creek are not well documented. No known surface water quality sampling is occurring at present, nor is there historical record of erosion studies or sediment transport studies in the watershed. Potential sources of water quality degradation appear similar to other small Monterey Bay coastal watersheds. Based on aerial photos, discussions with water quality regulators, and a brief watershed conditions survey by car, four types of nonpoint source pollution were identified that may be affecting San Vicente Creek: sediment, horse manure, floricultural chemicals (fungicides, fertilizers, and pesticides), and urban runoff.

Excessive sediment is likely to be the most significant water quality and habitat issue in the stream. The decomposed granite of Montara Mountain has the potential to yield large quantities of medium and coarse sand when disturbed by agricultural activities, grading, and horse paddocks. Annual sediment yields computed for nearby watersheds in the San Mateo County by the USGS range from 657 tons per square mile in the San Francisquito Creek Watershed to 2,300 tons per square mile at Crystal Springs Reservoir to 5,138 tons per square mile in Colma Creek during the period of rapid urban development in the early 1970s (Brown and Jackson, 1973).

It should be noted that sediment yields in this region vary widely from year to year, depending of the amount of runoff, the intensity and duration of local storms, and level of disturbance in the watershed. Conditions encountered in the San Vicente channel included heavy accumulations of sand in both pools and riffles, indicative of

very high sediment yields. Sediment sources in the upper watershed, particularly unpaved road surfaces, bare ground in equestrian facilities, and tilled fields are not currently undergoing known erosion control efforts.

Nutrient loading in the form of nitrate and ammonia from upstream equestrian facilities is likely to be occurring due to the location of facilities and waste storage in close proximity to the creek, upstream of Etheldore Road. Quantitative information regarding the transport of fertilizers and nutrients from these uses is lacking, and the potential affects on local freshwater and intertidal habitats are not documented.

The San Vicente Creek valley alluvial aquifer is recharged from within the drainage basin, therefore increased levels of nitrogen in percolate from the equestrian facilities and fields could potentially affect groundwater quality, which in turn may affect dry season base streamflow.⁹ However, resource vulnerability to nitrogen inputs may vary considerably with location throughout the project site. Regarding percolation, most significant aquifer recharge appears to be from the alluvial terrace rather than the uplands. However, the two stables, their paddocks and pastures are sited along the creek itself. Therefore, it is likely that there is, and has been for a number of years, considerable nitrogen loading from this source to the creek, and possibly to the terrace aquifer as well. Sensitivity of the upland and riparian habitats to augmented nitrogen levels may also vary. Some hillsides have been disked for agriculture and may have been fertilized as well; the vegetation in and along the creek may be adapted to higher nitrogen levels emanating from the stables.

Pesticide and agricultural chemical use for the floricultural operations is documented in the pesticide reporting requirements regulated by the San Mateo County Department of Agricultural Weights and Measures.

Only one record of actual water quality data at the Reserve (2/16/1981) has been located by investigators in the State Mussel Watch Program records, which assesses bio-accumulation of pollutants in shellfish around the state. The results are attached. Several notable constituents were found in elevated levels within resident California Mussels. These included total DDT and PCBs.

The vulnerability of local wildlife to pesticides will vary with the particular species and the specific compounds applied. Pesticides vary considerably in their toxicological characteristics (toxicity to terrestrial and aquatic biota, potential for bioconcentration, environmental fate after application) and in the cultural factors related to their application (including the size of area treated and location, season of chemical application, frequency of treatment).

⁹ Nitrogen levels in San Vicente Creek have been reported by Reserve staff to be as high as 60 ppm.

Non-point source urban runoff pollution from automobiles, road surfaces, residences, and commercial development in Moss Beach may also adversely impact local water quality. Typical pollutants found in urban runoff in the Monterey Bay area include sediment, nitrate, phosphate, ammonia, pesticides, heavy metals, oil and grease. Like other potential sources of water quality degradation, there is a paucity of information. Field observations revealed a notable amount of urban refuse in the stream channel above the Reserve, including aerosol cans, motor oil cans, styrofoam, plastic, and other debris. Within the neighborhood, unlined roadside ditches convey urban runoff directly into the creek.

Heavy metal and pesticide transport is a topic worthy of future study, particularly substances known to occur in the Monterey Bay coastal wetlands. As with pesticides, specific sampling of water quality, sediment quality, and bioaccumulation in fish and shellfish would be necessary to ascertain local water quality impacts of urban runoff on the reef habitat.

3. Pillar Point Marsh

While generally recognized as a surface water resource, the Pillar Point Marsh may be more appropriately described as a groundwater fed lowland area (generally below 10 feet mean sea level [msl]), the lowest portion of which is subject to tidal inflows during high tides. On the land surface, however, the hydrology of Pillar Point Marsh has been periodically altered since it was first noted in local maps in the 1800s.

Hydrologic conditions also vary seasonally and throughout cycles of drought and abundant rainfall. The hydrologic status, or relative “wetness” of the marsh at any given time, will depend on the following factors: 1) tidal inflow to the saltmarsh, 2) the annual amount of rainfall, runoff and recharge to the aquifer, 3) the groundwater storage capacity of the upslope area supplying the freshwater marsh, 4) the percent stored at any given time, 5) the rate of subsurface flow through the aquifers to the marsh, 6) the rate of subsurface outflow, and 7) the rate of evapotranspiration, or water taken up and used by local vegetation.

The Pillar Point Marsh is bounded by Pillar Point Harbor to the south, Stanford Avenue on the southeast, Airport street to the east, the old Granada Sanitary District access road to the north, the SGF fault scarp on the west and the Pillar Point Military Reservation to the south west. The marsh occupies approximately 66 acres total area (Flint, 1977). It is separated into two distinct components, a brackish/saltwater marsh, and a freshwater marsh-willow riparian zone. The salt marsh portion occupies some 22 acres between the beach and the access road to the Pillar Point Military Reservation. The freshwater component of the marsh is east of the road, separated from the saltwater marsh by culverts through the road fill prism. The shape of the freshwater marsh components may be characterized by two lobes or

arms, one that follows the trace of the SGF to the north and one that is dominated by the westerly drainage channel created during airport construction.

a. Land Use History and Changes in Pillar Point Marsh. Historical land uses on the Half Moon Bay Terrace have greatly altered surface hydrology, sedimentation and vegetation patterns in the Pillar Point Marsh. Its earliest appearance on topographic maps (USC&GS, 1866) reveals that areas without standing or brackish water were used for the cultivation of grain. At that time, the marsh was crossed by agricultural roads, including one along the beach bar to Pillar Point (Flint, 1977). The earliest available aerial photos from 1928 to 1931 shows that agricultural uses predominated. An access road to Pillar Point from Princeton existed in approximately the same location as the current paved road and culverts (CA Dept. of Transportation, 1928-31). Several agricultural ponds, including the San Vicente Reservoir and two ponds along the SGF scarp are visible.

Subsequent aerial coverage indicates that by 1943, construction of the Half Moon Bay Airport had commenced and an extensive surface drainage network, consisting of excavated ditches, had been developed to drain the runways, fields and other airport facilities.¹⁰ In this drainage system, numerous small feeder ditches drain into a main collector ditch, which flows through a culvert, discharging at the then newly constructed Airport Boulevard into the upper marsh. The grading of the runway and ditch network significantly altered surface drainage at that time. The ditch network continues to function today, serving as the primary source of surface flow and sediment to the marsh complex.

The 1943 aerials also show that the dirt road bisecting the saltwater and freshwater sections of the marsh was a well-traveled route to the top of Pillar Point. The Town of Princeton to the south had been subdivided, but was still in agricultural production. The photos also show that by this time the freshwater marsh appears to be expanding in area east of the Pillar Point access road, as evidenced by the reduction in cultivated area and the apparent spread of native vegetation, such as scrub and emergent marsh. The Pillar Point harbor breakwater had not yet been constructed, and the salt marsh outlet was closed by a barrier dune thrown up by wave action, creating two distinct brackish open water areas.

By 1956, most of the upper marsh appears to have been reclaimed as agricultural land, with isolated willow stands. Princeton had still not yet been developed, though the street layout remained. It should be noted that this photo was taken just six months after the damaging 1955 Christmas floods. It should also be noted that the

¹⁰ ASCS, October 11, 1943. These photos were taken during what is normally the driest season in regional freshwater marshes. The density of non-cultivated vegetation indicates that the farming operations had pulled back at least several years earlier.

Pillar Point bluff and eastern slopes, as in earlier photos, continued to be grazed and exhibited no coastal scrub characteristics.

Between 1959 and 1967, the Pillar Point Breakwater was constructed by the U.S. Army Corps of Engineers, enclosing Pillar Point Harbor and substantially reducing wave and tidal action at the mouth of the salt marsh. In 1968, the U.S. Air Force established the Pillar Point Missile Tracking Station, during which time the Pillar Point access road assumed essentially its current dimensions, drainage features, and alignment.

The 1972 aerial photos show that new structures on several lots next to the salt marsh had been developed and the El Granada mobile home park and Granada Wastewater Treatment Plant abutting the freshwater marsh had been built. Stands of willow had begun to fill in between the mobile home park and the Pillar Point access road. An additional new feature was the spur road off the access road which now serves as the harbor district coastal access parking lot. 1977 aerial photos show several structures on the barrier beach at the salt marsh outlet, implying a level of beach front stability previously unknown. At this time, willows begin to appear in the lowermost reach of the drainage ditch from the airport as they also expanded in area along the flanks of the eastern Pillar Point bluff downstream of the mobile home park.

During the 1982 January storms, aerial photos reveal an actively aggrading delta at the mouth of Denniston Creek, with a plume of sediment discharging into Pillar Point Harbor. This sediment event appears to have overwhelmed the upstream Denniston Reservoir and resulted in this discharge to the harbor. Aerial coverage in the following year, July 1983 show that even at high tide, the barrier beach remained larger due to the previous year's sediment discharge episode and the reduced littoral current, which had been constrained by the breakwater's calming effect on wave action at the mouth of the salt marsh. At the same time, it appears that the extent of freshwater emergent marsh and unbroken willow riparian habitat was expanding upstream of the Pillar Point access road.

The widening barrier bar and continuing delta formation at the mouth of Denniston Creek are still apparent in 1993 aerial photos. Consequent to this, the dune at the salt marsh outlet appears to be well vegetated, implying stability and an absence of wave action at higher elevations on the beach.

b. Groundwater Hydrology. Because the Half Moon Bay Terrace is the principal water bearing formation in the El Granada/Moss Beach area, wells are numerous, and their use and yield have been the subject of several hydrogeologic studies. Two water supply companies, Coastside County Water District and Citizen's Utilities, operate municipal wells to provide drinking water to the area's residents and

account for the predominant pumpage in the project area. Other smaller, privately owned wells, including three wells at the Granada Mobile Home Park, draw upon the abundant groundwater.

In the Half Moon Bay/Pillar Point Marsh Ground-Water Basin Report (June 1992) Luhdorff and Scalmanini, Consulting Engineers, identified sixteen existing wells in the Pillar Point area. Over 90 wells exist in the El Granada area, which have been the subject of several hydrogeologic investigations to assess the safe yield of the terrace aquifer and to evaluate the role of groundwater withdrawals and water table drawdown effects on the Pillar Point Marsh.

Since at least 1974, water level records have been measured in the marsh area and regional pumping has been monitored (Lowney-Kaldveer, 1974). Professor Phillip Flint of San Jose State University (SFSU), working as a consultant to Coastside County Water District between 1976-1978, conducted what is perhaps the most intensive investigation of Pillar Point Marsh and its seasonal surface and groundwater hydrologic conditions relative to municipal water supply production in the terrace groundwater aquifer.

Follow-up groundwater studies of the terrace aquifer conducted by Kleinfelder (Hecht and others, 1988) and Luhdorff & Scalmanini confirm Dr. Flint's assessment that, despite periodic lowering of the groundwater by pumpage, rainfall runoff and recharge on the terrace and from Denniston Creek provide sufficient water to reverse drawdown effects and, most probably, inhibit seawater intrusion into the groundwater basin. In addition, these locally conducted groundwater studies agree that the overall groundwater gradient in the terrace formation indicates a condition of groundwater discharge in the area of the marsh.

The flow of groundwater to the marsh is the primary reason the freshwater wetland habitats exist. Where this groundwater emerges at the surface, at approximately 10 to 15 feet msl, the freshwater wetland and riparian species can be found. Below this elevation, from approximately 5 to 10 feet msl, salt marsh habitat and tidally influenced brackish water predominates, except during rainy season flushing, such as is occurring during this study period, the winter of 1997/98.¹¹

¹¹ Balance Hydrologics informally sampled salinity and specific conductance in a longitudinal profile from the salt marsh outlet to the upper ends of the freshwater marsh, during its two brief field visits to the marsh in December 1997 and January 1998. Both visits occurred after rainfall events and during ebbing tides. Both visits revealed freshwater conditions in both the freshwater marsh and willow riparian zone, as well as in the saltwater marsh portion, implying freshwater outflow sufficient to "flush" the saltwater marsh. In addition, differences in specific conductance and turbidity were noted between terrace surface runoff from the Airport (lower conductance and higher sediment loads) and slope runoff and shallow seepage from the Purisima formation on the Pillar Point bluff (higher conductance and qualitatively less sediment).

Water level records from monitoring wells located in the terrace formation in the vicinity of Pillar Point Marsh indicate average seasonal water-level fluctuations of 4 to 10 feet during average rainfall years. Water level declines of 14 to 29 feet have been recorded during dry and critically-dry years in a monitoring well just west of the Half Moon Bay Airport. Most important, however, is the quick response of several local monitoring wells to abundant periods of rainfall (Luhdorff and Scalmanini, 1987). The conclusion to be drawn is that water levels in the terrace aquifer, which is generally about 65 feet deep in the project area, recover seasonally, except during periods of extended drought. As in many coastal basins, groundwater levels appear to be dictated by the elevation of the outflow point in the marsh, which is at or above mean sea level.

c. Surface Water Hydrology. As mentioned in the section above, surface water ponding and drainage in the Pillar Point Marsh has been altered by three primary man-made features: 1) the access road to Pillar Point, 2) the construction of the Half Moon Bay County Airport, and 3) the U.S. Army Corps of Engineers Breakwater at Pillar Point Harbor. Each of these features have had substantial impacts on both the biology and function of the marsh complex.

The most conspicuous feature is the access road, which separates the saltwater marsh from the freshwater marsh/willow riparian habitats. The road serves as both a physical constraint to tidal inflow to the freshwater wetlands, and perhaps more importantly, as a sediment trap that has gradually caused aggradation of the freshwater habitats to the east.

The less conspicuous features are: 1) the Pillar Point Harbor breakwater, which limits wave action on the saltwater marsh barrier dunes, and 2) the airport which serves as the primary source of stormwater runoff and sediment to the upper freshwater marsh. Surface water in the marsh occurs as runoff enters and ponds in the low lying areas, and as groundwater levels rise above the ground surface. Fluctuations in extent and duration of ponding occur throughout the year and over longer periods of wet and dry cycles. In effect, aggradation changes the mean elevation of the ground surface. Changes of habitat type over the long term reflect this long history of fluctuating water levels and sediment generating disturbance, especially in the freshwater portions of the marsh subject to flooding and sedimentation.

d. Water Quality. Limited surface water quality data exists for Pillar Point Marsh beyond periodic salinity and specific conductance measurements in the saltwater marsh portion (Flint, 1977). Groundwater quality data is relatively more abundant in terms, due to its use for water supply. Groundwater quality is generally considered good, with the exception of elevated levels of iron and manganese. Because the groundwater basin interfaces with the ocean in Half Moon Bay,

seawater intrusion has long been a potential source of concern. Chloride concentrations in area groundwater, however, do not appear to indicate the existence of seawater intrusion into the groundwater basin at past or current levels of groundwater production.

The three primary potential sources of degraded water quality in the marsh are: 1) sediment transported from the airport drainage ditch network, roadside ditches and grading and development in the Princeton area; 2) urban runoff from the airport and Princeton; and 3) agricultural chemicals used by local growers on the Half Moon Bay Terrace. Visual impressions of the sediment transported from the airport drainage system and Airport Road imply that a substantial proportion of the sediment delivered to the marsh originates in the disked airport fields, the periodically cleared ditches, and roadside drainage ditches. During and after rainfall events, it is possible at the culvert above the saltwater marsh to differentiate, by eye and specific conductance measurements, between turbid waters flowing from the airport ditch and the relatively sediment-free surface runoff from the vegetated hillsides and terrace to the north.

As in San Vicente Creek, urban runoff and non-point sources of pollution related to the airport and local automobiles, mainly hydrocarbons for fuel and heavy metals, are not documented for the marsh. The potential for fuel spills and related industrial chemicals exists, though the Regional Water Quality Control Board staff does not have any record of known occurrences that have adversely impacted the marsh (Napolitano, 1998).

Agricultural chemicals known to be used by local farm operations on the Half Moon Bay Terrace include: Meta Systox, Vapam, Terra Clor 75 percent WP, Lorsban, Diazonon, Di-methoate, Guthion, and Lannate. Fertilizers used are 15-15-15, 12-12-12, urea, ammonium nitrate, and calcium nitrate (Teter, 1996). Transport of diazaron and other pesticides has the potential to adversely impact biotic communities of the marsh. Equally important, it is likely that residues of more toxic and persistent older pesticides no longer being applied may remain in the soil and are transported to the marsh adsorbed to eroded sediment. No definitive water and sediment quality studies have been conducted to our knowledge at the marsh to assess whether these substances are present or have caused problems.

4. Regulatory Agencies

Geographically, the Fitzgerald Marine Reserve is downstream of all watershed problems. As such, the Pillar Point Marsh and San Vicente Creek corridor in the project area receive flow, sediment, and potential pollutants transported from above. The Reserve and the San Mateo County Parks Department exercise no jurisdiction over watershed activities that affect the resources under their stewardship. This lack

of authority within the watersheds of concern is the primary constraint to protection of the Reserve's wetland resources.

Watershed conditions that may adversely impact the Reserve are under a wide range of jurisdictions, including, but not limited to, the State Coastal Commission, State Water Resources Board (SWRB), Regional Water Quality Control Board (RWQCB), U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers, California Department of Fish and Game, and San Mateo County departments and agencies.

Water quality impacts resulting from equestrian facilities and agricultural activities are not well documented at this time, but as Coastside County Water District proceeds with the use of diverted San Vicente water, additional water quality testing and watershed protection measures will be required by the State Department of Health Services for compliance with the Surface Water Treatment Rule (SWTR).

The San Mateo County Health Department and the County Agricultural Commissioner are locally responsible for maintaining public health and safety relative to water quality, pesticide applications, and other potential environmental hazards. The San Francisco Bay Regional Water Quality Control Board, the State Department of Fish and Game, and the State Water Resources Control Board exert authority over local waterways and their water quality. Changes in watershed management practices are likely to occur through combined efforts of these agencies.

The Half Moon Bay County Airport is also an area with considerable influence on the water quality and sedimentation rate of Pillar Point Marsh. Activities on the Airport property, as well as on other neighboring parcels, directly affect the marsh. The airport is required to maintain a NPDES permit, a Stormwater Pollution Prevention Plan, and Hazardous Material Management Plan, required by the RWQCB and the County Department of Environmental Health.

Future development in these nearby areas should consider impacts to the marsh that may occur during construction as well as throughout the use of these properties.

G. GEOLOGICAL/GEOTECHNICAL CONDITIONS

The Reserve and Marsh are situated in a challenging geologic setting since they are crossed by the active San Gregorio Fault (SGF) zone, and the entire seaward edge of the upland portion of the Reserve is fronted by a continuously eroding coastal bluff. Any proposed improvements must be sensitive to the hazards associated with earthquakes, unstable sea cliffs, and soil erosion.

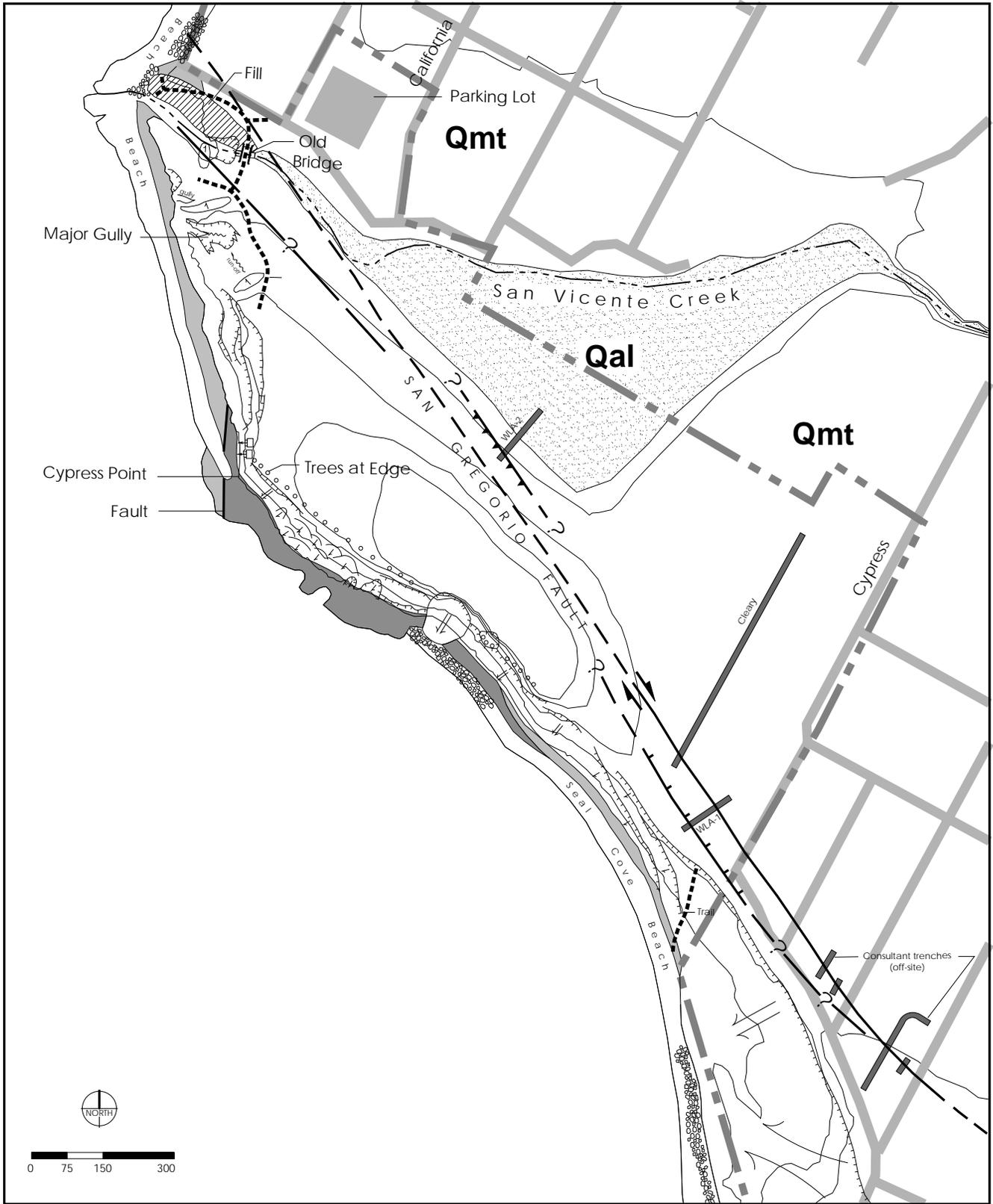
1. Geology

The Reserve and Marsh are situated on a structural block west of the San Andreas and Pilarcitos faults. The Salinian bedrock in the vicinity of the project area consists of Cretaceous granitic rocks of Montara Mountain, often referred to as the Montara granodiorite. The granitic basement is overlain by Pliocene sedimentary rocks of the Purisima Formation (unit Tp on Figure 16). The Purisima Formation in this region consists of highly fractured, well-indurated (hardened), soft to medium-hard fossiliferous mudstone, siltstone, and sandstone in distinct, thin beds (Pampeyan, 1994). Within the Reserve, the Purisima Formation can be subdivided into two subunits based on the relative degree of induration and resistance to erosion. Unit Tp-1 is a soft, pervasively sheared, thin-bedded mudstone which is susceptible to erosion and large-scale slope failure. Unit Tp-2 is a moderately- to well-indurated, thin-bedded, silicified mudstone that is relatively resistant to erosion and slope failure. The distribution of these rock types and their relative differences in resistance and erodability are reflected in the configuration of both the sea cliff and reef. Unit Tp-1 is susceptible to deep-seated slope failures along the sea cliff and corresponds to the deep-water slots and valleys within the reef complex. Unit Tp-2 forms steep sea cliffs and is responsible for the elevated portions of the reef.

Bedrock in the coastal region was eroded during episodes of Pleistocene high sea levels, forming relatively level marine terraces. The marine terrace in the project area is the Half Moon Bay terrace, which corresponds to a high sea level stand about 83,000 years ago (Kennedy et al., 1982). The terrace consists of a wave-cut platform overlain by littoral (between the high and low watermarks) to sublittoral sands and alluvial deposits that are typically 20 to 65 feet thick. These terrace deposits comprise the upper part of the sea cliff through most of the Reserve, and underlie most of the bluff top region. At the Marsh, the terrace has been tectonically down-warped and buried by late Pleistocene and Holocene alluvial fan and marsh deposits.

2. San Gregorio Fault (SGF)

There are three principal seismic hazards in the project area: 1) surface fault rupture; 2) strong ground shaking during a large magnitude earthquake; and



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 16:

GEOLOGY

- | | | |
|--|--|--|
| Direction of surface run-off | Fault (Solid line where well-constrained and dashed where approximate) | Tertiary Purisima Formation (Plio-Pleistocene) |
| Raveling block | Riprap | TP-1: Soft, pervasively sheared, fissile mudstone |
| Landslide
Hachures along head scarp | Quaternary alluvium of San Vicente Creek (Qal) | TP-2: Moderately consolidated, thin-bedded to laminar mudstone and sandstone, silicified and resistant (cliff-forming) |
| Trench | Quaternary marine terrace deposits (Pleistocene) (Qmt) | |

(3) earthquake-induced sea cliff failure. There is a high level of risk associated with these hazards because both the Reserve and Marsh are crossed by the active northern SGF zone (Figure 17). The level of risk can be reduced to a reasonable level, however, by avoiding construction of site improvements over active faults and near the coastal bluff, and by strengthening structures to withstand high dynamic earthquake loads.

The SGF is the principal tectonic structure west of the San Andreas fault in the coastal region of central California between Monterey Bay and Bolinas Lagoon. The SGF is part of a coastal system of parallel strike-slip faults extending from Point Conception in the south to the Marin Peninsula in the north. Because the fault zone is complex and primarily lies offshore, its rate of deformation and earthquake history are largely unknown. As such, the frequency and magnitude of potential earthquakes are poorly understood.

The fault displaces and deforms the Half Moon Bay marine terrace (Lajoie et al., 1979; Lajoie, 1986). East of the fault, the terrace is laterally continuous for several miles. The western wave-cut platform of the terrace is present at about sea level at Moss Beach, but may be as much as 60 feet below sea level near Pillar Point Marsh. Remnants of an uplifted marine terrace are present immediately west of the fault, forming the upland areas in the Reserve and south to Pillar Point. The uplifted terrace remnant may be older.

A total of three exploratory trenches have been excavated within the boundaries of the Reserve (Figure 17). Two of the trenches (WLA-1 and 2) were part of recent research studies of the fault for the U.S. Geological Survey; the third was conducted by Cleary Consultants in 1990 for the County to evaluate potential sites for a new interpretive center (Cleary trench). The trenches indicate that the location of the SGF is farther west in the vicinity of the Reserve than previously estimated. Also, the trenches indicate that the SGF is an active, right-lateral strike-slip fault that has experienced repeated movement through the late Holocene (the last 5,000 years). The fault zone is complex, and typically consists of multiple active strands (fault lines). At the location of trench WLA-1, the fault zone is 72 feet wide, and consists of at least five Holocene-active strands.

The most recent surface rupturing earthquake on the SGF at Seal Cove occurred sometime after the formation of a native Californian cooking hearth that was exposed in trench WLA-1. The hearth was formed between A.D. 1270 and 1400 based on radiocarbon dates on shell and charcoal. Since no record of a large earthquake exists in the historic record that dates to the arrival of Spanish missionaries ca. A.D. 1775, the most recent earthquake on the SGF occurred between A.D. 1270 and 1775. The second most recent earthquake is less well-



FITZGERALD MARINE RESERVE MASTER PLAN

Figure 17:

FAULT ZONE CONSTRAINTS

-  Fault (Solid line where well-constrained and dashed where approximate)
-  Fault Setback
-  Seacliff Setback
-  Edge of Seacliff

defined, but appears to have occurred between A.D. 620 and A.D. 1400. Thus, two earthquakes have occurred at the site in the past approximately 1400 years. The earlier earthquake appears to have been associated with a right-lateral surface rupture of about 10 feet. Based on published estimates correlating displacement with earthquake magnitude, it is estimated that the magnitude was on the order of 7.0 (Wells and Coppersmith, 1994). No information is currently available on the magnitude of the most recent earthquake.

The fault zone is relatively well-defined within the Reserve, based on the three exploratory trenches and sea cliff exposure of the fault at Moss Beach before it was covered by rip-rap. The fault has never been exposed within the vicinity of the Marsh, and its location is less defined in this area (see Figure 17). Northwest of the Marsh, the fault is shown on geologic maps running along the base of the uplifted terrace. To the southeast, it is mapped offshore along submarine escarpments that have been identified in bathymetric surveys.

Development near known active faults in California is subject to the requirements set forth in the Alquist-Priolo Special Studies Zone Act. This Act is intended to prevent the development of structures across active fault traces to mitigate the hazard associated with surface fault rupture. As part of the implementation of the Act, the State Division of Mines and Geology issued maps showing the location of active faults and defining "special studies zones" within which site-specific geologic investigation must be performed to assess the presence or absence of active faults. It was for this reason that the County contracted a geological consultant in 1990 to conduct a trenching study within the Reserve, as previously mentioned. Based on the results of this study, as well as the results of two WLA paleoseismic research trenches, the fault location shown in Figure 17 is more accurate than the generalized State Special Studies Zone map encompassing the Reserve. The fault shown in the figure therefore supersedes the State map. To mitigate the hazard associated with a surface rupturing earthquake on the *SGF through the Reserve*, no major site facilities (e.g., visitors center) should be located within a 50-foot setback from the mapped fault zone as shown in Figure 17.

Because the location of the active *SGF* is less clear at the south end of the Reserve, the State Special Studies Zone map for this area must be relied upon for guidance. For permanent structures for human occupation (a restroom would not be classified as such) proposed in this area, a site-specific geologic investigation should be performed to better identify the location of the active fault trace(s).

In addition to the *SGF*, the Reserve and Marsh are in close proximity to a number of potential seismic sources that could produce strong ground shaking. The San Andreas fault, for example, is located about 7 miles east of the project area. To mitigate the strong ground shaking hazard associated with a large magnitude

earthquake on the SGF or other nearby faults, structures should conform to Uniform Building Code (UBC) Seismic Zone 4 standards.

3. Coastal Bluff Retreat

The sea cliff within the Reserve is up to 90 feet in height at its highest point near Cypress Point. The cliff is fronted by a very narrow beach in parts of the Reserve, or by no beach. As such, virtually the entire cliff face just north of Seal Cove is subject to wave impact during high tides and/or periods of high surf. Slope instability and coastal bluff retreat are driven by erosion and undercutting at the cliff base. At Seal Cove, the relatively wide beach and cliff face are protected by a reef complex offshore and deeper water in the nearshore zone.

Most retreat takes place during the winter season, particularly when storms and high surf occur during high tides, or during earthquakes. As such, bluff retreat occurs episodically. There may be several consecutive years when no retreat occurs at all. During these intervals, weathering and erosion weaken the cliff face, making it susceptible to wave attack the next time that high tides and surf coincide, or when strong earthquake shaking occurs.

The lower part of the cliff face consists of Purisima Formation bedrock, and the upper part, marine terrace deposits. These materials are weakly to moderately consolidated, and susceptible to slope failure and/or erosion. The slope never reaches a state of equilibrium and stability because materials derived from landsliding that ordinarily would accumulate at (and buttress) the base of the slope are continuously removed by waves.

The style of slope failure and rate of coastal bluff retreat are, at least in part, controlled by the nature of the bedrock at the base of the cliff (Figure 16). In areas of subunit Tp-1, it is weak and fissile, unstable, and the slope tends to fail in large, deep-seated rotational landslides. These large landslides move along rupture surfaces that penetrate well back into the slope, daylighting on the bluff top several tens of feet back from the bluff crest. Bedrock in these areas consists of soft, pervasively sheared shale, which is susceptible to infiltration of water and is highly erodible. Examples of these deep-seated failures include the bluff adjacent to the southern portion of Seal Cove Beach and the slope immediately north of Cypress Point. Where bedrock is more resistant (subunit Tp-2), and therefore capable of resisting wave impact, the cliff face is steeper and tends to fail in shallow block falls and rock slides. Bedrock in these areas consists of silicified shale that is considerably more indurated and distinctly less sheared than in adjacent areas. These portions of the bluff are present between Seal Cove Beach and Cypress Point.

Several estimates of the rate of coastal bluff retreat have been published for nearby areas outside of the Reserve, but as conditions vary along the coast, it is important to understand the cliff retreat rates for pertinent areas within the Reserve. Historic aerial photographs of the Reserve dating back to 1931 were evaluated and field reconnaissance was conducted to document current conditions and estimate the rate at which the bluff has retreated over the past 67 years. A row of cypress trees along the bluff top near Cypress Point served as a constant reference point (see Figure 16). In the 1931 photos, these trees are fairly young, based on the limited extent of visible canopy, and there is little other vegetation on the bluff top.

In 1931, up to 90 to 100 feet of bluff existed seaward of the tree row. In 1943, it appears that about 80 feet of bluff remained, and the cliff had retreated to the northwest end of the row of trees, where several may have been lost. In 1956, there was little change at Cypress Point, but the tree row was breached at the southeast end. By 1977, 50 feet of bluff remained, and a larger portion of the northwest end of the tree row was gone. Field checking of current conditions shows that considerable retreat has occurred in the past 21 years. A maximum of 10 to 20 feet of bluff top remains seaward of the tree row; in specific areas, the bluff crest has receded all the way to the trees. A larger number of trees at the northwest end of the tree row are now missing, and six trees are currently dead and are close to being lost. The head of the slide that breached the tree row at the southeast end is presently 25 feet beyond the projection of the trees.

Based on the interpretation of aerial photography and field reconnaissance, it is estimated that up to 100 feet of coastal bluff retreat has occurred since 1931. This indicates an *average* retreat rate of 1.5 feet per year for the area around Cypress Point. There have been no moderate or large magnitude earthquakes on the SGF in the vicinity of the Reserve since 1931; therefore, the rate may increase should a significant earthquake occur. To account for the potential of a higher retreat rate in the event of an earthquake, it is prudent to assume a conservative value of 2.0 feet per year. As noted above, coastal bluff retreat does not occur at a constant rate, but episodically.

North of the mouth of San Vicente Creek, near the Moss Beach syncline, the rate of retreat was documented at 1.5 feet per year over a 105-year period between 1850 and 1955 (Lajoie et al., 1979). Southeast of Cypress Avenue, in the Seal Cove community, the rate of retreat was documented at 1.0 foot per year over a 29-year period (Leighton and Associates, 1979).

Future development at the Reserve should be located at a sufficient distance from the bluff crest to prevent future damage and/or loss of major, permanent structures. To determine an appropriate and safe distance, the rate of coastal bluff retreat of 2.0 feet per year and an assumed project lifespan of 50 years was used to establish a

setback zone of 100 feet (see Figure 17). This setback zone extends from the bluff crest or the landward extent of encroaching landslide headscarps. It applies only to the bluff in its current state; as retreat continues, the setback zone will change as well. Therefore, the setback should be measured in the field at the time of development.

There has been concern expressed in the past that increased numbers of visitors in the Reserve may result in increased slope instability and higher rates of cliff retreat. This does not appear to be the case, however. As described above, coastal bluff retreat is driven by wave erosion at the base of the cliff. The mechanisms that result in slope failure are more closely tied to wave impact, gravity, groundwater flowing out of the slope face, lack of support (buttressing) at the toe of the slope, and the weak nature of the materials that comprise the cliff. The potential impacts associated with foot traffic are surficial and of a much smaller magnitude, and do not appear capable of initiating large scale slope failures.

However, because the sea cliff is an unstable, erodible slope, pedestrian access to the crest of the bluff has adverse impacts by impeding vegetation growth and exacerbating erosion on the slope face. Informal trails form paths for water flowing over the bluff crest, thus increasing the potential for triggering and expanding areas of erosion and increasing the rate at which it occurs.

4. Soil Erosion

Significant erosion problems currently exist at two locations in the Reserve: 1) at the bridge crossing near the mouth of San Vicente Creek; and 2) along the northern end of the bluff where a large gully complex is growing (see Figure 16). These problem areas demonstrate the vulnerable nature of the geologic materials at the Reserve, and their susceptibility to rapid erosion.

Both of these areas are the result of past grading activities conducted in the early 1960s to create building pads for proposed residential development at the northern end of the bluff top west of San Vicente Creek. Vegetation and the top layer of soil were removed from the bluff and used as fill in the creek to provide access to the graded building pads. Development was never approved, and the resulting erosion is now the problem of the Reserve.

Up to 100 feet of San Vicente Creek may have been filled and culverted with a tapered metal chimney with the narrow end upstream (pers. comm. with Bob Breen). Small concrete wing walls at the upstream end of the culvert channel water from the creek into the pipe. However, the culvert and fill were not properly engineered, and the system has been unstable since its inception. In addition, the upstream end of the culvert is severely overgrown with riparian vegetation, and the headworks to the

culvert are partially blocked. Water ponding at the entry to the culvert percolates through the porous fill and flows toward the downstream face of the fill prism. The downstream face of the fill prism is a near-vertical, unsupported free face that recedes farther upstream each year. With each failure, sections of the culvert are exposed that, in turn, become detached and land in the creek. Sediment derived from the failing fill prism goes directly into the creek and is carried to the reef. The fill is a significant point source for sediment on the reef.

As of the beginning of 1998, the condition of this system was extremely unstable, as water continued to saturate and destabilize the fill. Only about 30 lateral feet of the fill prism remained at the time of inspection. Left alone, the remaining fill over the creek is likely to wash out within the next few years. A footbridge over the creek above the fill was moved upstream in December of 1997 and now lies at the upstream edge of the fill. It can be moved no farther upstream. The bridge was built in 1992, and replaced a trail that had been used for about 30 years.

When the building pads were originally graded, valuable topsoil that allows water to infiltrate and vegetation to become established, was removed. In 1970, the current gully was initiated at a small cave dug into the cliff face by children (pers. comm. with Bob Breen). The cave became a nick point at the bluff crest and developed into a significant gully complex, especially in the last few years when there has been heavy winter rainfall. Water flowing across the ground surface on the graded pad flows over into the gully and rapidly erodes the friable marine terrace deposits. Once in the gully, runoff carries the eroded terrace sand over the bluff crest, and onto the beach below. The gully may be another significant point source of sediment on the reef. It is a hazard to pedestrians, and both visually prominent and unsightly.

The graded pad that drains into the gully is relatively small. However, because there is no vegetation or soil on the pad to impede surface runoff, virtually all water falling on the pad flows into the gully. Even this relatively small amount of water is sufficient to cause significant erosion of the marine terrace deposits. The headwall of the gully complex is currently up to 14 feet in height, and currently overhangs in several places as weaker materials low on the headwall preferentially erode. The gully complex will continue to expand in the future unless some remediation occurs.

H. CULTURAL RESOURCES

This section describes the history of the area and cultural resources contained within the Fitzgerald Marine Reserve and Pillar Point Marsh. Information in this section is taken from “Seal Cove Prehistory: Archaeological Investigation at CA-SMA-134, Fitzgerald Marine Reserve, San Mateo County, California”, Mark G. Hylkema, 1998, and personal communication of Mark Hylkema, 1999.

1. Setting

At the time of the first European contact in the fall of 1769, the vicinity of Fitzgerald Marine Reserve was controlled by a small tribal community called the Chiguan. This group was one of over fifty politically autonomous tribal groups composing what ethnographers have called the Costanoan cultural division (Levy, 1978). This term was derived from the Spaniards designation of the coastal tribes as *costeños*, meaning coastal people.

The Chiguan held an area of approximately 8 square miles from Point Montara to Pilarcitos Creek. The tribal members occupied two different villages. The first was named Chagunte, and was probably located near Pillar Point at the southern end of the Reserve. The second village was called Ssatumnumo, and was probably situated near the town of El Granada.

The native people of California managed the landscape and food production through the use of fire. After burning the grasslands in late summer, new and improved vegetal growth would attract game like deer, elk, pronghorn, quail, doves, and other animals (Lewis, 1973). Evidently the people of Pillar Point also managed their environment this way.

In 1776, the Presidio of San Francisco and Mission Dolores were established, with the purpose of managing native population and converting them to Christianity. Between the years of 1779 and 1791, a total of 44 Chiguan people were brought into Mission Dolores in San Francisco, where most died after being exposed to foreign diseases and malnutrition (Cook, 1976; Milliken, 1991).

In the 1820s, after the Mexican Revolution divested Spain of its title to the lands, more settlers moved into the coastal area as ranches continued to expand.

Between 1840 and 1850, American settlers increased in numbers and encroached on the large Mexican ranchos as they set up small communities focused on a logging industry. At what would later become the City of Half Moon Bay, Rancho San Benito was called by the immigrant Americans “Spanish town.” After California

Statehood in 1850, many of the Hispanic ranchers lost title to their lands, and like the Indians before them, lost their property (Harlow, 1989).

By the 1870s, the area of the Half Moon Bay coast began to grow again as the local economy shifted increasingly towards agriculture. Although rough logging roads had been established linking the coast with the interior San Francisco Bay area, the first real road along the Half Moon Bay coast was built in 1879. It traversed along Point Montara down past Fitzgerald Marine Reserve. Despite the greater access to the area, many towns over the next century maintained small populations until the end of this century.

2. Archaeological Resources

Four cultural resources have been confirmed within the boundaries of the Reserve.

- a. 4-SMa-22, Pillar Point Mound. Variouslly called the Princeton Site, Half Moon Bay Mound, and/or Pillar Point Mound, 4-SMa-22 has long been recognized by archaeologists as one of the most significant sites on the coastside of San Mateo County. The site is dated sometime between AD 500 and AD 1000. Molluscan remains may be observed on the surface of the site, and burials and artifacts have been found at deeper levels. Although this remains a significant and important resource offering a wealth of information, it is estimated that a significant portion of the site has been damaged or destroyed by vandalism (local relic hunters).
- b. Site 4-SMa-109, Whaler's Cove Site. Only a few flecks of shell can be found at the site. It is very likely that the site has been subject to repeated impacts by automobile parking activities and has been destroyed.
- c. Site 4-SMa-133, Fitzgerald Marine Reserve Site. Molluscan remains as observed on the surface are identical to those listed for Site 4-SMa-22. The site has remained unchanged and seems to have suffered little or no damage through vandalism and natural erosion.
- d. Site 4-SMa-134, Seal Cove Site. The site is characterized as a Late Period deposit, dated between the years AD 1200 and AD 1300. Various tools, including milling tools and pitted stones, contribute to an emerging picture of early coastal subsistence trends and subsistence diversification, including exploitation of vegetal and marine resources. Marine and terrestrial mammal bones found in association with a large hearth feature point to significant hunting activity. The site has been dated at about 5,800 years. This site is subject to continuous destruction through erosion. Because of the size of the site in both surface area and depth, this site has the potential of being as important a resource as 4-SMa-22. This is especially true considering that the site has not suffered damage by acts of vandalism.

It is estimated that 50 percent of the known archaeological resources within San Mateo County have been destroyed. These sites are becoming increasingly rare. The sites at the Reserve, therefore, represent both a significant and a rare resource. Site 4-SMa-22 appears to have been a village or permanent residence. Despite the damage to the site, it contains a large amount of information which will be invaluable in reconstructing a cultural history of the prehistoric inhabitants and in elucidating adaptive and exploitative activities and processes. In addition, Site 4-SMA-22 is important to Native Americans as well because of the presence of human remains.

Both 4-SMA-133 and 4-SMa-134 represent specialized centers of resource utilization and therefore important to establishing exploitative patterns among the local Native American inhabitants.

Increased visitor activity on the project site could result in an increase in vandalism of the archaeological resources due to more people exploring the project site and finding archaeological artifacts. Conversely, more intensive management of these resources might aid preservation while allowing expanded interpretive and educational opportunities for visitors to the Reserve.

