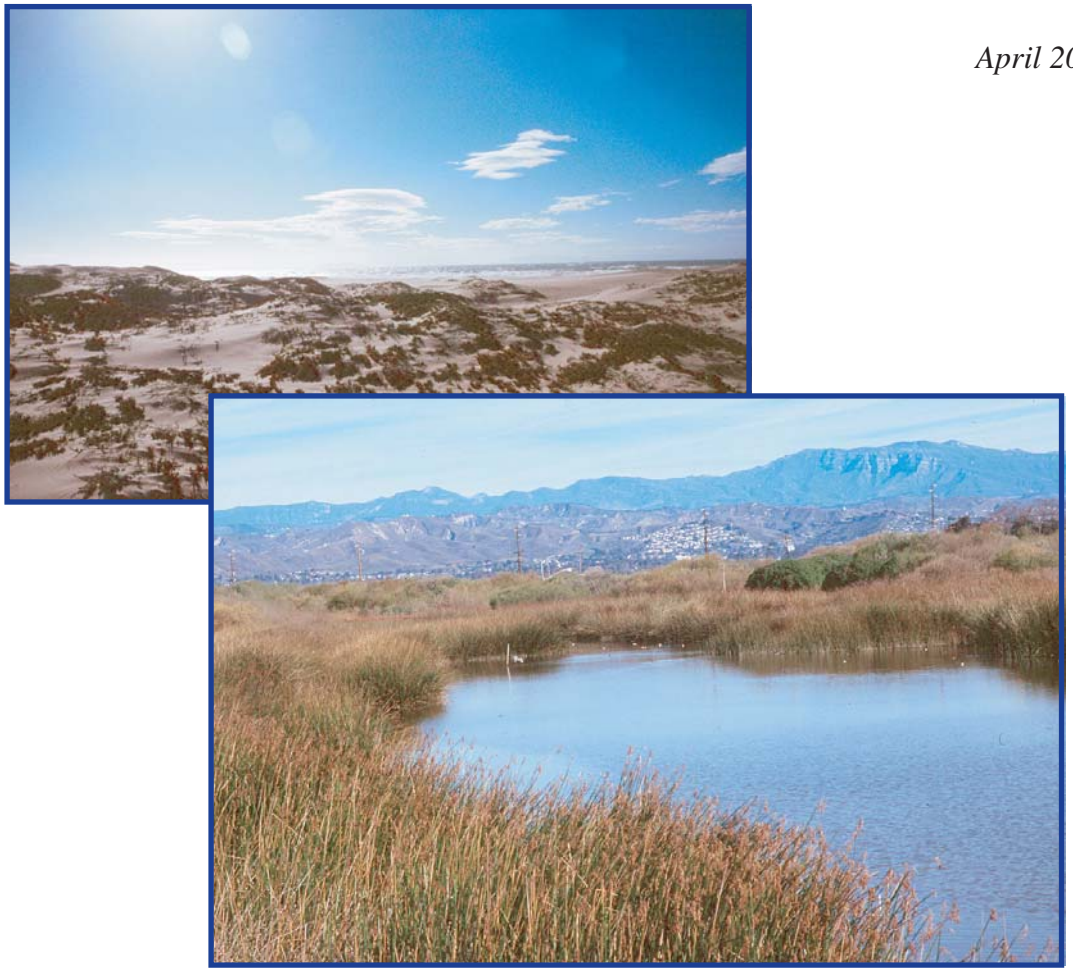
MCGRATH STATE BEACH NATURAL RESOURCES MANAGEMENT PLAN

Final



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Final

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CHAPTER 1.0

EXECUTIVE SUMMARY

The mission of the California Department of Parks and Recreation is to "…provide for the health, inspiration, and education of the people of California by helping to preserve the State's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation."

CHAPTER 1.0
EXECUTIVE SUMMARY

McGrath State Beach is uniquely situated at the intersection of nine important ecosystems. These ecosystems include the Pacific Ocean, sandy beach, coastal dunes, Santa Clara River and estuary, McGrath Lake – a coastal freshwater back dune lake, riparian woodland, freshwater marsh, and brackish marsh. While each of these ecosystems is individually noteworthy, it is especially uncommon to have them occurring adjacent to each other, and on public land. This combination of important ecosystems and relatively distant setting from high-density urban development provides a quality experience for visitors to McGrath State Beach. After over 40 years of activity at McGrath State Beach there are indications of habitat degradation mostly due to non-native species invasion and other disturbance to natural habitats from undirected visitor use.

This natural resources management plan has made a comprehensive analysis of the historic and recent information on the natural resources, recreation, cultural resources and land use within the park and the surrounding areas. As a result of that analysis significant and unique natural resources were identified and the physical and ecological processes that support those resources were determined. Based on that information, along with historic and current land use changes outside the boundaries of McGrath State Beach, management issues were identified and management recommendations were developed. These recommendations have taken a comprehensive approach to improving natural resources and recreational opportunities. Further, the management recommendations identify how the Department of Parks and Recreation, an important stakeholder in the community, can participate in local and regional planning issues to ensure that McGrath State Beach remains a unique and significant resource.

In 1964, the current footprint of the recreation areas and facilities was established and has not significantly changed. During those early years, management activities in the park largely focused on the recreational facilities and maintaining the infrastructure that supports those facilities. The park was initially developed to provide recreational opportunities for the surrounding communities. In 1979 the McGrath State Beach General Plan was developed. This plan recognized the need to protect and enhance natural resources while providing recreational opportunities to visitors. As a result of the General Plan many unique natural features were identified and recognized as important park resources. This led to the creation of the Natural Preserve, which protects the Santa Clara River and its estuary within the park boundaries, as well as an area of sandy beach, vegetated dunes, a brackish marsh, and an extensive riparian forest and woodland. Some important management recommendations in the 1979 General Plan have yet to be implemented. Delays in implementation have been in part due to a complex set of hydrological conditions that affect a large portion of the park. A better understanding of the ecosystems and their processes, and a thorough analysis of natural resource values and other park resources, such as recreation, is necessary before implementing many of the original General Plan management recommendations.

McGrath State Beach can be divided into hydrologically dependent and independent resource areas. The majority of all the resources are dependent on seasonal or perennial water associated with either the Santa Clara River or an extensive near surface groundwater system. The Santa Clara River provides seasonal flows to the Pacific Ocean where an estuary forms due to the formation of a sand bar. The river supports a diverse array of habitats including aquatic, wetland, and riparian forest. These habitats support a diverse assemblage of plants and wildlife that is unique to Southern California. The near surface groundwater is the result of a clay layer that occurs between 3 and 8 feet below the surface of the ground. This clay layer prevents surface water from penetrating further into the soil and into deeper aquifers. McGrath Lake is a low elevation point where this near surface groundwater is temporarily exposed as it moves southeast to northwest. This near surface ground water presumably drained into the Santa Clara River prior to the construction of an earthen levee, built before the park was established to prevent flooding of agricultural fields. The near surface ground water supports a brackish marsh near the river, a freshwater marsh surrounding McGrath Lake, and an extensive area of riparian vegetation that occurs toward the southern end of the park.

Only as an emergency flood control measure has the Department of Parks and Recreation obtained permits to artificially breach the sandbar; however, it is believed others outside the park covertly breach the sandbar to meet their specific needs. As a result, the natural ecosystem process of the estuary is truncated and rare and endangered fish, including the tidewater goby and southern steelhead, are put in jeopardy because they cannot complete their life-cycles under normal conditions. This plan identifies the complex hydrology of this system, which first must be understood by the local community. Management recommendations that do not jeopardize the water-dependent resources must be implemented.

The hydrologically independent areas include the active dunes that occur along the 2-mile stretch of beach, areas of back dune, and coastal dune scrub habitat. These upland areas are an important contrast to the wetlands and riparian areas. The active dunes include areas that are seasonally used by the federally listed Threatened western snowy plover for nesting and foraging. McGrath State Beach has begun an active western snowy plover monitoring and protection program to ensure this sensitive species remains a protected resource.

Use of non-native plants, such as myoporum and eucalyptus trees, for landscaping has been a common practice. These trees do provide wind breaks and cover for the campground. Unfortunately, these plants have invaded other areas of the park and caused damage and loss of native habitats. Other non-native noxious weeds, such as giant reed, ice plant, and tamarisk, have also invaded different areas of the park and continue to damage and cause loss of native plant communities including wetlands, riparian woodlands, and dune scrub. The result of these impacts is reduced plant and wildlife biodiversity, loss of habitat for special-status species such as western snowy plover, Belding's savannah sparrow, yellow warbler, and California least tern. Also, there is a loss of ecological function when the native habitats are reduced or lost. Riparian and wetland habitats provide conditions that allow nutrients, such as nitrogen and phosphorus from agricultural and urban runoff, and other water-transported elements to be removed resulting in higher water quality. Management recommendations have been developed that identify actions to remove non-native plants and improve native plant communities through restoration.

Damage to dune and brackish marsh plant communities has occurred due to unregulated creation of volunteer trails through these areas by visitors trying to access the beach. McGrath State Beach has developed a boardwalk through the riparian woodland in the Natural Preserve to provide access to the Santa Clara River in an effort to prevent additional disturbance to this sensitive habitat. Management recommendations identify specific access points to the beach and development of additional boardwalks. A modification to campground and day use parking facilities, along with increased trail signage will provide better direction and access to the beach. Additional trails will provide more access to areas of the park while reducing damage to the natural resources.

Impacts and interference with foraging and nesting western snowy plovers on the beach and dunes are due to unregulated access to the beach, lack of compliance with park regulations of dog leash laws, and access to McGrath State Beach from the north and south of the park in areas without signs. Most reasons for non-compliance are due to lack of education of the public. Management recommendations identify use of signs, providing visitor information, increased protection with fencing during breeding season, and having patrols during high use periods as methods that will decrease these impacts. An increase in the recently developed western snowy plover monitoring and protection program is recommended with a goal of identifying population levels and establishing population thresholds for measuring the success of management activities.

This Natural Resources Management Plan identifies a single primary goal *"sustain and improve the vitality and biodiversity of natural resources at McGrath State Beach."* One of the major management issues that must be addressed is the presence and spread of non-native noxious weeds. Eradicating non-native weeds can increase habitat quality without major funding or infrastructure changes. A series of objectives and implementation tasks have been identified for enhancing habitat quality through weed eradication as one of three management options. These management options involve increased levels of effort but provide greater opportunities to protect, increase and enhance natural resources as well as recreational and cultural resources. These management options include:

- conducting specific restoration with native plants after weed eradication,
- increasing the water quality and habitat quality of McGrath Lake, and restoration of the park staff residence area following relocation, and
- creating a buffer zone adjacent to the Natural Preserve following relocation and enhancement of a seasonally inundated section of the campground.

The management recommendations include specific implementation tasks with justifications that should occur within the boundaries of McGrath State Beach. Information is provided in the existing conditions that, along with the historical and current land use, provide parks staff with information they can use to respond to external actions, which may affect the park. In addition, regional planning issues are discussed in context with park natural resource and recreational values. The Department of Parks and Recreation is an important stakeholder in the community. Park staff must participate in a proactive process of regional planning so that McGrath State Beach will continue to provide valuable recreational opportunities that include diverse and high-quality habitat values.

CHAPTER 2.0

INTRODUCTION

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INTRODUCTION

PURPOSE AND APPROACH

This Natural Resources Management Plan for McGrath State Beach was developed to provide a comprehensive evaluation of the natural resources and their functions and identify how the Department of Parks and Recreation (DPR) can better implement management activities. This document will be used as a planning and management tool and will aid in future updates of the General Plan. The DPR Resource Management Directives provide guidance for developing information and management recommendations for parks. Two directives, in particular, provide explicit guidance:

> "31) In carrying out the provisions of the Resource Elements for units of the State Park System, it is an objective of the Department to apply creative and effective techniques of environmental resource management found by scientific analysis to be required to achieve the protection and perpetuation of the values around which the units are built."
>
> "32) In order to assure a continuity of effort in management and preservation of resources, it shall be an objective of the Department to prepare for each unit of the State Park System a resource management program or programs, identifying the field management actions required to achieve unit purpose(s) in relation to resources. When approved by the Director, the resource management program or programs for each unit will form the basis for resource management activities in that unit."

The task of developing a natural resources management plan identified seven goals that needed to be met. These goals were:

- **Provide Comprehensive Natural Resource Data –** The Natural Resources Management Plan will encompass the entire park and address issues of the larger environs. The Plan will review existing data, fill data gaps, and provide a comprehensive analysis of the park's natural resources within the context of geographic, geologic, hydrologic, or other major defining characteristics.

- **Focus on Unique Ecosystem Elements –** The Plan will focus on conservation and restoration of elements of the natural ecosystem that are unique or perform essential ecosystem functions within the area, region or state and require special management consideration.

- **Balance Resource Conservation with Visitor Experience –** The Plan must balance resource conservation and restoration with visitor use and expectation to ensure fulfillment of State Park's mission.

- **Include All Stakeholders –** Plan development and implementation must include interested stakeholders and the community at large to be successful. The Plan will include strategies for

public education and interpretation that will inform the public and will achieve responsible stewardship.

- **Ensure Consistency with Regional Planning Efforts –** There is a high level of awareness among stakeholders that the larger watershed has suffered serious decline in recent decades. The Natural Resources Management Plan must be consistent with the planning efforts for the larger Santa Clara River watershed.

- **Provide Clear Direction for the Future** – The Plan will describe in detail how to implement management recommendations. The Plan will include clear goals and monitoring protocols, and will describe the adaptive management methods that will be used to measure progress toward those goals, and to refine the plan as conditions change and more is learned about the environment. Desired conditions will be consistent with the General Plan.

- **Develop an Adaptive Management Program and Natural Resources Management Plan that can be Implemented on the Ground, Not on a Shelf –** The difference between planning and implementation are distinct. Planning uses existing information to identify the needs, goals, justification, order in which actions must occur, and detailed methods for implementation. Implementation takes action following the planning process, following the prescriptions identified, monitors the implemented actions and evaluates whether the goals are being met. Adaptive management is an evaluation process that recognizes some of the information used while making management recommendations at a higher level of uncertainty. Based on specific monitoring of implemented management actions, whether or not the goals and objectives are met can be determined. If the goals are not being met the adaptive management process potentially can identify the reason and take corrective action.

MANAGEMENT PLAN METHODOLOGY

Developing management recommendations that can be implemented requires specific knowledge about existing conditions and the variability of those conditions that can occur through one set of seasons or over many years. Opportunities to improve natural resource functions and values depend on knowing the existing conditions. But more important is understanding that, constraints which may have developed due to historic changes in land use in the region, can limit the feasibility of some management recommendations. Management recommendations developed in this management plan used the following steps in recommendation development:

- Determine the historical context,
- Characterize existing conditions and processes,
- Establish goals and objectives,
- Evaluate constraints to enhancing resources,
- Identify specific management recommendations,
- Identify that a management activity will lead to goal and objective,
- Identify steps to implement management activity,
- Identify ecological or other basis for the recommendation or methods proposed,
- Identify assumptions that must be met for implementation,
- Justify why and when a management activity should occur.

There are three types of management recommendations that can be made for McGrath State Beach:

- Recommendations that reflect actions to be taken within McGrath State Beach boundaries,
- Recommendations that identify how the Department of Parks and Recreation staff at McGrath State Beach should respond to proposed actions outside the park that could have an environmental impact on McGrath State Beach natural resources,
- Recommendations that lead to proactive regional planning by McGrath State Beach staff in conjunction with other regional agencies and organizations that will result in greater regional ecosystem protection and ultimately benefit natural resources in McGrath State Beach.

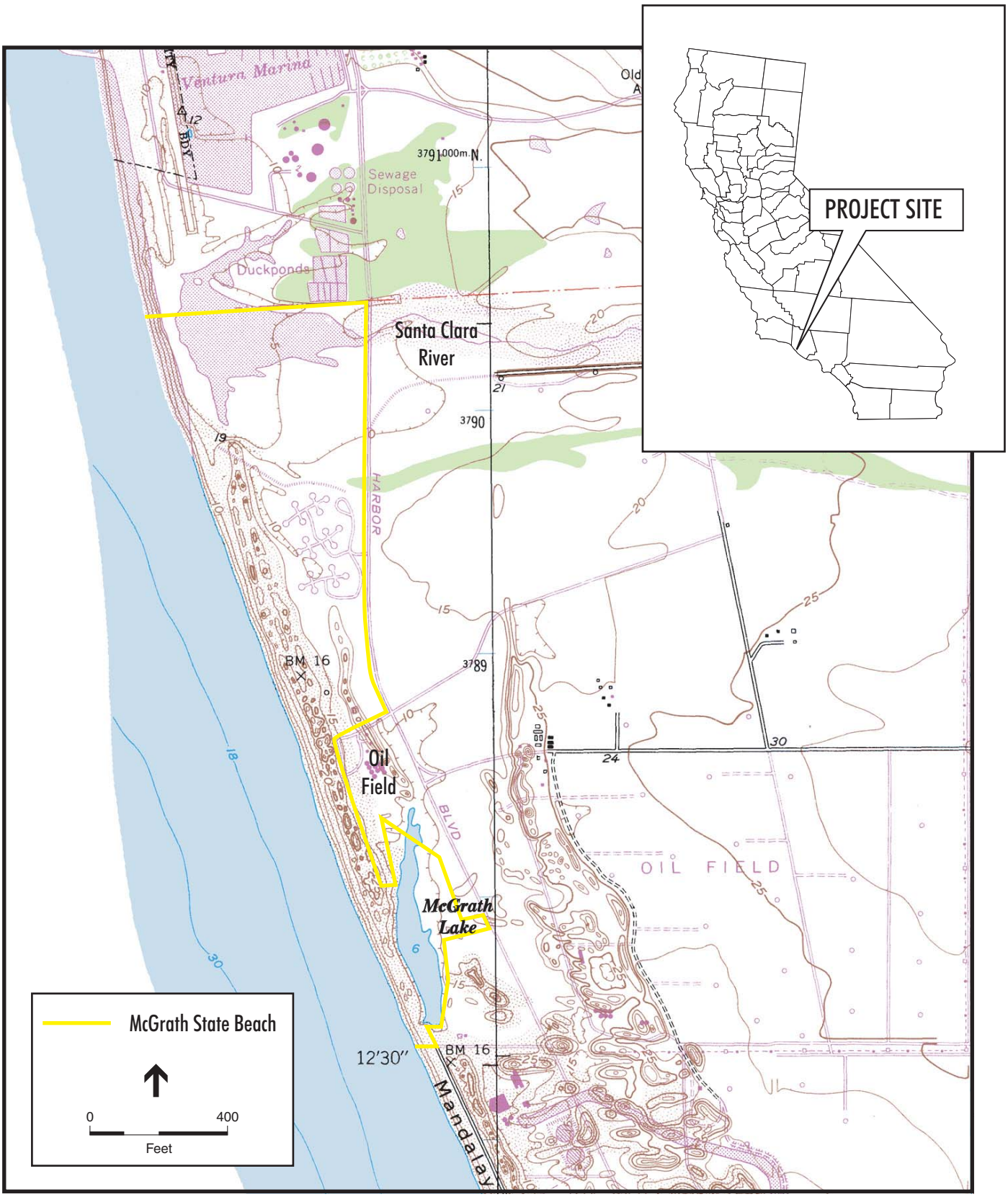
This plan developed management recommendations that address all three of these types. Most of the management recommendations focused on specific issues and actions that would occur within the boundaries of the park. Staff at McGrath State Beach has the greatest control and opportunities to implement management actions that will have significant benefits over a short-term. Specific actions could be identified that direct staff to implement management that will directly benefit natural resources as well as recreational use.

Actions proposed by individuals and organizations outside the boundaries of McGrath State Beach that are made without consideration of park values result in a reactive response by DPR staff. Public comment by DPR staff on projects that influence McGrath State Beach is an important management activity when the proposed outside actions may result in a reduction of natural resource values. This natural resources management plan also makes some specific recommendations on actions that are known to have a direct negative effect on sensitive and other natural resources in McGrath State Beach.

The Department of Parks and Recreation is an important regional stakeholder because McGrath State Beach provides unique and important natural and recreational resources to the community. Therefore, parks officials should actively participate in short-term and long-term planning in the region when those efforts could result in significant benefits to McGrath State Beach and the community. This natural resources management plan has identified some broad goals and made some recommendations for long-term regional planning. The ecosystem context and approach (see below) of this management plan requires a broader planning perspective to ensure future natural and recreational resource values are available for the community.

SETTING

McGrath State Beach is situated at the mouth of the Santa Clara River on the coast of Ventura County between the cities of San Buenaventura (Ventura) and Oxnard (Figure 1). The Santa Clara River watershed includes portions of the San Rafael, Santa Ynez, San Gabriel, and Santa Susana Mountains on the southern edge of the Transverse Range, and spans Ventura and Los Angeles Counties. The river flows through an alluvial valley, which has been extensively developed for agriculture and oil extraction, and is currently experiencing heavy urbanization pressures. The river and adjacent riparian vegetation provide an important ecological link between the coast and mountains.



SOURCE: Environmental Science Associates, 2002

McGrath State Beach / 201476 ■

Figure 1
McGrath State Beach and Vicinity

Harbor Boulevard, a major arterial street, and agricultural lands, which occur east of Harbor Boulevard, border the park to the east. The Santa Clara River estuary occurs at the northern end of the park, and the City of San Buenaventura wastewater treatment facility is located north of the park boundary. To the west is the Pacific Ocean, and to the south is the Mandalay Generating Plant (an electrical power generating facility) (Figure 2). The park boundary narrows to the south due to the location of two privately held parcels west of Harbor Boulevard. The park is mostly flat, with low sand dunes separating the beach from more inland areas.

ECOSYSTEM APPROACH

McGrath State Beach includes one of the more complex sets of environmental conditions and recreation, land use, and planning issues in southern California. Nine distinct ecosystems intersect and occur at McGrath State Beach including river, estuary, ocean, beach, dunes, coastal scrub, freshwater marsh, saltmarsh, and riparian. This complexity of environmental conditions makes the park environmentally sensitive to internal and external change. Visitor use within the park is an important park service. Recreation activities and facilities can have a significant negative impact on the sensitive environmental conditions if these activities are not managed. A comprehensive evaluation of the ecosystems within the park and potential effects from visitor use will better identify management activities that can allow for a balanced use of the park.

Also, McGrath State Beach is part of one of the more complex ecosystems in southern California due to its location on the Pacific Coast, along the Santa Clara River and estuary, and within the floodplain. The park is a sink for actions made up river due to its location at the mouth of the Santa Clara River. A series of groundwater aquifers in the watershed contribute to a complex hydrology that has a significant influence on McGrath State Beach, being at a low elevational position and associated with near surface groundwater level. The hydrology, arid coastal climate, and dynamic river and beach environments create a complex set of habitats that support a diverse suite of species including rare and endangered plants and wildlife. These natural environmental characteristics alone offer substantial challenges to management at McGrath State Beach. The environment of the park is complicated by historic and current activities by landowners and groups that manage resources and change land use to meet their specific needs.

Management of natural resources, recreation, and maintenance activities are all affected to a greater or lesser degree by decisions and actions made outside the park. Therefore, evaluation of the existing conditions and their function must include processes and actions that occur outside the park boundaries. Although state parks staff may not have direct control over external actions by others, the Department of Parks and Recreation is an important stakeholder to activities that have public and environmental regulatory peer review. This management plan evaluated the natural resources of McGrath State Beach in the ecosystem context of the Santa Clara River watershed, floodplain and regional setting. Management recommendations were made that included park staff participation in regional planning based on the broader ecosystem and regional information.

SOURCE: CA Dept. of Parks and Recreation, 2001 and ESA 2002.

McGrath State Beach / 201476 ■

Figure 2

McGrath State Beach

CHAPTER 3.0

EXISTING CONDITIONS

CHAPTER 3.0
EXISTING CONDITIONS

This chapter describes and discusses the natural resources that occur within McGrath State Beach. The majority of information in this chapter is based on existing information. This information was synthesized and amended as appropriate in order to develop an overall understanding of ecosystems in McGrath State Beach and the surrounding areas. The purpose of this chapter is understand the structure and functions of ecosystems in order to develop better management recommendations that use sound ecological approaches. Ecosystem structure includes how components of the ecosystem change over space such as the landscape and watershed. Ecosystem function addresses how components of the ecosystem such as hydrology, plant and wildlife species, and habitats change over time. In this chapter is a description of the physical and other environmental features that make this area unique due to the mosaic of features. It also describes how the intersection of important ecosystems results in complex environmental processes that pose management challenges for District staff. The chapter identifies and describes the diverse terrestrial and aquatic biological resources within the park including the many special status plants and wildlife. The chapter finishes with a discussion of the regional land uses and the cultural history of the area that have contributed to the existing conditions.

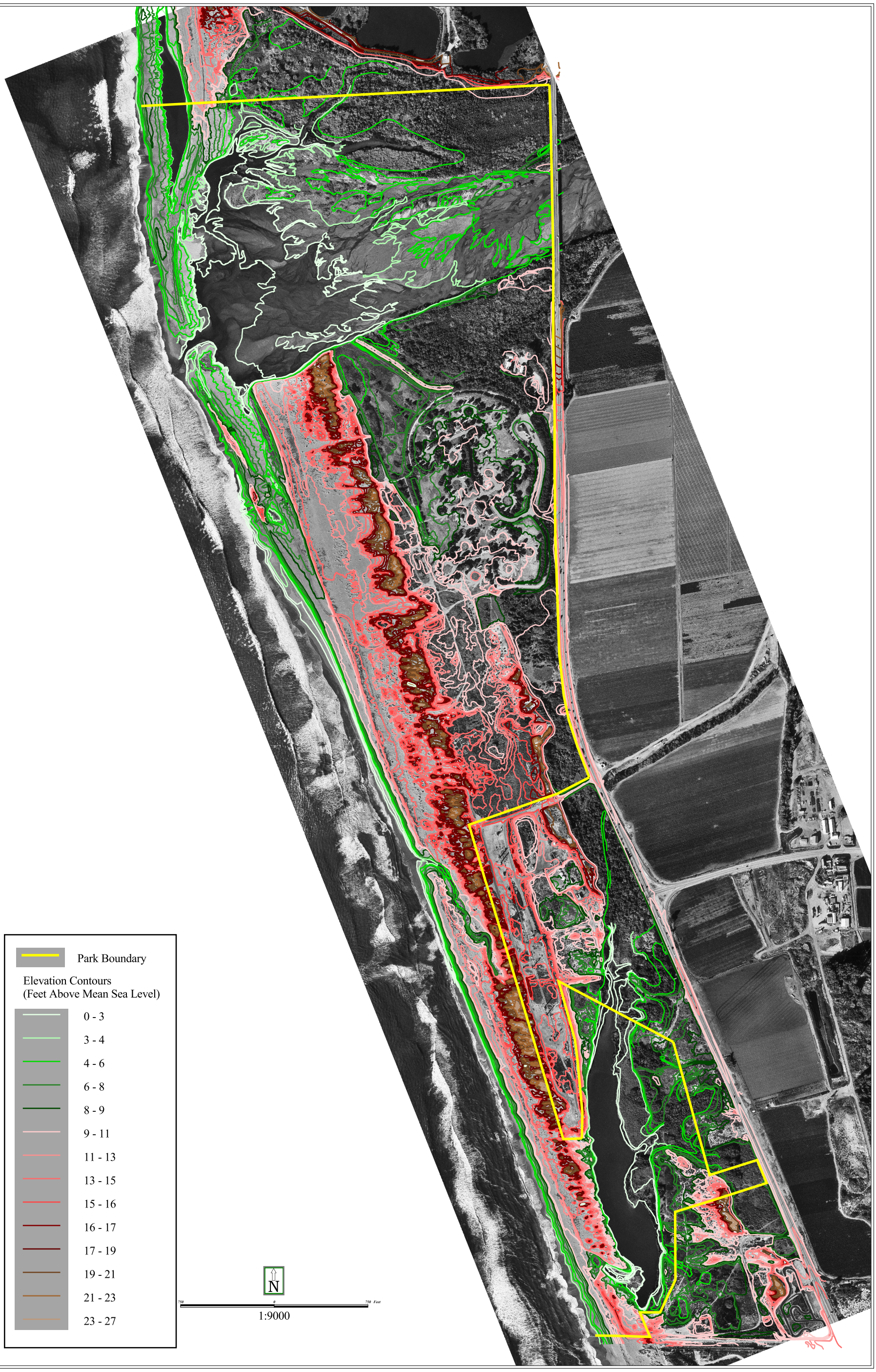
3.1 PHYSICAL CHARACTERISTICS

CLIMATE

The climate in the region of McGrath State Beach is typical of the Southern California coast. It is predominantly influenced by the marine environment, which produces mild conditions. Normal high temperatures in Oxnard range from 18.8°C, from January to March, to 23.3°C in August and September. Normal low temperatures in Oxnard range from 7.2°C, in December and January, to 15.6°C in August. Annual precipitation (measured in Ventura) averages 39 cm, the majority (36 cm) of which falls from November through April. Summers are frequently foggy at the coast. Moderate daytime on-shore ocean breezes are common, reversing to offshore breezes in the evenings. Hot, dry Santa Ana winds occasionally occur during the fall and winter.

TOPOGRAPHY

McGrath State Beach is relatively level and low-lying, with the lowest elevations of the park located within the estuary and northern portion of the campgrounds as shown in Figure 3. The shoreline along McGrath is relatively straight, and gently sloped. Beach width varies seasonally, with a larger beach approximately 100 to 200 feet wide exposed during summer months, then narrowing during winter. Annual dredging of Ventura Harbor contributes up to 500,000 cubic yards of sand to the beach and



SOURCE: CA Dept. of Parks and Recreation, 2001 and ESA 2002.

Figure 3

Topography of McGrath State Beach

nearshore environment of McGrath State Beach between September and March. The discharge of dredged sand is visible in Figure 2, to the north and south of the Santa Clara River mouth. A ridge of sand dunes separates the shoreline and beach from the campgrounds, visitor center, and McGrath Lake. The formation and height of the sand dunes shift constantly due to seasonal changes and wind patterns, with dunes being lowered and raised as the sand is rearranged by winds and rain. Dune height rarely exceeds 26 feet above sea level (California Department of Parks and Recreation, 1979). Pumping of water from McGrath Lake by the Coastal Berry Company and discharging it into a low point in the dunes (Figure 3) within the park is potentially having a significant impact on dune formation and stabilization in the area west of McGrath Lake.

An earthen levee approximately 10 to 13 feet msl partially separates the Santa Clara River estuary and riparian forest from campgrounds. This levee originates approximately 875 feet west of Harbor Boulevard and extends northwest along the edge of the riparian forest. Originally constructed by the McGrath Family in the 1950's, the levee historically connected to the sand dune ridge, confining the western edge of the Santa Clara River estuary as shown in aerial photographs from 1978 and 1987 (Appendix A). However, heavy rainfall and flooding in 1998 resulted in the erosion of the westward portion of the levee. On-going erosion has shortened the levee to its present length of approximately 900 feet.

GEOLOGY AND SOILS

McGrath State Beach is located within the Transverse Ranges geomorphic province. This province is unusual within the state of California, as it is dominated by east-west rather than north-south trending ridges (Norris, Webb, 1990). The Transverse Ranges are complexly folded and faulted; consequentially, the geology of the individual mountain ranges which compose the Transverse Ranges varies significantly (Oakeshott, 1978). The age and composition of basement rock and overlying materials that are the origin of alluvial sediments on which McGrath State Beach rests are therefore diverse.

Located on the edge of the Santa Clara alluvial plain, McGrath State Beach is underlain by unconsolidated alluvial deposits eroded from surrounding mountain ranges that have been carried and re-deposited by the Santa Clara River. The valley through which the Santa Clara River flows was formed as a result of tectonic uplift and folding, causing rock and overlying alluvial sediments at McGrath State Beach and surrounding areas to be compressed into a syncline. The path of the Santa Clara River follows this syncline axis and the associated Oak Ridge fault along the majority of the Santa Clara Valley.

SEISMICITY

Located in a seismically active area, McGrath State Beach is 3 miles south of the active Ventura fault, while the potentially active Oak Ridge thrust fault is approximately 1 mile north. The active San Fernando fault, source of the 1971 San Fernando earthquake, is located over 40 miles to the east. Although the low number of structures at McGrath State Beach minimizes the potential for damage associated with seismic activity, ground shaking and liquefaction hazards do exist.

Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. Historic earthquakes have caused strong ground shaking and damage in Southern California, such as the 1971 San Fernando and 1994 Northridge earthquakes. Although the epicenter for the San Fernando event was over 50 miles to the east, earthquakes of similar magnitude occurred less than 10 miles off the coast of Santa Barbara in 1925 and 1941. According to the California Department of Conservation, Geological Survey (CGS, formerly the Division of Mines and Geology) probabilistic seismic hazard map, peak ground acceleration in the McGrath State Beach region could reach between 0.5 to 0.6 g (Peterson, et al., 1999). The Modified Mercalli (MM) intensity scale (Appendix B) is commonly used to measure earthquake effects due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage.

Liquefaction is a phenomenon whereby unconsolidated and/or near saturated soils lose cohesion and are converted to a fluid state as a result of severe vibratory motion. The relatively rapid loss of soil shear strength during strong earthquake shaking results in a temporary fluid-like behavior of the soil. Soil liquefaction causes ground failure that can damage roads, pipelines, underground cables, and buildings with shallow foundations. As earlier described, McGrath State Beach is underlain by unconsolidated alluvial deposits and groundwater is relatively shallow. The California Department of Conservation, Geological Survey has designated McGrath State Beach and surrounding region as a Seismic Hazard Zone for liquefaction (CGS, 2001).

SOILS

Soils in the park consist primarily of sandy loams, river wash, and tidal flats (USDA NRCS, 1970). Riverwash soils are restricted to the Santa Clara River estuary, and are characterized as highly stratified layers of stony and gravelly sand containing relatively small amounts of silt and clay. McGrath State Beach is underlain by tidal flat and sandy loam deposits, areas characterized by the National Resource Conservation Service as displaying relatively poor drainage due to a high water table and slow surface water run-off. Oil development operations conducted by the McGrath family prior to the property's ownership by State Parks have reworked native sediments south of the campground area, disturbing pre-existing soil horizons. However, sandy soils still typify this and other areas of the park.

HYDROLOGY AND WATER QUALITY

The surface and groundwater hydrology of McGrath State Beach and the surrounding area is the most significant feature that defines the ecosystem. Only a relatively small area of active and back dunes is somewhat independent of the hydrology of the region. The hydrology of McGrath State Beach is described in terms of surface water and groundwater. But it is critical to understand that these two components are inexorably linked and their influence on the ecosystem cannot be viewed independently.

SURFACE WATER

SANTA CLARA RIVER AND ESTUARY

McGrath State Beach is located at the mouth of the Santa Clara River, a 1,600 square mile watershed that originates in Sierra Pelona and the San Gabriel Mountains and flows westward through the 30-mile long Santa Clara River Valley (Figure 4). The Topatopa Mountains to the north and the Santa Susana Mountains to the south flank it, before it finally empties into the Pacific Ocean. Approximately 84 miles in length, the Santa Clara River is one of the larger drainages in Southern California.

Santa Clara River and McGrath State Beach have a semi-arid Mediterranean climate, with approximately 80% of precipitation received between November and March. This climate results in annual flow rates varying widely throughout the year, with little or no measurable flow in summer months and large, winter storm events dramatically increasing flow rates and occasionally resulting in flooding. This pattern of extended dry periods punctuated by high flow events following winter storms has resulted in the Santa Clara and Southern California rivers being characterized by 'flashy' flows (Swanson et al., 1990).

Substantial flooding on the Santa Clara River has occurred relatively frequently, with flood events recorded in 1938, 1940, 1955, 1962, 1965, 1969, 1970, 1980, and 1983 (Swanson et al., 1990). Damage associated with the 1969 event included extensive flooding and damage to the Ventura Water Reclamation Facility, Ventura Harbor, and the Montalvo and Olivas Golf Course, located on the opposite side of the Santa Clara River from McGrath State Beach, and agricultural operations. The extent of 1969 flooding was documented through aerial photography, as depicted in Appendix A 1969 aerial**.** Upstream at Saticoy, peak flows of 165,000 cubic feet per second, approximately equal to a 100-year flood event, were measured (YSE, 1999, Swanson et al., 1990). Following the 1969 flood, levees were installed to protect the Ventura Water Reclamation Facility and golf courses from being inundated during future flooding events. Installation of these levees and other upstream has restricted channel development resulting in a change of river geomorphology, as discussed below.

Santa Clara River Geomorphology

The Santa Clara River is a braided channel, with the morphology of the river changing frequently as sediments carried by the river form sandbars and river flows meander among these deposits. This pattern is a result of the wide, relatively level valley through which the Santa Clara River flows after leaving the San Gabriel Mountains and Sierra Pelona, with valley river banks composed of unconsolidated sand, gravel, and other easily eroded materials. These deposits enable the river to meander, rather than be confined within a canyon of erosion-resistant bedrock. Although the riverbed itself is wide, flows rarely encompass the channel in its entirety except during flood events. These flood events carry substantial quantities of sediment, and the rapidly moving, high volume flows wash away existing sediment deposits and then gradually re-deposit sediment carried by flood waters as flows gradually subside. In this manner sandbar locations are constantly shifted, altering the future meandering path of the river. Streamflow records indicate the riverbed is altered at least every 2 to 3 years (Swanson et al., 1990).

The Santa Clara River has been dramatically impacted by growth and development in the region, as meander patterns and flood flows have been constricted by agricultural and later industrial activities.

McGrath State Beach / 201476 ■

SOURCE: County of Ventura, Environmental Science Associates, 2003

Figure 4
Santa Clara River Watershed

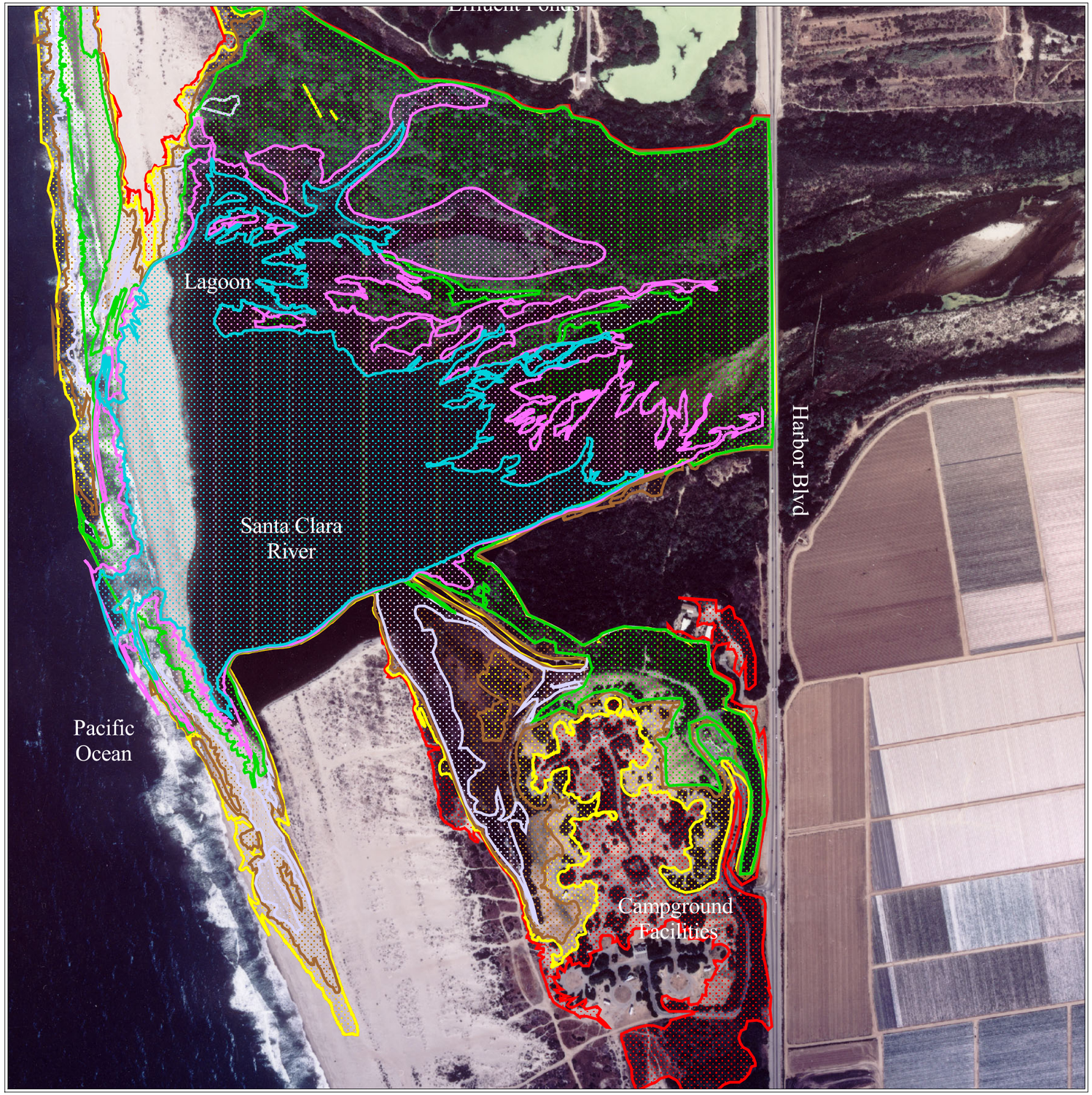
This pattern is evident in historically successive aerial photographs and maps, Appendix A 1929 through 1987. For example, in 1855 when in a relatively pristine state, the mouth of the Santa Clara River was far wider than it currently is today, extending north across the current location of the Ventura Harbor, and south over present-day McGrath State Beach. Constriction of the river channel has narrowed the mouth of the Santa Clara River to its present width of approximately 1,500 feet at Harbor Boulevard, and 3,000 feet at the ocean's edge.

Santa Clara River Levees and Flood History

Near McGrath State Beach, meander patterns have been restricted by the installation of levees along its northern banks. These levees have caused the river mouth to shift south, as flood flows are deflected from the erosion-resistant levees toward unconsolidated alluvial deposits that compose the estuary and the northern edge of McGrath State Beach. Erosion of the levee northwest of the campground has been a direct result of this shift in river morphology. An aerial photograph from March 1978, Appendix A, is an excellent illustration of river flows being deflected by levees along the northern banks towards McGrath State Beach. However, historical documentation indicates that flooding of the campground predates levee erosion in the late 1980's. As depicted in Appendix A, the 1969 flood resulted in Santa Clara River flows to extend across McGrath State Beach. Figure 5 represents levels of inundation of McGrath State Beach based on contour levels from 4 to 10 foot elevation. The 10-foot contour inundation level is approximately equivalent to the 1969 flood event. The park's 1979 General Plan indicates park personnel would routinely breach the estuary sandbar to prevent flooding in the campgrounds caused by high groundwater. Due to natural resource considerations, however, by 1985 this practice had ceased.

Surface water ponding due to seepage from near surface groundwater was seasonally documented by Swanson et al. (1990) in low elevation areas behind the levee that prevent surface flows from the river from flowing into low elevation areas (see Figure 5). However, during the late 1990's surface flows from the Santa Clara River began to enter these low elevation areas as a result of partial destruction of the earthen levee along the south side of the Santa Clara River. Recent flooding of these low elevations areas including Section 3 of the campground, day use parking, and portions of the natural preserve has become more rapid and exacerbated due to the combination of groundwater seepage and surface flows. Impoundment of the estuary for extended periods raises groundwater levels, resulting in flooding. Flow velocities have increased as a result of both increased storm water run-off from surrounding, developed impervious surfaces and a narrower river channel frequently banked by erosion-resistant levees and groins. Higher flow velocities have consequently increased scour and erosion along the river as the movements of floodwaters are restricted and access to the river's historic floodplain is impeded. Development along riverbanks, combined with historic and on-going gravel mining operations within the river channel has also reduced the sediment volumes transported by the river. Reductions in the volume of sediment carried by the Santa Clara River directly impact McGrath State Beach, which is sustained by sediments deposited at the mouth of the river that replenish the shoreline's sandy beach. Due to gravel mining and damming, described below, sand replenishment has been reduced by approximately 75 percent. However, this reduction in sediment has been somewhat offset by annual dredging operations at Ventura Harbor that deposit approximately 1.1 million cubic yards per year (Nobel, 1989 as cited in Swanson, et al., 1990). This dredging is not be a permanent activity and studies on the potential loss or any other affects of this dredging should be conducted.

This figure represents elevation contours in low lying areas in McGrath State Beach. These elevations have periodically been inundated by surface flows from the Santa Clara River and from near-surface groundwater seepage. Until recently, a levee prevented much of the park, including the campground, from being flooded by high water in the estuary (Swanson et al 1990). However, groundwater was measured seeping to the surface at these low lying areas when the estuary backed up from treated water discharge from the City of Ventura's water treatment facility during July 1989 (Swanson et al 1990). This levee recently eroded allowing direct surface flooding from the river and seepage from groundwater. Recent flooding in the park reached an elevation of 9 feet msl (yellow line). This elevation was field verified from a sketch prepared by S. Cramolini (November 13, 2001) that showed the highest point of flooding in the park during November 2001. Flooding reached the 10 foot level during the 1969 flood (see Appendix A Historical Aerial Photos).



Santa Clara River Visual Inundation Levels (Above Mean Sea Level)

- 4 Feet
- 5 Feet
- 6 Feet
- 7 Feet
- 8 Feet
- 9 Feet
- 10 Feet

Aerial photograph taken on 9-28-2001.

N

1:6000

500 0 500 Feet

McGrath State Beach / 201476 ■

SOURCE: CA Dept of Parks and Recreation, 2001 and ESA, 2002.

Figure 5

Flood and Tidal Inundation Based on Elevations

Santa Clara River Water Flows

Dams have been installed along the Santa Clara River and their tributaries to control flow rate and divert water. The most significant of these is the Freeman Diversion Dam is located approximately 9 miles upstream of McGrath State Beach. The dam was constructed in 1991, and replaced previously constructed temporary dams at this location. Freeman Diversion Dam is owned and operated by the United Water Conservation District (UWCD). Water diverted from the Santa Clara River at the Freeman Diversion Dam is directed into the adjacent Saticoy settling ponds for the purpose of groundwater recharge. UWCD has a diversion right of 375 cubic feet per second (cfs) at any given time of the year with a maximum allowable diversion of 144,000 acre-feet per year (afy) (Coastal Conservancy, 2002).

As earlier discussed, the Ventura Water Reclamation Facility is located on the northern banks of the Santa Clara River estuary. Originally constructed in the 1958 and subsequently expanded in 1971, the Ventura Water Reclamation Facility presently discharges 8.5 million gallons of tertiary treated effluent into the Santa Clara River estuary daily (Davis, 2002b). This discharge is regulated by the facility's National Pollutant Discharge Elimination System (NPDES) permit, issued by the Los Angeles Regional Water Quality Control Board. Effluent discharge from the Ventura Water Reclamation Facility raises estuary water levels year-round, but especially in the summer when flow contributions from the Santa Clara River significantly diminish. The sandbar, which naturally forms at the mouth of the Santa Clara River, typically impounds the estuary. As previously discussed, past park operations up to 1985 included regularly breaching the sandbar to keep estuary water levels low and prevent flooding in the McGrath State Beach campground and neighboring agricultural areas.

McGRATH LAKE

McGrath Lake was historically part of the Santa Clara River and estuary. It was a freshwater, coastal dune lake sustained primarily by groundwater inflow, with surface water runoff from surrounding areas likely contributing minor volumes of water to lake levels (YCE, 1999). Separated from the Pacific Ocean by coastal dunes, McGrath Lake previously did not drain into the ocean, although occasional high ocean waves associated with winter storm events likely breached dune ridges resulting in a brief hydrologic connection (LACRWQCB et al., February 1999).

As agricultural activities began to be established on surrounding properties, McGrath Lake became a receiving water body for agricultural drainage. This has continued for approximately 100 years, with McGrath Lake currently receiving run-off from 1400 acres of farm land. Due to surface water inflows associated with agricultural drainage practices, water levels in McGrath Lake rise and historically resulted in occasional flooding of agricultural lands and stretches of nearby Harbor Boulevard. Coastal Berry Company currently retains the right to control McGrath Lake water levels to prevent drainage and associated flooding problems (LACRWQCB et al., February 1999). This easement was established when Hugo McGrath and Associates (predecessor to Coastal Berry Company) sold property that included the southern portion of McGrath Lake to the Department of Parks and Recreation. It allows for the lake to be maintained between specified levels (California Department of Parks and Recreation, 1979). Although McGrath Lake was historically used for power boat races and water skiing, average depth is now only 2 feet (State Water Resources Control Board, 1999). Lake depth currently fluctuates dramatically

depending upon rainfall, groundwater levels, and pumping operations undertaken by Coastal Berry Company (LACRWQCB et al., February 1999). Lake levels are presently controlled by pumping from the lake to the ocean via a pipe discharging onto McGrath State Beach due west of McGrath Lake's north end. It is important to note that the northern end of McGrath Lake is not within the boundaries of the park (see Figure 1). Further, the grant deed for the park includes easements to an adjacent landowner for pumping and breaching of McGrath Lake to control lake water levels.

Water discharged from McGrath then meanders through sandy beach deposits until infiltrating or meeting with the Pacific Ocean. This discharge point and associated flows are depicted in an aerial photograph taken in November 2001 (Figures 2 and 3). A field visit conducted in January 2002 revealed that the channel created by discharge from McGrath Lake had migrated southward along the beach, a pattern confirmed by State Park staff working regularly in the area (Coulter, 2002). This migration indicates that discharges from McGrath Lake may be associated with future beach dune erosion, as water discharged from the lake in January 2002 was observed flowing through sand dune ridges. In the past, lake levels were controlled by breaching the sand dunes near the lake's southern end. This practice was restricted to periods of heavy rainfall in winter months when capacity limitations of McGrath Lake discharge piping could not prevent flooding of agricultural land (State Water Resources Control Board, 1999). Today, this practice would require permits from regulatory agencies such as the California Coastal Commission and U.S. Army Corps of Engineers.

A crude oil spill of 92,400 gallons occurred on December 22, 1993 upstream of McGrath Lake, and a portion of released crude oil eventually reached the lake and ocean (Berry Petroleum Company, 1997). This spill originated from a broken pipeline owned by Berry Petroleum Company, which conducts operations on its facility located north of McGrath Lake. Following the spill, sampling of McGrath Lake sediments and water was conducted in 1998 to determine the extent of possible residual impact from the 1993 oil spill, and concurrently examined the potential impacts from long-term agricultural practices (LACRWQCB et al., May 1999). Sediment sampling measured elevated concentrations of selenium, manganese, total polychlorinated biphenyls (PCBs), and the pesticides chlordane, DDT, dieldrin, lindane and endosulfan I. Based upon the absence of elevated concentrations of petroleum hydrocarbons or polyaromatic hydrocarbons (PAHs), the study concluded agricultural run-off has more heavily impacted lake sediments than the 1993 oil spill (LACRWQCB et al., May 1999). McGrath Lake has been identified as a high priority toxic hot spot by the State Water Resources Control Board's Consolidated Toxic Hot Spots Cleanup Plan. However, potential remediation options such as dredging are considered infeasible due to their anticipated significant expense (State Water Resources Control Board, 1999). McGrath Lake has also been designated as impaired water body by the Los Angeles Region, California Regional Water Quality Control Board in 1996 due to sediment pollution and sediment toxicity (State Water Resources Control Board, 1999).

During the spill response and subsequent Natural Resource Damage Assessment process, short term impacts to the lake and surrounding area were assessed and where possible, minimized or mitigated. Long term and unavoidable impact were the subject of a settlement agreement which created a trust fund for remediation and restoration that is administered by the McGrath Lake Trustee Council which is responsible for developing the restoration plan for the lake and other impacted areas. As part of the Trustee Council's restoration plan development, in 1998 McGrath Lake sediments and water were

sampled to determine the extent of possible residual impacts from the 1993 oil spill. In addition, the Trustee Council used the data and other information to evaluate long term impacts from agricultural practices that might influence lake restoration planning.

GROUNDWATER

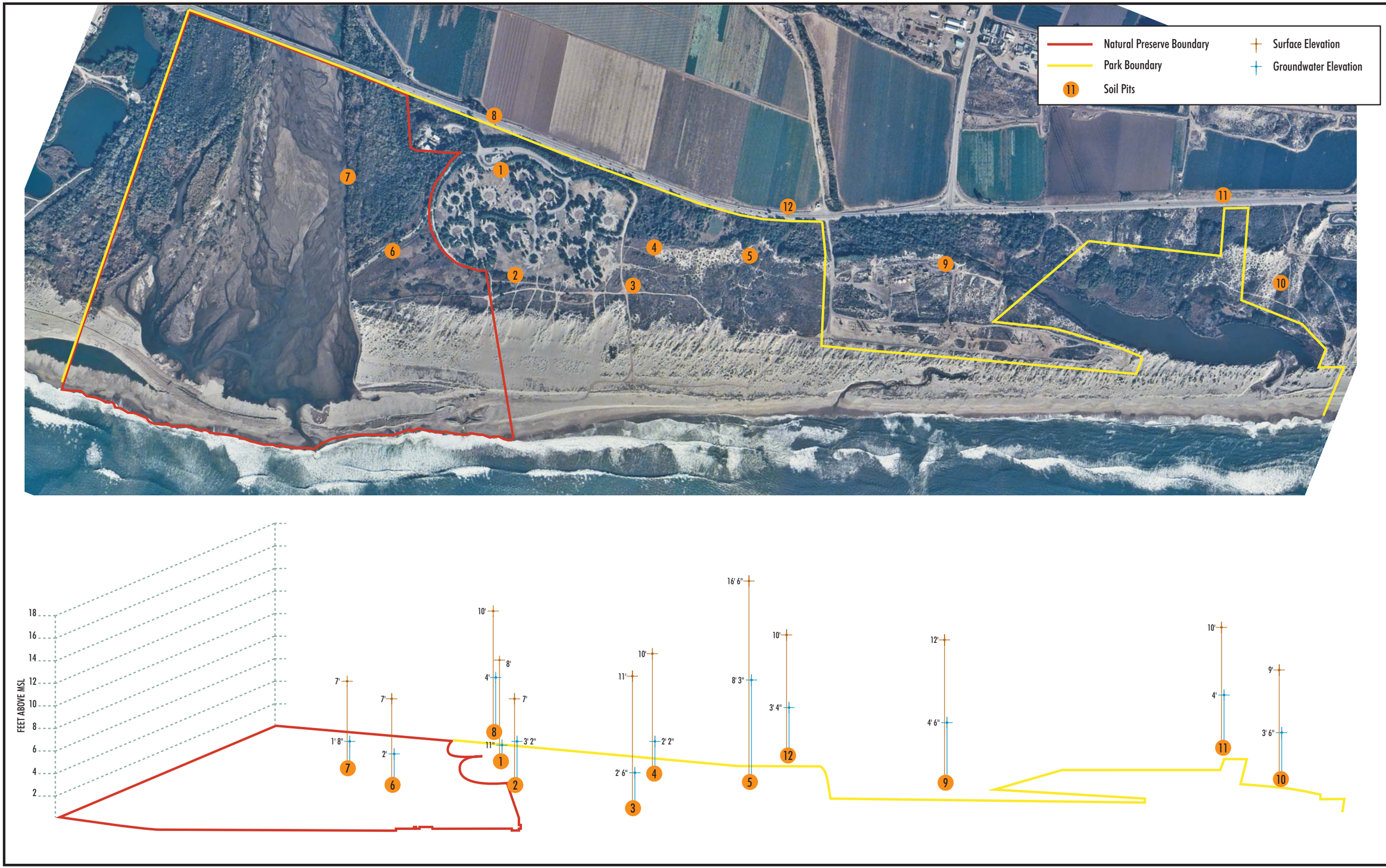
The groundwater is found at two distinct depth zones. One zone is relatively deep and the groundwater is associated with aquifers supplied mostly by the Santa Clara River. A second zone is near the surface. This near surface groundwater is associated with an alternating sand and clay layer in the soils close to the ocean. Both the deep and near surface groundwater systems are affected by seasonal rainfall and human-caused modifications or uses of the surface and groundwater sources.

Deep Aquifer Groundwater

Located within the larger Santa Clara Watershed, McGrath State Beach overlies the Mound Basin Groundwater unit. This relatively deep aquifer unit extends several miles offshore, with a groundwater gradient generally flowing west to southwest, although periods of extended groundwater pumping associated with drought conditions can result in groundwater gradients shifting toward the south (UWCD, 2001). South and southwest of the Mound Basin lie the Oxnard Plain and Oxnard Forebay, respectively. The Santa Clara River provides much of the natural and artificial recharge of groundwater in the Oxnard Forebay, which serves as the primary groundwater recharge basin for agricultural pumping operations in Ventura, and includes the UCWD operated Saticoy Spreading Grounds. High water levels in the unconfined Oxnard Forebay groundwater basin cause groundwater from the Oxnard Forebay to flow westward across the Oxnard Plain and into the Mound Basin, thereby acting as a recharge area for groundwater uses toward the coast (UWCD, 1996)

Near Surface Groundwater

From the 1950's until early 1998, the southern bank of the Santa Clara River was defined by an earthen levee that altered surface flows from the river into the floodplain. This also prevented flows from low elevations within the park into the river. A flap gate allowed water to flow from areas in the park, that are now low elevation campgrounds, back into the river. The flap gate did not always function which resulted in modified or reduced flows into the river. A diked, brackish marsh within the Natural Preserve was hydrologically supported by near surface groundwater that would seasonally seep through the sandy surface soils and pond in the marsh and other low elevation areas (Swanson et al., 1990). Recently, studies by Environmental Science Associates (2002) documented the contiguous nature of the near surface groundwater hydrology. A dense subsurface clay layer extends through most of McGrath State Beach. Groundwater is perched on top of this clay layer. Field studies and soil types indicate that this perched water table exists east of Harbor Boulevard and continues through McGrath State Beach (Figure 6). This clay layer causes any water from surface sources such as rainfall or agricultural runoff to remain perched near the surface instead of seeping into the soil to lower elevations. The clay or clay-sand layer ranges in elevation from 3 to 8 feet msl. Near surface groundwater has been measured above the clay at various elevations (Figure 6) and below the clay layer (ESA, 2002 and Swanason et al., 1990). McGrath Lake represents an elevation low point where the near surface groundwater is exposed as surface water as it flows through the area. The elevations of these clay layers suggest that the movement



SOURCE: Environmental Science Associates, 2002

McGrath State Beach / 201476 ■

Figure 6
Surface and Groundwater Elevations

of this perched groundwater most likely flows southeast to northwest. This belief is supported by observations by Coastal Berry Farms (D. Murray pers. comm. 2002) that irrigation of fields east of Harbor Boulevard causes flooding in those fields if McGrath Lake is not pumped. The backup of near surface groundwater is increased when the sand bar on the Santa Clara River is in place and there is ponding in the estuary due to treated water discharge.

The shoreline of McGrath Lake is approximately 3–4 feet elevation msl and is therefore one of the lowest elevations in the park other than portions of the Santa Clara River. Swanson et al., (1990) recorded water elevations in the Santa Clara River estuary at 9 feet elevation in July 1989. These water elevations exceed those of the surface of McGrath Lake as well as most of the area in the previously diked marsh, most of the day use parking area, and sections of the campground. These low elevation areas experience surface ponding seasonally due to the backing up of groundwater. Similarly, seasonal rainfall often has ponded in these low elevation areas after the layer of sandy soil above the clay layer has became saturated. Up until recently the levee prevented surface flows into the river.

The relatively recent erosion and loss of sections of the levee along the south side of the Santa Clara River has increased the rate, and possibly frequency of surface ponding south of the river. The combined water sources from near surface groundwater and surface flows from the river exacerbate flooding within the park. These surface flows cannot move in other directions due to higher surface elevations elsewhere. The areas experiencing surface ponding are the same areas that previously ponded due to groundwater seepage or seasonal rainfall. Loss of the earthen levee has resulted in the river causing surface water to flow south resulting in a more rapid appearance of surface ponding. The primary controls over the appearance of ponding in low elevation areas of McGrath State Beach are a function of the depth below the surface of groundwater and water elevations in the Santa Clara River. The control mechanisms are seasonal flows through the river, seasonal or artificial presence or absence of the sand bar, periods of seasonal rainfall, irrigation of agricultural fields, and pumping of McGrath Lake.

WATER QUALITY

SANTA CLARA RIVER

Water quality in the Santa Clara River is continuously being monitored by UWCD, although this monitoring is restricted to certain constituents of concern for the water agency and is largely collected upstream of McGrath State Beach at the Freeman Diversion Dam. Water quality in the Santa Clara River varies significantly due to gravel mining operations, water diversion activities, and numerous point and non point source pollutant discharges along its flow path. At McGrath State Beach, water quality in the estuary is heavily influenced by the level of interaction between the lagoon and the Pacific Ocean, controlled by sand bar breach patterns, and discharge from the Ventura Water Reclamation Facility.

The U.S. Fish and Wildlife Service conducted long term water quality studies in 1997 through 1999. Salinity concentrations were determined to vary significantly across the estuary, although the highest and lowest salinity levels were measured when the sand bar was breached. The lowest concentrations of 0.6 parts per thousand (ppt) recorded in at a backwater sampling station and the highest concentration (32.8 ppt) near the mouth of the estuary. Overall, salinity levels increased when the sand bar was breached and

the lagoon was most subject to tidal influence. Dissolved oxygen levels were typically lowest in backwater areas and near the Ventura Water Reclamation Facility discharge point, with levels across the estuary ranging from 0.21 to >20 micrograms per liter (µg/l). The pH levels ranged from 6.54 to 9.04, with the lowest levels recorded near the Ventura Water Reclamation Facility discharge. Water temperatures in the estuary ranged from 13.94 to 29.04 degrees Celsius (Cº), with water temperatures increasing in the summer as water elevations dropped (Greenwald et al., 1999).

High coliform levels at McGrath State Beach have resulted in cautionary advisories from the Ventura County Environmental Health at McGrath State Beach following periods of heavy rainfall (County of Ventura, 2001). Similarly, the Los Angeles Region, California Regional Water Quality Control Board has designated McGrath Beach a medium priority impaired waterbody for coliform levels (LACRWQCD, December 1999).

McGRATH LAKE WATER QUALITY

Water quality information presented here reflect data provided through the cooperative study conducted by California Regional Water Quality Control Board – Los Angeles Region, Moss Landing Marine Laboratories and others. Data from this study is presented in the report entitled *Chemical and Biological Measures of Sediment Quality in McGrath Lake*, February 1999.

Water quality data collection from 54 stations within McGrath Lake has provided measurements of salinity, dissolved oxygen, turbidity, pH, and temperature. Of particular interest within the lake are the salinity concentrations and the observation that salinity fluctuates between the upper and lower portion of the water column. Lake water at shallower depths can range in salinity between 2.6 parts per thousand (ppt) and 5.3 ppt, while in deeper areas, salinity is higher and ranges between 4.08 ppt and 24.3 ppt. (LACRWQCB et al., May 1999). Previous salinity data suggest that a "salt wedge" (stratification of denser high salinity water and less dense fresh water) exists at the west end of the lake where salinity differences measured as high as 19 ppt. This condition is prevalent when inputs to the lake are reduced and water circulation is low. Dissolved oxygen was measured to range between 7 parts per million (ppm) and 16 ppm with higher values typical of water that is well circulated. Increased algal photosynthesis during daylight hours can also result in the dissolved oxygen values recorded in McGrath Lake. Turbidity is a measure of the cloudiness in water and can vary depending on the level of disturbance or water turbulence. For instance, if the lake is receiving inputs from adjacent land, the turbidity would likely be high due to the suspended solids in the water entering the lake and the lake sediments disturbed by the turbulence the incoming water generates. Measured levels within the lake indicated relatively low turbidity. Measurements of temperature within the lake ranged between approximately 25 Cº in July to 19.5 Cº in October. The pH in the lake water, measured between 8.24 and 9.39, indicated alkaline conditions likely due to the brackish conditions. This pH level could also be attributable to the contents (salts, nutrients) of the agricultural runoff entering the lake. Nitrogen and phosphorus level in the lake vary depending on location and proximity to the inflow locations and are present in agricultural drainage outflows, primarily due to the use of fertilizers on the adjoining fields.

Overall, the water in McGrath Lake is of relatively poor quality due to the lack of circulation, inputs of agricultural water runoff, and contaminated sediments. Agricultural chemicals, such as residual

concentrations of pesticides, nutrients from agricultural fields, and petrochemical residues in the sediments, contribute to further degrade the lake water and produce intolerable conditions for various plant and animal species.

3.2 VEGETATION AND HABITATS

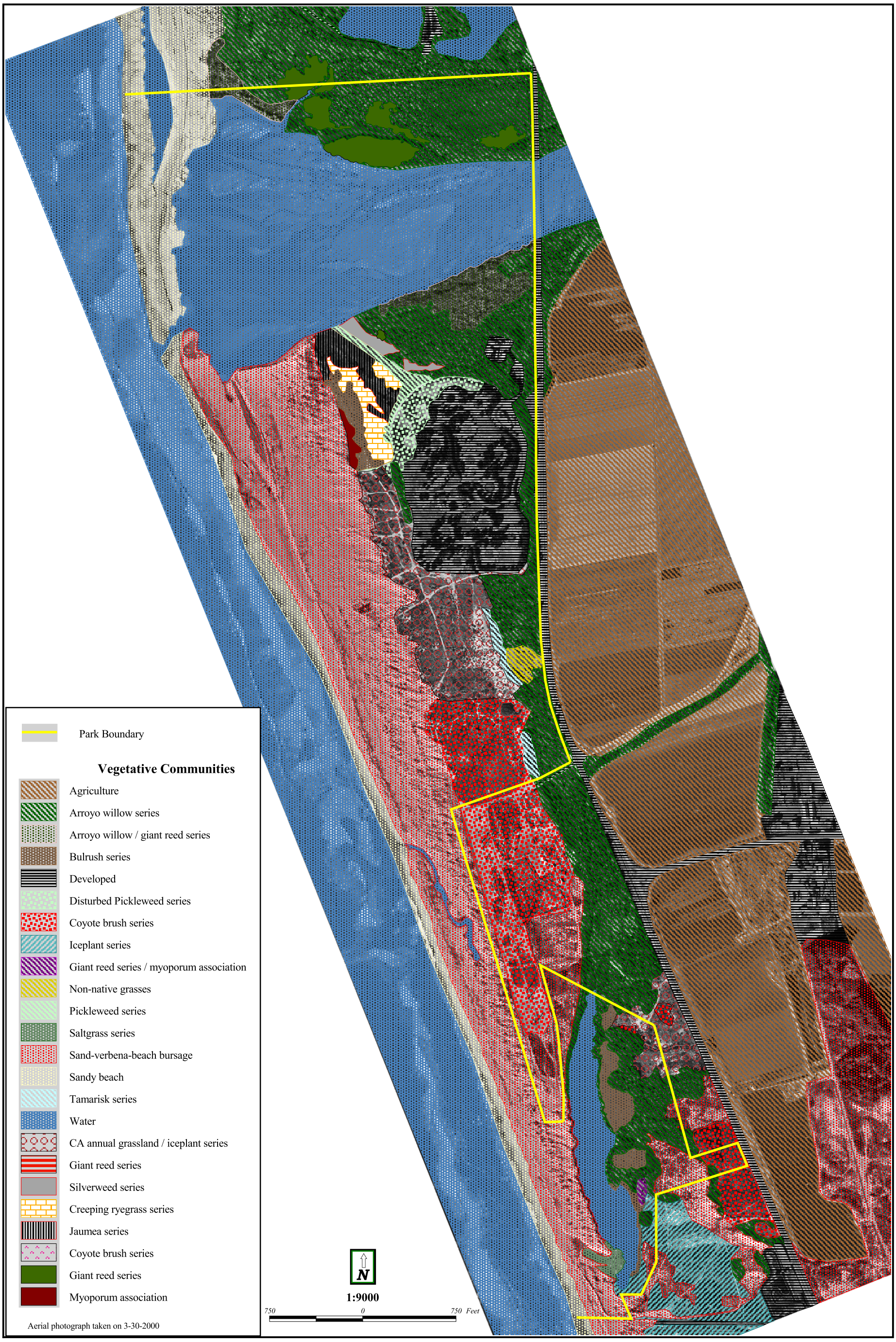
Plant communities in McGrath State Beach previously were partially characterized in the Santa Clara Estuary Natural Preserve Saltmarsh Vegetation Management Plan (Fields and Miner, 2000). As part of this plan, a revised plant communities study and field survey was conducted and mapped into Geographic Information System (GIS) following the Department of Parks and Recreation's protocols for vegetation mapping (Appendix C). The revised vegetation mapping is shown in Figure 7. Table 3-1 lists each of the plant communities their acreage and the percent of the park they cover. A list of 204 plant taxa known to occur or potentially occurring in these plant communities at McGrath State Beach was developed by DPR (Appendix D).

VEGETATION SERIES DESCRIPTIONS AND GENERAL DISTRIBUTIONS

Arroyo willow series: This wetland vegetation type is dominated by arroyo willow (*Salix lasiolepis*) in the tree or shrub layer (< 8 m). This species grows in dense thickets, often with lesser components of black cottonwood (*Populus balsamifera*), western sycamore (*Platanus racemosa*) or bigleaf maple (*Acer macrophyllum*) sharing the canopy. Associated shrublands are often interspersed between these thickets. These shrub layers are typically composed of species such as coyote brush (*Baccharis pilularis*), mulefat (*Baccharis salicifolia)*, or Mexican elderberry (*Sambucus mexicana*). At McGrath State Beach, areas with continuous tree canopy and mixed scrub are present. Tree and shrub species associated with this series are coyote brush, mulefat, black cottonwood (*Populus balsamifera*), Myoporum (*Myoporum laetum*) and giant reed (*Arundo donax*). This vegetation type occurs in stands along both sides of the Santa Clara River channel, and northward of the natural preserve boundary. South of the river, it forms a nearly continuous strip, from 20–400' wide, along the west side of Harbor Boulevard extending to the southern boundary of McGrath Lake.

Bulrush series: This wetland herb layer is dominated by bulrush species (*Scirpus* spp.) or tules. These are large, typically rhizomatous, perennial sedges with either triangular or round stems. Other herb species associated with this series include many other facultative wetland species such as broadleaf cattail (*Typha latifolia*), various sedges (*Carex* spp., *Cyperus* spp.) and water plantain (*Alisma plantago-aquatica*). At McGrath State Beach, hardstem bulrush (*Scirpus acutus*) and common tule (*Scirpus californicus*) dominate the series while the species that form a lesser component of the herb layer include: spiny rush (*Juncus acutus*), creeping ryegrass (*Leymus triticoides*), cattail, saltgrass (*Distichlis spicata*), and yerba mansa (*Anemopsis californica*). The Bulrush series is present on the east side of the Santa Clara River on the western edge of the Creeping ryegrass series and along the eastern shore of McGrath Lake. Bulrush – cattail series and Cattail series vegetation, where cattail shares an important or dominant role in the herb layer also occurs in these areas.

California annual grassland series: Annual, non-native grasses and herbs dominate this herbaceous vegetation (< 1m) often forming stands with continuous cover. Typical non-native species associated with this series are found at McGrath State Beach including ripgut (*Bromus diandrus*), soft chess (*Bromus*



SOURCE: CA Dept of Parks and Recreation, 2001 and ESA 2002.

Figure 7

Plant Communities of McGrath State Beach

hordeaceus), red brome (*Bromus madritensis* ssp. *rubens*), dogtail (*Cynosurus echinatus*), slender oats (*Avena barbata*), ryegrass (*Lolium multiflorum*), Tocalote (*Centaurea melitensis*), filaree (*Erodium* spp.) and annual fescue (*Vulpia* spp.). Iceplant (*Carpobrotus* spp.) mats are often mixed into these disturbed grasslands. Native species that are associated with this series include scarlet pimpernel (*Anagallis arvensis*) and peppergrass (*Lepidium nitidum*). This vegetation is widely distributed east of the Sand-verbena – beach bursage series in the dunes and also in the southern edge of the park between the Arroyo willow series and the edge of Harbor Boulevard. This series is widely associated with the Iceplant series at McGrath State Beach.

Coyote brush series: This vegetation type is dominated in the shrub layer by coyote brush (*Baccharis pilularis*) with continuous or intermittent canopy (< 2 m). This native, evergreen shrub in the sunflower family is common in many habitats of California, but especially on coastal bluffs, river mouths, stabilized dunes and terraces. Commonly associated species at McGrath State Beach include beach bursage (*Ambrosia chamissonis),* California sagebrush (*Artemisia californica*), bromes (*Bromus* spp.) and pink sand verbena (*Abronia umbellata*). This vegetation is distributed south of the campground between the Iceplant series / California annual grassland series and the private (oil drilling) property. It extends towards the ocean to the edge of the dunes (Sand-verbena – beach bursage series). Large areas at the south end of the park near Harbor Boulevard and east of McGrath Lake are also dominated by this series. A heavily disturbed area with remnant stands of this vegetation extends southwards towards McGrath Lake (private property).

Creeping ryegrass series: This perennial herbaceous groundlayer (< 1 m tall) vegetation is dominated by creeping ryegrass (*Leymus triticoides*). This native grass is associated with the saltmarsh at McGrath State Beach where it forms extensive stands just eastwards of the Bulrush series and west of the Jaumea and Saltgrass series. Species forming associations within this vegetation at McGrath include yerba mansa (*Anemopsis californicus*) and baltic rush (*Juncus balticus*).

Giant reed series: This non-native ground layer series is dominated by giant reed (*Arundo donax*) a perennial, rhizomatous, cane-like grass reaching heights of 8 m. Emergent shrubs and trees may also be present. The distinctively silver to purplish plume-like inflorescence is typically 4–6 dm long. The species, one of three worldwide, is a native of Europe and has become widespread in drainage ditches and wet places in the warmer temperate regions of the United States. At McGrath, it occurs as the sole dominant species or with arroyo willow (*Salix lasiolepis*) or Myoporum. Giant reed is abundant in the riparian corridor of the Santa Clara River Mouth, dominating more than 13 acres on the either side of the drainage. A thin strip of this species extends southwards from the rivermouth along the beach, west of the Sand-verbena – beach bursage series, to the beach west to McGrath Lake. It also occurs in an area around 50’ east of the center of McGrath Lake.

Iceplant series: The Iceplant series is a broadly defined non-native herbaceous vegetation type most commonly associated with coastal uplands. One or more of three low-growing (>50 cm. tall), succulent-leaved species typically dominate this series: Crystalline iceplant (*Mesembryanthemum crystallinum*), Fig-marigold (*Carpobrotus edulis*) and sea fig (*Carpobrotus chilensis*). Other species often found in conjunction with the series at McGrath State Beach include other common coastal dune species such as pink sand-verbena (*Abronia umbellata*), coast buckwheat (*Eriogonum parvifolium*) and beach bursage

(*Ambrosia chamissonis*). This vegetation is most commonly associated with the California annual grassland series and Sand-verbena – beach bursage series. It is distributed south of the campground and east of the dunes as well as towards the south end of the park, southeast of McGrath Lake. This is perhaps the most abundant non-native vegetation in the park.

Jaumea series: This herbaceous wetland groundlayer vegetation is dominated by Jaumea (*Jaumea carnosa*) and is typically associated with alkaline or saline environments. Though not yet formally recognized in the Manual of California Vegetation (Sawyer & Keeler-Wolf, 1995) this series dominates significant acreage along the south coast of California. At McGrath these stands are typically associated with other saltmarsh species such as saltgrass (*Distichlis spicata*.), creeping ryegrass (*Leymus triticoides)* and pickleweed (*Salicornia grandiflora*) as well as ripgut brome *(Bromus diandrus)*. Within the park the series dominates portions of the saltmarsh, near the Saltgrass and Creeping ryegrass series.

Myoporum and Giant Reed: These two non-native species, one a shrub or small tree (*Myoporum laetum*) native to New Zealand (3–10 m tall), the other a tall, thick-stemmed grass (*Arundo donax*), dominate an area around 50' east of the center of McGrath Lake. There is no formal classification for this stand, though it would probably be lumped into the Giant reed series (Sawyer & Keeler-Wolf, 1995).

Myoporum association: In areas where Myoporum dominates the canopy it can be considered an association. This evergreen shrub or small tree (3–10 m tall) is native to New Zealand. Though not yet formally recognized in the Manual of California Vegetation (Sawyer & Keeler-Wolf, 1995) Myoporum trees are widely distributed throughout the inland portions of the park. These trees form emergent stands in the Saltgrass series, Creeping ryegrass series, Coyote brush series and sometimes dominate portions of the canopy in the Arroyo willow series (especially the southern stands) and Giant reed series. A small stand dominated by this species occurs south of the campground near the transition between California annual grasslands / Iceplant and Coyote brush series.

Saltgrass series: Saltgrass (*Distichlis spicata*) is the dominant grass in this herbaceous ground layer vegetation (>1m). Saltgrass is a perennial, rhizomatous species with stiff, yellow stems and purple unisexual inflorescences. This series is associated with alkali and saltmarsh settings. At McGrath saltmarsh species such as the grass *Monanthochloe littoralis*, yerba mansa (*Anemopsis californica*), creeping ryegrass (*Leymus triticoides*) and Jaumea (*Jaumea carnosa*) are typically associated with the series. This series occurs in sections of the salt marsh south of the river mouth and between the beach and the southwest edge of McGrath Lake.

Sand-verbena – beach bursage series: The ground layer of this series is composed of perennial forbs, grasses and occasional emergent shrubs. Species common to the series at McGrath State Beach include beach bursage (*Ambrosia chamissonis*), beach evening primrose (*Camissonia cheiranthifolia* ssp. *suffruticosa*), lotus (*Lotus junceus*), and red sand verbena (*Abronia maritima*), pink sand verbena (*Abronia umbellata*), coast buckwheat (*Eriogonum parvifolium*) and sea rocket (*Cakile maritima*). These habitats are often very open, but may have higher vegetation cover as well. The series is widely distributed on the foredunes from the Santa Clara River mouth southwards beyond the park boundary and east of McGrath Lake in the smaller dunes that occur there. Iceplant is a commonly associated species in this series within the park.

Silverweed series: This groundlayer vegetation type (<.5 m) is dominated by silverweed (*Potentilla anserina*) a native herbaceous, yellow flowered, perennial member of the rose family. Though not yet formally recognized in the Manual of California Vegetation (Sawyer & Keeler-Wolf, 1995) this series may be covered in the 2nd edition of the manual. At McGrath State Beach several meadows dominated by this species border the Arroyo willow series and salt marsh habitats near the Santa Clara rivermouth, where it is associated with species such as mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis*), poison hemlock (*Conium maculatum*), and rabbitfoot grass (*Polypogon monspeliensis*).

Tamarisk series: This non-native, wetland shrub layer (< 5m tall) vegetation is dominated by tamarisk (*Tamarix* spp.), and is often associated with saline wetland sites. These deciduous, deep-rooted plants have jointed green stems with alternate, awl-like leaves that often exude salts. Five species of this invasive plant occur in California, though *T. parviflora* and *T. ramosissima* are the most widespread. It often forms dense clonal, single species stands, but at McGrath it is associated with arroyo willow and Myoporum. At McGrath, it has formed two larger stands (one around 600' long) just south of the campground between the Arroyo willow series/ Myopurum association and the California annual grassland / Iceplant series and a smaller population located in the pump pond.

TABLE 3-1
ACREAGE AND PERCENT COVER OF VEGETATION COMMUNITIES FROM MAP CLASSIFICATIONS FOR MCGRATH STATE BEACH

Classification	Acreage	Percentage
Arroyo willow series	63.5	14.7
Arroyo willow series / Giant reed series	9.0	2.1
Bulrush series	6.6	1.5
California annual grassland series	1.3	0.3
California annual grassland series / Iceplant series	23.8	5.5
Coyote brush series	13.3	3.1
Creeping ryegrass series	3.3	0.7
Developed	31.1	7.2
Disturbed Pickleweed series	4.2	1.0
Giant reed series	7.0	1.6
Iceplant series	1.6	0.4
Jaumea series	4.1	1.0
Myoporum association	1.0	0.2
Giant reed series / Myoporum association	0.36	< 0.1
Pickleweed series	1.9	0.4
Saltgrass series	1.1	0.3
Sand-verbena beach bursage series[1]	113.3	26.3
Sandy beach[1]	18.4	4.3
Silverweed series	1.4	0.3
Tamarisk series	1.7	0.4
Water[1]	123.2	28.6
Total[1]	**431.2**	**100.0**

1 Note that the total area of McGrath State Beach is 295 acres (General Plan); the total presented in this table is higher due to including an area to the west of the physical boundary of McGrath State Beach. This discrepancy has likely inflated the acreages of Sandy beach Sand-verbena beach bursage, and Water.

SOURCE: ESA, 2002

WILDLIFE HABITATS

Wildlife habitats provide food, shelter, movement corridors, and breeding opportunities for wildlife species. They are classified in broad terms with an emphasis on vegetation structure, and include other elements such as vegetation species composition, soil structure, and water availability. Some wildlife species are generalists and may use a variety of habitats, while other species may be restricted to one habitat. Species that are restricted to a single habitat type are more susceptible to habitat loss than are generalists, and are more likely to experience population declines. These species are presented in greater detail later in this section.

Habitats are not distinct features that can be managed in isolation from each other. More common wildlife species, such as red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), northern flicker (*Colaptes auratus*), brown-headed cowbird (*Molothrus ater*), raccoon (*Procyon lotor*), and western toad (*Bufo boreas*) frequently use more than one habitat type. They may use riparian habitat for breeding sites, resting sites, cover while moving from one area to another, or thermal cover, and range into open upland grasslands, scrub, or over open water to forage. Frequently it is at the edges of habitats, or where they intergrade from one type or another, that the greatest number of these more common wildlife species will be found.

In McGrath State Beach there are ten habitats, as described in *California Habitats* (CDFG, 2000). These habitats are listed and briefly described below, along with associated vegetation series. For information on the plant species components of these habitats see the vegetation series descriptions in this report. The park includes a number of habitats which are experiencing serious threats (e.g., riparian, dune, and rear-dune freshwater lakes), and which provide food, shelter, and breeding opportunities for a wide variety of wildlife species. While these habitats are individually noteworthy, it is especially uncommon to have them occurring adjacent to each other, and on public land. McGrath State Beach has the opportunity to conserve these very limited resources, and to provide the public exceptional opportunities for wildlife viewing. This opportunity is recognized in SCRPSC 1996, and further illustrated by the designation of the Santa Clara River mouth, including the estuary (as lagoon and mudflats), riparian vegetation, and adjacent beach and dunes as a California Important Bird Area (Cooper, 2001).

RIPARIAN HABITAT

VALLEY FOOTHILL RIPARIAN

This habitat is principally composed of a sparse cottonwood overstory and a dense willow subcanopy mixed with introduced giant reed, Myoporum, and tamarisk. It occurs from the edges of the Santa Clara River in a wide to narrow band almost to the southern boundary of McGrath State Beach; however the cottonwood overstory is restricted to the area north of the campground. Many species of wildlife use this habitat type for movement corridors, foraging, cover, and breeding. Native riparian habitats have been recognized as an important component of properly-functioning ecosystems, and have been identified as the most important habitat to landbird species (RHJV, 2000). Recent estimates of this habitat remaining in California range from 2–15%, in desert locations and northern coastal streams, respectively (RHJV, 2000). In McGrath State Beach the Arroyo willow, Giant reed, and Tamarisk vegetation series compose this habitat.

UPLAND HABITAT

EUCALYPTUS

This habitat is limited to a small windbreak of *Eucalyptus* trees at the entrance to the park. Raptors such as red-shouldered hawk may nest in this habitat, which also serves as a food source for birds such as Anna's hummingbird and yellow-rumped warbler. Sticky gum produced by this non-native species can effectively glue shut the bills of birds foraging on nectar, resulting in their death (William, 2002). Monarch butterflies commonly use large stands of Eucalyptus trees for roosts, at a few locations along the California Coast.

Urban

Landscaped areas of McGrath State Beach are best characterized as urban habitat. Introduced Myoporum shrubs were planted as windbreaks around the campground, and are naturalizing into areas with native vegetation. Lawns were planted within the campground. These areas provide cover and foraging opportunities to some wildlife species, especially those adapted to human disturbance.

COASTAL SCRUB

This habitat is principally composed of a discontinuous canopy of coyote brush and California sagebrush, with a mixed herbaceous layer. It is an open habitat in McGrath State Beach, and provides foraging habitat for many species of wildlife, and breeding habitat for a more limited number of species such as California ground squirrel. Ground squirrel burrows are used by other wildlife, including burrowing owl, as breeding and roosting habitat. It occurs from the rear dune towards the campground, and south to McGrath Lake. Coyote brush and Iceplant vegetation series compose this habitat.

ANNUAL GRASSLAND

This habitat is annual herbaceous vegetation with little structural complexity. It is composed of the non-native grasses series, which occurs in a small area south of the campground, adjacent to Harbor Boulevard. It is a minor component of the habitats in the park.

WETLAND AND AQUATIC HABITAT

FRESH EMERGENT MARSH

This habitat is corresponds with the Bulrush series, which occurs adjacent to the eastern edge of McGrath Lake, and within the estuary of the Santa Clara River. A small, narrow band of fresh emergent marsh occurs between the Pickleweed and Arroyo willow series northwest of the campground. This habitat provides important cover and nest or nursery sites for aquatic-associated wildlife species such as waterfowl and muskrat.

SALINE EMERGENT MARSH

This habitat occurs in two isolated areas, northwest of the campgrounds and at the south end of McGrath Lake. This habitat type has been severely reduced throughout California reported that in 1975 the California Coastal Commission estimated that only 25% of Southern California saltmarsh that existed in 1900 remained. As a consequence, the populations of a large number of wildlife species that are dependent on this habitat have also declined. Altered hydrologic regimes (i.e., freshwater input to the SCRE, artificial breaching of the SCRE sandbar, groundwater pumping and discharge to McGrath Lake associated with agricultural activities, and pumping of McGrath Lake to maintain the surface elevation) may have altered the functioning of these areas of saline emergent marsh. The vegetation series composing this habitat type in McGrath State Beach are Pickleweed, Disturbed Pickleweed, and Saltgrass.

LACUSTRINE

McGrath Lake, at the southern end of the park, is approximately a10-acre back-dune lake that receives agricultural runoff from farming activities east of Harbor Boulevard. The size of the lake varies due to fluctuations in water level. This habitat consists of open water, which is bordered by fresh emergent marsh. Lacustrine habitat typically provides roosting and foraging opportunities for wildlife. Near marine environments, they also provide bathing opportunities to wildlife. Under conditions where pollutants accumulate in lakes or ponds, they can become a hazard to wildlife using the habitat. As described in the water quality section of this document, water quality in McGrath Lake is of sufficiently poor quality that it does not support some vegetation or aquatic animals that may be expected to occur.

ESTUARINE

Principally unvegetated, this habitat occurs at the mouth of the Santa Clara River. It is characterized by a mixing of freshwater and saltwater influences, and is a rich source of phyto- and zooplankton. These plankton form the basis of a rich food web which support a wide variety of wildlife species, including terns, shorebirds, and waterfowl. This is a dynamic habitat, due to seasonal flooding and breaching of the sandbar at the mouth of the river. Depending on timing of flooding, breaching, and tides, it can form a large lagoon or mudflats. The estuary is described in greater detail in the aquatic habitats section of this document.

MARINE HABITAT

MARINE

This habitat extends from the upper limit of the unvegetated shore to the ocean. The intertidal zone extends from the area exposed at the lowest low tides through the zone influence by salt spray. This zone provides foraging opportunities for shorebirds and opportunistic feeders such as crows, ravens, turkey vultures, and, historically, California condor. The shore zone extends from the spray zone inland to vegetated habitat. The dunes in the park are included in the shore zone, including areas where the Sand verbena – beach bursage series is sparse. Wildlife that use the dunes for breeding, roosting, or foraging may find cover under or near drift wood and other debris deposited by high tides and moved by wind.

Seed-eating small mammals and birds find forage in vegetated portions of the shore zone. This habitat occurs in a band from the north to the south along the shoreline of the park.

AQUATIC HABITATS

SANTA CLARA RIVER

The Santa Clara River is the longest free-flowing river in Southern California and is one of the few remaining rivers in the area that remain in a relatively natural state. The total river length is approximately 70 miles, extending from its headwaters at Mount Pinos to the Santa Clara River Estuary (SCRE) adjacent to McGrath State Beach. Approximately 90% of the total watershed area of about 1,600 square miles are located within the rugged San Gabriel Mountains; the reminder traverses the valley floor and coastal plain. Elevations range from 8,800 feet near the headwaters to sea level at McGrath State Beach. Approximately 47%, or 480,000 acres, of the Santa Clara River watershed is publicly owned, the vast majority of which lies within the Los Padres and Angeles National Forests.

The headwaters of the Santa Clara River in Los Angeles County are typical of a mountain stream with steep, narrow banks and rapid winter flow. In the lower 30-mile stretch in Ventura County, the channel becomes wide and sandy. The bed and banks in the lower reaches are composed of unconsolidated sand and gravel, which are easily eroded. Historically, the floodplain of the river contained a dense riparian zone with marshy areas. Agricultural land reclamation and urban development throughout the 1900's have resulted in a narrowing of the river and its riparian area and a concurrent increase in erosion damage in the floodplain (PWA, 1996). Currently the banks along much of the lower river are reinforced with groins and levees, although no portions of the river have been channelized.

Large areas of the upper watershed remain fairly undisturbed and provide fairly good aquatic habitat. Santa Paula, Sespe, and Piru creeks are believed to be the primary spawning grounds for endangered southern steelhead (*Oncorhynchus mykiss*) (Titus et al., in preparation) and provide habitat for a variety of other sensitive and common aquatic species. Current aquatic habitat values in the floodplain reaches are low, primarily due to very low to entirely absent surface flows during most of the year.

The construction of a 20-foot tall concrete diversion dam, Vern Freeman Diversion Dam near Saticoy, was completed in 1991 and replaces the temporary diversion dikes used at this location since the 1920's. The dam is operated by the UWCD and delivers water to underground recharge basins via percolation areas. UWCD currently has a diversion right of 375 cfs at any given time of the year with a maximum allowable diversion of 144,000 afy (Coastal Conservancy, 2002). The dam is equipped with a fish ladder to enhance steelhead passage, but the National Marine Fisheries Service (NMFS) is currently reviewing the operation and design of the fish ladder. Bypass flow requirements for steelhead migrations are expected to be established in the near future (Rogers, pers. comm.). Out-migrating steelhead smolts are currently captured behind the dam and released in the Santa Clara or Ventura River Estuaries. However, NMFS is considering releasing the fish in the Ventura River only because this estuary remains open later into the steelhead migration period than the SCRE, thus increasing the likelihood of steelhead being able to enter the ocean (Rogers, pers. comm.).

In addition to water diversions and steelhead migration issues, other stressors on the Santa Clara River include water quality problems associated with agricultural and urban runoff, in-channel gravel and sand mining, and non-native species invasions.

Santa Clara River Estuary

The SCRE borders the northern edge of McGrath State Beach. The estuary historically covered approximately 870 acres and was situated in a wide coastal delta. Land use changes since 1855 have reduced the total wetland area to about 230 acres, converting the delta to more of a river channel. Approximately 180 acres of the current estuary are within the Department of Parks and Recreation Natural Preserve at McGrath State Beach (Swanson et al., 1990). The estuary is a dynamic environment with constantly changing habitat conditions resulting from both natural and artificial hydrologic processes.

Flows in the Santa Clara River are highly variable and typical for Southern California rivers. Winter storm flows are flashy and often very high, while summer and fall flows are very low or entirely absent. Major flood events have occurred relatively frequently and have caused severe and extensive damage, often significantly altering the channel, banks, and vegetation of the estuary. Levees now protect the Ventura Water Reclamation Facility located on the northern bank of the estuary from flood flows. A smaller levee protecting McGrath State Beach on the southern bank recently failed, most likely due to the northern levee deflecting the force of storm flows against the south bank. Continued erosion of the southern bank has been reducing the terrestrial area while increasing the estuarine area of the park.

The SCRE displays a highly unnatural pattern of sandbar formation and destruction. Under natural conditions, Southern California estuaries are typically open to the ocean during the winter and spring, but the formation of a sandbar at the mouth closes the lagoon during the summer and fall. The natural formation and destruction of sandbars is dependent upon a number of variables, including wave dynamics, sand abundance and distribution, coastline shape, streamflow, and channel width and volume (Smith, 1990). High-energy winter storm waves erode beach sand and remove the sandbar while high streamflows typically widen and deepen the mouth of the lagoon. Annual fall and winter disposal of up to 500,000 cubic yards of dredged sand from the Ventura Harbor contributes to the abundance of sand at the river mouth. During the summer and fall, low-energy waves and long-shore sand transports cause sand to be deposited at the river mouth at a faster rate than outflows can scour the mouth, thus forming a new sandbar and closing the lagoon off until the next winter (Swanson et al., 1990; Smith, 1990). Unfortunately, few estuary systems in California are allowed to undergo this natural pattern. Sandbars are often artificially breached for a variety of reasons, including flood control, insect control, and to protect agricultural water diversions.

After sandbar formation is completed in the spring, the tidal influence to the estuary is largely lost and the lagoon begins the process of being converted from brackish water to freshwater. The time required to complete this process is dependent upon the inflow of freshwater and the size of the lagoon. During this time, the water column becomes increasingly stratified as heavier saltwater sinks to the bottom and inflowing freshwater remains on the top. The salty bottom layer is gradually lost by seepage through the sandbar and by dilution with freshwater, until eventually the salinity level in the lagoon drops to near-freshwater levels and the water column becomes destratified. Due to the relatively dry weather conditions

in Southern California, this conversion process probably takes longer to complete in some areas, while in other areas it is never fully completed, resulting in predominantly brackish water conditions. According to Smith (1990), estuaries are highly productive rearing grounds for anadromous salmonids when they are open to full tidal influence and when the conversion to freshwater lagoon has been completed. However, the conversion process itself is usually a time of low biological productivity (Smith, 1990).

The Ventura Water Reclamation Facility discharges approximately 9 million gallons per day (MGD) of essentially freshwater into the lagoon. This is equivalent to a year-round stream flow of 14 cfs, far more than the 0-5 cfs summer and fall streamflow that would be expected from an unimpeded Southern California river. This freshwater inflow results in a relatively short transition period in the SCRE, as well as a relatively rapid rise in the water level of the lagoon. The sandbar at the SCRE typically breaches various times during the summer and fall months (VWRF, unpublished data). These breaches appear to occur in two ways. The discharge of large amounts of treated effluent may raise the water level of the lagoon beyond the elevation of the sandbar, which causes overtopping and consequent breaching (Swanson et al., 1990). There also appear to be unexplained breaches, possibly unauthorized mechanical breaches by unknown entities, or breaches resulting from unknown natural causes such as wave climate dynamics. It is noted that authorized mechanical breaching requires extensive environmental review and permitting. Breaching to reduce flooding has not occurred for well over a decade. There was an emergency breach as part of the response on the McGrath Lake oil spill in 1994, and occasional breaches associated with the Ventura Port District annual winter dredging disposal operations, are the only known authorized instances of breaching.

The effects of the treated effluent discharge on the ecology of the SCRE are twofold. On one hand, the estuary appears to benefit to a certain degree from the freshwater inflows, especially in light of the water diversions occurring at the Vern Freeman Diversion Dam. Upstream water diversion have severely limited spring and summer freshwater flows into lagoons throughout California, and are widely acknowledged as a major factor in the overall decline in estuary health (Moyle et al., 1995; Smith, 1990). Thus, the discharge of treated effluent into the estuary serves to replace some of the water inflow that has been lost in the watershed. However, there appears to be a considerable amount of evidence, including the unseasonal sandbar breaches and the general dominance of freshwater invertebrate species (USFWS, 1999a), that the current level of discharge exceeds the capacity of the estuary at its current size.

The most recent and comprehensive surveys of biological resources within the estuary were conducted by the USFWS from October 1997 through July 1999 (USFWS, 1999a). Although El Niño weather patterns during the 1997/1998 winter season occurred during the study period, the results of the study are comparable to information gathered at other Southern California estuaries (USFWS, 1999a) and probably provide a fairly accurate indication of the general ecological conditions of the system. The major findings of the study are summarized below:

- Surface water levels fluctuated frequently among survey dates, ranging from 3.5 feet above mean sea level (MSL) to 9.3 feet MSL.
- Salinity levels in the estuary were typically in the mixohaline (0.5- 18.0 parts per thousand) range. The lowest recorded salinity level was 0.6 ppt and the lagoon was never fully stratified.
- Water temperatures ranged from 13.9 to 29.0ºC.

- Dissolved oxygen levels ranged from 0.21 milligrams per liter (mg/l) to more than 20 mg/l, with the lowest levels generally observed in the vicinity of the effluent discharge area.
- Of the 24 invertebrate taxa collected during the study, all but two were freshwater organisms.
- Of the 14 fish species collected, five are restricted to freshwater while the other nine are considered to be euryhaline species capable of withstanding a wide range of salinity levels.
- Four exotic fish species (yellowfin goby, mosquitofish, fathead minnow, green sunfish) and three special status species (tidewater goby, arroyo chub, Santa Ana sucker) were collected. A special status species (southern steelhead) is known to occur in the estuary, but was not observed during the study.
- Two amphibian species, one native (Pacific treefrog) and one exotic (African clawed frog) are present in the estuary when salinity levels are low.
- Most of the vegetation within the estuary boundaries was scoured away by high river flows associated with the previously mentioned El Niño season.

The study concludes that the physical and chemical conditions in the SCRE that appear to be potentially limiting to some estuarine species include periodic shallow water depths, silt deposition, low salinity, low dissolved oxygen, and low redox values (USFWS, 1999a).

McGRATH LAKE

McGrath Lake, is approximately a 10-acre lake located at the southern end of McGrath State Beach, has not been surveyed for aquatic fisheries or amphibians, although exotic mosquitofish (*Gambusia affinis*) have been observed in the past. The lake contains high levels of chlorinated pesticides as well as other types of agricultural pollution (California RWQCB, 1999) and is unlikely to support a native fishery.

HABITAT QUALITY

The vegetation described indicates a high diversity of types of habitats with a high level of plant diversity. The diversity is the result of the confluence of multiple physical features including proximity to the ocean, a large seasonally variable river system, a complex groundwater system, active sand dune formation, and presence of older back dunes. In more general terms, the vegetation reflects the gradient in hydrology from a variety of wetland types, riparian woodlands and forests, and uplands on active and back dues. This diversity of vegetation and characteristic physical features provides a similarly diverse set of habitats for wildlife.

The Department of Parks and Recreation recognizes the significance of habitat diversity as well as recognizing habitat quality. Each habitat is influenced by several factors that determine its value such as level of disturbance, proximity to urban development, size, type and diversity of adjacent habitats, and use by wildlife. It was previously stated that McGrath State Beach is unique due to the diversity of physical features such as the Santa Clara River, Pacific Ocean, McGrath Lake, active and stabilized dunes, and the underlying near surface hydrology. This combination of features has resulted in a complex

suite of ecosystems occurring in very close proximity to each other. Within this complex context the habitats that are present benefit from the diversity of the adjacent and often contrasting habitat types.

AQUATIC HABITATS

The three aquatic habitats include the Santa Clara River estuary, the flowing river, and McGrath Lake. The estuary and river are high-quality habitats due to their size and degree of wildlife use. Due to the significant loss of estuarine and riverine habitats in Southern California, the McGrath State Beach habitats are rated as high-quality despite the artificial hydrology of the system due to upriver water diversions, treated water discharge, and occasional human-caused breaching of the sandbar. The habitat use by wildlife, especially bird species is significant. As habitat for fisheries the habitat quality may be viewed with a somewhat lower value (see Aquatic Species-Fish Section below). McGrath Lake provides a unique freshwater habitat. The surrounding wetlands, riparian, and dunes create a diverse set of adjacent habitats that enhance its value. As a terrestrial wildlife habitat it may be considered to have high-quality value. This high-quality rating may need to be lowered if it was determined that the poor water quality conditions were having a detrimental affect on terrestrial wildlife. For aquatic species the water quality issues (see Water Quality section) result in low-quality habitat. Significant enhancement of the water quality would be required to increase the aquatic habitat value.

WETLAND HABITATS

The wetland habitats fall into two quality categories of high and low. The high-quality wetland habitats include the brackish marsh and other wetlands within the Natural Preserve boundary. The plant diversity, relative size, vegetation density and contiguous nature of these habitats produce high-quality habitat. This remains true even though some of these areas have been bisected by “volunteer” (i.e., unauthorized, visitor-created) trails and there is some invasion by non-native exotic plants. Relatively simple management activities can address these disturbance factors and improve the conditions. This also is true for the wetlands surrounding McGrath Lake. Due to the lower level of human disturbance to the vegetation the freshwater wetlands are high quality. Again, management and removal of non-native weedy plants would enhance these high-quality wetlands.

The wetlands mapped in Figure 7 as “disturbed pickleweed series” are ranked as low-quality due to the presence of the campground in this area. The groundwater hydrology of this area would naturally support brackish marsh similar to that within the Natural Preserve. Prior to the designation of the State Park, this area was part of the Santa Clara River floodplain and historical aerial photos indicate it may have been seasonally used for agriculture. The placement of roads and other recreational facilities, landscaping with non-native trees and shrubs and the mowing of the planted turf limits this natural wetland from developing. The presence of brackish marsh plant species that persist despite active management for recreation indicates the tenaciousness of these plants and the clear natural conditions that support wetland habitats. The active management to reduce the native species and the promotion of non-natives for the purpose of a recreational landscape also limits this area to low-quality. Significant restoration would be required in this area to enhance this habitat to a high-quality one (see Management Recommendations).

RIPARIAN

The riparian habitat in McGrath State Beach includes high, medium, and low-quality areas. The majority of the riparian habitat occurs within the Natural Preserve and this area is viewed as high quality, at least on the south side of the Santa Clara River. The relatively large size, proximity to the Santa Clara River, plant community diversity, extensive wildlife use, and the management as a protected area provide adequate value to rank this area as high-quality. However, non-native weeds, especially giant reed, are having an increased impact on habitat quality. The giant reed provides little habitat value and the increase in this plant is reducing the habitat quality. The contiguous stands of giant reed are considered to be low-quality habitat. Riparian areas in the southern part of the McGrath State Beach north and east of McGrath Lake are medium to low-quality habitat. The main reasons for these areas being assigned medium or low-quality is due to the proximity to Harbor Boulevard and the oil fields, distance from the Santa Clara River, relatively low density and small area, and disturbance from non-native weeds such as tamarisk. Several other stands of isolated willows occur in the park, and to some extent non-native landscape trees such as Myoporum form low-quality substitutes for native riparian species. These isolated willow riparian stands serve as low-quality habitat, but they do serve to provide habitat diversity for the park.

DUNES

The active and back dunes vary in their habitat quality between high, medium, and low. The higher quality areas are furthest away from and south of the campground. These areas have good natural vegetation and have limited disturbance from park visitors. Further north and closer to the campground and area of day use recreation, the dunes are more disturbed from foot-traffic and have a higher level of invasive non-native plants. These areas mostly are of medium quality habitat value due to the higher disturbance. The lowest quality dune areas are the foredunes where natural vegetation is normally sparse, but recreational use increases the disturbance level and areas of giant reed have become established. The dunes in the vicinity of the outfall area where McGrath Lake is artificially discharged is highly disturbed and is a low-quality area that appears to be increasing in size based on aerial photo interpretation and field surveys during 2002. Excavation of the dunes was done to provide drainage to the ocean that has formed a large ponding area and meandering channel to the ocean. There is a significant change in topography and habitat conditions.

DUNE SCRUB

The dune scrub areas mostly include the Coyote bush vegetation series (see Figure 7). These areas are mostly located within the center of the park. These areas have had an active land use history associated with the adjacent oil fields and agricultural activities that occurred prior to the establishment of the park. Some former dune scrub also occurred in areas that are now included within the southern parts of the campground. This habitat is low-quality due to the level of disturbance to the native vegetation and low percent cover, high densities of non-native weedy plants, and extensive network of trails. Some areas of dune scrub are dominated by non-native iceplant that produces low-quality habitat.

3.3 INVENTORY OF SPECIES

SPECIAL STATUS PLANTS

Ventura marsh milk-vetch (*Astragalus pycnostachyus* var. *lanosissimus*)

The Ventura marsh milk-vetch (VMMV), *Astragalus pycnostachuys* var. *lanosissimus*, is a state and federally-listed endangered species (CNPS List 1B). This herbaceous perennial in the legume family (*Fabaceae*) has an erect stem less than 1 m tall. The leaves and stem of the species are typically covered with a dense layer of white hairs. The leaves are less than 15 cm long and composed of 23–41 narrow leaflets. The flowers are greenish white to cream colored and located in dense spike-like racemes. This variety blooms from June through October.

Astragalus pycnostachyus is apparently restricted to coastal habitats including salt marshes and coastal seeps at elevations below 100' (Hickman, 1993). Associated shrub species include coyote brush, mulefat (*Baccharis salicifolia*) and skunkbush (*Rhus ovata*). These habitats are typically open with sandy soils, providing abundant bare ground for germination (Wilken et al., 2001). Historical records indicate the species occurred in Los Angeles and Ventura counties. Prior to 1997, the species had not been seen since 1967 where it had been observed at McGrath State Beach and was presumed extinct; all of the historical occurrences were believed to be extirpated (Hickman, 1993; Skinner and Pavlik, 1994). However a single population was discovered in 1997 adjacent to an agricultural field just east of McGrath State Beach in the City of Oxnard, Ventura County.

A recent project under the auspices of the California Department of Fish and Game selected sites for experimental populations of the species at Carpinteria Salt Marsh and McGrath State Beach. The project will help determine what the habitat requirements of the species are. The experimental populations at McGrath State Beach are located just east of the center of McGrath Lake. In April, 2002, five sites in the vicinity of McGrath Lake were planted with approximately 200 plants. The experiment planted 35–40 plants taken from approximately 11 maternal lines in each of these five sites. The plants were spaced 3–5' apart to reduce competition (Soza et al., 2002).

Salt marsh bird's-beak *(Cordylanthus maritimus* ssp. *maritimus)*

This hemiparisitic annual member of the figwort family (*Scrophulariaceae*) is a state and federally listed species (CNPS List 1B). The diminutive (10–40 cm) stems are gray-green and covered with short hairs. The leaves are opposite, linear to lanceolate (0.5 to 2.5 cm long) and entire. The inflorescence is a many-flowered spike between 20–90 cm long with a leaf-like outer bract. The corolla is white to cream colored with lips that are brownish or purplish-red. This plant was observed historically in the brackish marsh in the Natural Preserve. This species has not been seen recently at McGrath State Beach and at least one other population has been located approximately 9 miles south of McGrath State Beach at Ormand Beach.

NON-NATIVE PLANTS

Giant Reed *(Arundo donax)*

This perennial, rhizomatous, cane-like grass can reach heights of 8 m (~26') with stems approaching 4 cm. (~1.5") thick. The distinctively silver to purplish plume-like inflorescence is typically 4–6 dm long. The species, one of three worldwide, is a native of Europe and has become widespread in drainage, ditches and wet places in the warmer temperate regions of the United States. It became established in California in the 1880's and is now commonly found in the desert regions, central and southern coastlines, central Sierra Nevada foothills, and San Gabriel Mountains (Sawyer & Keeler-Wolf, 1995; Hickman 1993). It is considered a highly invasive exotic plant (List A-1 threat level), often crowding out existing native riparian plant communities and altering wildlife habitat. Giant reed is abundant in the riparian corridor of the Santa Clara River Mouth, dominating more than 13 acres. It also occurs sporadically along the eastern side of the park south of the campground to McGrath Lake. Patches of short plants of giant reed also have established along some of the foredunes.

Iceplant *(Mesembryanthemum crystallinum)* **and Fig-Marigold** *(Carpobrotus edulis, C. chilensis)*

These succulent-leaved members of the Aizoaceae form dense mat-like ground covers throughout many coastal habitats of California, Oregon and Mexico. All of these species are native to South Africa and flower colors vary from white-pink in iceplant to yellow-red in fig-marigold. *C. edulis* has been extensively planted along highways and coastal dunes throughout California (Hickman, 1993). These species stabilize sand, preventing the natural shifting processes most native dune species need to survive (Redwood State Park- iceplant URL). All three species are considered invasive (List A-1 threat). *C. edulis* was planted in the park as an ornamental. Iceplant series vegetation is extremely abundant on the sand dunes and within the Sand verbena - beach bursage series it has also spread inland to the marshes of the Natural Preserve.

Gum Tree *(Eucalyptus* spp.*)*

These large trees or shrubs in the Myrtle family are native to Australia. They have long lanceolate, opposite leaves and shedding bark, which tends to leave their trunks smooth. The sepals and petals are fused into a bud cap. Their height ranges from 10 to 50 m and they often occur in dense monoculture stands. Though nine species have been introduced to California, some, like blue gum *(E. globulus*), are more common than others. These trees have been widely planted in the state and most have escaped from cultivation (Sawyer & Keeler-Wolf, 1995; Hickman, 1993). Stands of gum tree crowd out and decrease native vegetation and have been recognized as a major fire hazard throughout the state. These trees are often found growing in disturbed or urban areas at elevations less than 1,000'. They occur in a broad range of habitats in California. At McGrath State Beach, gum tree is restricted to a small stand east of the campground near Harbor Boulevard.

Pampas Grass *(Cortaderia selloana, C. jubata)*

These tall (2–7 m) perennial tussock grasses with a plume-like inflorescence in excess of 1 m form dense stands in many disturbed habitats of California. The genus is dioecious and the females are capable of

reproducing asexually. The species are both native to South America. Black pampas grass (*C. jubata*) is prevalent in the north coast and central coast of California, while white pampas grass (*C. selloana*) has become widespread in the San Francisco Bay Area and southern coastlines of the state (Sawyer & Keeler -Wolf, 1995; Hickman, 1993). Both species are invasive (List A-1 threat), crowding out native plant communities and degrading wildlife habitat. There are a few pampas grass plants in the salt marsh and within the riparian woodland of the Natural Preserve.

Tamarisk *(Tamarix* spp.*)*

These large, woody, salt-excreting shrubs or trees (2–8 m tall) with jointed stems and scale-like leaves are often found in saline wet places throughout the U.S. The five species found in California are native to parts of Africa and Eurasia. *T. parviflora* and *T. ramosissima* are the most common, occupying washes, roadsides, streambanks and ditches throughout the state. They can reproduce clonally from below ground and are very aggressive (List A-1 threat), according to the California Exotic Pest Plant Council. Tamarisk supplants native plant communities and lowers water tables, often reducing water for wildlife. As of 2000, there was less than an acre of this species in McGrath State Beach. A small dense stand of tamarisk occurs east of the back dune area in the park, near the campground. It borders stands of Arroyo willow series and Sand-verbena-beach bursage series. A few other plants occur at the end of the levee.

TERRESTRIAL WILDLIFE

The natural environment in the vicinity of McGrath State Beach has changed considerably with colonization by European settlers, as described in previous sections of this document. The result has been the loss, degradation, and fragmentation of native habitat, introduction of exotic animals, and increased disturbance. While these influences have affected the wildlife in McGrath State Beach, causing a once rich local biota to be reduced, the habitats that remain still provide valuable resources for a large number of wildlife species. While no recent comprehensive surveys of terrestrial wildlife species has occurred in McGrath State Beach, the Santa Clara River Enhancement and Management Plan Study (SCRPSC, 1996) provides a comprehensive account of species that have been recorded in the area, and those that may occur in the area. Other technical reports (e.g., Keane, 1999 and Cooper, 2001), while not comprehensive, also provided recent information on some species. A list of wildlife potentially occurring in McGrath State Beach is presented in Appendix E. Note that this list consists principally of vertebrate taxa; invertebrates have only rarely been considered in past efforts, and then primarily only when they have been recognized as threatened or endangered by the federal or state government. Threats to particular wildlife species are detailed individually later in this section.

TERRESTRIAL ANIMALS

SPECIAL STATUS WILDLIFE SPECIES

In this report the term “special status” wildlife species means those wildlife species that are listed, or candidates for listing, as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) or California Department of Fish and Game (CDFG). This includes those species considered rare by public or private resource agencies. The list of sensitive status wildlife species presented in Table 3-2 was

developed using information from the California Natural Diversity Database (CNDDB, 2001), which is a positive-sighting database compiled from published records and observations reported directly to the database. Other sources include SCRPSC 1996, Smith et al. (undated), and observations during a site visit to the park (February 20–22, 2002). These special status species are described in more detail following Table 3-2.

TABLE 3-2
SPECIAL STATUS WILDLIFE SPECIES KNOWN OR HAVING POTENTIAL TO OCCUR IN MCGRATH STATE BEACH AND VICINITY

Species	Sensitivity Status	Use of McGrath State Beach, or Potential to Occur
Sandy beach tiger beetle (*Cicinderela hirticollis gravida*)	Federal Special Concern	Clean, dry, sandy areas which are bright and open.
Brown pelican (*Pelecanus occidentalis*)	Federal Endangered (delisted), State Fully Protected	Roosts at river mouth. Forages in nearshore marine environment.
Western least bittern (*Ixobrychus exilis*)	State Special Concern	Breeds in freshwater marsh with dense cattails.
White-faced ibis (*Plegadis chihi*)	State Special Concern	Marsh and mudflats in the Santa Clara River estuary.
Osprey (*Pandion haliaetus*)	State Special Concern	Breeds in tall dead trees near permanent water sources. Forages for fish over open water.
White-tailed kite (*Elanus leucurus*)	State Fully Protected	Breeds in tall shrubs and trees with thick canopy. Forages over open grasslands and agricultural land.
Northern harrier (*Circus cyaneus)*	State Special Concern	Breeds on the ground in moist grasslands, forages over marsh, grasslands, dunes, and agricultural land.
Sharp-shinned hawk (*Accipiter striatus*)	State Special Concern	Forages in woodlands.
Cooper's hawk (*Accipiter cooperi*)	State Special Concern	Forages in woodlands.
Light-footed clapper rail (*Rallus longirostris levipes*)	Federal Endangered, State Endangered and Fully Protected	Breeds and forages in coastal saltmarsh.
Western snowy plover (*Charadrius alexandrinus nivosus*)	Federal Threatened, Critical Habitat, State Special Concern	Breeds in foredunes, and at the mouth of the Santa Clara River. Forages on sandy beach.
Long-billed curlew (*Numenius americanus*)	State Special Concern	Forages in winter on mudflats, lagoon, beaches and moist agricultural land.
California least tern (*Sterna antillarum browni*)	Federal Endangered. State Fully Protected	Currently breeds on sandbars in the Santa Clara River and at the mouth of the Santa Clara River. Recent breeding also recorded near the south end of McGrath Lake.

Species	Sensitivity Status	Use of McGrath State Beach, or Potential to Occur
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	State Endangered	Historic breeding records on the lower Santa Clara River from the early 1920's and 1942. Recent sightings are reported on the Santa Clara River near the Ventura/Los Angeles County lines (Cooper, 2001).
Burrowing owl (*Athene cunicularia*)	State Special Concern	Nests and roosts in medium-sized mammal burrows. Forages for insects, small vertebrates over open habitats.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Federal Endangered, Critical Habitat, State Special Concern	There are no records from the lower Santa Clara River, but potentially suitable breeding habitat exists in the riparian area adjacent to the river (SCRPSC, 1996).
Loggerhead shrike (*Lanius ludovicianus*)	State Special Concern	Breeds in shrubs and small trees, forages for insects and small vertebrates in open habitats such as grasslands and agricultural land.
Least Bell's Vireo (*Vireo bellii pusillus*)	Federal Endangered, Critical Habitat	Pairs observed in McGrath State Beach in riparian habitat adjacent to the Santa Clara River.
Yellow warbler (*Dendroica petechia*)	State Special Concern	In Central California coast, typically breed in riparian woodlands. Common brown-headed cowbird host (RHJV, undated).
Yellow-breasted chat (*Icteria virens*)	State Special Concern	Breed in dense riparian thickets with tall trees for perches; susceptible to brown-headed cowbird parasitism (RHJV, undated)
Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*)	State Endangered	Recorded in McGrath State Beach in 1977, but population considered extirpated after saltmarsh at mouth of Santa Clara River was closed to tidal action (CNDDB, 2001).
California red-legged frog (*Rana aurora draytonii)*	Federal Threatened, State Special Concern	Still or slow moving fresh or brackish water with emergent vegetation for breeding.
Southwestern pond turtle (*Clemmys marmorata pallida*)	State Special Concern	Slow-moving to still, permanent water sources with upland areas of friable soils for nests.
Silvery legless lizard (*Anniella pulchra pulchra*)	State Special Concern	Sandy or loose organic soils, especially with leaf litter; coastal dunes and scrub.
San Diego horned lizard (*Phrynosoma coronatum blainvillei*)	State Special Concern	Open, especially sandy areas such as washes and flood plains.
Two-striped garter snake (*Thamnophis hammondii*)	State Special Concern	Permanent or semi-permanent bodies of water bordered by dense vegetation.
South coast garter snake (*Thamnophis sirtallis* ssp.)	State Special Concern	Marsh and upland habitats near permanent water with riparian vegetation.
Townsend's (western) big-eared bat (*Corynorhinus townsendii*)	State Special Concern	Colonial species which uses caves and buildings. Forages over a wide range of forested and open habitats.

SOURCE: CDFG, 2001; CDFG, 2002; SCRPSC, 1996; USFWS, 2002.

Sandy Beach Tiger Beetle (*Cicinderela hirticollis gravida)*

Sandy beach tiger beetles inhabit clean, dry light-colored sand. They occur in bright sunlight in open areas, and feed on arthropods. Tiger beetle larva use burrows in the same areas as adults (DON, 2002). Reasons for decline in this species is loss of habitat (SCRPSC, 1996), but they are also sensitive to contact with humans (CNDDB, 2001). Tiger beetles may be a good indicator of disturbance in coastal systems, with presence in least-disturbed areas (DON, 2002). McGrath State Beach is a historical location of sandy beach tiger beetles, which were recorded as abundant on sandbars, possibly near McGrath Lake, in 1970, but were presumed extirpated by 1980 (CNDDB, 2001).

California Brown Pelican (*Pelecanus occidentalis*)

The California brown pelican breeds in colonies on islands which do not have mammalian predators. In the area of McGrath State Beach, they breed on Anacapa and Santa Barbara Islands, and disperse to the mainland coast after breeding (DON, 2002). Threats to their population include oil spills, disturbance at post-breeding roosts, entanglement with hooks and fishing line, and outbreaks of disease resulting from overcrowding in harbors (USFWS undated a). They feed on anchovies and sardines in shallow marine waters. At McGrath State Beach, sand islands within, and the sandbar at the mouth of Santa Clara Estuary provide post-breeding roost habitat for California brown pelicans.

Western Least Bittern (*Ixobrychus exilis*)

The western least bittern feeds and nests in dense stands of emergent vegetation. Its very secretive behavior has resulted in a lack of detailed information on this species. The Southern California population of western least bittern is thought to be non-migratory, while most of California population migrates south to Mexico for winter. It is quite rare in coastal lowlands, but may breed in some locations. The western least bittern hunts for fish, small vertebrates, and invertebrates such as crayfish in shallow water in small openings in dense, emergent vegetation. They have been observed at the Salton Sea and Colorado River to feed in thickets of tamarisk adjacent to dense emergent vegetation. Populations have declined from marsh drainage, human disturbance, and pesticides. Potential habitat for western least bittern exists in wetland habitat near the Santa Clara River mouth and adjacent to McGrath Lake.

White-faced Ibis (*Plegadis chihi*)

White-faced ibis is a migratory water bird that no longer regularly breeds in California (CDFG, 2002). They feed on invertebrates in shallow waters with emergent vegetation, and in soft muddy substrates in wet meadows. Marsh and mudflats at the Santa Clara River mouth and McGrath lake provide potential habitat for McGrath State Beach, and would most likely be used in winter or migration. A small wintering population has been documented in the Point Mugu area (CDFG, 2002).

Osprey (*Pandion haliaetus*)

Osprey forage for fish near the surface of open water. They breed on large snags or platforms near large bodies of water; after breeding, they migrate south. This species has been recorded breeding at Lake Casitas in Ventura County. The Santa Clara River estuary provides potential foraging habitat for this species.

White-tailed Kite (*Elanus leucurus*)

This species nests in dense vegetation, typically in large shrubs or small trees in riparian woodlands. It forages over open habitats such as grasslands and agricultural fields, frequently hovering over an area before diving onto a small rodent or moving on to a new area. Loss of breeding and foraging habitat to agriculture and urban development has reduced the population. The riparian areas of McGrath State Beach provide potential nesting habitat, and upland areas provide potential foraging habitat.

Northern Harrier (*Circus cyaneus*)

Northern harriers nest on the ground in shrubby vegetation, often at the edge of a marsh or in wet areas. The species frequently nests in emergent wetland or along rivers or lakes, but may nest in grasslands, or other areas. Northern harriers forage over open habitats, frequently flying close to the ground. Potential nesting habitat occurs in McGrath State Beach near McGrath Lake, especially in locations not easily accessible by people or dogs. Northern harriers could forage over upland and wetland habitats, and in the dunes.

Sharp-Shinned Hawk (*Accipiter striatus*) **and Cooper's Hawk (***A. cooperi***)**

These hawks not breed in the vicinity of McGrath State Beach, but they can occur during the non-breeding season. They typically perch and hunt in wooded areas, where their agility allows then to surprise smaller birds, but they can also hunt in open upland habitats. Potential foraging and roosting habitat occurs throughout McGrath State Beach, especially in the riparian areas and adjacent uplands.

Light-Footed Clapper rail (*Rallus longirostris levipes*)

Light-footed clapper rails are found in coastal California in marshes from Santa Barbara to the Mexican border. They occur in small populations in fragmented salt marshes, where they feed on crabs and other invertebrates. They breed on platform nests, typically in thick cordgrass, although they have been documented breeding in spiny rush and pickleweed in Point Mugu (DON, 2002). While saline or brackish marsh at McGrath State Beach may not be large enough to support a breeding population of this species, it could be used by individuals dispersing between larger marshes.

Western Snowy Plover (*Charadrius alexandrinus nivosus)*

Western snowy plovers both breed and winter in Southern California; breeding individuals may migrate and be replaced by other western snowy plovers from the more northern range of the subspecies (DON, 2002). Western snowy plovers nest in sandy depressions, often concealed near driftwood or rocks, although vegetation and debris is usually sparse. Their breeding range extends from Washington to southern Baja California, where they can nest from early March through late September. The breeding season may begin two to four weeks earlier in Southern California than in Oregon and Washington, but fledging may extend into the third week of September throughout the breeding range (USFWS, undated). Western snowy plovers feed on insects and crustaceans taken from the surface of the sand from the spray zone to the intertidal zone of sandy beaches. They also forage on salt flats, tide flats, and salt ponds.

Western snowy plover chicks are precocial, and they leave the nest within hours after hatching to search for food. Approximately 4 weeks after hatching chicks develop the ability to fly. Adult plovers (typically the male) lead their chicks to suitable feeding areas, and use distraction displays to lure predators and people away from chicks. They may also lead chicks, especially larger ones, away from predators. Most chick mortality occurs within 6 days after hatching (USFWS undated a).

Western snowy plovers nest in McGrath State Beach (Figure 8) where known high-use breeding area is protected from human disturbance with permanent fencing, temporary (seasonal) posting of signs, and additional fencing (M. Coulter pers. comm.). Threats to successful breeding include disturbance by humans, dogs - especially dogs off-leash, vehicles, and predation (O'Neill, pers. Comm.). Disturbance is also a threat during the non-breeding season, when western snowy plovers alter their behavior (e.g., feeding) at shorter distances than during the breeding season (Lafferty, 2001). The annual disposal of dredged sand from the Ventura Harbor onto the beach and nearshore marine environment of McGrath State Beach may also pose a threat to western snowy plovers. This activity increases vehicle use of the beach and may continue into the early part of the western snowy plover breeding season. Dredging is limited by a Temporary Use Permit between DPR and the Ventura Port District to the period from September 20 to April 10, and the California Coastal Commission limits the period to between September 15 and March 15, with conditional extensions to March 31. As shown to the north and south of the river mouth in the photo used for Figure 2, which is dated March 30, 2000, dredging activities may extend past March 15. In addition to vehicular disturbance to breeding and non-breeding western snowy plovers, beach grooming associated with the dredging may remove woody debris from the beach, reducing the suitability of beach habitat.

Long-Billed Curlew (*Numenius Americanus*)

Long-billed curlew is a migratory shorebird that within California breeds in the northeastern part of the state and winters in marshes and lagoons, agricultural fields, pastures, and on beaches. They forage for crabs, shrimp, crayfish, and other invertebrates on soft substrates and in flooded fields. The beach and mouth of the Santa Clara River provide suitable foraging habitat for this species at McGrath State Beach.

SOURCE: CA Dept. of Parks and Recreation, 2001 and ESA 2002.

McGrath State Beach / 201476 ■

Figure 8

Snowy Plover Use Areas
In and Adjacent To
McGrath State Beach

California Least Tern (*Sterna antillarum browni*)

The California least tern is a colonial nesting species with colonies from Baja California to the San Francisco Bay. Its wintering range is not known, but is thought to be from southern Mexico to Central America (Keane, 1999). Historic nesting sites included sandy beaches and salt flats near the coast; as beaches became more disturbed through the 20th Century, a severe decline in the number of nesting colonies and nesting pairs occurred (Keane, 1999). This species nests in scraped depressions in sand, usually in areas of little vegetation. Breeding individuals arrive in the area in early to late-May (DON, 2002). It forages for small fish over bays, lagoons, and the nearshore marine environment.

Protection under the state and federal endangered species acts has resulted in an increase of breeding sites from 23 in 1976 to 39 in 1998 (Keane, 1999). Fencing of nesting sites and posting of signs are an effective method of reducing human disturbance at (and destruction of) nests, however, predation is still a significant cause of nest failure. Native and introduced predators include American kestrel, common raven, dogs, cats; some common species that act as predators also benefit from human presence, which indirectly can increase predation pressures (Keane, 1999). Historical breeding sites that are abandoned due to predation pressure may be used again after a few years (SCRPSC, 1996).

This species is a fairly common summer resident in the vicinity of McGrath State Beach, with breeding colonies at the mouth of the Santa Clara River and near McGrath Lake. Current management activities at McGrath State Beach include the fencing of a breeding colony at the mouth the Santa Clara River; California least terns also use an exclosure erected for western snowy plovers near McGrath Lake (Coulter, pers. comm.).

Western Yellow-Billed Cuckoo *(Coccyzus americanus occidentalis)*

Western yellow-billed cuckoos are restricted to breeding in large areas of dense riparian woodland. Minimum patch size is 50–100 acres, with a width of at least 100 meters (RHJV, 2000). They are a migratory species, and may occur in riparian areas not suitable for breeding during spring and fall migration. Although currently a rare bird in California, this species was documented breeding at the mouth of the Santa Clara River in the early 1920's. Eggs were also collected from near Montalvo in 1942 (CNDDB, 2001). More recently, western yellow-billed cuckoos were recorded on the Santa Clara River near the Ventura/Los Angeles county line in an area of ancient Freemont cottonwood (Cooper, 2001). Potentially suitable habitat occurs for this species in riparian habitat adjacent to the Santa Clara River. However, unless restoration of a wide area of riparian habitat upstream from McGrath State Beach occurs, it is unlikely that this species will breed at McGrath State Beach.

Burrowing Owl *(Athene cunicularia)*

Burrowing owls in California can be either migratory or sedentary. They nest and roost in burrows, often which are excavated by fossorial mammals such as ground squirrels or badgers. They will also use human-made structures such as culverts or cavities in debris piles. They forage over open habitats such as grasslands and agricultural land. Threats to the population are primarily related to loss of nesting habitat through the conversion of habitat to urban and agricultural uses and poisoning of ground squirrels. Burrowing owls are also susceptible to disturbance, especially at nest sites.

During a February 2002 site visit to McGrath State Beach, a single burrowing owl was documented at a ground squirrel burrow under a debris pile south of the campground. Other single owl sightings have occurred during the non-breeding season (O'Neill, Linda personal communication). While burrowing owls have not been recorded breeding at McGrath State Beach, potentially suitable breeding and foraging habitat is available. Human disturbance during the breeding season would increase due to increased day and overnight use of McGrath State Beach during spring and summer. This disturbance could prevent burrowing owls from successfully breeding in McGrath State Beach.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher occurs in riparian habitat near stream, rivers, or other wet areas where suitable habitat exists. It forages by sallying from perches to capture insects as they fly by. Southwest willow flycatchers nest in open cups in dense stands of riparian vegetation. In general, willow flycatcher do not occur in stands of dense tree cover; however the mean canopy cover at southwest willow flycatchers on the Kern River was almost 75% (RHJV, 2000). They may require small openings, open water, or short vegetation within patches of dense vegetation. In California, breeding habitat in lowland riparian woodland is typically dominated by tree willows (*Salix* spp.), and cottonwoods (*Populus* spp.). In lowland riverine habitats, contiguous willow thickets are used (RHJV, 2000). They have also been documented using monotypic stands of Tamarisk (RHJV, 2000), and using giant reed (Greaves, 2001). Southwest willow flycatchers arrive on their breeding grounds in early May, and remain until about September; post-breeding migration may occur in California until early October (RHJV, 2000).

Declines in this species are a result of habitat loss and degradation throughout its breeding and non-breeding range. Livestock grazing and changes in hydrologic regimes are likely the cause of much of the loss of habitat through the reduction of species diversity and plant density. Nest parasitism is another factor in the decline of southwestern willow flycatcher, which is frequently parasitized by brown-headed cowbirds.

Southwestern willow flycatcher has not been documented breeding in the park, however suitable habitat may occur in the riparian area adjacent to the Santa Clara River (SCRPSC, 1996). The species has recently been documented breeding on the Santa Clara River in the vicinity of Saticoy (Cooper, 2001). The protection and restoration of lowland riparian deciduous shrub vegetation has been recognized as a priority for this species (RHJV, 2000). If a lack of appropriate breeding sites is restricting this species from breeding in McGrath State Beach, habitat restoration efforts designed to create suitable breeding conditions may have a reasonable chance for success.

Loggerhead Shrike (*Lanius ludovicianus*)

This species occurs principally in open habitats with sparse shrub cover. It usually nests in dense foliage of shrubs or trees. The diet of the loggerhead shrike consists of small vertebrates and invertebrates. Population reductions, where reported, are often associated with impacts due to urbanization of habitat. In the park this species could occur at the edge of riparian habitat, and in the open, especially where perches are available.

Least Bell's Vireo (*Vireo bellii pusillus*)

Least Bell's vireo is a migrant species that breeds in riparian habitats of coastal California. They arrive from their wintering grounds about mid-March, and depart by late September. The species tends to breed in dense willow thickets, usually with a substantial arboreal canopy. Mule fat is also commonly associated with breeding territories (SCRPSC, 1996). Least Bell's vireo home ranges typically range from 0.5 to 7.5 acres, and hatching success tends to be higher in areas with better quality riparian habitat (USFWS undated b). The least Bell's vireo primarily forages mostly on insects, which are obtained in high and low shrub layers, and occasionally in non-riparian habitats.

Historic declines in least Bell's vireo populations are attributed to loss of riparian habitat and cowbird parasitism. In recent years the population of least Bell's vireo has been increasing. In 1986, when this species was listed by the USFWS as endangered, there were approximately 330 pairs in southern California; through 1996 this number had increased to 1,346. This increase is possibly a result of cowbird trapping and habitat conservation and restoration efforts (USFWS undated b).

Least Bell's vireo has not been documented breeding in McGrath State Beach, however, recent sightings have been recorded on the Santa Clara River near Highway 101 (SCRPSC, 1996). Potentially suitable habitat in McGrath State Beach exists for this species in riparian habitat near the Santa Clara River. Riparian habitat conservation and restoration efforts at the mouth of the river have a high chance of successfully resulting in least Bell's vireo breeding in the park.

Yellow Warbler (*Dendroica petechia*)

Yellow warblers are a migratory species that breeds in riparian habitat. It is a fairly common to common breeder in lowland riparian woodlands and foothill canyons in Ventura County (RHJV, 2000). Although it is not a rare breeder, this species is showing declines in California. Breeding Bird Survey data indicates a significant decreasing trend in yellow warbler detections from 1980–1996 (RHJV, 2000). This species is an open-cup nester and thus is susceptible to parasitism by brown-headed cowbirds. Potentially suitable breeding habitat for this species occurs in riparian habitat throughout McGrath State Beach.

Yellow-Breasted Chat (*Icteria virens*)

Yellow-breasted chats are a migratory, cup-nesting bird that breeds in dense riparian willow thickets. Nests are frequently placed amid dense vines, such as blackberry. Early successional riparian habitat with some tall perches such as cottonwood or alder is preferred. Yellow-breasted chats have been found breeding in exotic vegetation such as tamarisk to the extent that it is available (i.e., they do not appear to be selecting it preferentially to other vegetation) (RHJV, 2000). Yellow-breasted chats are a frequent brown-headed cowbird host. Potentially suitable habitat for this species would be the riparian habitat in the park (SCRPSC, 1996), and it has been recognized as an important site for this birds' conservation (Cooper, 2001).

Belding's Savannah Sparrow *(Passerculus sandwichensis beldingi)*

This subspecies of the savannah sparrow is a resident of salt marsh habitat from Goleta Slough in Santa Barbara County to northern Baja California. They typically breed in upper saltmarsh habitat, in

pickleweed, but will forage throughout a marsh and on the shoreline (James and Stadtlander, 1991). In the late 1970's 12 pairs were recorded in McGrath State Beach, but they were considered extirpated by 1986. In 1991 one individual was detected in the park on a survey of the population. Threats to the population include habitat loss and disturbance during breeding; this species may abandon its nest if disturbed.

California Red-Legged Frog (*Rana aurora draytonii*)

On the southern central California coast, California red-legged frogs are generally found near sources of permanent water, often in riparian habitats, where they can remain moist during dry periods of the year. They breed in still or slow moving fresh or brackish water with emergent vegetation which is used to anchor egg masses. Threats include loss of habitat, predation by introduced bullfrogs (*Rana catesbeiana*), and possibly exposure to agricultural chemicals. Few populations remain south of the Tehachapi mountains, and natural spread of the range to McGrath State Beach would encounter many obstacles. Little potential habitat for this species occurs in McGrath State Beach, and occurs only around McGrath Lake and perhaps the Santa Clara River estuary where pools may exist, although Greenwald et al. (1999) did not detect this species during recent sampling in the estuary. Water in McGrath Lake may not be of sufficient quality to support California red-legged frogs at this time.

Southwestern Pond Turtle (*Clemmys marmorata pallida*)

This subspecies of the western pond turtle occurs in ponds, small lakes, and slow moving water, and may occur in brackish water, usually where there is abundant aquatic vegetation. For breeding they typically need upland habitat with soft soils for nests, although they can excavate nests in heavy soils as well. It is uncommon west of the coastal ranges. Suitable habitat in McGrath State Beach may include the mouth of the Santa Clara River (although this is an unstable area with fluctuating water levels) and McGrath Lake.

Silvery Legless Lizard (*Anniella pulchra pulchra*)

Silvery legless lizards use the herbaceous layer in coastal scrub, chaparral, and open riparian areas with loose soil. They are susceptible to drying, and so typically use moist areas and remain under cover unless active. This species has been recorded in Ventura, and potentially suitable habitat occurs in much of McGrath State Beach, especially in riparian at the mouth of the Santa Clara River and near McGrath Lake. The use of agricultural pesticides has severely reduced some populations of this species.

San Diego Horned Lizard *(Phrynosoma coronatum blainvillei)*

San Diego horned lizards prefer open vegetated areas in riparian habitat, coastal sage scrub, annual grassland and other habitats where there is well drained and loose soil. They feed on small insects, especially ants. In McGrath State Beach they could occur in most areas. This species was recorded on the Santa Clara River in Ventura in 1995, and could occur throughout much of McGrath State Beach. San Diego Horned lizards are very susceptible to predation and disturbance by humans and their pets; rather than fleeing danger, they freeze and can be approached easily by people, their pets, or vehicles.

Two-Striped Garter Snake (*Thamnophis hammondii*) and south coast garter snake (*Thamnophis sirtallis* ssp.)

These garter snakes are highly aquatic species, and are usually found near permanent sources of water with emergent freshwater vegetation. They prey on small vertebrates such as fish and other amphibians (e.g., tree frogs). During winter, they may use upland habitats such as coastal sage scrub and grasslands adjacent to riparian areas. Threats include loss of riparian habitat and the decline of other amphibian species taken as prey. In McGrath State Beach suitable habitat for garter snake occurs at McGrath Lake and adjacent to the Santa Clara River. The south coast garter snake is endemic to a few locations on the southern coastal plain, including the Santa Clara River (CDFG, 2002)

Townsend's (Western) Big-Eared Bat (*Corynorhinus townsendii*)

Townsend's big-eared bat is a wide-ranging species that roosts in caves, mines, tunnel, and on cliffs and buildings. They forage for insects over riparian areas. They are a colonial species are likely to use a particular roost for many years. Declines are likely caused by roost site limitations, and disturbance at roosts (Pierson and Rainey, 1994).

AQUATIC SPECIES- FISH

As discussed throughout this document, historic changes have considerably altered the hydrology of the Santa Clara River Estuary. Nevertheless, a number of fish species continue to utilize the habitat to varying degrees and the species diversity is comparable to other modern-day Southern California river estuaries (USFWS, 1999a). The most recent and comprehensive surveys of biological resources within the estuary were conducted by the USFWS from October 1997 through July 1999 (USFWS, 1999a). While the results of this study may have been significantly influenced by the occurrence El Niño weather patterns during the 1997/1998 winter season, the report provides valuable information about fish species that can be expected to occur in the estuary. The USFWS captured a total of 14 fish species, five of which are primarily freshwater species and nine of which are considered to be euryhaline (capable of living in a wide range of water salinity levels). In addition to those species observed during the surveys, two anadromous (ocean migrating) species, southern steelhead (*Oncorhynchus mykiss*) and Pacific lamprey (*Lampetra tridentata*), are known to occur in the estuary during parts of the year. Fish species known to occur in the SCRE are listed in Table 3-3. Two of the species, the tidewater goby (*Eucyclogobius newberryi)* and the southern steelhead are federal endangered species, while the Santa Ana sucker (*Catostomus santaanae*) is a federal threatened species. The arroyo chub (*Gila orcutti*) is a state species of concern. These sensitive species are further discussed below.

TIDEWATER GOBY

The tidewater goby (*Eucyclogobius newberryi*) is listed federally as an endangered species and is a California Species of Special Concern. However, tidewater goby populations north of Orange County have been proposed for delisting by the U.S. Fish and Wildlife Service (USFWS, 1999b) because more recent data collected on the species suggests that the original listing rule overestimated the species' risk of extinction (USFWS, 2001). The delisting of the goby in northern and central California may take place prior to the implementation of the McGrath State Beach Management Plan. Nevertheless, the

management of the estuary for tidewater gobies should remain a priority as the restoration and maintenance of hydrologic conditions that are suitable for this predominantly estuarine species can be assumed to benefit the overall ecology of the SCRE. Moyle et al. (1995) suggest that tidewater goby's sensitivity to environmental change makes it a good indicator species of the health of small coastal lagoon

TABLE 3-3
FISH SPECIES KNOWN TO OCCUR WITHIN THE SANTA CLARA RIVER ESTUARY

Scientific Name	Common Name
Eucyclogobius newberryi	Tidewater goby
Acanthogobius flavimanus	Yellowfin goby [2]
Clevelandia ios	Arrow goby [1]
Gila orcutti	Arroyo chub
Gambusia affinis	Mosquitofish [1,2]
Pimephales promelas	Fathead minnow [1,2]
Fundulus parvipinnis	California killifish
Lepomis cyanellus	Green sunfish [1,2]
Atherinops affinis	Topsmelt
Mugil cephalus	Striped mullet
Cottus asper	Prickly sculpin
Leptocottus armatus	Staghorn sculpin
Catostomus santaanae	Santa Ana sucker [1]
Gasterosteus aculeatus microcephalus	Partly armored threespine stickleback
Lampetra tridentata	Pacific lamprey
Oncorhynchus mykiss	Southern steelhead

Notes: 1 = primarily freshwater; 2 = non-native
Source: USFWS (1999), ESA (2002).

ecosystems that are important to many other species. Of the four federal and/or state sensitive fish species known to occur in the SCRE, the tidewater goby is the only one restricted entirely to the estuary.

The tidewater goby is a benthic fish that inhabits shallow lagoons and the lower reaches of coastal streams. It differs from other species of gobies in California in that it is able to complete its entire life cycle in fresh to brackish water. This goby appears to be mainly an annual species, although individuals in the northern part of the range may live up to three years (Moyle et al., 1995).

Tidewater gobies typically inhabit areas of slow-moving water, avoiding strong wave actions or currents. Particularly important to the persistence of the species in lagoons is the presence of backwater, marshy habitats, as well as annual sandbar formation, to avoid being flushed out to the ocean during winter flood flows (J. Smith, pers. comm.). Marked decreases in the number of adult tidewater gobies have been observed during the winter season (Moyle et al., 1995), presumably due to this flushing effect. Interestingly enough, it is data collected during the USFWS (1999b) study of the SCRE that appears to provide the strongest indication of the effects of open-mouth estuaries on tidewater goby populations. The study found that the goby was most abundant during October 1997, August 1998, June 1999, and July 1999. The gobies were absent during the February 1999 surveys and scarce during March 1998, April 1998, July 1998, and April 1999 (USFWS, 1999b). Comparing these results to a daily log of flow measurements collected at the mouth of the river by the Ventura Water Reclamation Facility (VWRF, unpublished data) shows that the mouth was closed for at least one month prior to surveys dates on which gobies were abundant. Conversely, the mouth was open for at least a month prior to each of the surveys that yielded a low goby population abundance, even when the survey was conducted during the summer. While there appears to be sufficient evidence to suggest that tidewater gobies are often flushed from their habitat during high flow/open sandbar conditions throughout their range, it should also be noted that populations often recover very quickly (Lafferty et al., 1999a, 1999b). Although tidewater goby abundance in the SCRE fluctuated greatly during 1997–1999, the species was cumulatively the most abundant fish captured by seine sampling, representing 50% of the total catch (USFWS, 1999b).

Preferred water temperatures generally range from 8–23°C and water depths are usually less than 3 feet. Although tidewater gobies are typically found in brackish conditions (salinity of less than 10 ppt), they are capable of living in salt concentrations ranging from 0 to 50 ppt. Furthermore, the species generally occurs in water with relatively high levels of dissolved oxygen, but can also survive under anoxic condition that eliminate many other fish species (Moyle et al., 1995). Water quality measurements collected by the USFWS in the Santa Clara River Estuary generally revealed conditions that are usually suitable for the goby, although potentially stressful conditions do occur on occasion. Salinity measurements ranged from 0.6 to 32.8 ppt and dissolved oxygen levels ranged from 0.21 mg/l to over 20 mg/l. Water temperatures ranged from 13.9 to 29.0°C (USFWS, 1999b). It is interesting to note that the highest water temperatures (23.3 to 29.0°C) were measured in August 1998, a month during which gobies were determined to be abundant by USFWS.

Based on the information presented above, and in the absence of data on water pollutants potentially present in the estuary, it appears that hydrologic conditions, rather than general water quality conditions, are important in determining tidewater goby abundance within the SCRE. In addition to the risk of gobies being flushed out to the ocean during natural as well as artificial sandbar breaches, there may be additional adverse effects associated with the draining of the lagoon during summer and fall breaches (Lafferty, pers. comm.). Tidewater gobies spawn by burrowing in shallow sand flats. At high water, these habitats are broadly distributed around the periphery of the lagoon. After breaching, all or nearly all of these burrows, potentially with guarding males inside, are left dry. Furthermore, breaching causes the habitat to go from very large to very small in a short period of time. In the summer, when goby densities are very high, this can lead to concentrations of gobies that may run into food limitation, burrow site limitation and a concentration of predators.

Other potential threats to the tidewater goby population in the SCRE include the introduction of non-native species. Yellowfin gobies (*Acanthogobius flavimanus*) and African clawed frogs (*Xenopus laevis*), both of which are present in the estuary (USFWS, 1999b), are suspected of adversely affecting the tidewater goby (Lafferty et al., 1999a), presumably through competition and/or predation.

SOUTHERN STEELHEAD

The Southern California Evolutionarily Significant Unit (ESU) of steelhead (*Oncorhynchus mykiss*) is listed federally as an endangered species and is a California Species of Special Concern. The species is presently considered to be in danger of extinction (Busby et al., 1996). In 2000, the NMFS designated Critical Habitat for this ESU. The designation covers "all waterways, substrate, and adjacent riparian zones below longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years)," as well as some major dams (NMFS, 2000). Within the Santa Clara River drainage, critical habitat extends from the estuary upstream to Santa Felicia Dam (NMFS, 2000). A critical habitat designation affords protection to the habitat of a species, even if that species does not currently occur in the area. Unlike the tidewater goby, steelhead use the SCRE primarily as a migratory corridor to and from spawning grounds located in the upper watershed, although historically the estuary probably played a far greater role as rearing habitat for juvenile fish.

According to a history and status review of coastal California steelhead (Titus et al., in preparation), the Santa Clara River system once supported a popular winter steelhead sport fishery based on its apparently "large and consistent runs". The average annual run in the Santa Clara may have been on the order of about 9,000 adult steelhead (Busby et al., 1996). Steelhead migrated upstream through the lower Santa Clara River to reach spawning grounds in Santa Paula, Sespe, and Piru creeks, and perhaps in other tributaries and reaches of the upper Santa Clara itself (Titus et al., in preparation). However, the steelhead stock has declined precipitously since the mid- 1950's, primarily due to an increase in surface water diversion in the lower Santa Clara by the United Water Conservation District (Titus et al., in preparation). The steelhead decline in the Santa Clara River has also been attributed, in part, to altered flow patterns and blocked access to historic spawning grounds by upstream dams. Current steelhead abundance in the Santa Clara River is estimated at less than 100 (Busby et al., 1996) and the stock is considered to have a high risk of extinction (Titus et al., in preparation).

In the past, the unscreened United Water Conservation District diversion near Saticoy blocked upstream migration of adult steelhead, entrained emigrating smolts into percolation basins, or eliminated fish movements to and from the ocean altogether by dewatering the river channel during critical migration periods (Titus et al., in preparation). The current diversion structure, the Vern Freeman Diversion Dam, was equipped with a fish ladder and intake screens in 1989 to enhance fish passage (Titus et al., in preparation). The operation and design of the fish ladder are currently being reviewed by NMFS and bypass flow requirements for steelhead migrations will soon be established (Rogers, pers. comm.). Out-migrating steelhead smolts are currently trapped behind the dam and released in the Santa Clara River Estuary. However, NMFS is considering releasing the fish in the Ventura River instead because this estuary remains open and thus increases the likelihood of steelhead entering the ocean.

All southern steelhead populations are winter-run steelhead. In the Santa Clara River, adults enter the river from the ocean in late December through early April, with most of the spawning occurring in January through March (Moyle et al., 1995). In northern populations of steelhead, juveniles typically spend one to three years in freshwater and migrate out to the ocean primarily during late March through the end of May. Southern steelhead, however, are typically faced with lower year-round water availability and may therefore migrate to the ocean or have a greater dependence on coastal lagoons during their first year (Moyle et al., 1995).

The importance of estuary and lagoon systems as feeding and rearing grounds for steelhead has long been acknowledged (Moyle et al., 1995; Smith 1990). Smith (1990) found that lagoons in San Mateo and Santa Cruz counties were heavily used by juvenile steelhead for rearing, despite the predominance of shallow, warm-water conditions. Furthermore, most of the yearling steelhead captured in the Waddell Creek lagoon the late summer and early fall had grown big enough to enter the ocean by the end of the year, presumably due the abundance of food supplies found in lagoons (Smith, 1990). Scale samples collected from a limited number of adult steelhead collected on Pescadero Creek showed that at least 70% had reared in the lagoon rather than within the stream channel. Smith (1990) estimated that the entire 25 miles of accessible streams in the Pescadero Creek watershed produce fewer and smaller steelhead than the lagoon. The same study also analyzed the effects of sandbar formation and breaching on the aquatic habitat of the lagoon. Smith (1990) concluded that juvenile steelhead survival and growth was excellent when the lagoons were open to full tidal mixing and when the closed lagoons were entirely converted to freshwater. Growth was poor during the long, stratified transition periods between sandbar closure and conversion to freshwater (Smith, 1990).

As mentioned above, it has been surmised that steelhead in Southern California rely heavily on estuaries as rearing habitat because many of their streams seasonally had very low flows or dried completely in the alluvial fan areas of the watersheds (Moyle et al., 1995). The research described above suggests that the artificial breaches that occur in the SCRE during the summer and fall may create sub-optimal juvenile steelhead habitat due to the inherent increase in the total amount of days in a year that the lagoon undergoes the transition from tidal to freshwater habitat. While this opinion appears to be in direct conflict with NMFS's consideration of releasing smolts captured at the diversion dam in an estuary that remains open for longer than the SCRE, the two views merely highlight the extent to which hydrologic conditions in this estuary have been altered. Although the amount of freshwater effluent entering the lagoon during the summer and fall may be too large for the physical and ecological capacity of the SCRE, it is nevertheless too small to keep the mouth of the lagoon open for long enough during the spring steelhead smolt migration in the absence of significant streamflows diverted upstream at the Vern Freeman Dam. The conflicting hydrologic conditions currently influencing the SCRE, as well as the generally poor understanding of southern steelhead life history, present significant challenges with respect the management of the SCRE for steelhead. NMFS is planning on conducting extensive research and monitoring studies on the Santa Clara River over the next five years (Rogers, pers. comm). This work should also include detailed evaluations of the rearing conditions of the SCRE and should include an extensive study of the hydrologic conditions within the watershed and the estuary. Moyle et al. (1995) summarize the following management challenges for southern steelhead:

- "The artificial breaching of lagoons, such as Santa Clara lagoon, may pose a problem if large numbers of steelhead use lagoons as rearing habitat."

- "Return water from sewage treatment plants may provide an important means by which to recharge streams and groundwater. The effective allocation of recycled water could be instrumental in maintaining and rebuilding steelhead runs."

- "Further studies are needed to determine the importance of Southern California estuaries as steelhead rearing habitat, and if appropriate, management measures for maintaining and enhancing estuarine habitat will need to be clearly defined."

The SCRE appears to be highly suitable to serve as a case study on southern steelhead management.

SANTA ANA SUCKER

The Santa Ana sucker (*Catostomus santaanae*) is a federal threatened species and a California Species of Special Concern. The Santa Ana sucker is native to the Los Angeles, San Gabriel and Santa Ana River drainages and is believed to have been introduced in the Santa Clara watershed, where they are known to hybridize with the Owens sucker (*Catostomus fumeiventris*) (Moyle et al., 1995). The species inhabits clear, cool rocky pools and runs of creeks and small to medium rivers. Over the duration of its 2-year study of the SCRE, the USWFS found a total of only three individuals (USFWS, 1999a). The sucker's freshwater habitat requirements and its scarcity in the estuary suggest that the captured individuals were either flushed into the estuary or temporarily ventured into the habitat during low salinity periods. Either way, estuaries are not known to provide important habitat for the Santa Ana sucker, and the SCRE should not be managed for this species.

ARROYO CHUB

The arroyo chub (*Gila orcutti*) is a California species of Special Concern. As is the case with the Santa Ana sucker, the arroyo chub is also believed to have been introduced into the Santa Clara River drainage, were they appear to be more abundant than in their native drainages (Moyle et al., 1995). The species inhabits slow moving or backwater sections of warm to cool streams with mud or sand substrates and can often be found in intermittent streams. The arroyo chub was the most abundant species collected by means of minnow trap sampling in the SCRE in 1997–1999, but was only present when salinity levels were low (USFWS, 1999a). This suggests that, while the species is primarily a freshwater fish, it is fairly well adapted to the current hydrologic conditions in estuary and is capable of utilizing this habitat whenever it becomes available.

3.4 UNIQUE FEATURES

ECOSYSTEM STRUCTURE AND FUNCTION

All of the previous sections have explicitly identified physical and biological features and ecological processes that occur in McGrath State Beach and the surrounding watershed. While many of those features may individually occur elsewhere it is the dynamic interaction and coalescence of the physical infrastructure and overlapping natural resources that make McGrath State Beach unique. The physical and biological resources at McGrath State Beach contribute to a unique mix of structural ecosystem components. Water is, however, the clear overarching ecosystem component that plays an important

functional role. The surface and groundwater hydrology influence essentially every ecosystem in McGrath State Beach.

All of McGrath State Beach is unique because it includes the intersection of nine ecosystems including river, estuary, ocean, beach, dunes, coastal scrub, freshwater marsh, saltmarsh, and riparian habitat. Except for a local diversion dam, the Santa Clara River is the longest free-flowing river in Southern California and many of its source tributaries are also free flowing. The river, estuary, McGrath Lake and associated riparian woodland are the reasons the park is used by a great diversity of birds (at least 190 species may be observed from the park at some time during the year). McGrath Lake is unique in the park and recognized as a unique wetland feature of Ventura County (Ventura County General Plan, 1988). The lake is the only back dune lake south of San Luis Obispo and it is the only lake of its kind in California in close proximity to a river and estuary.

The unique value of McGrath State Beach partly stems from the range of mostly hiqh-quality plant communities and habitats that provide conditions for a very diverse group of plant and wildlife species. For many terrestrial wildlife species, McGrath State Beach is one of the few viable locations in Southern California for nesting or as a stop over during their annual migration. Similarly, the Santa Clara River, which is the largest undammed river in Southern California, is significant for fish. The diversity of physical conditions and natural resources provides a unique resource for the state and the region. Due to this complexity, it is also a challenge for DPR to protect and enhance resources while trying to meet a mission that includes recreational use. The hydrological infrastructure that includes the watershed and local surface and groundwater processes has largely set the conditions that have created this diversity and complexity that make McGrath State Beach unique. Therefore, it should be anticipated that these natural conditions must be understood and incorporated into management efforts.

3.5 LAND USE

Changes in land use take on many forms, each of which may center on a particular human impact on the environment. The forces that govern this process can emanate from a variety of sources, but the prime movers for land use change come from either the human environment, such as food or commodities, or from the natural environment, such as floods and climatic change. While both of these processes tend to exert their effects to the physical environment at different time scales and duration, each carry the potential to make lasting changes to the biogeochemical processes in the region. The decision-makers involved, from antiquity to modern day, have taken their knowledge of the environmental system and the productive strategies available, to generate and actualize changes to land use that meet both demands economically, but are also socially appropriate. As this process continues, the consequences of change lead to further human responses, from a variety of inputs, to expand the level of change, intensify it, or abandon the initial decision altogether.

Based on this framework, then, the following sections will focus on the land use changes that have taken place in Ventura County, namely along the Santa Clara River and McGrath State Beach. The following sections will address the historical changes that have taken place in the region from two perspectives. First, by looking at natural “pulses” in the environment, such as floods and periodic climatic changes, and the human responses to those changes, a better picture of the environmental conditions of the land use system can be made. And secondly, the role of human agency in shaping the ecosystem of the Santa

Clara River and the ramifications of cumulative change on the riverine system, and McGrath State Beach in particular, will be described as well. In order to achieve this, remote sensing and GIS will be used to demonstrate the historical changes in settlement and intensity of use over the past century on a regional-to- local-scale level of analysis. Aerial photos are especially useful to achieve this end, and can show dramatically the change and dynamism that coastal landforms exhibit over time.

McGRATH STATE BEACH AND THE PREHISTORIC ERA

PREHISTORIC LAND USE PATTERNS

Human impacts and modifications to the Oxnard Plain and the region surrounding the Santa Clara River is not a recent phenomenon. The Ventureno Chumash were the dominant group occupying the majority of the Santa Barbara Channel region, which extended from the mouth of the Santa Clara River in Ventura County to the Santa Maria River at the border of Santa Barbara and San Luis Obispo Counties. The physical terrain is a low, flat plain extending from the coastline to the Santa Ynez Mountains, which reach over 4,000 feet in elevation just a few miles from the coast. During the 9,000 years prior to European contact, an estimated 15,000 Chumash people inhabited the Santa Barbara Channel coastline and offshore islands. Given this lengthy period of occupation and the size of the human population, the Chumash were undoubtedly an influential component of the ecosystem – particularly with regard to settlement dynamics and resource exploitation.

Multiple factors have shaped the cultural complexity and population levels of these early inhabitants since the early Holocene (starting around 10,000 years ago). Many scholars posit that these changes were influenced greatly by climate change or fluctuations in resource availability (Kennett and Kennett, 2000). Nevertheless, throughout the prehistoric period, the Chumash were able to achieve a high level of social complexity without adopting agriculture. This existence without agriculture has been attributed to the extremely favorable environmental conditions of the Santa Barbara Channel region and the dietary-breadth that the land and sea provided (Bean and Lawton, 1976; Fagan, 1995).

Accessibility to resources is one of the dominant factors influencing settlement patterns on a landscape. But, in light of the bountiful resources surrounding the Chumash, very few areas within the Santa Barbara Channel region were not inhabited or used in some way. Although many of the sites were located along the coastline, many of the villages were along major riverine environments, including along the courses of the Ventura River and the Santa Clara River and its tributaries. Moreover, many fish processing sites existed on the Channel Islands, some with duration of usage that exceeded 8,000 years (Rick et al., 2001). In all cases, however, the Chumash villages that existed until contact with Europeans were predominately focused on maritime and estuarine resource exploitation, which remained a stable economic strategy throughout the Holocene. Although the intensification of resource use continually increased as populations grew in the area and as fishing technology evolved, the sedentary, maritime focus of the economy was maintained without the adoption of agriculture (Raab et al., 1995).

PREHISTORIC LAND USE AND THE SANTA CLARA RIVER MOUTH

As mentioned above, the Chumash maintained an economy focused on marine resources; therefore, areas that harbored such resources would have been attractive settlement locales during the prehistoric period. The Santa Clara River Mouth and the present day McGrath State Beach would have been a biologically diverse and bountiful estuary for the indigenous groups living in the area during the Holocene (~10,000 B.C. to the present). Major environmental changes to the Southern California region throughout this time period would have wrought significant changes to the landform and the beach morphology, rendering disparate opportunities for safe and permanent settlement than exist today. As western glaciers receded during the early Holocene, sea levels rose, flooding estuaries and coastal plains along the west coast (Fagan, 1995). Because fresh water floats on heavier salt water, an influx of seawater would raise the groundwater and thereby change coastlines into freshwater swamps on the outskirts of brackish estuaries. The prevailing estuarine conditions would have forced settlements to the south of present day McGrath State Beach toward Mandalay Beach, as well as upland areas along the Santa Clara River (Horne and Craig, 1979a; Rozaire, 1955).

As the middle Holocene emerged (6,500 to 2,000 B.C.) climate changed toward a drier, hotter environment, which caused water supplies to dry up and sea levels to drop. This phenomenon caused greater dominance of fresh water on the river mouth and the gradual development of sand closing off the open water lagoon that likely prevailed during the early Holocene. With this change, wetlands developed around the old lagoon boundaries, creating a rich, biologically productive wetland.

The Late Holocene (2,000 B.C. to the present) represented, in contrast to the early to middle Holocene, a climatically stable period, although punctuated by shorter episodes of colder and wetter periods (Fagan, 1995). However, it is probable that the fluvial influence continued to have a greater impact to the wetlands and river mouth context, bringing greater amounts of sediment, thereby shrinking the extent of the wetlands and estuary. As the historic period began by the late 18th century, the inexorable human influence on the landscape became one of the dominant forces on landscape change after a relatively benign and extremely long period of human settlement in the area.

Indeed, the Chumash were faced with a constantly changing and transitional environment, and their settlement patterns reflected that change. However, the high water table and the periodic inundation of the coastal plain probably overwhelmed archaeological sites that may have existed on the edges and uplands from the old coast, obscuring our knowledge of these earlier settlements and how the people lived in and around McGrath State Beach. Further discussion of the ethnographic and archaeological research in the region can be found in the Cultural Resources chapter. The following section will address the historic land use changes that took place in the region and how they affected the coastal zones.

THE HISTORIC PERIOD

THE SPANISH AND MEXICAN PHASES

As of the middle 16th century, sporadic exploration of California began by Spanish, British, and Russian explorers, which, in turn, initiated the progressive development of immigrant cultures into native California. However, this first phase of exploration did not necessarily result in permanent settlement,

but was, in fact, subject to the vagaries of European politics and, in the case of the Spaniards, the progress of Mexican colonial administration. These incipient expeditions, such as those by Gaspar de Portola in 1769–70 and Juan Bautista de Anza in 1775–76, led up to the establishment of the Mission of San Buenaventura in 1782. The founding of the mission marked a clear beginning of the historic period and the decline of the native populations in the process of missionization. It was with the founding of the Mission that the first cultivation of the land took place and precipitated the agricultural significance of the region.

Despite the proximity to the original Ventura Mission, modern McGrath State Beach and its surrounding landscape fell just outside of the Mission boundaries. Consequently, the region of McGrath was not a major part of the first fifty years of colonization in Ventura County – although any local Chumash were undoubtedly affected by the events taking place around them. By 1822, the Mexican government gained control of California and began to wield more power over the affairs of California and its use economically, which led to a greater degree of secularization of the missions and ranchos. To this end, in 1837, Governor Juan B. Alvarado awarded the Rancho el Rio de Santa Clara o La Colonia to eight soldiers, consisting of 44,883 total acres, which subsumed present-day McGrath State Beach. Subsequently, a smaller rancho, Rancho San Miguel, was sold to Raimundo Olivas and Felipe Lorenzana. The land of this Rancho was situated north of the Santa Clara River with the river itself marking its southern boundary.

Although the original Rancho Santa Clara was awarded to eight men, the only part owner that maintained active pastureland for cattle grazing was named Rafael Gonzalez. As the American Period began around 1848, many of the original land grants were converted to U.S. Land Commission control; however, many of the placenames have been preserved, such as El Rio, an unincorporated residential community north of the Ventura Freeway. It was in the location of present-day El Rio that the Gonzales family adobe was located and, consequently, where much of the ranching activities were situated. In addition, the original name for the city of Oxnard, La Colonia, still remains as an Hispanic borough within the city.

Another Rancho of the Spanish-Mexican era pertinent to the Santa Clara River mouth was Rancho San Pedro, a small parcel that was later incorporated into the Rancho Santa Clara. A map of this rancho from 1852 depicts the boundaries very close to the mouth of the river. The map depicts a dense strip of riparian vegetation along the bank of the river, along with two freshwater lakes, “lagunas aqua dulce,” which are located near the sand dune border with the ocean and adjacent to the banks of the river mouth. The area around the river mouth was mapped again fifteen years later as part of the Rancho Santa Clara. According to Cota (1867, as cited in Swartsberg and Moore 1995), the mouth of the river was estimated to be fifteen to twenty chains (330 to 440 yards) wide, the sand dunes were measured at 100 to 500 yards, and the “swampy land full of sloughs and lagunas extending along the whole front of the rancho” was measured at one-half to three-quarters of a mile long.

CATTLE GRAZING AND THE RANCHOS

Ranchos are, by definition, devoted to livestock raising, and the Rancho Santa Clara was no exception. The action of grazing along the river did have an impact on the river and the riparian habitats along its banks (Faber, 1989). Principally, this impact is related to the grazing-caused reduction in groundcover

and the erosion that results from the lack of vegetation. This, in turn, results in sedimentation of the river which, coupled with animal waste, undermines the water quality as a whole. Intensive cattle grazing along the Santa Clara River continued up to the mid-1860s, when a wholesale shift toward raising sheep occurred after a prolonged drought caused heavy losses to the cattle industry. As with many of the changes that have taken place along the river, this switch to sheep grazing also affected the river. This was largely due to the disparate grazing patterns that sheep exhibit that cause more damage as they graze; that is, they tread out the native grasses from the root, and, in so doing, precipitate desertification.

THE ANGLO-EUROPEAN-AMERICAN STAGE AND EMERGENT COMMERCIAL AGRICULTURE

As mentioned above, the center of land use for the region during this early period was in the area of El Rio, which was enough distance away to suggest that the coastal area and fringe was likely of peripheral importance—at least during the Gonzalez's tenure. The land tenure was changing, however. By the early 1860s many non-Hispanics began purchasing rancho lands for the first time. An easterner named Thomas A. Scott purchased many of the rancho lands through a local agent, Thomas A. Bard. When Scott's plans to encourage the Southern Pacific Railroad to build its terminus on the property failed, he sold the land to Bard in 1869. By this time, however, squatters had assumed that the land was public and available for the taking, and had already occupied portions of the land. After a protracted dispute over the land rights between Bard and the squatters, the courts decided in Bard's favor, with the condition that the squatters be given the opportunity to purchase the lands they occupied. This resulted in the settlement and eventual incorporation of the Town of Hueneme. The underpinnings of these land tenure issues, was, by and large, the evident agricultural potential of the Oxnard Plain, which became the dominant land use in subsequent decades.

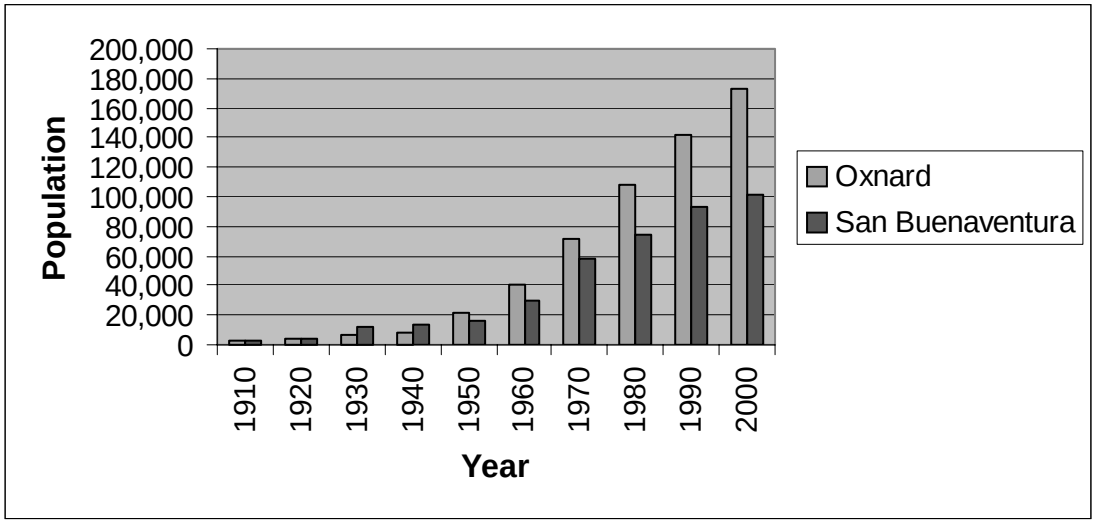
The impetus for land use change that took place by 1870 from grazing to intensive agriculture was likely due to the development of new strategies to exploit the agricultural potential of the Oxnard flood plain, and the increasing economic importance of agriculture to the growing population of California. The discovery of two major aquifers, the Oxnard and the Fox Canyon Aquifers, contributed greatly to the development of artesian wells in order to exploit this resource. The Fox Canyon Aquifer underlies most of the coastal plain, making it the most widely distributed of the local aquifers. With the increasing irrigation capabilities, the existing cultivation potential of the alluvial soils in the coastal plain led, almost inevitably, to the agricultural focus of land use in the region. As a result, many of the new settlers to the region were principally farmers, such as Dominick McGrath, who purchased 1337 acres of the original land grant in 1875 (Bodie, 1977). In addition, the Oxnard brothers' success in the sugar beet industry in Chino led to the construction of the American Sugar Beet Factory in La Colonia. The local farming industry quickly reoriented to focus on the sugar beet industry, which created unprecedented economic growth for "La Colonia." This led, in turn, to the establishment of the City of Oxnard on the La Colonia center.

With the success of the beet industry, commercial agriculture began in earnest, supplanting livestock raising as the predominant land use. By 1875, intensive agriculture began with the introduction of lima beans, which slowly surpassed grain as the top cultigen in the region. By the late nineteenth century, the

agricultural potential of the Oxnard Plain became more evident, with its high water table and dissolved salts, and more crops were rotated in with limas, including sugar beets, barley, and citrus (Gregor, 1953).

The experimentation with citrus became a harbinger for change along the Santa Clara River, especially with respect to irrigation and the need to divert water from the river itself, which was not as necessary with the dry-land farming that had taken place up to that point. Although an expensive and risky business, farmers began replacing walnut groves with citrus when the first substantial diversion of the river took place by the turn of the century (Blanchard, 1983; Freeman, 1968; Teague, 1944). By the turn of the century, the region became one of the most important agricultural regions in California. The extent of the agricultural influence on the Oxnard plain has been rising dramatically ever since, and, with it, unprecedented population growth.

TABLE 3-4
POPULATION GROWTH FOR OXNARD AND VENTURA, 1910–2000



Source: California Department of Finance, 2000.

As seen in **Table 3-4**, the rapid and significant increases in population have increased the needs for urbanization, which has especially affected the upper Santa Clara Region. Many of the use changes have taken the form of bridge construction, flood control development, and landfills, as well as a residential boom that has taken place since the 1920s. Related to the valley's urban development has been the increasing industrial use of the river for sand and gravel mining, which went into the building of roads and general infrastructure.

Local agriculture in the lower river region, including the area surrounding the river mouth, has seen a shift toward smaller farms during the 20th century. With the increasing population to Oxnard, farm area has decreased in some locations, which has led to a shift toward higher priced crops that require more intensive irrigation. According to Gregor (1953), over 62 percent of the grain, row, or tree crop farms in the lowland area were less than 100 acres. As depicted in Appendix F, this shift is shown in the increasing urbanization of Oxnard and the decreasing size in agricultural acreage since 1984.

THE INDUSTRIAL ERA (1920–PRESENT)

As urbanization and economic growth continued to increase, the demands on the river and the land around it also grew. Agriculture in the region became agribusiness. Population growth in Ventura County expanded during this period exponentially, and, as a result, urban development has followed suit with residential and industrial development further encroaching on the floodplain. Changes in land use in the immediate vicinity of McGrath State Beach is evident from the historical aerial photos taken in 1929, 1959, 1967, 1970, 1977 and 1997 (Appendix A).

FLUVIAL PROCESSES AND LAND USE

As mentioned above, many of the transitional changes that occurred in prehistoric land use were influenced by ecological cycles and their impact to the landform of the coastal plain. Similar processes have affected historical land use change and decision making for the region, especially the meandering and flooding of the Santa Clara River. In order to gain a distant perspective on the coastal landform during catastrophic changes to the river and the surrounding areas, aerial photography becomes a powerful tool to assess how dramatically land use has changed in the past 50 years. Appendix A includes a series of aerial photos from 1929 until 1987 that depict significant changes in McGrath State Beach, the Santa Clara River and the surrounding landscape.

The earliest aerial photography, taken in 1929, especially along the lower river region, demonstrates the scarring from former river levels and changes in river morphology, creating a braiding effect on the banks of the river (see Appendix A). Periodic flooding of the river and this natural braiding effect tended to delimit the extent of agriculture along the banks of the river only until recently with the addition of a series of levees to prevent flood damage.

In 1928, the Saint Francis dam, a Los Angeles aqueduct reservoir project, gave way, inundating the river valley and creating a massive loss of human life and structural damage in its wake. This dam disaster caused significant changes to the topography of farmlands near the river banks, and was the impetus for much of the flood control assistance that the federal government began to supply to the region.

The effect of flooding to the river valley and adjacent land use is most evident in the aerial photographs, Appendix A, for the floods of 1969. The damage to the river bed created by this flood was exacerbated by the gravel mining that had been going on upriver. The river mouth was also affected, as it turned northwest and flooded the Ventura Marina.

3.6 RECREATION

Recreation at McGrath State Beach is very diverse and includes camping, surfing, hiking, bird watching, nature observation, swimming, sunbathing, and visitor equipped sports such as volleyball and Frisbee (California Department of Parks and Recreation, 1979). Visitor statistics indicate that recreational use at McGrath State Beach has been very high over the past 15 years. Visitor numbers have ranged from about 102,000 per year to nearly 340,000 per year (Appendix I). Camping facilities include 174 campsites and two group campgrounds. Limited day use parking is available on a dead end paved road north of the kiosk (Figure 9). These recreational facilities were planned and developed soon after the park was

established. Despite recommendations to increase camping and day use facilities in the General Plan (1979), there has not been an increase. Access to the beach and the Natural Preserve, and other areas of the park are mostly on dirt or sand paths or roads used by park staff vehicles. A boardwalk extends north through the riparian section of the nature preserve. Most of the existing trails to the beach that extend through the dunes are informal. One dune trail is used by park staff and life guards to patrol the beach. Paved roads provide access to individual campsites and a small day use area. Other facilities include three centralized toilet and shower buildings, a small visitor center, and a visitor area for "campfire" talks presented by the park staff. An on-site park staff residence area is located on the northeast side of the park (Figure 9).

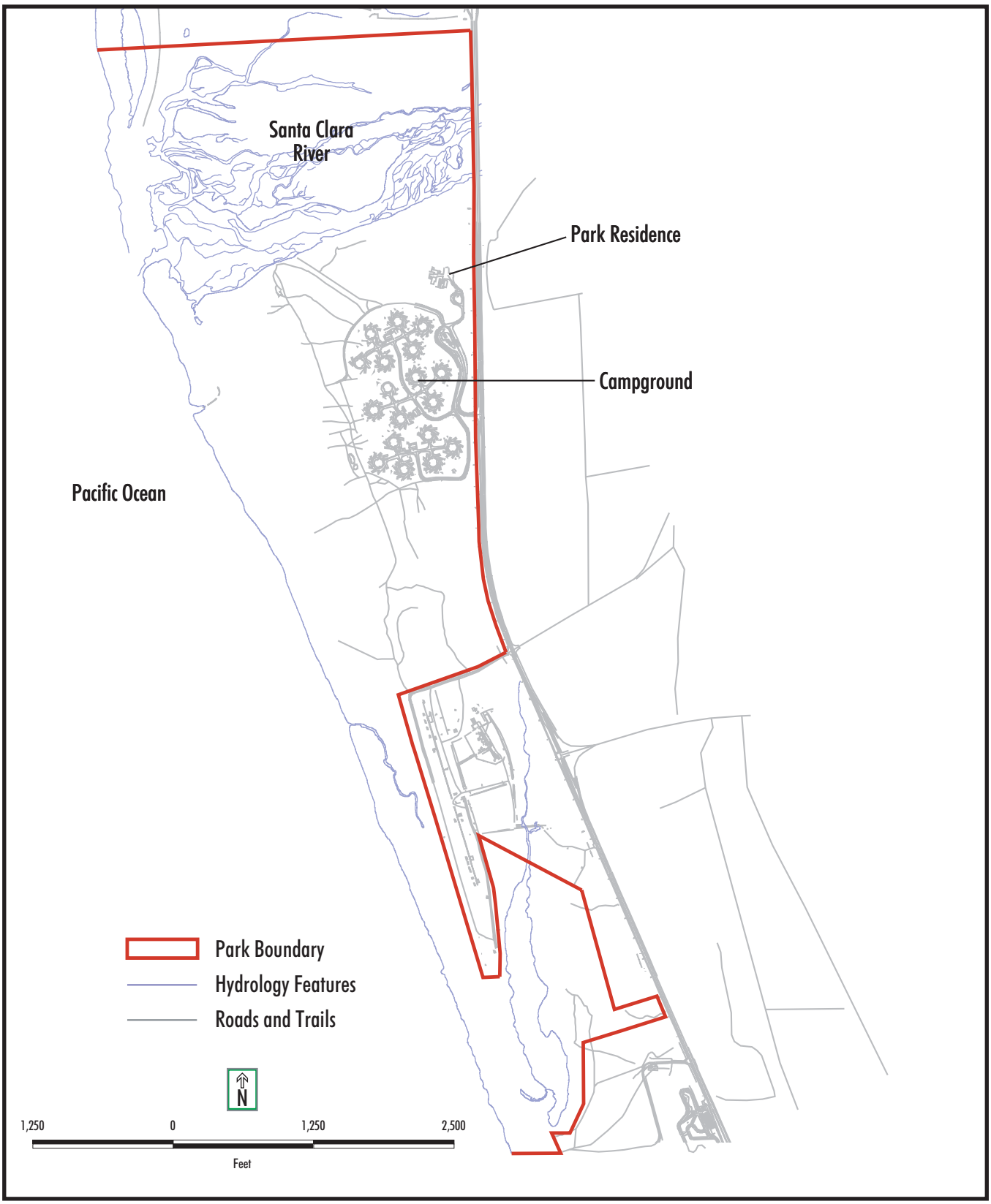
It was acknowledged that increased camping and day use facilities would be fully utilized by visitors at the time of the General Plan (1979). Other recreation destinations in the area include Mandalay State Beach just south of McGrath State Beach, Ventura Harbor and associated marinas, and San Buenaventura State Beach to the north. Further north is Emma Wood State Beach on the Ventura River. McGrath State Beach can be considered a preferable site to visit due to the better camping facilities, diversity of habitats, and protection from the beach winds, and a greater diversity of recreational opportunities. Visitors to McGrath State Beach often travel from the Los Angeles basin cities such as Glendale for weekend camping (K.Dolinar pers. comm. 2002). Increased recreational pressures will occur as increased development in the cities of Ventura and Oxnard occurs in close proximity to McGrath State Beach.

Use of the recreational facilities is highly seasonal with warm spring, summer, and fall weather causing a significant increase in visitors. In addition to limitations in camping sites and day use parking, seasonal high water levels in the groundwater and Santa Clara River Estuary have closed sections of the campground due to flooding. This flooding can occur during peak use periods such as in July. The dynamics of this flooding are described in the surface and groundwater hydrology sections of this document. Area 3 of the campground occurs at the lowest elevation and groundwater seeps into these low-lying areas as the water elevations increase (Figure 10), causing closure of this section. In more extreme conditions the flooding can extend into other parts of the park and campground causing complete park closure (see Figure 4).

3.7 CULTURAL RESOURCES

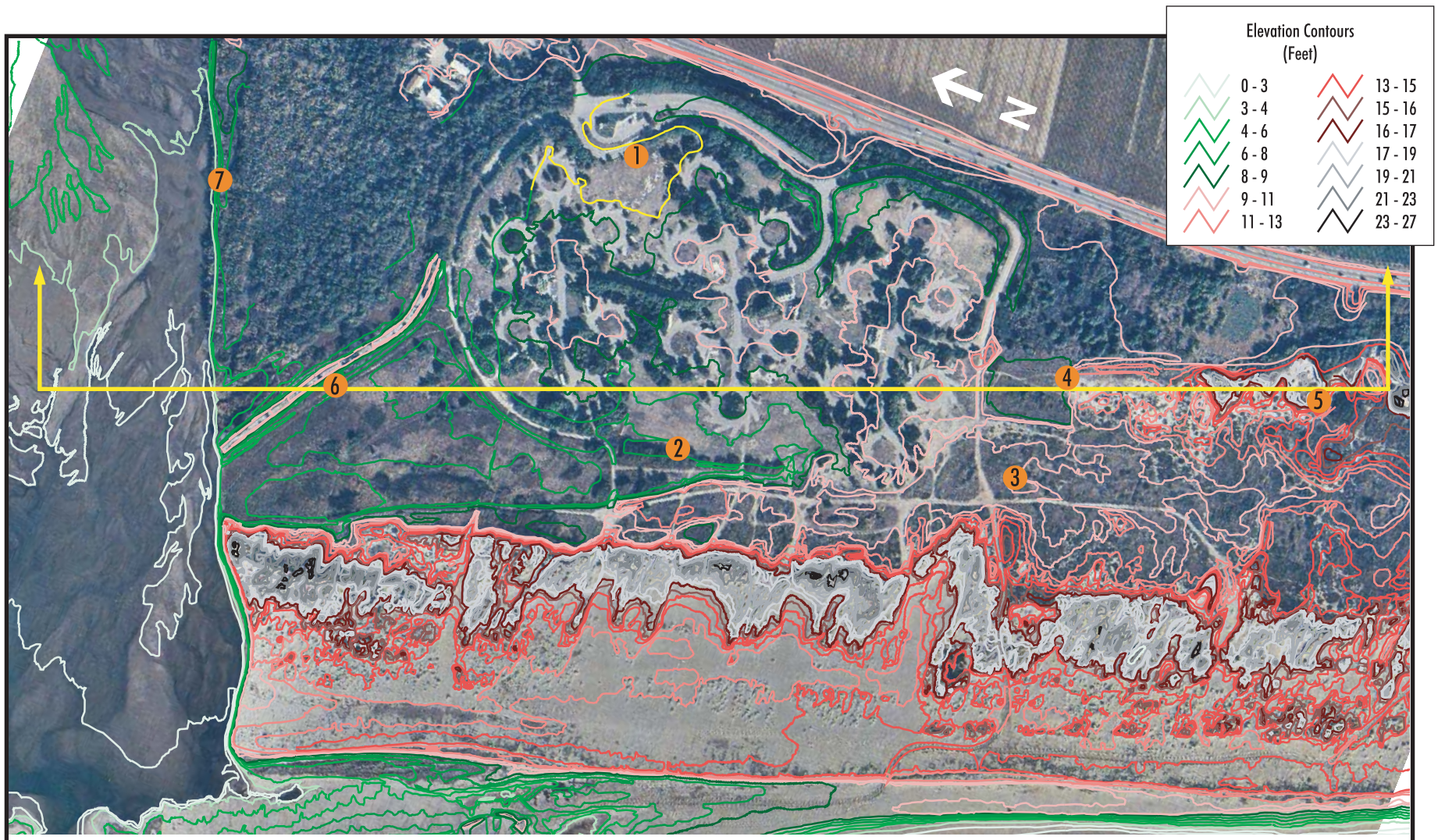
REGIONAL CULTURAL RESOURCES

The coastal region of the Santa Barbara Channel and the vicinity of the Santa Clara River mouth has a long and diverse history of occupation and represents a singular archaeological record that has contributed greatly to our understanding of prehistoric lifeways in coastal environments. The Santa Barbara Channel region contains a rich variety of landscapes, from coastal littoral to mountain zones separated by piedmont and terrace lands. In addition, the Santa Barbara region receives enough rainfall to sustain an abundant biotic community. The coastal landscape throughout the Southern California coast, especially during the Holocene (or the last 10,000 years), featured lagoons, large estuaries, and bays harboring a rich community of life, such as mollusk, fish, and waterfowl. As a result, the regions' native peoples, the Chumash, were able to sustain one of the most complex hunter-gatherer cultures on earth.

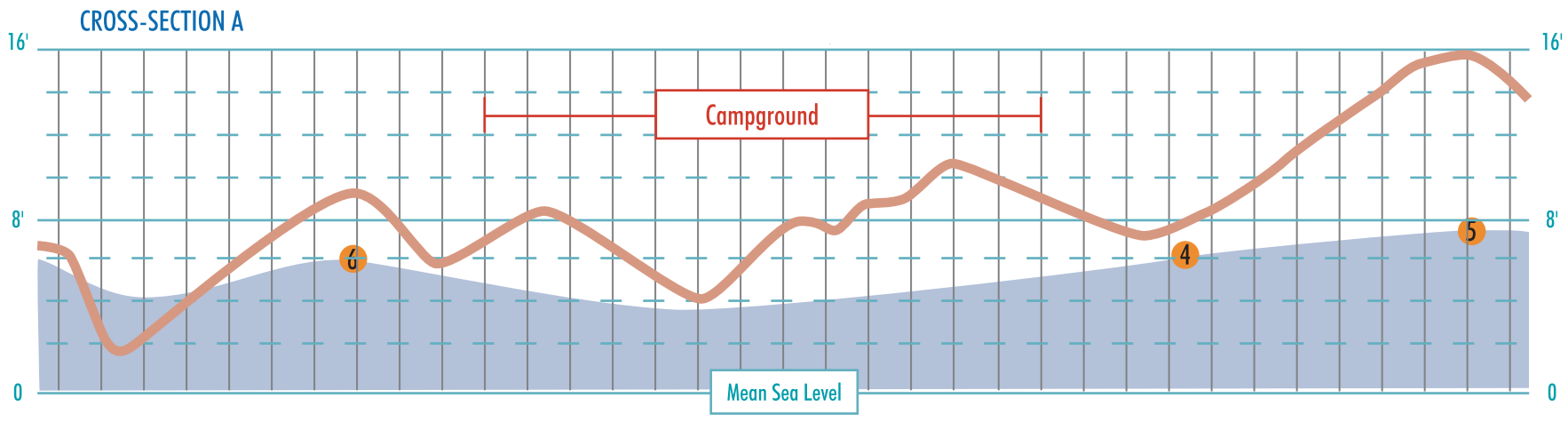


SOURCE: California Department of Parks and Recreation, 2001; and Environmental Science Associates, 2002

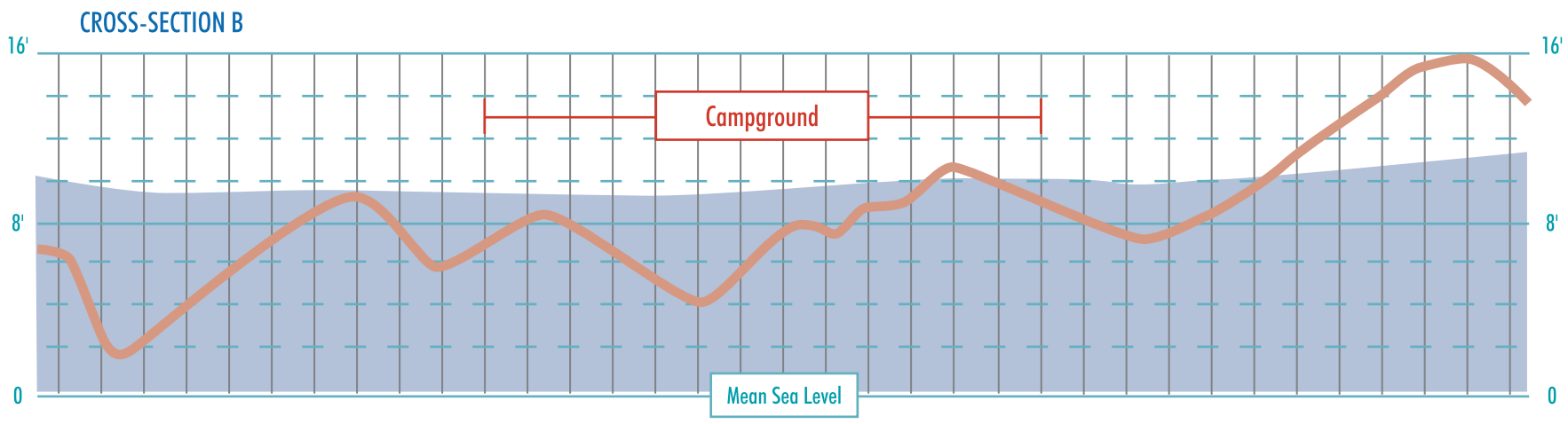
Figure 9
McGrath State Beach Facilities



VIEW FROM OCEAN



OBSERVED WATER LEVEL - FEBRUARY 20, 2002



ELEVATED GROUNDWATER CONDITION
DURING PEAK WINTER AND SUMMER
WHEN SAND BAR NOT BREACHED

5 Soil Pits — Water Level — Ground Surface

Aerial photograph of section of McGrath State Beach campground area and Santa Clara River with elevation contours. Cross-Section A shows breached sandbar conditions. Cross-Section B shows unbreached sandbar with high water.

SOURCE: Environmental Science Associates, 2002.

Figure 10
Surface and Groundwater Model of River Sandbar Breached and Unbreached

The Ventureno Chumash, who spoke a language of the Hokan stock, occupied the area from Topanga Canyon northwest to San Luis Obispo. The Chumash followed a diverse subsistence pattern, with a reliance on fishing, but hunting and gathering augmented their resource breadth. It is plausible that the abundant sea resources throughout the Chumash coastal occupation were crucial to their overall success in the region. Moreover, their wide diet breadth allowed them to exploit a variety of environments, including long term habitation on the Channel Islands. Indeed, the Chumash achieved a high degree of social complexity, including at least two major cheifdoms, and population size without the need for agriculture.

In light of this long-term occupation and land use in the vicinity of McGrath State Beach, the following section will address the prominent cultural sequences and traditions that mark the Santa Barbara Channel region and, especially, those that were connected to the Santa Clara river mouth and estuary. By illustrating the extent of native uses of the river mouth and McGrath State Beach, a plan that emphasizes cultural awareness and sensitivity in future management decisions can be achieved.

THE PALEO-INDIAN PERIOD

Although much debate surrounds the pioneering cultures along the California Coast and the dates of the earliest occupation of the coastal zones, a few discoveries scattered throughout the state have revealed some glimpses into these early peoples' behavior. For the Santa Barbara Channel region, the earliest evidence comes from San Miguel Island, the western most island of the northern Channel Islands. The most recent work done at Daisy Cave, San Miguel Island indicates that early inhabitants of the islands fished intensively over long periods of time, beginning around 11,500 B.P. (Rick et al., 2001). This new evidence suggests that these early fishing occupation sites represented a much more eclectic diet and technology than mainland cultures during the early Holocene. Much of the mainland evidence from this period indicates that the technological base was made up of relatively crude stone tools, like projectile points, which was highly suited for nomadic hunters who were unable to carry large numbers of tools (Chartkoff & Chartkoff, 1984). The Daisy Cave site also emphasizes the importance of marine resources to the early peoples of the Santa Barbara Channel and portends its continued importance throughout the human occupation of the coastline.

ARCHAIC PERIOD

The first recognizable cultural tradition along the Southern California Coast began with the San Dieguito people by around 10,000 years ago (Warren, 1967). While localized mainly in the San Diego region, many of the traits of the San Dieguito culture parallels that of the contemporaneous Santa Barbara cultures, especially as Millingstone period, or Encinitas Tradition, (8,000 to 3,000 years ago) artifacts started to become prevalent in the archaeological record (Wallace, 1955). These early findings reflected a people whose economy was reliant on hard-shelled seed processing, given the preponderance of millingstones and scraper planes in these early sites. Others have suggested that two distinct cultures, the Oak Grove and Hunting societies, coexisted along the Santa Barbara coastline, especially by around 4,000 years ago (Harrison, 1964; Harrison and Harrison, 1966). The Oak Grove peoples were more attuned to inland resources, such as seeds and vegetal foods, whereas the Hunting peoples exploited the sea.

As was alluded to above, more recent evidence suggests that the populations along the coastline maintained a wide diet breadth, but with a focus on maritime resources, before 7,000 B.P. Erlandson and Colton, 1991). This further suggests that these early inhabitants were not specialized in a particular strategy, like game hunting or seed gathering, but rather maintained a diffuse economy to buffer climatic and environmental changes, and maintained focus on relatively stable maritime resources. As a whole, then, the adaptations to seashore and insular environments appear to be an ancient tradition in the Santa Barbara Channel.

PACIFIC PERIOD

With the period beginning around 4,000 years ago, a general trend throughout California toward increasing adaptations to particular environments and the resources available became more entrenched. The Campbell Tradition marked this intermediate stage, or Middle Period, which were located along shorelines and littoral zones, yet maintained a wide diet breadth. The artifactual record shows increasing numbers of shell beads and maritime tools, such as nets and hooks, as well as mortar and pestle and larger numbers of projectile points to exploit inland resources (Harrison & Harrison, 1966). In addition, the favorable environmental conditions yielded a highly productive biological community, and, consequently, human populations began to grow in the region.

As the Late Period, or Chumash Tradition, began at A.D. 1,000, increasing populations and the dominance of maritime economic strategies led to a burgeoning social complexity, which manifested in the occurrence of *Olivella* beads (Olive snail shells) and clam disk beads. The preponderance of beads suggests that ornamentation and trade became more important indicating social stratification and resource competition. The mortuary and burial practices demonstrated particular grave disposition and accompaniments that reflect status; that is, burials oriented toward the west contained greater quantities of beads than those in the east. Further, beads functioned as a form of money for exchange or as storable wealth. This implies that acquisition of beads and their use in exchange was a means of buffering periods of resource shortfall and environmental stress by trading with coastal groups. Indeed, the period from A.D. 450–1300 was marked by cool and variable marine conditions often associated with increased productivity, while inland drought became the norm. This new data indicates that new competitive and cooperative behavior may have been the result of the climatic variability, especially with the advent of the bow and arrow by A.D. 500–800 (Lambert, 1994). Decreasing settlement mobility, intensified fishing, along with the development of exchange networks, were all responses to environmental instability and social competition for resources.

HISTORICAL PERIOD

The historical period effectively began with the passing of Gaspar de Portola in 1770 that led to a number of succeeding expeditions. These early explorations precipitated the establishment of the Mission of San Buenaventura in 1782. Just as the sociopolitical complexity of the Chumash reached its highest levels, the Spanish colonization and the subsequent missionization of the Chumash led to the demise of traditional cultural lifeways. However, the McGrath portion fell outside of the mission boundaries and, therefore, was not as affected by missionization as much as some of the surrounding areas. However,

some early ethnographic research prior to the disruption of indiginous cultures, which revealed a few placenames for the Santa Clara River mouth (Applegate, 1975):

> Ihsha, or "ashes," was the name of the village at the mouth of the Santa Clara River.
>
> Iswey, or "the cut," was the name for the mouth of the Santa Clara River.
>
> Kanaputequnon, the name of a place near the river mouth.

Please see the Land Use chapter for further discussion of the historic period.

CULTURAL RESOURCES AND MCGRATH STATE BEACH

EXISTING ARCHAEOLOGICAL RESEARCH

A records search for previous surveys and identified archaeological sites within the boundaries of McGrath and the vicinity of the Santa Clara River mouth was conducted at the South Central Coastal Information Center in Fullerton, California, in March, 2002. The results revealed that six archaeological surveys have been conducted in the vicinity of McGrath State Beach and one survey has been conducted within the boundaries of McGrath itself. Although the survey conducted by Timbrook (1986) of McGrath State Beach, as well as other nearby surveys, revealed no evidence of cultural resources, one prehistoric and a protohistoric ethnographic site exist just south of McGrath Lake on the dunes of Mandalay Beach.

The prehistoric site, CA-VEN-667, is a dark lens of shell midden and charcoal, which is indicative shellfish processing. The site did not contain any temporally diagnostic artifacts, so the site was not dated. Given the lack of artifacts, the presence of midden deposit suggests that the site was used more as a seasonal food processing site rather than the remnants of a prehistoric village. Archaeological sites on beaches are typically preserved only when they are outside the active zone of beach erosion, which is the case with this site given its location on the dunes above the surf zone. However, because the landform is also Aeolian, or land subject to wind erosion, sites may become buried or exposed randomly by the effects of wind caused surface modification. These processes are also prevalent within the boundaries of McGrath State Beach, which can reveal, in time, archaeological sites that are obscured by sand and sediment.

A reported *Juncus acutus* collection site, CA-VEN-1234, was also found adjacent to Harbor Boulevard in the dunes of Mandalay Beach, south of McGrath Lake. This plant was used extensively by the Chumash for water bottles, gathering baskets, and acorn leaching basins. The stands found along the dunes and McGrath Lake are among the last remaining in the region (Timbrook, 1986).

Table 3-5, identifies outlines the sites near McGrath State Beach and those that are examples of coastal Chumash village sites. As mentioned above, McGrath State Beach and the Santa Clara River mouth was a very different landform throughout much of the Holocene, and, as with today, presented an attractive setting with a rich and diverse biological community to support human occupation. Although no direct evidence exists for long term occupation of McGrath State Beach, the previous research that demonstrates the Chumash maritime economic focus, in addition to the ethnographic data available, strongly suggests

that the Santa Clara River mouth and estuary was exploited by prehistoric peoples. Fish remains from shell middens in other areas of the Santa Barbara Channel have indicated that paleocoastal people fished estuarine habitats both on the Channel Islands and on the mainland, with mainland peoples relying on nets more extensively (Rick et al., 2001). Indeed, this new research suggests that the initial occupants of the coast in California and other early New World sites exploited a highly productive marine fish resource, and demonstrates the effectiveness of the early technology, including nets, to successfully exploit this resource.

The potential for the area surrounding McGrath Beach to further augment what is known about paleocoastal peoples in Southern California is still unclear. This is mainly due to the unpredictable nature of the Santa Clara River, and the position of the park on the floodplain of the river mouth, the material culture that may have existed at this site are likely deeply buried under sediment.

FUTURE CHANGES AND RECOMMENDATIONS

In light of the potential for significant archaeological remains to exist within the park, future development should acknowledge this possibility and take appropriate steps to mitigate impacts to unidentified or unanticipated cultural resources.

Given the existence of ethnobotanical sites within the park, and the prehistoric use of the Ventura coastline for food resources, the preservation of these sites for visitor appreciation of prehistoric use of estuarine and river resources is suggested. Further, the research potential of the river mouth and the surrounding beach environment has yet to be fully realized. Geoarchaeolgical methods for understanding and interpreting ancient landforms and their relationship to archaeological sites would provide insights into the lives and behavior of the ancient inhabitants of McGrath State Beach.

TABLE 3-5
ARCHAEOLOGICAL SITES NEAR MCGRATH STATE BEACH AND VICINITY

Site Designation	Location	Age (B.P.[1])	Description	Technology	Comments	Reference
CA-VEN-31	Saticoy	3,000–900	Village site on Santa Clara River	Projectile points, mortars, metates, beads	Likely Middle Period Site	Rozaire, (1955)
CA-VEN-667	South of McGrath Lake	Prehistoric (N.D)	Food processing site	None Found	Dark midden soil lens	Horne & Craig, (1979a)
CA-VEN-1234	South of McGrath Lake	Prehistoric/ Historic	Juncus collecting site	None Found		Horne & Craig, (1979b)
CA-SBA-1807	Western S.B. Coast	8,400–9,000	Fishing village	hook and line; nets	Example of Early Period fishing	Rick & Erlandson, 2000
CA-SBA-2057	Western S.B. Coast	8,300	Fishing village	nets; hook and line	Also good Early Period site	Rick & Erlandson, 2000

[1] All dates Before Present.

CHAPTER 4.0

MANAGEMENT AND ADAPTIVE MANAGEMENT

CHAPTER 4.0

MANAGEMENT AND ADAPTIVE MANAGEMENT

This section describes management opportunities that will help meet the goal of sustaining and improving natural resources at McGrath State Beach. Many of these management issues previously were identified in the 1977 General Plan. Management activities that have been conducted or are on-going based on the General Plan are identified. A better understanding of the environmental complexity of the ecosystems that has been described in Chapter 3 Existing Conditions provides the basis for evaluating the previous management goals and identifying new ones. This section also outlines a process for making environmental decisions as they relate to natural resources management at McGrath State Beach. This decision-making process includes the steps taken in this natural resources management plan to develop new management recommendations and provide guidance for evaluating them. It also provides a process for developing and evaluating management recommendations in the future.

This section also identifies goals and objectives that will lead to the overall goal of sustaining and improving the natural resources at McGrath State Beach. A series of specific management recommendations have been developed based on these goals and objectives. These management recommendations identify the specific resources, objectives of the recommendation, a justification for making the recommendation, and the opportunity or benefit that will result from implementing the management action. The management recommendations are coordinated in a way that allows overall park management to implement actions that are beneficial to natural resources while simultaneously often improving public access and recreational opportunities. A section on management implementation identifies how monitoring of management actions and future research will help improve the natural resource management in the park.

The management recommendations have been grouped into three separate management options. The first option identifies actions that will help sustain the quality and quantity of the natural resources within the park. The second option identifies additional management actions that will lead to improving the natural resources. The third management option outlines a coordinated set of actions that will improve and increase the quality and quantity of the natural resources while implementing changes to park facilities and public access that will include a recreational benefit. Finally, an adaptive management section discusses how the monitoring and future research activities will assist District staff to evaluate whether the goals and objectives are being met and make appropriate adjustments to management activities as needed.

4.1 MANAGEMENT ISSUES

Management of McGrath State Beach represents a balance between protecting significant and sensitive natural resources and providing a range of recreational opportunities. The McGrath State Beach General

Plan (1979) recognized the balance between protecting natural resources while providing recreation. However, information was not available on the ecological functioning of the Santa Clara River, estuary and groundwater hydrology to the parks' natural resources and infrastructure during the writing of the General Plan. McGrath State Beach was recognized as a recreational park and the General Plan identified a future need for expansion of recreational opportunities. Most of the recommendations for expanding the recreation have not occurred. This may have been fortunate due to the perception up until recently that high water levels in Santa Clara River and estuary during winter and summer was the sole cause of flooding of parts of the campground (primarily section 3). Further, the maintenance section of the park has a challenge to provide adequate sewer and other facilities to parts of the campground due to the low elevations.

The McGrath State Beach General Plan (1979) identified opportunities and management recommendations. Table 4-1 lists these recommendations for natural resources issues, identifies whether they were implemented, and how these activities should be viewed today as being supported by current recommendations. Table 4-2 lists the recommendations for recreational components of the plan.

Mutually beneficial opportunities exist for natural resources protection and enhancement along with increased recreational facilitation. The key to taking advantage of those opportunities will be to take an informed and comprehensive approach; identifying specific goals and developing a logical stepwise process for implementation. The basis for making management recommendations and deciding to implement them must be based on a comprehensive understanding of the physical characteristics of McGrath State Beach. Our current understanding of the existing conditions at McGrath State Beach provides such as basis for decision-making.

TABLE 4-1
MANAGEMENT ISSUES AND RECOMMENDATIONS FOR NATURAL RESOURCES FROM GENERAL PLAN (1979)

Resource Type	Action Proposed 1979	Status Since General Plan 1979	Action Proposed in Current Management Plan
Natural Resource	Additional vegetation around campsites.	No change.	Supports GP recommendation.
	Use native plants for landscaping.	Minor willow tree restoration.	Supports GP recommendation.
	Iceplant removal to reduce ground squirrels.	No change.	Supports GP recommendation.
	Buffer zone to protect Santa Clara River mouth and McGrath Lake.	No buffer zone adjacent to Natural Preserve. GP recommends a buffer zone around McGrath Lake.	Create a buffer zone between recreation areas and Natural Preserve near river mouth. Supports GP to create a buffer zone surrounding McGrath Lake.
	Interpretive signing around natural preserve boundary.	Limited signing exists and boundaries not clear.	Supports GP recommendation.
	Trails in Santa Clara river mouth to be established.	Boardwalk developed and levee trail exists.	Support GP. Also, recommends closing volunteer trails.
	No development near McGrath Lake. Create access trail and interpretive signs.	No development has occurred. Trails and signs not developed.	Supports GP. Recommends making McGrath Lake a Natural Preserve. Create specific access trails.
	No development in the dune area. Low-density use only.	No development has occurred. Established fencing to protect western snowy plovers. Disturbance to habitat and wildlife still an issue.	Supports GP. Recommends identifying only two access paths to beach through dunes, enforcing dog leash law. Increase fencing of sensitive dune areas.
	Designate mouth of Santa Clara river as a natural preserve.	Designation of Natural Preserve established.	

TABLE 4-2
MANAGEMENT ISSUES AND RECOMMENDATIONS FOR RECREATION FROM GENERAL PLAN (1979)

Resource Type	Action Proposed 1979	Status Since General Plan 1979	Action Proposed in Current Management Plan
Recreation	Increase number of campsites, currently 174.	No change.	Supports GP recommendation with integrated natural resource changes.
	Create a specified day use parking area.	Temporary area near Kiosk still in use. No change.	Supports GP recommendation associated with natural resource and recreation changes.
	Increase campground through development of disturbed area south of current campground.	No change.	Supports GP recommendation in conjunction with relocation of part of northern campground and revegetation.
	Relocate entrance and separate day use and campground road access.	No change.	Supports GP recommendation. Identifies how to make appropriate changes.
	Relocate residence housing and trailers.	Action proposed as part of levee construction program on northwest side of campground.	Supports GP recommendation.

ENVIRONMENTAL REGULATION AND COMPLIANCE

Management activities within McGrath State Beach may fall under the laws and guidelines of federal and state environmental regulations. Planning and implementation of projects, as defined under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), require environmental review. A number of the actions identified in this natural resources management plan would require CEQA and/or NEPA review if they were to be implemented. In many cases, the California Department of Parks and Recreation can act as the lead agency for CEQA compliance. Most of the proposed management recommendations can be performed under a negative declaration or a mitigated negative declaration. Some of the management recommendations involve federal or state-listed wildlife species and these management activities may require consultation under the federal Endangered Species Act (FESA) or the California Endangered Species Act (CESA). In addition to regulatory compliance it is anticipated that District staff will coordinate with state and federal resources agencies, including the California Department of Fish and Game (DFG) and the U.S. Fish and Wildlife Service, when considering to implement management recommendations that may affect sensitive natural resources.

4.2 DECISION MAKING

Every activity and action conducted by District staff at McGrath State Beach will likely have an environmental effect. It is generally hoped that these decisions will have a benefit to the natural resources. Therefore, the decision to take an action that modifies the landscape or natural resources has a consequence that may affect many other activities in the park. Further, decisions are regularly made

outside of the park by individuals, agencies, and organizations that may have a profound affect on the natural resources of McGrath State Beach. It is incumbent on the Department of Parks and Recreation and District staff at all levels to carefully evaluate decisions that may have consequences on other park resources.

ENVIRONMENTAL DECISION MAKING

Prior to making the decision to implement management actions a decision-making process should identify the factors that go into making a specific decision.

MODE OF ENVIRONMENTAL DECISION MAKING

Decisions may be the result of the following:

- Emergency action- this may include breaching the sandbar in response to flooding in the campground,
- Routine procedures – this may include cutting tree limbs that block roads or using pesticides to eradicate rodents,
- Analysis-centered – use of information to help decide. This includes monitoring to determine the boundaries of western snowy plover breeding and foraging areas to establish protective fencing,
- Elite corps – this is a decision by someone isolated from the issues at McGrath such as flood control project up river or approval of a housing development in the region.

UNDERLYING CAUSES OF ENVIRONMENTAL PROBLEMS

Actions that lead to environmental problems generally result from a few key issues including:

- Lack of scientific knowledge or understanding about natural systems – the interrelationship of groundwater and Santa Clara estuary, and the sandy permeable soils in the park resulting in flooding of the campground demonstrates how not understanding of the system has lead to changing the natural functioning of the estuary, perhaps to the detriment of tidewater goby,

- Inappropriate economic incentives – the view that maximizing regional growth will be economically beneficial. The loss of natural resources that have value to improve water quality, protect river banks and provide significant species habitat will result in a higher economic cost than benefit,

- Misplaced belief system or core values – the uninformed citizen or visitor to McGrath State Beach may not appreciate the natural resources that, in fact, contribute to the quality of the experience to the park,

- Failure to use comprehensive approach – a focused management activity that addresses as single species or views recreation as being in conflict with natural resources will not solve problems without a broader perspective of resources and management issues.

CRITERIA FOR EVALUATING ENVIRONMENTAL DECISIONS

Ultimately a decision must be made whether or not to implement a management action. Two components of the decision are the process and the expected outcome.

DECISION PROCESS- ONE NEEDS TO ASK THE FOLLOWING THREE QUESTIONS TO EVALUATE THE DECISION:

- Was the decision fair?
- Was the decision inclusive, and
- Was the decision informed?

Decision Outcome- The result of the decision should be able to identify the following six components of a good decision: the outcome is workable, accountable, effective, efficient, equitable and sustainable. If these components of the potential outcome are true then the decision is justified and should be accepted as an implementable action.

DECIDING ON IMPLEMENTING MANAGEMENT RECOMMENDATIONS

Each of the management recommendations identified in this natural resources management were evaluated using the decision-making process identified above. Because a comprehensive approach was taken that included knowledge of the natural resources, but also the recreational and maintenance issues, management recommendations were informed and inclusive. The recommendations are also fair to the interests of McGrath State Beach because they recommended improvements to recreation while increasing and enhancing natural resource protection and values.

4.3 MANAGEMENT GOAL AND OBJECTIVES

This plan shall set forth a program to target specific important resources within McGrath State Beach and implement management measures that will attain qualitative and quantitative levels of their ecosystem function. Goals and objectives specify desired outcomes of specific management activities. Goals are generally designed to identify a broader qualitative outcome while objectives should identify a measurable result. The purpose is to be able to implement a management activity and through monitoring determine whether the management goal and objective was met. This Natural Resources Management Plan identifies a single overarching goal. This goal is "*sustain and improve the vitality and biodiversity of natural resources at McGrath State Beach*." This goal appropriately expresses the desire to ensure the natural resources are not diminished and when possible to improve the unique and diverse natural resources that have been identified at McGrath State Beach while meeting DPR's mission and policies for resource management.

Objectives have been developed for the natural resources goal to identify specific desired conditions or outcomes resulting from implementing management actions. These objectives have specific implementation tasks that identify what specific activities need to occur in order to meet the objective. Implementation tasks are those activities which are assumed will lead to meeting the objectives that fall

under the principal goal established for McGrath State Beach. Table 4-3 identifies the goal, individual objectives, and associated implementation tasks. While the main purpose of these tasks is to meet the goal and objectives for protecting and enhancing natural resources, adjunct objectives and management activities were developed for recreation, cultural resources, and land use. The reasoning for this is many of the natural resource management activities can only be implemented through coordinated efforts with recreation and taking advantage of land use opportunities.

4.4 MANAGEMENT RECOMMENDATIONS AND ASSOCIATED IMPLEMENTATION ACTIVITIES

The sections below provide a more detailed discussion of potential management activities identified in Table 4-3. These discussions identify activities that will assist the McGrath State Beach District staff to achieve the primary goal and associated objectives in this management plan. Most of these management activities describe opportunities within the boundaries of McGrath State Beach while others discuss larger scale actions and environmental conditions that are outside the park boundaries. The importance of the description of desired conditions outside the park and generally outside DPR jurisdiction is to provide park officials with tools with which to participate in regional management groups whose input can influence external activities affecting McGrath State Beach.

NATURAL RESOURCES

VEGETATION MANAGEMENT ACTIVITY RECOMMENDATIONS

The following section addresses management recommendations for vegetation in McGrath State Beach. The emphasis of these recommendations is on increasing the amount and quality of native vegetation in the park. These recommendations can be achieved through three means: expanding existing resources, invasive plant eradication, and revegetation with appropriate native species. The plant communities in McGrath State Beach are subject to modification by forces outside of the park boundaries (especially invasion by water- and wind-borne exotic plants), beyond the direct control of the Department of Parks and Recreation (DPR). While DPR may have limited influence on land use practices outside of its boundaries, it can have a very real effect on the vegetation within McGrath State Beach.

Revegetation with Native Riparian Trees in Area of Staff Residence and Campground Area 3

Relocating the staff residence is an action planned as part of current the levee project. This action will leave a disturbed area in the riparian vegetation which will be subject to colonization by noxious plant species. Re-vegetation of this area with native riparian trees prior to the establishment of noxious weed species will decrease the chance for their colonization, and will increase the amount of contiguous, higher-quality riparian habitat. An even larger area would be made available for restoration by relocating camping Area 3 to the south of its current location. This would have the additional benefit of removing the campground from an area that experiences flooding.

TABLE 4-3
NATURAL RESOURCE AND OTHER MANAGEMENT RECOMMENDATIONS FOR MCGRATH STATE BEACH

Resource	Objectives	Implementation Task	Justification	Opportunity/Benefit
Natural Resources	Improve habitat quality of riparian vegetation.	• Conduct giant reed eradication along Santa Clara River in McGrath State Beach (MSB). Coordinate with adjacent landowners and watershed groups to develop a program of giant reed eradication. • Restore area with native riparian trees*. • Conduct tamarisk eradication. • Restore with native willows*.	• This exotic plant has decreased the amount and quality of riparian habitat in McGrath State Beach (MSB), especially in the Natural Preserve. • This exotic plant increases rate of habitat loss and reduces ecosystem function. It displaces native plants such as arroyo willow and provides low-quality wildlife habitat. • 1979 General Plan (GP) recommendation to remove exotic plants and restore areas with native vegetation.	• This management activity will increase the amount of contiguous, higher-quality riparian habitat. • This will likely improve wildlife use within the Natural Preserve and other riparian areas in MSB.
	Increase habitat quality of dune and dune scrub vegetation.	• Conduct giant reed eradication in dunes. • Restore with native dune plants*. • Conduct iceplant removal. • Restore area with native dune and dune scrub vegetation*.	• Giant reed and iceplant displace native vegetation, reducing habitat quality including foraging and breeding areas for western snowy plover. • Iceplant rapidly displaces native plants and reduces plant diversity. It also provides habitat for pest rodents. • 1979 GP recommendation to remove exotic plants and restore areas with native vegetation.	• Giant reed and iceplant eradication followed by dune restoration will improve habitat quality and may result in more high-quality western snowy plover habitat. • This also will reduce habitat for pest rodents and increase benefits to campers.
	Increase habitat quality throughout MSB.	• Conduct Myoporum tree removal in campground and elsewhere in MSB. • Replace Myoporum trees with native willows trees. • Increase the total amount of vegetative cover.	• Myoporum trees were planted to provide vegetative cover. • This species has invaded other natural plant communities in MSB. Native trees, such as arroyo willow, can perform the same function of providing vegetative cover. • 1979 GP recommendation to remove exotic plants and restore areas with native vegetation.	• Sapling native arroyo willows can be planted next to Myoporum first, and then the Myoporum removed. This way any temporary loss of vegetative cover is avoided. • Non-native birds and ground squirrels use Myoporum more than native plants.
	Increase habitat quality of brackish and freshwater marsh.	• Conduct pampas grass eradication*.	• This noxious plant has become established in several areas and will reduce native vegetation and habitat quality. • 1979 GP recommendation to remove exotic plants and restore areas with native vegetation.	• With only a few dozen plants within the park, a limited effort could eradicate all of this noxious weed.
	Restore historic riparian vegetation adjacent to Natural Preserve.	• Relocate staff residence to more appropriate location. • Restore former staff residence area (See Recreation) with native riparian trees.	• 1979 GP recommendation to remove exotic plants and restore areas with native vegetation. • Will provide a net increase of higher-quality riparian vegetation. • 1979 GP recommendation to move staff residence to a less sensitive area. • Satisfies a condition required by the Coastal Commission permit to develop a replacement levee.	• Will increase the amount of contiguous, higher-quality riparian habitat adjacent to Natural Preserve.

* Eradication efforts will most likely require ongoing maintenance and monitoring as dictated by DPR protocols.

TABLE 4-3
NATURAL RESOURCE AND OTHER MANAGEMENT RECOMMENDATIONS FOR MCGRATH STATE BEACH (continued)

Resource	Objectives	Implementation Task	Justification	Opportunity/Benefit
Natural Resources (Continued)	Restore riparian and wetland vegetation and establish a habitat buffer zone adjacent to Natural Preserve.	• Restore area formerly occupied by campground Area 3 (see Recreation section below) with riparian and wetland vegetation.	• The ground and surface water hydrology in the location of campground area 3 causes seasonal flooding and the conditions are more suitable to supporting riparian and wetland habitats. • This management activity would increase riparian and higher-quality habitat through restoration of the degraded area currently occupied by campground Area 3.	• Will increase and improve habitat quality. • Will provide more protection for special-status species of wildlife. • Will provide a buffer between campground and Natural Preserve.
	Improve water quality in McGrath Lake.	• Through coordination with the McGrath Lake Trustee Council (MLTC) identify specific activities for DPR participation that will lead to improved water quality through the MLTC and the Watershed Action Committee work with all Landowners to reduce sediment and nutrient discharge into McGrath Lake.	• McGrath Lake a unique and valuable resource and one of the significant ecosystems in McGrath SB. Protection of this resource is a priority.	• Increase wildlife and aquatic habitat Value. Reduce risk of contamination and disease to wildlife and potentially to park visitors.
	Improve habitat quality at McGrath Lake.	• Conduct exotic plant removal in the freshwater and brackish marsh areas • Identify areas where visitor access should be restricted to reduce impacts to natural resources.	• McGrath Lake a unique and valuable resource and one of the significant ecosystems in McGrath SB. Protection of this resource is a priority surrounding and adjacent to McGrath Lake.	• Removal of non-native plant species will improve habitat quality and its value to wildlife.
	Improve water quality in the Santa Clara River and Estuary.	• Coordinate with other state agencies to develop a plan for improving water quality in the upper Santa Clara River. This will include implementing best management practices to reduce sources of sediment and nutrients.	• The upper Santa Clara River watershed is the source of freshwater for the biologically significant estuary. This water source has been significantly modified to the extent that ecosystem processes no longer function normally.	• Implementation of better management practices could improve the river and estuary with respect to ecosystem functions and natural resource values.
Plants and Wildlife Special Status Species	Special-status plant species.	• Conduct field surveys to determine presence of special-status plants.	• Salt marsh bird's beak was historically known to occur in the saltmarsh area in MSB. • A project to determine presence of milk vetch is currently underway. McGrath Lake is a suitable site for reintroduction of milk vetch.	• Monitoring of the flora for special-status plants will ensure that these natural resources are recognized and that management to protect them is implemented. Monitoring will provide better information for management decisions.
	Wildlife.	• Conduct periodic comprehensive surveys for wildlife (including reptiles and amphibians) throughout MSB.	• No recent comprehensive surveys have been conducted. • There is a lack of information on amphibian presence in the vicinity of McGrath Lake.	• Will provide data upon which informed management decisions can be based. • If conducted systematically and using appropriate methods, survey can provide an important record of changes in wildlife communities through time, which may be used as a performance measure for restoration efforts.

TABLE 4-3
NATURAL RESOURCE AND OTHER MANAGEMENT RECOMMENDATIONS FOR MCGRATH STATE BEACH (continued)

Resource	Objectives	Implementation Task	Justification	Opportunity/Benefit
Plants and Wildlife Special Status Species (Continued)	Breeding wildlife (western snowy plover, least tern, cup-nesting birds).	• Improve refuse management in MSB, including on the beach and dunes, to eliminate availability of refuse to scavengers. Discourage campers from feeding wildlife.	• Supplemental feeding of opportunistic predators (e.g., striped skunk, raccoon, western scrub jay) and nest parasites (brown-headed cowbird) increases the populations of these animals to the detriment of other wildlife, including listed species.	• Will increase environmental awareness of campers and decrease the threat of predation and nest parasitism of less common wildlife.
	Breeding wildlife (western snowy plover, least tern, low-nesting birds in open habitat).	• Place a high priority on enforcing dog laws and sensitive nest area restrictions. • Implement DPR's Western Snowy Plover Systemwide Management Guidelines that apply to MSB.	• Disturbance to western snowy plovers, least terns, and other birds such as savannah sparrows can have a significant negative effect on their breeding. Dogs tend to have an effect over a greater distance than do humans.	• Enforcing existing laws and policies could have a significant beneficial effect. Enforcement may preclude the future need by regulatory agencies to seasonally restrict larger areas of the beach and dunes from visitor access.
	Breeding wildlife (western snowy plover, least tern).	• Continue current fencing of breeding habitat and other management activities (e.g., posting signs).	• Reduces recreational and park management activities that cause disturbance at nest sites.	• Will provide direct protection of listed species.
	Breeding wildlife (western snowy plover).	• Begin nesting western snowy plover research to identify threats to successful reproduction. Establish breeding colony sizes that can be used to establish thresholds of plover numbers and breeding for use in determining the success of management activities.	• Will provide information on greatest threats to McGrath population, whether it's people recreating, dogs, or predators (and type of predator: ground vs. avian).	• Will improve management efforts and justification for dog and recreation restrictions.
	Breeding wildlife (western snowy plover, least tern).	• Establish a western snowy plover and least tern nest protection program.	• Public outreach has been effective at Pt. Reyes National Seashore to educate people about western snowy plover and threats to them, and to enforce dog restrictions. Nest and fledgling survival increased when monitors were present and interacting with the public.	• Will protect listed species. • Will provide an opportunity for public education.
	Wildlife (western snowy plover).	• Place a high priority on enforcing all conditions of authorities and permissions between DPR and the Ventura Port District, and California Coastal Commission and U.S. Army Corps of Engineers approvals regarding disposal of dredge sands. • Coordinate with the Ventura Port District and U.S. Army Corps of Engineers to use nearshore sand disposal or explore other disposal alternatives that would eliminate beach activities on McGrath State Beach.	• Will avoid potential breeding and non-breeding seasons threats to western snowy plover and other wildlife.	• Will provide direct and indirect protection of listed species.
	Breeding wildlife (burrowing owl).	• Monitor for breeding activity. If breeding, restrict access to active burrows (e.g., with fencing), install signs about sensitive habitat. Possibly close off trail.	• Disturbance at active burrows may cause birds to abandon nests and the area.	• Will provide public education, viewing opportunities of conspicuous wildlife.

TABLE 4-3
NATURAL RESOURCE AND OTHER MANAGEMENT RECOMMENDATIONS FOR MCGRATH STATE BEACH (continued)

Resource	Objectives	Implementation Task	Justification	Opportunity/Benefit
Plants and Wildlife Special Status Species (Continued)	Protect tidewater goby and its habitat.	• Support/conduct land acquisition east of Harbor Blvd.	• Floodplain restoration would likely increase habitat availability for the species and reduce scouring forces within estuary.	• Coastal Conservancy's Santa Clara River Parkway Acquisition or DPR acquisition. Could improve riparian habitat management adjacent to MSB.
	Protect tidewater goby and its habitat.	• Support removal from SCRE of yellowfin gobies and African clawed frogs	• These non-native species compete with and can cause predation on tidewater gobies.	• Will provide direct and indirect protection of listed species.
	Maintain natural estuary processes for tidewater goby.	• Avoid use of artificial sandbar breaches as a method of flood control. • Determine whether unmonitored breaches of sandbar occur and by whom. • Develop a coordinated effort with those who may cause sandbar breaches to help reduce breaching. • Use the hydrological information to develop an education program that identifies alternatives to breaching.	• Sandbar breaches result in rapid fluctuations in salinity, temperature, and stratified estuarine conditions which are unfavorable to gobies and other species. • Draining of estuary may reduce reproductive success and habitat availability.	• Although DPR has only conducted breaching as an emergency measure it can help manage this activity since it is within the State Park system. • Breaching of the sandbar is an activity that should be controlled by DPR and provides additional management opportunities that will improve natural resources.
	Evaluate tidewater goby population variation and use the goby as an environmental indicator species.	• Develop a monitoring program in coordination with USFWS.	• The species is a valuable indicator of environmental conditions in the estuary. Potential impacts of exotic species need to be closely monitored.	• Local experts have conducted research in the region and in Santa Clara River Estuary.
	Protect southern steelhead and its habitat.	• Eliminate or reduce frequency of artificial sandbar breaches.	• Sandbar breaches result in rapid fluctuations in salinity and temperature and stratified estuarine conditions which are unfavorable to steelhead and other species.	• Although DPR has only conducted breaching as an emergency measure it can help manage this activity since it is within the State Park system. • Breaching of the sandbar is an activity that should be controlled by DPR and provides additional management opportunities that will improve natural resources.
	Protect upstream hydrology of steelhead.	• Advocate year-round bypass flows at Vern Freeman Diversion Dam.	• If the lower watershed is to support the species, flows between the dam and the estuary need to last further into the spring. • Participate in regional land use efforts to protect riparian areas. Such efforts may include controlling for exotics in drainages.	• NMFS is preparing Biological Opinion for dam operation and will conduct research in the future.
	Identify habitat needs for steelhead in the Santa Clara River.	• Conduct/support hydrologic and ecological research.	• Steelhead use of estuaries in Southern California is poorly understood, but dependence may be considerable. Volume and location of effluent discharge needs to be evaluated in terms of species' habitat requirements.	• NMFS planning on conducting Santa Clara River studies. Studies can be extended into estuary with DPR advocacy and support.

TABLE 4-3
NATURAL RESOURCE AND OTHER MANAGEMENT RECOMMENDATIONS FOR MCGRATH STATE BEACH (continued)

Resource	Objectives	Implementation Task	Justification	Opportunity/Benefit
Plants and Wildlife Special Status Species (Continued)	Protect sensitive habitats (Dunes).	• Develop an environmental education program for lifeguards, maintenance people, and others who may have reason to take equipment onto the dunes and beach. • Work with Coastal Berry Co. to prevent McGrath Lake pumping discharge from entering and modifying dunes.	• Increase awareness of the sensitivity of nesting birds and native plants to disturbance, and the need to ensure that equipment (lifeguard jeeps, bulldozers) is used only on approved routes and that the area disturbed during routine operations is minimized. • Water discharges from McGrath Lake are altering the dunes, removing native dune vegetation and habitat, and preventing natural dune processes from occurring.	• Improve stewardship of natural resources; encourage a sense of responsibility and desire to protect natural resources in employees/volunteers. • Discharge of McGrath Lake water directly into the ocean will significantly increase dune habitat and eliminate barriers to beach recreation that currently exist due to drainages.
Recreational Resource	Improve beach access trail and signage.	• Identify and close all volunteer trails and trails currently used except for the two proposed access locations (see Figure 10). • Post and maintain closure and interpretive signs. • Clearly identify trails and sign trails to beach.	• The volunteer trails and redundant park trails result in damage to the natural resources including increasing opportunities for non-native plant establishment and disturbance of sensitive species.	• Closing and posting closed signs on volunteer and trails for closure will direct visitors to use the most efficient means to access the beach and protect the natural resources.
	Establish all weather day use parking area(s).	• Evaluate alternatives to existing day use, (e.g., reduce size of parking area, extend existing trailhead for nature trail)	• Location will be flooded less frequently. • Closer to beach access and trail system.	• Will meet MSB GP recommendations. • Improve day use by providing all season access. • Road redesign will improve traffic flow.
	Establish boardwalk and trail signs.	• Identify 2 specific access areas to beach from the campground and day use areas. One boardwalk access and one drivable sand access for rangers and lifeguards. Add signs indicating beach access. • Post signs to indicate seasonal closure for special species.	• These actions will direct visitors to the beach area more efficiently. • Trails will be through lower sensitivity areas. • Redirect foot traffic out of sensitive areas (marsh and dunes).	• Provide better beach access for campers and day use including surfers.
	Improve all season campground access.	• Relocate camping Area 3 to south end of existing campground.	• Will provide opportunities to restore riparian area adjacent to Natural Preserve and establish a buffer zone. • Area 3 of the campground can become flooded due to surface and groundwater during winter and summer. • Relocating this section of campground will provide all season camping.	• Will be located in area not subject to seasonal flooding. • Will provide opportunities to provide fair weather day use in the previous Area 3 campground.

TABLE 4-3
NATURAL RESOURCE AND OTHER MANAGEMENT RECOMMENDATIONS FOR MCGRATH STATE BEACH (continued)

Resource	Objectives	Implementation Task	Justification	Opportunity/Benefit
Cultural Resources	Protect Cultural Resource sites.	• Protect sites within proposed McGrath Lake Natural Preserve mentioned previously.	• Two prehistoric sites occur in the vicinity of McGrath Lake; ethnohistoric evidence for pre-contact village sites also exists (Iqsha and Tipshishmu).	• Will preserve interpretive themes of estuarine and aeolian prehistoric adaptations/lifeways.
	Provide opportunities to continue cultural traditions and provide cultural education.	• Ethnographic collecting of Juncus spp. (Rush) for basketry and clothing; Yerba mansa medicinal use.	• Interpretation themes focused on traditional basketry and *Juncus* gathering.	• Preserves Native American traditions and develops cultural awareness of native plant uses.
Land Use	Land acquisition (inholdings)	• Acquire two inholdings as identified in Figure 11. The assessor's parcel numbers (APNs) for the inholdings are 138008002 and 138008003.	• This land acquisition will increase MSB lands, provide more control over management and protection of resources in the south part of the park.	• Provide contiguity and allow for better management of natural areas within Park property.
	Land acquisition (Go-cart property)	• Acquire the go-cart property south of McGrath Lake.	• This land acquisition will increase MSB lands, provide more control over management and protection of resources in the south part of the park.	• Increase the amount of area with dune scrub, coastal sage scrub and other habitats. Provide better management in the vicinity of McGrath Lake.
	Land acquisition (Berry Co. oilfield)	• Acquire the Berry Co. oilfield property as identified in the General Plan.	• This land acquisition will increase MSB lands, provide more control over management and protection of resources in the south part of the park.	• Provide an opportunity to increase natural vegetation through restoring the site and increase protection of McGrath Lake and the dune habitats such as breeding western snowy plover area.
	Minimize or reduce adverse external impacts to McGrath State Beach beach area.	• Continue to work with Ventura Port District and other agencies to avoid, minimize, or eliminate adverse impacts from the annual Ventura Harbor dredging operations.	• Current dredging operations adversely affect the sandy beach and Santa Clara River estuary by changing natural ecological processes.	• Changing the location of placement of Ventura Harbor dredge materials will help to reestablish natural hydrological function of the estuary and improve wildlife habitat.

Giant Reed Exotic Plant Eradication along Santa Clara River in McGrath State Beach

Giant reed is a noxious plant that decreases the amount and quality of riparian habitat. It increases the rate of habitat loss, and reduces ecosystem function. This species spreads easily, and populations upstream of McGrath State Beach will continue to provide a source for colonizing propagules. Therefore, DPR should coordinate with adjacent landowners and watershed groups to develop a program of eradication. Eradication methods for giant reed and other noxious or exotic species are presented in Appendix G. Areas where giant reed has been eradicated should be restored with native riparian trees. This will increase the amount of contiguous, higher-quality riparian habitat. Future monitoring for recolonization by giant reed sources outside of the park can provide will be required to ensure success. Eradication will result in a temporary impact to wildlife along the Santa Clara River, and efforts should be timed to avoid nesting birds and other resources during especially sensitive times of the year.

Giant Reed Exotic Plant Eradication in Dunes and Dune Restoration

Giant reed established on the dunes displaces native dune vegetation, reducing habitat quality, including foraging and breeding areas for western snowy plover. Giant reed eradication followed by revegetation with native dune plants will improve habitat quality and may result in more high-quality western snowy plover habitat. These efforts should be appropriately timed to avoid the western snowy plover nesting period. This effort may result in temporary disturbance to some areas of dune vegetation.

Myoporum Removal and Replacement with Native Willows

Myoporum trees were planted to provide vegetation cover. This species has invaded other natural plant communities in McGrath State Beach. Native trees, such as arroyo willow can provide higher quality wildlife habitat and increase the total amount of vegetative cover, while performing the same function. In order to prevent loss of vegetative cover during this effort, sapling native arroyo willows can be planted next to Myoporum before Myoporum removal is implemented. This effort will require willow restoration protection in the campground area. There will be a short-term decrease in tree cover, but the park will maintain the same level of overall vegetation cover. Campground areas may be temporarily decreased in small areas while willows grow into trees. Eradication methods are described in Appendix G.

Pampas Grass Exotics Removal

This noxious plant has become established in several areas and will further reduce native vegetation and habitat quality as it continues to spread. There are only a few dozen plants in the park currently, and limited effort could eradicate this entire non-native population with negligible impacts. Eradication methods for pampas grass are described in Appendix G.

Tamarisk Non-Native Species Eradication and Restoration with Native Willows

Tamarisk or salt-cedar trees have invaded some of the riparian and dune scrub habitats. Besides lowering valuable groundwater resources these trees displace other native plants associated with riparian corridors, such as arroyo willow and provide low-quality wildlife habitat. Tamarisk tree removal will increase habitat quality for wildlife and increase the amount of contiguous natural vegetation (wildlife habitat)

within the park. This effort requires implementing active eradication followed by monitoring. Eradication methods for Tamarisk are described in Appendix G.

Iceplant Removal and Restoration with Native Dune and Dune Scrub Vegetation

Non-native iceplant has become established in the dune and scrub habitats within the park eliminating native species. Eradication of iceplant will increase native plant species and diversity and provide higher-quality habitat. Temporary impacts of these efforts will include some areas being unvegetated until restoration has become established. Eradication methods for iceplant are described in Appendix G.

Native Plant Revegetation

California native plants also can reduce habitat quality if these species do not naturally occur in particular habitats such as dunes, dune scrub, brackish marsh, freshwater marsh, riparian, and coastal sage scrub communities. Specifically, Monterey cypress or pines will reduce native, naturally occurring herbaceous or shrub species. Using native plants that naturally occur within the existing habitats for restoration will increase habitat quality and species diversity. These efforts will require seed or plant collection from native species in the park to provide a stock source for revegetation.

WILDLIFE MANAGEMENT RECOMMENDATIONS

The following section addresses management recommendations for wildlife in McGrath State Beach. The emphasis with regards to the management and restoration of this highly dynamic and altered system is placed on sensitive wildlife species, particularly avian species such as least Bell's vireo and southwestern willow flycatcher in riparian habitat, and western snowy plover and California least tern in shore zone marine habitat. While all native wildlife species occupying these habitats are important to the overall health wildlife population in the park, the conditions that favor sensitive species populations typically indicate a functional, balanced ecosystem.

Wildlife in McGrath State Beach is influenced by management activities within the park, and by agricultural practices and urban development outside the park. While DPR may have limited influence on land use practices outside of its boundaries, it can have a very real effect on wildlife within McGrath State Beach. The Department's role should be one of advocate, when possible, regarding activities outside of the park, and steward of resources within the park.

Sensitive Habitats

Riparian Habitats

A large proportion of California's wildlife requires or prefers riparian habitat, and the majority of this habitat nationwide (70–90%) has been lost (SCREMP, 1996). The riparian habitat in McGrath State Beach, especially at the mouth of the Santa Clara River, has been recognized as important to the long-term viability of natural resources in the area (SCREMP, 1996). It also contributes to the recognition of McGrath State Beach as an important bird site (Cooper, 2001). Ten of the special status wildlife species listed in Table 3-2 occur in riparian habitat for a significant portion of their life cycle, either as a resident,

breeder, or during the non-breeding season. While some of these species may not currently breed in the park, the potential to encourage breeding populations of, for example, least Bell's vireo and southwestern willow flycatcher, exists.

The removal of exotic plant species such as giant reed is generally recognized as beneficial, creating a larger area for native plants to be re-established. There is some potential, however, for native wildlife species to use introduced plants for nest sites, perches, and cover (Greaves, undated and Bieber et al., 2002). Therefore, any removal activities should be timed to avoid impacts to nesting birds and other breeding wildlife. An additional consideration should be how exotic vegetation is handled. At the Camp Pendelton Marine Corps Base in Southern California, debris from giant reed that was chipped in preparation for removal was conveyed by wind and water to a creek channel, eventually accumulating at a California least tern colony. The organic material modified the sandy substrate and caused the nesting conditions in the tern colony to change (Bieber et al., 2002).

The existing boardwalk from the day use parking area through the riparian area to the river provides a good opportunity for visitors to enjoy nature watching. Disturbance is focused into a discrete area, leaving a larger area available for undisturbed wildlife use. However, there are unimproved trails branching off from the boardwalk. These trails are marked with abandoned interpretive signs that give visitors the impression that they are official trails with an interesting destination. Removal of these signs and revegetation of these trails would reduce the amount of disturbance to wildlife.

Shore Zone and Dunes Habitats

Dune habitat is uncommon, and is often disturbed by human activities. The coastal strand at McGrath State Beach has been recognized as unique and of significant conservation value by SCREMP (1996). The value of this habitat to wildlife, especially California least tern, at McGrath State Beach was recognized in the McGrath State Beach General Plan in 1979, and giving additional protection to this habitat was cited as a reason for establishing the Natural Preserve. In addition, McGrath State Beach is recognized as a western snowy plover breeding and wintering site by numerous entities, including the western snowy plover recovery team (USFWS, 2001).

Threats to wildlife using this habitat principally include recreating humans and their animals, especially dogs, off-highway vehicles, exotic vegetation, and predators. Efforts to minimize these threats include active education of visitors and implementing methods to minimize disturbance, strict enforcement of existing laws, minimizing vehicle impacts, removing exotic vegetation, and reducing predator density. These management recommendations may have greater applicability beyond solely the dunes. Activities related to the disposal of dredged sand from the Ventura Harbor add to the threat posed by off-highway vehicles, and may contribute to other threats such as the modification of western snowy plover habitat through beach grooming (removal of wrack) and alteration of the beach profile. Efforts to minimize these threats would include coordinating with other agencies to eliminate beach activities related to disposal of sand, and ensuring the enforcement of existing authorities and permissions.

MANAGEMENT TO MINIMIZE DISTURBANCE

Visitor Education Program

Efforts to actively educate people to the consequences of their actions appear to be successful in the Point Reyes National Seashore (PRNS). The Point Reyes Bird Observatory is monitoring western snowy plover nests at the PRNS, and observed unusually high chick mortality during weekends and holidays. In response, a beach habitat education program was implemented. This included contacting the public and informing them about sensitive areas at the beach, and a uniformed ranger patrolling the beach. Early results suggest that the education program has positively influenced chick survival (Abbot et al., 2002). While this study was limited to western snowy plovers, the results warrant application in order to provide protection to all sensitive dune resources. This type of program could also benefit sandy beach tiger beetle, California brown pelican during post-breeding dispersal, and nesting California least tern, and should be implemented at McGrath State Beach.

Staff at McGrath State Beach should also be educated to the consequences of their activities. Lifeguards, maintenance people, rangers, and other employees or volunteers at the park, especially those who work out side of the campground area, should receive information about special status species in McGrath State Beach. Particular attention should be given to threatened or endangered species, and to threats to their populations. In addition to basic regulatory information, this education should focus on interesting facts about the behavior or biology of these species, and should include opportunities to view the species where possible. The purpose should be to try and instill a sense of stewardship in employees and volunteers, and give people a sense of responsibility for the natural resources in the park.

Other disturbance results from visitors walking or riding horses in the dunes. Birds are kept off their nests, nests are crushed and the dune's physical structure and vegetation community is altered. A system of one or two boardwalks should be installed for visitors to use to gain access to the beach. Disturbance would be concentrated into a few areas, leaving more dune habitat potentially undisturbed.

Domestic Animal Control

Domestic animals also pose a threat to dune wildlife. Unrestrained dogs can destroy nests and cause birds to flush. Even dogs on leash, while less likely to destroy nests, can cause nesting birds to leave their nests unattended. In the case of western snowy plovers, adults who are tending chicks may move their brood in response to disturbance (animal or human), putting them at risk of predation or moving them into another bird's territory, where they may face aggression. Existing dog laws in McGrath State Beach should offer a lot of protection of dune wildlife, however they are not enforced adequately. Leash laws and dog restrictions are often unpopular with the public, who may not understand the rational behind them. Education about the necessity of these laws and policies would help to gain compliance with them.

Off Highway Vehicle Management

While off-highway vehicles (OHVs) are not permitted for the public at McGrath State Beach, lifeguards and rangers who must patrol the beach use them. Maintenance crews also must occasionally take vehicles onto the beach. Vehicles can cause similar disturbances as humans on foot or dogs, but they also pose a

threat of crushing wildlife nests and young. Minimizing the area disturbed by vehicles should be a priority. Having one access point to the beach, and requiring vehicles to drive in the least environmentally sensitive areas, depending on the season, can achieve this. During the breeding season, keeping vehicles at or below the high tide line would avoid crushing nesting birds. During winter, flocks of foraging shorebirds can be avoided by driving higher on the beach, but below vegetation. Maintaining a slow speed would allow wildlife to detect an approaching vehicle and move out of its way.

Refuse Control

Predators are a significant source of population decline for special status wildlife in many areas. Frequently documented nest predators include common raven (*Corvus corax*), American crow (*C. brachyrhynchos*), western scrub jay (*Aphelocoma californica*), coyote (*Canis latrans*), red fox (*Vulpes fulva*), raccoon (*Procyon lotor*), and rats (*Rattus* spp.).

Humans can directly and indirectly supplement the diets of predators, especially those, which scavenge. Feeding wildlife such as jays and raccoons is a common activity for people who do not understand the consequences. Also, improper handling of garbage can attract scavengers, which feed from open dumpsters and trash cans. This supplemental feeding results in higher densities of predators, which are not restricted to feeding on human handouts and trash.

Predator densities have not been determined in McGrath State Beach, and the effect of predators on special status species such as California least tern and western snowy plover have also not been established. However, anecdotal evidence suggests that foxes and some avian predators pose a threat to these species at McGrath State Beach (O'Neill, personal communication). Predator enclosures at nests can be an effective tool to limit nest predation of western snowy plovers, but the exclosures may also attract vandals and predators on adults to the nest (George and Liebezeit, 2001). Direct removal of predators has been successful in reducing predation pressure at some California least tern colonies. While the installation and maintenance of predator exclusions, and direct predator removal requires a significant effort on the part of wildlife managers, it can be worth the investment. However, prior to committing to this level of effort, it would be worthwhile to monitor the populations of nesting birds, especially special status species such as western snowy plover and California least tern, to determine whether the effort is warranted. Two simple methods of potentially reducing the levels of scavengers and predators (which may be artificially elevated) at McGrath State Beach would be to educate staff and visitors to the park on reasons why they should not feed wild animals, and to install garbage receptacles that prevent wildlife from gaining access to trash.

BURROWING OWL STATUS IN MCGRATH STATE BEACH

Burrowing owls have not been documented nesting in McGrath State Beach however they do occur there at least during the non-breeding season. Depending on the location of active burrows, even those used for roosting during the non-breeding season, maintenance activities may have the potential to kill or injure burrowing owls. Burrowing owls are a species of special concern in California, and as raptors they are protected from "take."

RIPARIAN RESTORATION AND NATURAL PRESERVE BUFFER ZONE

A Natural Preserve to protect the river ecosystem at the mouth of the Santa Clara River was designated to protect these natural resources (McGrath State Beach General Plan, 1979). It was established to protect estuarine waters, nesting habitat for California least tern, and riparian shrubland and saltwater marsh communities, which were recognized as particularly significant resources. A buffer zone should be developed south of the Natural Preserve where habitat can be restored, thereby extending the wetland and riparian habitat that currently exists within the preserve boundary. This buffer zone currently experiences seasonal ponding from surface and groundwater sources affecting use for year round recreation. Fair weather recreation compatible with natural resource enhancement and protection should be considered as a day use area in this zone. Figure 11 identifies a potential plan that will provide restoration opportunities and a buffer zone for the Natural Preserve. This approach simultaneously suggests recreational opportunities and objectives that will increase all weather recreation by moving section 3 of the campground to a location further south. In addition, the plan proposes to move the current day use parking area to a location closer to beach access, and using the vacated areas as a fair weather recreation and Natural Preserve buffer zone.

FISHERIES MANAGEMENT RECOMMENDATIONS

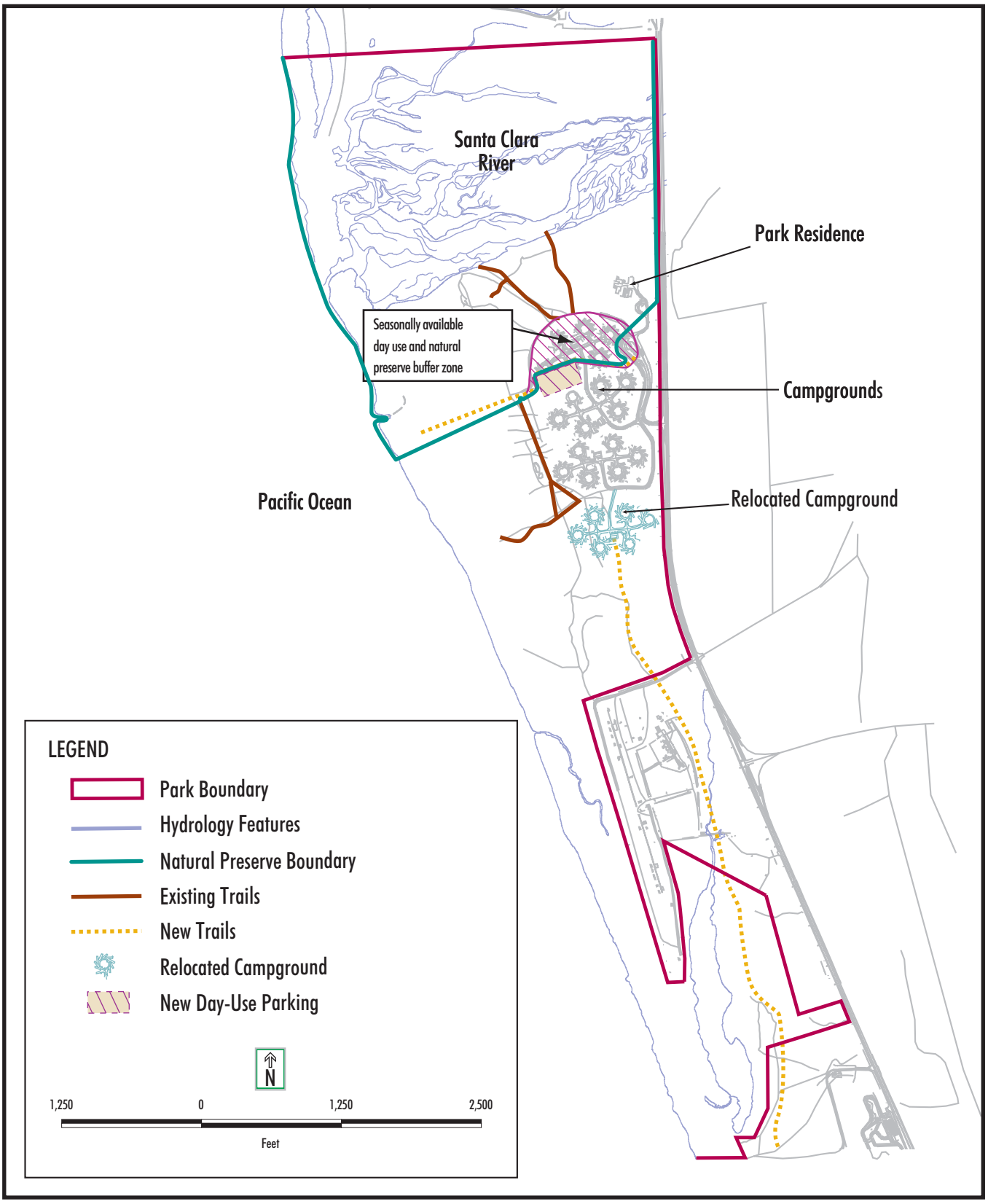
The following section addresses management recommendations for the Santa Clara River Estuary. The emphasis with regards to the management and restoration of this highly dynamic and altered system is placed on sensitive fish species, particularly tidewater gobies and southern steelhead. While all species (excluding exotic species) occupying this habitat are important to the overall health of the estuary, the conditions that favor tidewater goby and steelhead populations are typically synonymous with a well-functioning, balanced ecosystem.

With respect to the management of the estuary, DPR is confronted with issues that have resulted largely from outside influences, and there are very little direct action the Department can take to restore this habitat. Thus, the Department's role, at least for the foreseeable future, will be one of advocate, rather than steward, of the estuary.

Support or Conduct Land Acquisitions

The Coastal Conservancy's Santa Clara River Parkway Acquisition project proposes to purchase up to 6,000 acres of land along the lower 15 miles of the river. The intent of the project is to restore the natural function of the floodplain in this area. Agricultural properties located on the southern bank of the river immediately east of Harbor Boulevard are included in this plan. The outcome of the Parkway Acquisition is currently unclear and DPR may actually chose to purchase the above mentioned parcels itself. Either way, DPR should continue to support this acquisition to the fullest extent possible. The restoration of a functioning floodplain would likely result in the improvement of several current problems associated with the SCRE.

- A wider, meandering river channel would reduce the erosive forces of winter storm flows, thus reducing scour and erosion within the estuary. The loss of banks and riparian vegetation along the estuary may be significantly reduced if the river was allowed to meander more freely upstream.



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SOURCE: California Department of Parks and Recreation, 2001; and Environmental Science Associates, 2002

Figure 11
Conceptual Facilities and Trails Map

- The restoration would reduce scouring forces on tidewater goby populations and create more backwater areas that the species uses for breeding and to avoid high flows. The overall usable habitat of the species would be increased significantly.

- Depending on the elevation of the sandbar at the mouth of the estuary and the elevation of the river channel after restoration, the treated effluent of the Ventura Water Reclamation Facility may back up the river channel further during the summer and fall, rather than causing suspected sandbar breaches in the estuary.

Eliminate or Reduce Frequency of Artificial Sandbar Breaches

While some or most of the unseasonable sandbar breaches that are known to occur in the SCRE are probably a result of excessive amounts of effluent discharge into the lagoon, DPR has artificially breached the sandbar in the past as an emergency measure for flood control. Summer and fall breaching allows tidal inundation to occur for short periods of time and creates a stratified water column in the lagoon. The stratification occurs because more dense seawater flows to the bottom of the estuary while the inflowing freshwater remains above the saltwater. These stratified conditions cause problems for fish and other aquatic organisms that do not have high tolerances to salinity and temperature fluctuations. Although the unnaturally high volumes of freshwater in the SCRE during the summer and fall have had detrimental effects on salt marsh plant communities, and may also increase the predatory pressures of introduced freshwater species, such as African clawed frogs, the continued artificial breaching of the sandbar is not recommended. Tidewater gobies are particularly sensitive to these breaches (Lafferty, pers. comm.; Swift, pers. comm.; Moyle et al., 1995).

DPR should refrain from all artificial breaches in the future unless as an emergency measure. Recommendations in the plan identify how future need for breaching can be avoided. Unless the amount of treated effluent entering the lagoon can be reduced; DPR may have to relocate campgrounds to allow for periodic flooding.

DPR should also support a detailed study of the hydrologic conditions required to return the ecological functioning of the SCRE to a more natural state. As mentioned previously in this document, there is a clear benefit to the presence of the effluent discharge, namely that it replaces natural streamflows lost to diversions and other land use practices upstream of the park boundaries. However, the volume and location of the discharges need to be reevaluated. The total discharge volume may need to be split between estuary and ocean discharge, or the discharge point may need to be moved further upstream, into the vicinity of the Vern Freeman Diversion Dam, so that some water can be lost to percolation and evaporation. The restoration of the floodplain (see above) may also benefit from the discharge point being moved further upstream.

Advocate Year-Round Bypass Flows at the Vern Freeman Diversion Dam

The NMFS is currently preparing a Biological Opinion that will regulate the design and operation of the fish ladder at the Vern Freeman Diversion Dam and will also make provisions for bypass flows at the site during steelhead migration periods (Rogers, pers. comm.). However, these bypass flows are unlikely to be established on a year-round basis. The most important time for continued bypass flows is during the spring, when river flows are unnaturally low due to the diversion, and the volume of effluent discharge is

not high enough to keep the estuary mouth open long enough to allow steelhead smelt to enter the ocean. Please refer to *Aquatic Species – Fish,* Section 3 under Existing Conditions for an explanation of the apparent conflict between Recommendations 2 and 3 with regards to the volume of water discharged by the Ventura Water Reclamation Facility.

Conduct and/or Support Research and Monitoring

As discussed above, a detailed hydrologic study of the estuary and all influencing forces should be conducted to resolve continued uncertainties about the effects of the treated effluent discharge on the hydrology, and thus ecology, of the estuary. As suggested by Moyle et al. (1995), recycled water may play an important role in the preservation and recovery of southern steelhead, but its effective allocation needs to be studied in detail.

Furthermore, the current understanding of the historic and current importance of estuaries to southern steelhead is limited, but research conducted in central California suggests that it may be considerable. NMFS is planning on conducting detailed studies of steelhead habitat in the Santa Clara River over the next five years. DPR should encourage and assist NMFS in extending these studies into the estuary and, if possible, integrating them with the above mentioned hydrologic studies.

Also, the tidewater goby population in the SCRE should be monitored closely, even if the species becomes delisted. Tidewater gobies are important indicators of not only overall estuary health, but also emerging competitive and predatory pressures from exotic species such as yellowfin gobies and African clawed frogs.

RECREATION MANAGEMENT RECOMMENDATIONS

The following section addresses recreation management recommendations for McGrath State Beach. The emphasis of these recommendations is on improving recreation facilities by relocating them to sites where they will be less affected by flooding (and therefore available for a larger part of the year than they currently are), consolidating facilities to minimize impacts by visitors on the natural resources of the park, and providing visitors with the resources they need to find and use the facilities.

RELOCATE CAMPING AREA 3

The Area 3 campground can become flooded due to surface flows and high groundwater levels during winter and summer (see Figures 4 and 9). Development of the levee on the north and west side of the campground (which is being implemented at the time of this document's preparation) will only prevent some surface flows from inundating the area. Groundwater connectivity to the estuary will continue to cause seasonal increases in the groundwater levels that will flood the campground in the lowest elevations. Moving and expanding the Area 3 camping area to south of campground (see Figure 10) will require infrastructure changes and additions. However, since the camping facilities will be located in an area not subject to frequent flooding, they will not experience the seasonal reductions in group and single camping areas. Moving the campground would also provide an opportunity to restore a relatively large area of riparian habitat. Prior to implementing this recommendation DPR will need to determine potential sensitive biological and cultural resources in the new campground area.

ESTABLISH ALL WEATHER DAY USE PARKING

The existing day use parking location is subject to seasonal flooding. It provides convenient access to the riparian boardwalk trail, but the location encourages visitors to use informal trails through sensitive habitat (brackish marsh), which are also located near the parking area. Relocation of day use parking (see Figure 9) to a higher elevation will reduce or eliminate seasonal flooding. The proposed location is closer to the recommended beach access and trail system, which are also included in this section. This management recommendation will meet McGrath State Beach GP recommendations by improving day use facilities, improving beach access, protecting natural resources, and improving traffic flow during the road redesign. Prior to implementing this recommendation DPR will need to determine the potential impacts of increased day use on sensitive biological resources in the park. In addition, the existing seasonal day use parking area will be reduced in size and only maintained to provide disabled access to the Natural Preserve.

SPECIFY TWO BEACH ACCESS LOCATIONS

Informal and excessive trails damage the natural resources by increasing opportunities for non-native plant establishment and disturbance of sensitive native plant and wildlife species. All volunteer and informal trails will be closed. Two specific access areas to the beach from the campground and day use areas have been identified (See Figure 9). Rangers and lifeguards to gain access to the beach in patrol vehicles currently use one of these trails. The other should be improved with a boardwalk. While this measure will limit the number of access points to the beach, it will provide convenient beach access for campers and day users, including surfers, and will redirect foot traffic out of the marsh and dunes. This recommendation assumes that an adequate number of signs will be posted to ensure that visitors will know which trails to use, and to avoid sensitive habitat.

PEDESTRIAN AND POTENTIAL BIKE TRAIL

Following acquisition of the Berry oilfield, a pedestrian and bike trail should be developed from the southern campground access road south along the east side of McGrath Lake, then west to the beach at Mandalay (see Figure 9). In addition to providing a defined link between McGrath State Beach and Mandalay State Beach, the proposed trail will provide controlled, low-density access to the southern part of McGrath State Beach. The trail will direct visitors to areas where they can view McGrath Lake while minimizing disturbance to habitat and wildlife. This will prevent volunteer trails from being used or established in this area, and increase protection and management of McGrath Lake and the dune area west of the lake. Construction of the trail may impact some natural vegetation during development, and has the potential to impact to cultural resources that may be present in the area. DPR will need to survey these cultural resources and take measures to protect them from disturbance.

TRAIL AND BOARDWALK TO MCGRATH LAKE

An access trail and boardwalk on the east side of McGrath Lake would complement the north-south pedestrian and bike trail proposed above, and should be developed. This access to McGrath Lake will

reduce the formation of volunteer trails to a unique feature in the park. The result will be to provide an opportunity for natural resource interpretation and access while minimizing disturbance to the vegetation and wildlife. There would be a minor impact to habitats in the development of the trail and boardwalk. Potential cultural resources may be present and will be avoided.

CULTURAL RESOURCE MANAGEMENT RECOMMENDATIONS

In an effort to recognize and protect nearby evidence of prehistoric occupation in the vicinity of McGrath Lake, interpretive themes focusing on estuarine and aeolian (dune) landscape use by the ancient inhabitants of the Ventura coastline could be implemented, thereby increasing public awareness and knowledge of human adaptations to coastal environments. Moreover, the frequent environmental change that was faced throughout antiquity and the land management decisions made by the Chumash to sustain economic and ecological well being should be emphasized. However, the potential impacts to unidentified and the above archaeological sites around McGrath Lake may result in limiting visitor access.

Similarly, ethnographic evidence suggests that local botanicals, such as rush (*Juncus* sp.*)*, was used for traditional basketry and other uses. Interpretive themes could also be framed around the prehistoric use of native plants, while preserving the traditional ethnobotanical customs. Because the rush plants may be found in areas that are sensitive to impacts during wildlife breeding periods, seasonal restrictions to access interpretive areas may have to be implemented.

In both cases, focusing on the human history of the park, with an emphasis on the use of features of the landscape and local resources, can engender a holistic perspective for park users and managers that colors the future use of the park and its appreciation.

LAND ACQUISITION

Land acquisition of three locations immediately adjacent to McGrath State Beach was originally identified in the General Plan (1979). Two of these sites are recommended as acquisition or, at a minimum, a conservation easement with DPR holding the easement and managing the properties. These two sites are the lands under lease by the Berry Petroleum Co. (Assessor's Parcel Number [APN] 138008007) and the Go-cart property (APN 138008005). See Figure 12. Acquisition or control over management will allow the park staff to increase habitat quality and protect the natural resources that extend beyond the park boundaries into these areas. Not mentioned in the General Plan are two small inholdings (APN 138008002 and 138008003, see Figure 12) which should also be considered for acquisition by DPR in order to ensure the integrity of McGrath State Beach.

4.5 MANAGEMENT IMPLEMENTATION

Implementing some individual management recommendations can result in improved protection and value of the natural resources. Coordinated and planned implementation of a suite of management recommendations will provide a more comprehensive benefit. A comprehensive and coordinate approach to management is the basis of the proposed management options described in the next section. However, success of implementing management actions must be measured. Monitoring will provide the data

SOURCE: CA Dept. of Parks and Recreation, 2001 and ESA 2002.

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Figure 12

Potential Future Land Acquisitions

needed to conduct objective evaluation of the efficacy of any specific management action. A monitoring program will determine whether McGrath State Beach is meeting the objectives for management. A second component of management and its implementation is conducting research to fill data gaps and better understanding the ecological processes occurring. It is anticipated that District staff will coordinate with state and federal resources agencies, including the DFG and the USFW, when considering implementation of management recommendations that may affect sensitive natural resources.

MONITORING

Natural resources management requires monitoring to determine whether management activities are meeting their goals and objectives. The DPR has developed the Inventory, Monitoring, and Assessment Program (IMAP) and developed protocols (Appendix C) for conducting monitoring. This program identifies the need for general goals and explicit objectives in order to implement an effective monitoring program (Miner, 2001). This Natural Resources Management Plan has identified a series of objectives for the management recommendations. In some cases, additional, measurable objectives need to be determined prior to implementation of a management action and initiating a monitoring program. Management monitoring will be designed to measure the appropriate quantitative and qualitative variables at frequencies that will detect the level of changes necessary to determine whether the objectives are being met. The DPR protocols (Appendix C) are the starting point for establishing an appropriate monitoring program.

RESEARCH

Research may be conducted by parks staff or by allowing non-parks staff to conduct research. Increased information from research will help establish quantifiable objectives. The management recommendations include particular types of information that needs to be gathered in order to have a quantifiable measure of species or habitat conditions. Specifically, all the special-status species require some research to identify the population or colony sizes within McGrath State Beach. Based on that information specific quantifiable objectives can be established and future management activities measured to determine their effectiveness to maintain or improve natural resources. Some research is conducted by outside organizations such as the U.S. Fish and Wildlife Service, University of California at Santa Barbara, and the Point Reyes Bird Observatory. Only some of that information has been received by DPR and was available for developing this management plan. It is critical that these and other agencies, groups, and individuals that collect information in the park or surrounding areas make it available to parks for management purposes. McGrath State Beach will need to establish a policy of developing Memorandum or Understandings (MOUs) with these groups to identify what activities are occurring, what sorts of information is being collected, and ensure copies of all original and analyzed data are made available.

4.6 MANAGEMENT OPTIONS

McGrath State Beach management, like most public lands, must balance a defined mission to protect natural resources while meeting other goals such as recreation. Numerous specific management activities have been identified that will contribute to protecting and enhancing the natural resources of McGrath State Beach. A single, large project or action within the park would ultimately need to include many

smaller activities. Therefore, this section has created a three-tiered series of options that increase in complexity and level of effort in their implementation. These management options focus on management activities that can be accomplished within the current boundaries of McGrath State Beach and properties immediately adjacent to the park previously identified for future acquisition. However, a significant number of management recommendations are described and discussed that address issues created from sources outside the park. The order of these management options begins with the more basic, least costly activities that can be implemented then scaling up to larger areas and more complex management issues including changes in recreational facilities. In this later case, the management options consider how increasing and enhancing natural resources can be achieved while simultaneously improving and expanding recreational opportunities. Many of these recommendations in recreational improvements are derived directly from the 1979 General Plan.

MANAGEMENT OPTION 1 - NATURAL RESOURCE MAINTENANCE

This management option focuses on using restoration and exotic plant eradication to maintain a functioning set of ecosystems. Habitat functions and values in McGrath State Beach are currently being degraded due to spread of non-native exotic plants causing loss of native species. In addition, disturbance from visitor use of volunteer trails through the saltmarsh or dunes to the beach has degraded habitats that also promotes non-native species invasion. This management option uses non-native species eradication combined with restoration with native plants to re-establish the natural habitat functions and values. This level of management is essentially maintenance of conditions that should exist.

THE KEY MANAGEMENT RECOMMENDATIONS OF THIS OPTION:

Restoration

- eradicate non-native exotic plants,
- restore areas where exotic plants occupied with native species,
- restore disturbed areas such as volunteer trails with native plant species.

MANAGEMENT OPTION 2 - NATURAL RESOURCE HABITAT QUALITY PROTECTION AND ENHANCEMENT

This management option does not change the existing campground arrangement or change any facilities other than support the relocation of the residence site. The principal natural resource improvements are increased protection for sensitive habitats and associated species, and restoration to improve habitat quality.

THE KEY MANAGEMENT RECOMMENDATIONS OF THIS OPTION:

Natural Resources

Restoration

- eradicate non-native exotic plants,

- increase number of trees in campground using native willows,
- replace non-native Myoporum trees with native willows,
- develop an MOU with City of Ventura to manage vegetation associated with Santa Clara River estuary.

Recreation

- provide trails including board walks to more clearly direct visitors to the beach and McGrath Lake,
- add interpretive signs.

MANAGEMENT OPTION 3 - NATURAL RESOURCE PROTECTION, ENHANCEMENT AND EXPANSION

This management option proposes to relocate some of the existing recreational facilities and concomitantly increase the amount of vegetation and wildlife habitat (Figure 11). The proposed relocation of the residence is fully supported by this management option. Further, this management options proposes to protect additional areas in Natural Preserve units and use restoration and exotics control to increase and improve habitat quality.

THE KEY MANAGEMENT RECOMMENDATIONS OF THIS OPTION:

Natural Resources

Protection

- establish permanent protection for western snowy plover breeding and foraging areas,

Restoration

- restore the vacated campground area 3 with native riparian vegetation,
- eradicate non-native exotic plants,
- increase number of trees in campground using native willows,
- replace non-native myopurum trees with native willows.
- develop an MOU with City of Ventura to manage vegetation associated with Santa Clara River estuary.

Expansion

- expand park boundaries by completing land acquisition of adjacent properties recommended in the General Plan (1979) and shown in Figure 12,

Recreation

- relocate area 3 campground facilities to higher elevation (see Figure 10),

- increase the number of campground sites including group camping,
- provide trails including board walks to more clearly direct visitors to the beach and McGrath Lake (see Figure 11), and
- develop interpretive signs.

4.7 ADAPTIVE MANAGEMENT

Management and the implementation of activities designed to meet specific goals and objectives are often based on desired outcomes such as improving or enhancing some environmental condition. Developing goals and objectives is often based on assumptions, generally derived from other examples or cases that implementing a management activity such as restoration with native vegetation will result in an increase in habitat quality. The success of meeting the natural resource objectives is largely based on our understanding of existing conditions including the ecological processes that determine those conditions. Therefore, the more we know about the ecology of the vegetation, wildlife and underlying physical factors that affect them, the more confidence we may have in the basis of our assumptions for implementing restoration activities that will lead to improving habitat quality.

Our understanding of the existing conditions and underlying processes is tested when we attempt to achieve an objective of habitat enhancement. Fortunately, it has become recognized that not meeting a specific goal on the first try does not necessarily mean failure. McGrath State Beach District staff have initiated a resource protection program for the federally listed Threatened western snowy plover. This program is based on information from studies at other State Parks and from federal and state resource agencies that some human activities in close proximity to western snowy plover nesting sites can reduce nesting success (see Western Snowy Plover section in Chapter 3 Existing Conditions). The McGrath State Beach program includes establishing protective fencing around nesting areas identified during previous field observations. Regular monitoring of western snowy plover nests is conducted to evaluate the number and success rate for these nests. This monitoring will help to determine whether the fencing is providing some protection for the plovers. Additional management actions may be taken and data from the monitoring may help determine a potential quantitative goal for the McGrath State Beach breeding colony.

Management recommendations for natural resources at McGrath State Beach were developed based on the information from the existing conditions and processes. In most cases, management activities could be identified and specific management activities developed to meet those objectives whose implementation is assumed to result in achieving a specified goal. This may be adequate for many of the management recommendations. Unfortunately, the lack of data on sensitive species populations and other natural resources limit our ability to identify specific objectives. This level of uncertainty results in more qualitative measures being used and requires that most of the objectives will need to be revisited as monitoring data is collected.

The management recommendations identified in this natural resources management plan were developed with the assumption that increasing, restoring, and enhancing natural plant communities will result in

benefits to species and the ecosystems. Implementation of each objective and the associated management activities will require appropriate frequency and level of monitoring to determine whether the objective is being met. Vegetation restoration and exotic plant eradication can be qualitatively and quantitatively measured using standard field methods of plant ecology. Evaluating whether the result of the restoration and exotics eradication is having a broader habitat quality benefit will require expanding the monitoring program to include observations of wildlife use.

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CHAPTER 6.0

DEFINITIONS

CHAPTER 6.0
DEFINITIONS

A geologic province is an area that possesses similar bedrock, structure, history, and age (California has 11 geologic provinces).

A syncline is a geologic feature in which sediments and/or rock are folded into a downward arch. The axis of the syncline is therefore flanked by limbs of material that have been folded upward.

An "active" fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A "potentially active" fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. "Sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

g is gravity = 980 centimeters per second squared

The maps are typically expressed in terms of probability of exceeding a certain ground motion. For example, the 10 percent probability of exceedance in 50 years maps depict an annual probability of 1 in 475 of being exceeded each year. This level of ground shaking has been used for designing buildings in high seismic areas. The maps for 10 percent probability of exceedance in 50 years show ground motions that geologists and seismologists do not think will be exceeded in the next 50 years. In fact, there is a 90 percent chance that these ground motions will not be exceeded. This probability level allows engineers to design buildings for larger ground motions that geologists and seismologists think will occur during a 50-year interval, which make buildings safer than if there were only designed for the ground motions that are expected to occur in the next 50 years. Seismic shaking maps are prepared using consensus information on historical earthquakes and faults. These levels of ground shaking are used primarily for formulating building codes and for designing buildings. The maps can also be used for estimating potential economic losses and preparing for emergency response (Peterson et al., 1999).

The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. The damage, however, will not be uniform. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance (ABAG, 1998).

A 25-year storm event has a one in 25 (or 4%) probability of occurring in any given year. A 100-year storm event has a one in 100 (or 1%) probability of occurring in any given year.

CHAPTER 7.0

ACKNOWLEDGEMENTS

CHAPTER 7.0
ACKNOWLEDGEMENTS

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APPENDIX A

HISTORIC AERIAL PHOTOS

SOURCE: University of California, and Environmental Science Associates, 2002

Appendix A
1929 - Aerial Photograph of
McGrath State Beach,
Santa Clara River, and Vicinity

SOURCE: University of California, and Environmental Science Associates, 2002

Appendix A
1959 - Aerial Photograph of
McGrath State Beach,
Santa Clara River, and Vicinity

SOURCE: University of California, and Environmental Science Associates, 2002

Appendix A
1969 - Aerial Photograph of
McGrath State Beach,
Santa Clara River, and Vicinity

SOURCE: University of California, and Environmental Science Associates, 2002

Appendix A
1970 - Aerial Photograph of
McGrath State Beach,
Santa Clara River, and Vicinity

SOURCE: University of California, and Environmental Science Associates, 2002

Appendix A
1978 - Aerial Photograph of
McGrath State Beach,
Santa Clara River, and Vicinity

SOURCE: University of California, and Environmental Science Associates, 2002

Appendix A
1987 - Aerial Photograph of
McGrath State Beach,
Santa Clara River, and Vicinity

APPENDIX B

SEISMIC ACTIVITY TABLE

APPENDIX B

MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Acceleration
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0015 g[a]
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	< 0.0015 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	< 0.0015 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.015–0.02 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.03–0.04 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.06–0.07 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.10–0.15 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.25–0.30 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.50–0.55 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 0.60 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 0.60 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 0.60 g

APPENDIX C

DPR PROTOCOLS FOR INVENTORY AND MONITORING

Inventory & Monitoring Protocols – Plant Communities One time use of any of these levels is inventory, monitoring requires multi-time use.			
Survey Level	**Questions**	**Methods**	**Products**
Preliminary (office-oriented)	• What plant communities are documented at the unit?	• Conduct literature and database searches **(1, 4, 5)** • Consult with knowledgeable persons and agencies **(4)** • Review any existing documents for the site **(4)**	• A list of plant communities that are known to occur at the unit from past site visits and studies.
Reconnaissance (field-oriented)	• What are the plant communities that exist at the unit and what are their condition? • Is the plant community new to, or absent from, the unit compared to previous years?	• Methods outlined in the Preliminary Level plus: • Walk-through, drive-by, fly-over, and look at photos of the site • List plant communities observed and their condition **(2)** • Have experts verify communities in question • Take general photos of the site **(3)**	• Completed annual inspection and questionnaire • Rapid assessment of plant communities present and their condition
Baseline (field-oriented)	• What is the species composition of the plant communities at the unit? • Is there a change in species composition of the plant communities?	• Methods outlined in the Preliminary Level plus: • Conduct site visits to all suitable habitat types during the appropriate blooming period for proper identification. • Take photos, make general observations of the site, note associated taxa. **(3)** • Have experts verify the identification of taxa that are in question. • Use the Sawyer-Keeler-Wolf plant communities classification system to identify plant communities at the unit. **(2)** • Determine species composition by using the releve sampling method ** **(2, 5)** • Repeat the above periodically and compare results to previous years (Monitoring).	• Products of the Preliminary Level plus: • Plant community descriptions and species composition lists for each plant community type. • Detection of trends and changes
	• Where are the plant communities located in the unit and in relation to each other (i.e., what is the spatial distribution pattern)? • Is there a change in areal extent, total vegetation cover, density, patch size or shape, or % canopy cover of the plant communities compared to previous years?	• Methods outlined in the Preliminary Level plus: • Visit the unit with aerial photographs and topographic maps. • Establish photo stations. (3) • Use digital imagery to digitize the plant community polygons or use GPS to map polygons in the field to create GIS maps. • Use the ArcView or ArcInfo software to create maps. • Repeat the above periodically and compare results to previous years (Monitoring).	• Products of the Preliminary Level plus: • A GIS map with plant community site locations mapped as polygons • Calculation of acreage of each plant community type using GIS. • Photos of plant communities at the unit. • Detection of changes and trends in spatial distribution patterns.

Inventory & Monitoring Protocols – Plant Communities One time use of any of these levels is inventory, monitoring requires multi-time use.			
Survey Level	**Questions**	**Methods**	**Product**
Comprehensive (field-oriented)	• What plant species associations exists within the various plant communities (Alliances) at the unit? • Is there a change in: species composition, stand composition, species richness, plant community structure, height or age class distributions, mortality or disease, dominant taxa, condition of the community % cover, relative abundance, distribution of taxa, reproduction/recruitment, type of severity of impacts, timing of phenological changes of taxa within the community, number of snags, or duff and litter accumulation compared to previous years?	• Methods outlined in the Preliminary Level plus: • Use releve sampling protocol to obtain data on species composition, stand composition, and/or species richness. **(5)** • Collect data along transects and in quadrats to determine community structure, height or age classes, mortality, disease, % cover, density. **(4)** • Use the Sawyer-Keeler-Wolf "Manual of California Vegetation" to determine what plant community association has been described. **(2)** • Use statistics to analyze transect and quadrat data. **(4)** • Classify vegetation associations using TWINSPAN, CANOCO, or other multivariate statistical program. **(1)** • Repeat the above periodically and compare results to previous years (Monitoring).	• Products of the Preliminary Level plus: • A list of plant communities at the Association *** (a subcategory of the Alliance Level) Level. • Detailed species composition lists for each plant association and each plant community. • Detect changes and trends. • Data on various components of the community.
Intensive (field & laboratory-oriented)	• Questions related to the ecology of the plant community type and relationship between organisms. • Is the ecology of the plant community type changing?	• Methods will be dependent upon the nature of the question and the plant community type. Standard protocols, when available and applicable, should be employed. • Repeat the above periodically and compare results to previous years (Monitoring).	• Detailed and intensive studies and reports on an attribute of interest with regard to a plant community type at the unit or specific interactions between components within the community. • Detect changes and trends.

Inventory & Monitoring Protocols – Plant Communities

References:

1) Barry J. 2000. *Handbook for Vegetation Inventory Monitoring and Assessment of the California State Park System.* (unpublished report). Obtain from the California State Parks headquarters IMPA team, Sacramento

2) Sawyer, John O. and Todd Keeler-Wolf. 1995. *A Manual of California Vegetation.* Published by the California Native Plant Society. 471pp. ISBM (softcover) 0-943460-26-2; ISBM (hardcover) 0-943460-25-5. Obtain a copy by ordering from the California Native Plant Society, 1722 J Street, Suite 17, Sacramento, CA 95814. Phone 916-447-2677. Or order on the California Native Plant Society Bookstore website at: www.CNPS.org/bookstore/sellers.htm

3) Magil, A.W. 1989. *Monitoring Environmental Change with Color Slides.* General Technical Report PSW-117. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Dept. of Agriculture. 55pp. To obtain contact: Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, CA 94701 or online at the USDA Forest Service Pacific Southwest Research Station Publications at: www.psw.fs.fed.us/techpub.html

4) Elzinga, C.L., D.W. Salzer, J.W. Willoughby, & J.P. Gibbs. 2001. *Monitoring Plant and Animal Populations.* Blackwell Science, Inc., Massachusetts. 360 pp. ISBN (softcover) 0-632-04442-X. Obtain copy from on-line bookstores.

5) California Native Plant Society, Vegetation Program website at: www.cnps.org/vegetation/protocol.htm for releve sampling protocols.

** The releve sampling method is used to classify vegetation. The releve plot is positioned to be within a homogeneous patch of vegetation. Percent cover is noted for all observed taxa. Details on releve plot sampling methodology can be obtained from the CNPS website address listed in Reference #5 above.

*** The Association Level from “A Manual of California Vegetation” (1995) by Sawyer-Keeler-Wolf is not well-defined for all Series (i.e., not all Series are further broken down into Associations).

APPENDIX D

PLANT SPECIES AT MCGRATH STATE BEACH

APPENDIX D

VASCULAR PLANTS IDENTIFIED AT MCGRATH STATE BEACH

Family	Scientific Name	Common Name
Aizoaceae		
	Carpobrotus chilensis	Sea fig
	Carpobrotus edulis	Hottentot fig
	Mesembryanthemum crystallinum	Crystalline iceplant
	Tetragonia tetragonioides	New Zealand spinach
Amaranthaceae		
	Amaranthus albus	Tumbleweed
Anacardiaceae		
	Toxicodendron diversilobum	Western poison oak
Apiaceae (Umbelliferae)		
	Apium graveolens	Celery
	Berula erecta	Cutleaf water-parsnip
	Conium maculatum	Poison hemlock
	Foeniculum vulgare	Fennel
	Hydrocotyle umbellata *	Marsh pennywort
	Hydrocotyle verticillata	Whorled marsh pennywort
Asteraceae (Compositae)		
	Amblyopappus pusillus	Amblyopappus
	Ambrosia chamissonis	Beach-bur
	Ambrosia psilostachya	Western ragweed
	Artemisia biennis *	Biennial sagewort
	Artemisia californica	California sagebrush
	Artemisia douglasiana	Mugwort
	Artemisia dracunculus	Tarragon
	Aster subulatus var. *ligulatus*	Water aster
	Baccharis douglasii	Marsh baccharis
	Baccharis pilularis	Coyote brush
	Baccharis salicifolia	Mulefat
	Bidens laevis	Bur-marigold
	Carduus pycnocephalus	Italian thistle
	Centaurea melitensis	Tocalote

* Inclusion based on "reliable record" from R. Sermon, 1977 (Fosbrink, 1998).

Family	Scientific Name	Common Name
	Chaenactis glabriuscula var. *lanosa*	Yellow pincushion
	Chamomilla suaveolens	Pineapple weed
	Cirsium occidentale	Cobweb thistle
	Cirsium vulgare	Bull thistle
	Conyza bonariensis	Flax-leaved fleabane
	Conyza Canadensis	Horseweed
	Conyza coulteri	Marsh horseweed
	Cotula coronopifolia	Brass buttons
	Encelia californica	California encelia
	Ericameria ericoides	Mock heather
	Euthamia occidentalis	Western goldenrod
	Gnaphalium californicum	California cudweed
	Gnaphalium canescens ssp. *Microcephalum*	White everlasting
	Gnaphalium luteo-album	Common cudweed
	Gnaphalium ramosissimum	Pink everlasting
	Grindelia stricta var. *platyphylla* †	Gum plant
	Hedypnois cretica	Cretan hedypnois
	Helianthus annuus	Common sunflower
	Heterotheca grandiflora	Telegraph weed
	Heterotheca sessiliflora	False goldenaster
	Hypochaeris glabra	Smooth cat's ear
	Hypochaeris radicata	Rough cat's ear
	Isocoma menziesii var. *vernonioides*	Goldenbush
	Jaumea carnosa	Jaumea
	Lactuca biennis	Tall blue lettuce
	Lactuca serriola	Prickly lettuce
	Lessingia filaginifolia var. *filaginifolia*	California aster
	Microseris douglasii	Douglas' microseris
	Picris echioides	Bristly ox-tongue
	Pluchea odorata	Salt marsh fleabane
	Senecio flaccidus var. *douglasii*	Douglas ragwort
	Senecio vulgaris	Groundsel
	Silybum marianum	Milk thistle
	Sonchus asper	Prickly sow thistle
	Sonchus oleraceus	Common sow thistle
	Stephanomeria virgata ssp. *pleurocarpa*	Wand stephanomeria
	Xanthium spinosum	Spiny cocklebur
	Xanthium strumarium	Cocklebur

† ESA is sole source.

Family	Scientific Name	Common Name
Azollaceae		
	Azolla filiculoides	Duckweed fern
Boraginaceae		
	Amsinckia spectabilis var. *spectabilis*	Seaside fiddleneck
	Cryptantha clevelandii	Cleveland's cryptantha
	Cryptantha leiocarpa	Coast cryptantha
	Heliotropium curassavicum	Heliotrope
	Pectocarya penicillata	Winged pectocarya
Brassicaceae (Cruciferae)		
	Brassica nigra	Black mustard
	Brassica rapa	Field mustard
	Cakile maritima	Sea rocket
	Draba verna †	Whitlow grass
	Hirschfeldia incana	Shortpod mustard
	Lepidium nitidum var. *nitidum*	Peppergrass
	Lobularia maritima	Sweet alyssum
	Raphanus sativus	Wild radish
	Rorippa nasturtium-aquaticum	Water cress
Cactaceae		
	Opuntia littoralis	Coast prickly pear
	Opuntia prolifera	Cholla
Caprifoliaceae		
	Sambucus mexicana	Blue elderberry
Caryophyllaceae		
	Herniaria hirsuta ssp. *hirsuta*	Grey herniaria
	Silene gallica	Windmill pink
	Spergularia bocconii	Sand-spurrey
	Spergularia marina	Salt sand-spurrey
Chenopodiaceae		
	Allenrolfea occidentalis ‡	Iodine bush
	Atriplex californica	California saltbush
	Atriplex lentiformis ssp. *lentiformis*	Big saltbush
	Atriplex leucophylla	Sea-scale
	Atriplex patula §	Spear oracle
	Atriplex semibaccata	Australian saltbush
	Atriplex triangularis	Spearscale
	Bassia hyssopifolia	Five-horn bassia

† ESA is sole source.

‡ Inclusion based on "reliable record" from J. Timbrook, 1985 (Fosbrink, 1998).

§ Inclusion based on "reliable record" from B. Muns, 1977 (Bosbrink, 1998).

Family	Scientific Name	Common Name
	Beta vulgaris	Beet
	Chenopodium album	White goosefoot
	Chenopodium ambrosioides	Mexican tea
	Chenopodium macrospermum var. *halophilum*	Coast goosefoot
	Chenopodium murale	Nettle-leaved goosefoot
	Salicornia subterminalis	Parish's pickleweed
	Salicornia virginica	Pickleweed
	Salsola tragus	Tumbleweed
	Suaeda californica	California sea-blite
Convolvulaceae		
	Calystegia macrostegia	Island morning glory
	Calystegia soldanella	Beach morning glory
	Convolvulus arvensis	Bindweed
Crassulaceae		
	Crassula connata	Pygmy-weed
	Dudleya caespitosa **	Live forever
Cucurbitaceae		
	Cucurbita foetidissima	Calabazilla
Cupressaceae		
	Cupressus macrocarpa	Monterey cypress
Cuscutaceae		
	Cuscuta californica	Dodder
	Cuscuta salina §	Saltmarsh dodder
Cyperaceae		
	Carex sp.	Sedge
	Carex praegracilis	Field sedge
	Cyperus eragrostis	Nutsedge
	Cyperus esculentus	Flatsedge
	Cyperus involucratus §	Umbrella plant
	Cyperus odoratus *	Fragrant flatsedge
	Eleocharis parishii	Parish's spikerush
	Scirpus acutus var. *occidentalis*	Hardstem Bulrush
	Scirpus californicus	California tule
	Scirpus maritimus	Maritime tule
Equisetaceae		
	Equisetum hyemale ssp. *affine*	Common scouring rush

** Inclusion based on "reliable record" from Munro and Steck, 1998 (Fosbrink, 1998).

* Inclusion based on "reliable record" from R. Sermon, 1977 (Fosbrink, 1998).

Family	Scientific Name	Common Name
Euphorbiaceae		
	Croton californicus	California croton
	Euphorbia peplus	Petty spurge
	Ricinus communis	Castor bean
Fabaceae (Leguminosae)		
	Acacia phyllodea	Acacia
	Astragalus pycnostachyus var. *lanosissimus*	Ventura marsh milk-vetch
	Lotus junceus var. *biolettii*	Coast trefoil
	Lotus scoparius var. *scoparius*	Deerweed
	Lotus strigosus	Strigose lotus
	Lupinus arboreus	Coastal bush lupine
	Lupinus chamissonis ††	Dune bush lupine
	Medicago polymorpha	Burclover
	Melilotus alba	White sweetclover
	Melilotus indica	Yellow sourclover
	Melilotus officinalis	Sweetclover
	Trifolium repens	Creeping clover
Frankeniaceae		
	Frankenia salina	Alkali heath
Geraniaceae		
	Erodium botrys	Red filaree
	Erodium cicutarium	Filaree
	Erodium moschatum	White-stem filaree
Haloragaceae		
	Myriophyllum aquaticum	Parrot's feather
Hydrophyllaceae		
	Eriodictyon crassifolium	Thick-leaf yerba santa
	Phacelia distans	Common phacelia
	Phacelia ramosissima var. *austrolitoralis*	Stinging phacelia
Juncaceae		
	Juncus acutus ssp. *leopoldii*	Spine-tipped rush
	Juncus balticus	Baltic rush
	Juncus patens ‡	Rush
	Juncus rugulosus ‡	Wrinkled rush
Lamiaceae		
	Marrubium vulgare	Horehound
	Salvia leucophylla	Purple sage
	Salvia mellifera	Black sage

†† Inclusion based on "reliable record" from J. Bowland, 1994 (Fosbrink, 1998).
‡ Inclusion based on "reliable record" from J. Timbrook, 1985 (Fosbrink, 1998).

Family	Scientific Name	Common Name
	Stachys ajugoides	Hedgenettle
	Trichostema lanceolatum	Vinegar weed
Liliaceae		
	Agave sp.	Agave
Lythraceae		
	Lythrum hyssopifolium	Loosestrife
Malvaceae		
	Malva neglecta	Common allow
	Malvella leprosa	Alkali mallow
Myoporaceae		
	Myoporum laetum	Ngaio tree
Myrtaceae		
	Eucalyptus globulus	Blue gum
Nyctaginaceae		
	Abronia maritime	Red sand verbena
	Abronia umbellate ssp. *umbellata*	Pink sand verbena
Onagraceae		
	Camissonia bistorta ‡‡	California sun-cup
	Camissonia cheiranthifolia ssp. *suffruticosa*	Beach evening primrose
	Epilobium sp.	Fireweed
	Epilobium ciliatum ssp. *ciliatum*	Fireweed
	Oenothera elata ssp. *hirsutissima* *	Hairy evening primrose
	Oenothera elata ssp. *hookeri*	Hooker's primrose
	Oenothera glazioviana	Evening primrose
Plantaginaceae		
	Plantago lanceolata	European plantain
	Plantago major	Common plantain
	Plantago ovata	Desert plantain
Poaceae (Gramineae)		
	Ammophila arenaria	European beachgrass
	Arundo donax	Giant reed
	Avena barbata	Slender wild oats
	Avena fatua	Wild oats
	Bromus carinatus	California brome
	Bromus catharticus	Rescue grass
	Bromus diandrus	Ripgut
	Bromus hordeaceus	Soft chess
	Bromus madritensis ssp. *rubens*	Red brome

‡‡ Inclusion based on Ventura Sector Collection (Fosbrink, 1998).

* Inclusion based on "reliable record" from R. Sermon, 1977 (Fosbrink, 1998).

Family	Scientific Name	Common Name
	Bromus tectorum	Cheatgrass
	Cortaderia selloana	Pampas grass
	Cynodon dactylon	Bermuda grass
	Distichlis spicata	Saltgrass
	Eragrostis mexicana	Mexican lovegrass
	Hordeum marinum ssp. *gussoneanum*	Mediterranean barley
	Lamarckia aurea	Goldentop
	Leptochloa uninervia	Mexican sprangletop
	Leymus triticoides	Creeping wildrye
	Lolium multiflorum	Italian ryegrass
	Monanthochloë littoralis	Shoregrass
	Parapholis incurve	Sickle grass
	Pennisetum clandestinum	Kikuyu grass
	Piptatherum miliaceum	Smilo grass
	Polypogon monspeliensis	Rabbitfoot grass
	Schismus arabicus	Mediterranean grass
	Schismus barbatus	Mediterranean grass
	Vulpia bromoides	Annual fescue
	Vulpia myuros	Annual fescue
Polygonaceae		
	Eriogonum cinereum *	Coastal buckwheat
	Eriogonum parvifolium	Sea-cliff buckwheat
	Polygonum amphibium	Water smartweed
	Polygonum arenastrum	Common knotweed
	Polygonum lapathifolium	Willow weed
	Rumex crispus	Curly dock
	Rumex hymenosepalus	Wild rhubarb
	Rumex salicifolius	Willow dock
Potamogetonaceae		
	Potamogeton foliosus var. *foliosus*	Leafy pondweed
	Ruppia maritima	Ditch grass
Primulaceae		
	Anagallis arvensis	Scarlet pimpernel
Ranunculaceae		
	Ranunculus sp. †	Buttercup
Rosaceae		
	Potentilla anserina ssp. *pacifica*	Pacific silverweed
	Rubus ursinus	California blackberry

† ESA is sole source.

Family	Scientific Name	Common Name
Salicaceae		
	Populus fremontii ssp. *fremontii*	Fremont cottonwood
	Salix exigua	Narrow-leaved willow
	Salix laevigata	Red willow
	Salix lasiolepis	Arroyo willow
Saururaceae		
	Anemopsis californica	Yerba mansa
Scrophulariaceae		
	Cordylanthus maritimus ssp. *maritimus* §§	Salt marsh bird's beak
	Mimulus aurantiacus	Sticky monkeyflower
	Mimulus floribundus	Monkeyflower
	Scrophularia californica	California figwort
Solanaceae		
	Datura stramonium	Jimson weed
	Datura wrightii	Toluaca
	Nicotiana glauca	Tree tobacco
	Solanum douglasii	Douglas' nightshade
	Solanum nigrum	Black nightshade
	Solanum xanti	Purple nightshade
Tamaricaceae		
	Tamarix ramosissima	Saltcedar
Typhaceae		
	Typha angustifolia	Narrow-leaved cattail
	Typha latifolia	Broad-leaved cattail
Urticaceae		
	Urtica dioica ssp. *holosericea*	Hoary nettle
	Urtica urens	Dwarf nettle
Verbenaceae		
	Verbena lasiostachys	Western vervain

§§ This species does not occur within the boundaries of the park, however, it does occur 9 miles south at Ormond Beach.

APPENDIX E

WILDLIFE SPECIES AT MCGRATH STATE BEACH

APPENDIX E

WILDLIFE OF THE PROJECT AREA

Order	Scientific Name	Common Name
Amphibians		
ORDER CAUDATA		
	Taricha torosa	California newt
	Aneides lugubris	Arboreal salamander
	Batrachoseps attenuatus	California slender salamander
	Ensatina eschscholtzi	Ensatina
ORDER ANURA		
	Scaphiopus hammondi	Western spadefoot toad
	Bufo boreas	Western toad
	Bufo microscaphus	Southwestern toad
	Hyla californiae	California treefrog
	Hyla regilla	Pacific treefrog
	Rana aurora draytonii	California red-legged frog
	Rana catesbeiana	Bullfrog
Reptiles		
ORDER SQUAMATA		
	Anniella pulchra	California legless lizard
	Clemmys marmorata	Western pond turtle
	Coleonyx variegatus	Banded gecko
	Coluber constrictor	Racer
	Cnemidophorus tigris	Western whiptail
	Crotalus viridis	Western rattlesnake
	Diadophis punctatus	Ringneck snake
	Eumeces skiltonianus	Western snake
	Gerrhonotus multicarinatus	Sothern alligator lizard
	Hypsiglena torquata	Night snake
	Lampropeltis getulus	Common kingsnake
	Leptotyphlops humilis	Western blind snake
	Masticophis flagellum	Coachwhip
	Masticophis lateralis	Striped racer
	Phrynosoma coronatum	Coast horned lizard

Order	Scientific Name	Common Name
	Pituophis melanoleucas	Gopher snake
	Rhinoceilus lecontei	Long-nosed snake
	Salvadora hexalepis	Western patch-nosed snake
	Sceloporus occidentalis	Western fence lizard
	Tantilla planiceps	Western black-headed snake
	Thamnophis couchi	Western aquatic garter snake
	Thamnophis sirtalis	Common garter snake
	Trimorhodon vandenburghi	California lyre snake
	Uta stansburiana	Side-blotched lizard
Birds		
ORDER GAVIIFORMES		
	Gavia arctica	Arctic loon
	Gavia immer	Common loon
	Gavia stellata	Red-throated loon
ORDER PODICIPEDIFORMES		
	Aechmophorus occidentalis	Western grebe
	Podiceps auritus	Horned grebe
	Podiceps nigricollis	Eared grebe
ORDER PELICANIFORMES		
	Pelecanus occidentalis	Brown pelican
ORDER CICONIIFORMES		
	Ardea herodias	Great blue heron
	Butorides virescens	Great heron
	Botarus lentiginosus	American bittern
	Bubulcus ibis	Cattle egret
	Cathartes aura	Turkey vulture
	Egretta thula	Snowy egret
	Ixobrychus exilis	Least bittern
	Nycticorax nycticorax	Black-crowned night heron
ORDER ANSERIFORMES		
	Anser albifrons	White-fronted goose
	Branta canadensis	Canada goose
	Anas acuta	Pintail
	Anas americana	American wigeon
	Anas crecca carolinensis	Green-winged teal
	Anas cylpeata	Northern shoveler
	Anas cyanotera	Cinammon teal
	Anas discors	Blue-wing teal

Order	Scientific Name	Common Name
	Anas platyrhynchos	Mallard
	Anas strepera	Gadwall
	Aythya affinis	Lesser scaup
	Aythya americana	Redhead
	Aythya collaris	Ring-necked duck
	Aythya marila	Greater scaup
	Aythya valisineria	Canvasback
	Bucephala albeola	Bufflehead
	Bucephala islandica	Barrows goldeneye
	Clangula hyemalis	Long-tailed duck
	Histrionicua histrionicus	Harlequin duck
	Melanitta deglandi	White-winged scoter
	Melanitta perspicillata	Surf scoter
	Melanitta nigra	Black scoter
ORDER FALCONIFORMES		
	Accipiter cooperii	Cooper's hawk
	Accipiter striatus	Sharp-shinned hawk
	Buteo jamaicensis	Red-tailed hawk
	Buteo linneatus	Red-shouldered hawk
	Haliaeetus leucocephalus	Bald eagle
	Circus cyaneus	Northern harrier
	Pandion haliaetus	Osprey
	Falco peregrinus	Peregrine falcon
	Falco sparverius	American kestrel
	Elanus leucrurus	White-tailed kite
ORDER GALLIFORMES		
	Callipepla californica	California quail
ORDER GRUIFORMES		
	Laterallus jamaicensis	Black Rail
	Rallus longirostris	Clapper Rail
	Rallus limicola	Virginia Rail
	Porzana carolina	Sora
	Gallinula chloropus	Common Moorhen
	Fulica Americana	American Coot
ORDER CHARADRIIFORMES		
	Pluvialis squatarola	Black-bellied plover
	Charadrius alexandrinus	Western snowy plover
	Charadrius semipalmatus	Semipalmated plover

Order	Scientific Name	Common Name
	Charadrius vociferus	Killdeer
	Himantopus mexicanus	Black-necked stilt
	Recurvirostra americana	American avocet
	Tringa melanoleuca	Greater Yellowlegs
	Tringa flavipes	Lesser Yellowlegs
	Tringa solitaria	Solitary Sandpiper
	Catoptrophorus semipalmatus	Willet
	Heteroscelus incanus	Wandering Tattler
	Actitis macularia	Spotted Sandpiper
	Numenius phaeopus	Whimbrel
	Numenius americanus	Long-billed Curlew
	Limosa fedoa	Marbled Godwit
	Arenaria interpres	Ruddy Turnstone
	Arenaria melanocephala	Black Turnstone
	Aphriza virgata	Surfbird
	Calidris canutus	Red Knot
	Calidris alba	Sanderling
	Calidris mauri	Western Sandpiper
	Calidris minutilla	Least Sandpiper
	Calidris melanotos	Pectoral Sandpiper
	Calidris alpina	Dunlin
	Limnodromus griseus	Short-billed Dowitcher
	Limnodromus scolopaceus	Long-billed Dowitcher
	Gallinago delicata	Wilson's Snipe
	Phalaropus tricolor	Wilson's Phalarope
	Phalaropus lobatus	Red-necked Phalarope
	Phalaropus fulicarius	Red Phalarope
	Larus philidelphia	Bonaparte's gull
	Larus heermanni	Heermann's gull
	Larus canus	Mew gull
	Larus delawarensis	Ring-billed gull
	Larus californicus	California gull
	Larus argentatus	Herring gull
	Larus thayeri	Thayer's Gull
	Larus occidentalis	Western gull
	Larus glaucescens	Glaucous-winged gull
	Sterna caspia	Caspian tern
	Thalseus maximus	Royal tern

Order	Scientific Name	Common Name
	Thalsseus elegans	Elegant tern
	Sterna hirundo	Common tern
	Sterna forsteri	Forster's tern
	Sterna albifrons	Least tern
ORDER COLOMBIFORMES		
	Columba livia	Rock dove
	Streptopelia decaocto	Eurasian Collared-Dove
	Streptopelia chinensis	Spotted dove
	Zenaida macroura	Mourning dove
	Columbina passerina	Common Ground-Dove
ORDER STRIGIFORMES		
	Tyto alba	Barn owl
	Otus kennicottii	Western Screech-Owl
	Bubo virginianus	Great-horned owl
	Asia flammeus	Short-eared owl
ORDER CAPRIMULGIFORMES		
	Chordeiles acutipennis	Lesser nighthawk
ORDER APODIFORMES		
	Chaetura pelagica	Vaux's swift
	Aeronautes saxatilis	White-throated swift
	Archilochus alexandri	Black-chinned hummingbird
	Calypte anna	Anna's hummingbird
	Calypte costae	Costa's hummingbird
	Selasphorus sasin	Allen's humminbird
ORDER CORACIIFORMES		
	Ceryle alcyon	Belted kingfisher
ORDER PICIFORMES		
	Sphyrapicus ruber	Red-breasted Sapsucker
	Picoides nuttallii	Nuttall's Woodpecker
	Picoides pubescens	Downy Woodpecker
	Picoides villosus	Hairy Woodpecker
	Colaptes auratus	Northern Flicker
ORDER PASSERIFORMES		
	Contopus cooperi	Olive-sided Flycatcher
	Contopus sordidulus	Western Wood-Pewee
	Empidonax traillii	Willow Flycatcher
	Empidonax hammondii	Hammond's Flycatcher
	Empidonax oberholseri	Dusky Flycatcher

Order	Scientific Name	Common Name
	Myiarchus cinerascens	Ash-throated Flycatcher
	Empidonax difficilis	Pacific-slope Flycatcher
	Sayornis nigricans	Black Phoebe
	Sayornis saya	Say's Phoebe
	Tyrannus vociferans	Cassin's Kingbird
	Tyrannus verticalis	Western Kingbird
	Lanius ludovicianus	Loggerhead Shrike
	Vireo bellii	Bell's Vireo
	Vireo cassinii	Cassin's Vireo
	Vireo huttoni	Hutton's Vireo
	Vireo gilvus	Warbling Vireo
	Aphelocoma californica	Western Scrub-Jay
	Corvus brachyrhynchos	American Crow
	Corvus corax	Common Raven
	Eremophila alpestris	Horned Lark
	Progne subis	Purple Martin
	Tachycineta bicolor	Tree Swallow
	Tachycineta thalassina	Violet-green Swallow
	Stelgidopteryx serripennis	Northern Rough-winged Swallow
	Petrochelidon pyrrhonota	Cliff Swallow
	Hirundo rustica	Barn Swallow
	Baeolophus inornatus	Oak Titmouse
	Psaltriparus minimus	Bushtit
	Sitta Canadensis	Red-breasted Nuthatch
	Sitta carolinensis	White-breasted Nuthatch
	Certhia Americana	Brown Creeper
	Thryomanes bewickii	Bewick's Wren
	Troglodytes aedon	House Wren
	Troglodytes troglodytes	Winter Wren
	Cistothorus palustris	Marsh Wren
	Regulus satrapa	Golden-crowned Kinglet
	Regulus calendula	Ruby-crowned Kinglet
	Polioptila caerulea	Blue-gray Gnatcatcher
	Polioptila californica	California Gnatcatcher
	Sialia mexicana	Western Bluebird
	Catharus ustulatus	Swainson's Thrush
	Catharus guttatus	Hermit Thrush
	Turdus migratorius	American Robin

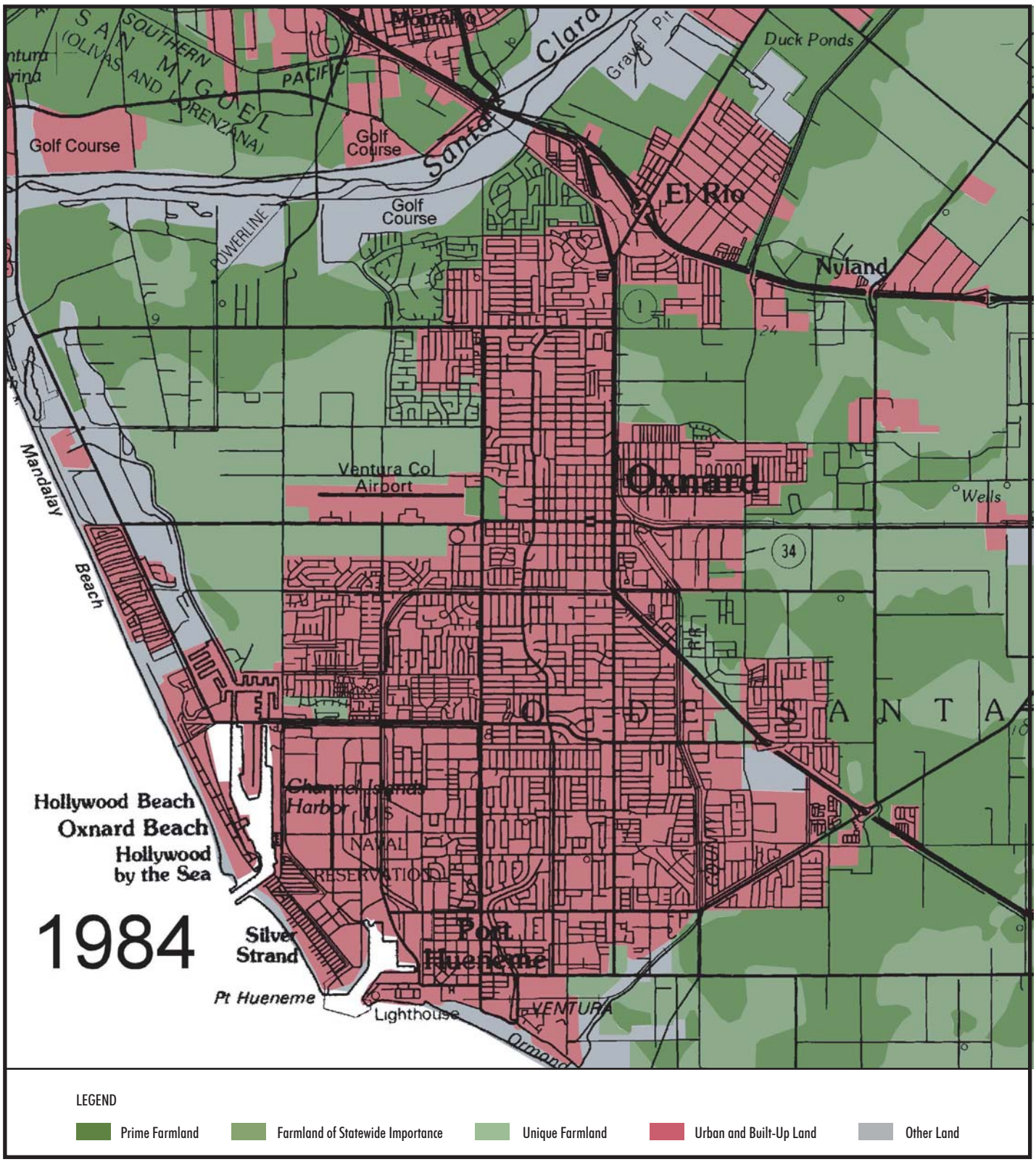
Order	Scientific Name	Common Name
	Ixoreus naevius	Varied Thrush
	Chamaea fasciata	Wrentit
	Mimus polyglottos	Northern Mockingbird
	Toxostoma redivivum	California Thrasher
	Sturnus vulgaris	European Starling
	Anthus rubescens	American Pipit
	Bombycilla cedrorum	Cedar Waxwing
	Vermivora celata	Orange-crowned Warbler
	Vermivora ruficapilla	Nashville Warbler
	Dendroica petechia	Yellow Warbler
	Dendroica coronata	Yellow-rumped Warbler
	Dendroica nigrescens	Black-throated Gray Warbler
	Dendroica townsendi	Townsend's Warbler
	Dendroica occidentalis	Hermit Warbler
	Dendroica palmarum	Palm Warbler
	Oporornis tolmiei	MacGillivray's Warbler
	Geothlypis trichas	Common Yellowthroat
	Wilsonia pusilla	Wilson's Warbler
	Icteria virens	Yellow-breasted Chat
	Piranga ludoviciana	Western Tanager
	Pipilo maculates	Spotted Towhee
	Pipilo crissalis	California Towhee
	Spizella passerine	Chipping Sparrow
	Spizella atrogularis	Black-chinned Sparrow
	Pooecetes gramineus	Vesper Sparrow
	Chondestes grammacus	Lark Sparrow
	Passerculus sandwichensis	Savannah Sparrow
	Ammodramus savannarum	Grasshopper Sparrow
	Passerella iliaca	Fox Sparrow
	Melospiza melodia	Song Sparrow
	Melospiza lincolnii	Lincoln's Sparrow
	Zonotrichia albicollis	White-throated Sparrow
	Zonotrichia leucophrys	White-crowned Sparrow
	Zonotrichia atricapilla	Golden-crowned Sparrow
	Junco hyemalis	Dark-eyed Junco
	Pheucticus melanocephalus	Black-headed Grosbeak
	Agelaius phoeniceus	Red-winged Blackbird
	Agelaius tricolor	Tricolored Blackbird

Order	Scientific Name	Common Name
	Sturnella neglecta	Western Meadowlark
	Xanthocephalus xanthocephalus	Yellow-headed Blackbird
	Euphagus cyanocephalus	Brewer's Blackbird
	Quiscalus mexicanus	Great-tailed Grackle
	Molothrus ater	Brown-headed Cowbird
	Icterus cucullatus	Hooded Oriole
	Icterus bullockii	Bullock's Oriole
	Carpodacus purpureus	Purple Finch
	Carpodacus mexicanus	House Finch
	Carduelis pinus	Pine Siskin
	Carduelis psaltria	Lesser Goldfinch
	Carduelis tristis	American Goldfinch
	Passer domesticus	House Sparrow
Mammals		
ORDER MARSUPIALIA		
	Didelphis marsupialis	Common opossum
ORDER INSECTIVORA		
	Sorex ornatus	Ornate shrew
	Scapanus latimanus	Broad-handed mole
ORDER LAGOMORPHA		
	Lepus californicus	Black-tailed jackrabbit
	Sylvilagus auduboni	Desert cottontail
	Sylvilagus bachmani	Brush rabbit
ORDER RODENTIA		
	Otospermophilus beecheyi	Beechey ground squirrel
	Thomomys bottae	Botta pocket gopher
	Perognathus californicus	California pocket mouse
	Perognathus fallax	San Diego pocket mouse
	Perognathus longimembris	Little pocket mouse
	Microtus californicus	California meadow mouse
	Neotoma fuscipes	Dusky-footed woodrat
	Neotoma lepida	Desert wood rat
	Ondatra zibethicus	Muskrat
	Peromyscus boylii	Brush mouse
	Peromyscus californicus	California mouse
	Peromyscus eremicus	Canyon mouse
	Peromyscus maniculatus	Deer mouse
	Reithrodontomys megalotis	Western harvest mouse

Order	Scientific Name	Common Name
	Mus musculus	House mouse
	Rattus norvegicus	Norway rat
	Rattus rattus	Black rat
ORDER CARNIVORA		
	Canis latrans	Coyote
	Urocyon cinereoargenteus	Grey fox
	Procyon lotor	Racoon
	Mephitis mephitis	Striped skunk
	Mustela frenata	Long-tailed weasel
	Spilogale putorius	Spotted skunk
	Lynx rufus	Bobcat

APPENDIX F

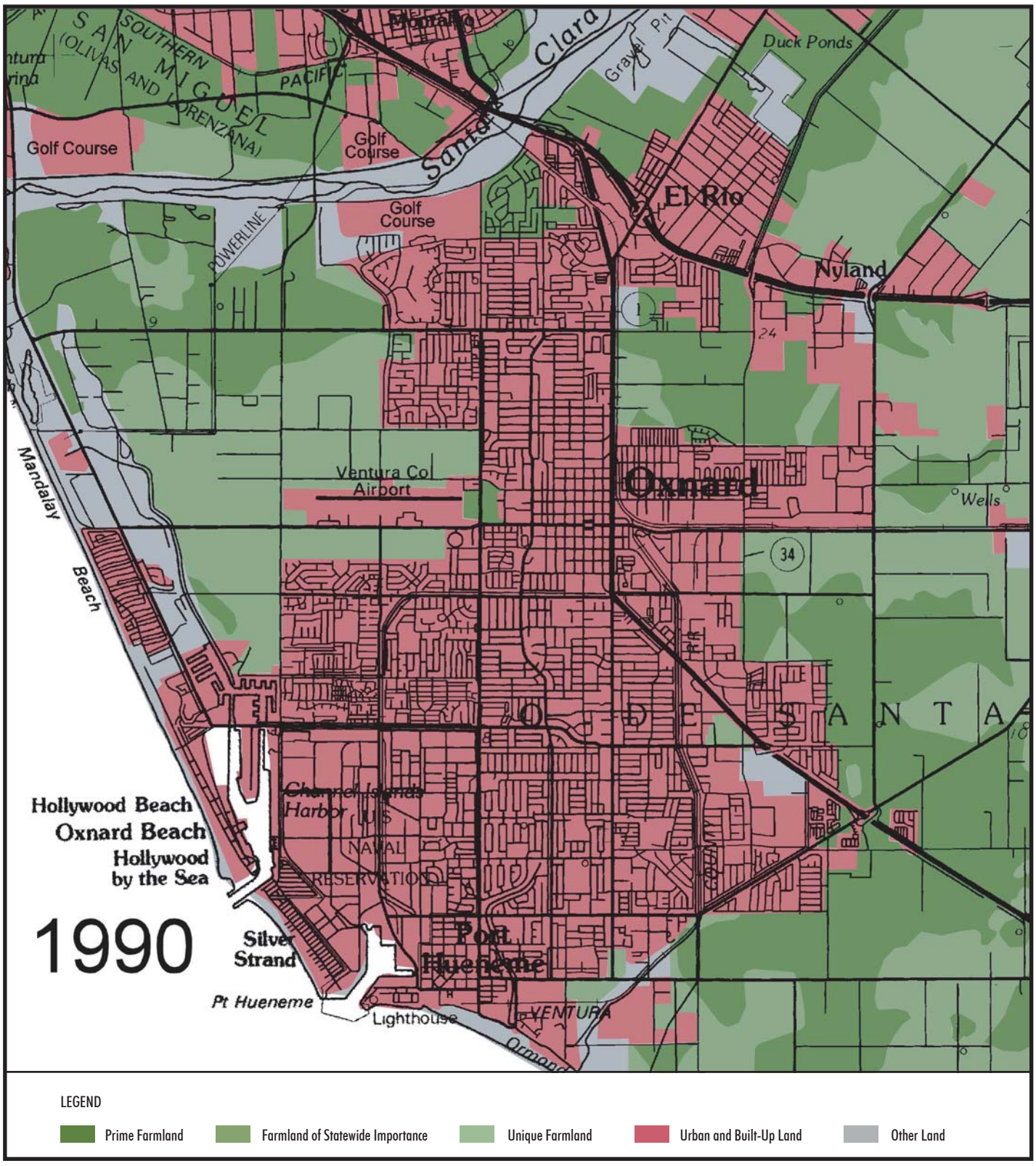
LAND USE HISTORY



SOURCE: California Department of Conservation, 2001; and Environmental Science Associates, 2002.

McGrath State Beach / 201476 ■

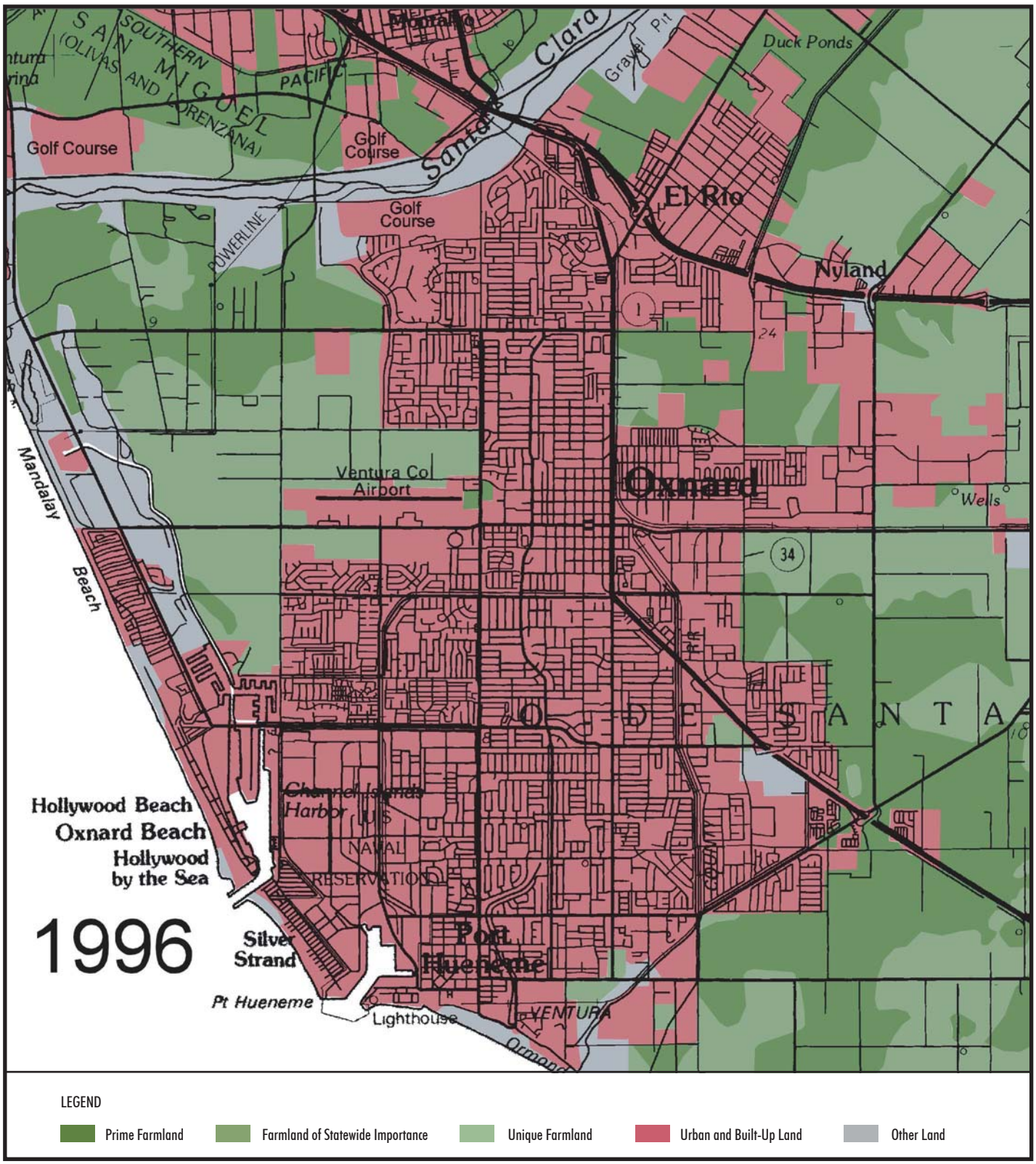
Appendix F
1984 Land Use



McGrath State Beach / 201476 ■

SOURCE: California Department of Conservation, 2001; and Environmental Science Associates, 2002.

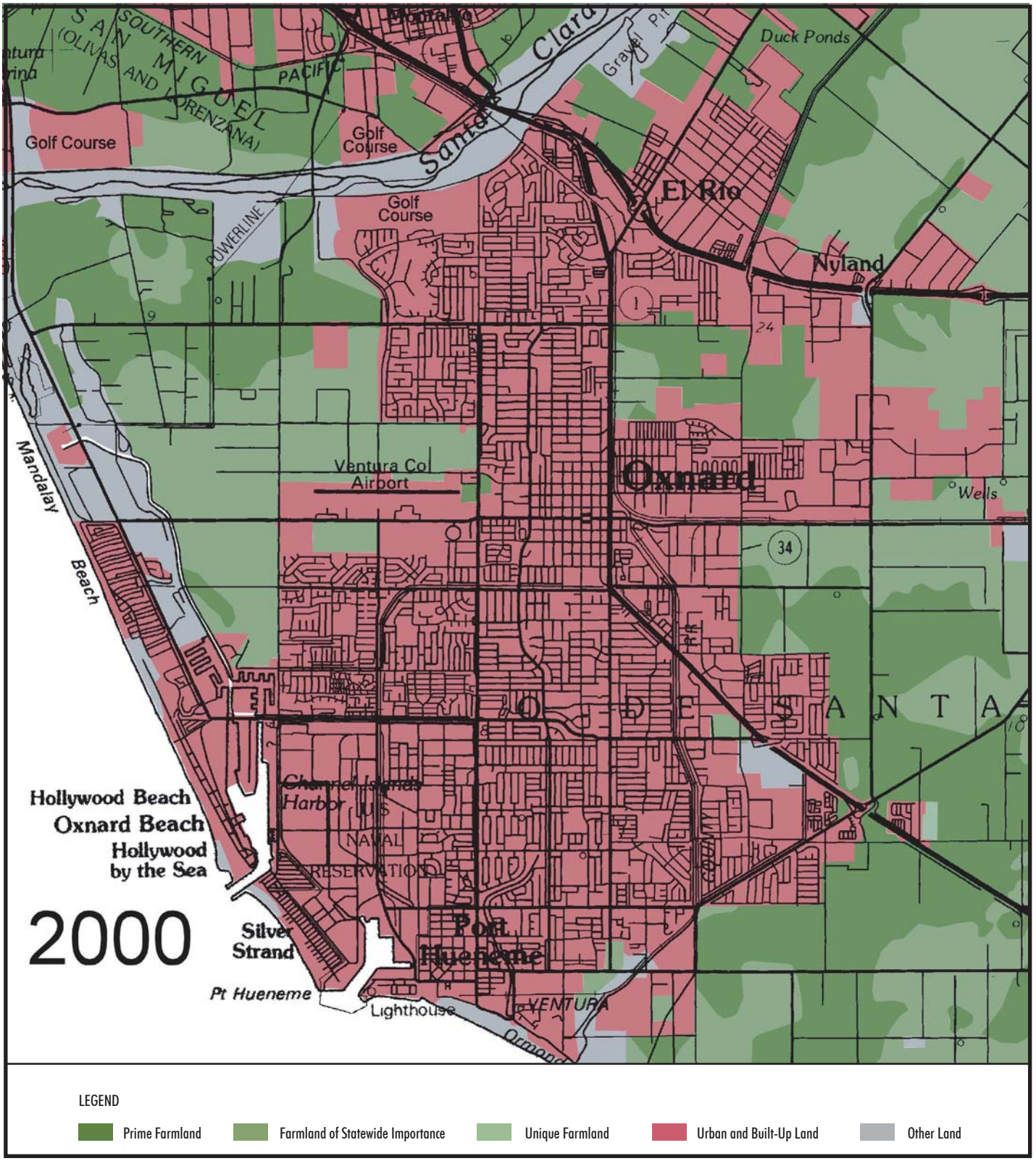
Appendix F
1990 Land Use



McGrath State Beach / 201476 ■

SOURCE: California Department of Conservation, 2001; and Environmental Science Associates, 2002.

Appendix F
1996 Land Use



McGrath State Beach / 201476 ■

SOURCE: California Department of Conservation, 2001; and Environmental Science Associates, 2002.

Appendix F
2000 Land Use

APPENDIX G

EXOTIC PLANT ERADICATION TECHNIQUES

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EXOTIC PLANT ERADICATION TECHNIQUES

ARUNDO DONAX

The most effective means of removing stands of *Arundo donax* lies in killing the root mass. Strictly mechanical removal is largely ineffective because this species reproduces rapidly from rhizomes (underground stems) and stem fragments. While one can realistically remove all traces of single plants or very small stands, attempts at physically removing larger stands inevitably result in leaving fragments that will regenerate. As well, it results in large areas of highly disturbed soil. No biological control methods (insects or fungi) are approved for use in the United States. Grazing sheep or cattle are mildly effective in controlling the spread of *Arundo donax*, but not sufficiently enough to eradicate established stands (Dudley, 2000). Thus, it is generally agreed that herbicide treatment is the only effective control method presently available. Primarily, three methods of herbicide control are currently in use. We refer to these prescriptive methods as: (1) Foliar spray treatment; (2) Cut-stem-spray treatment; and (3) Cut-stem-wait and spray treatment. These three methods are described below and primarily follow treatments prescribed in Bell (1997), Bossard et al. (2000) and Lawson et al. (1996).

- **Foliar spray treatment**. Use a foliar chemical application of a two-to-five percent solution of Rodeo® or a similar glyphosate product approved for use in or near aquatic habitats. Apply herbicide during the post-flowering and pre-dormancy periods (mid-August – early November) at a rate of 0.5 to 1L/hectare. When giant reed is dead, cut plant at ground level leaving roots in place to stabilize soil bank until replanting occurs.

- **Cut stem-spray treatment**. During the post-flowering period cut culms (stems) with a chainsaw or power brushcutter. Direct concentrated herbicidal application (50 to 75 percent Rodeo®) to cut culms within one to two minutes after cutting. This method reduces herbicide costs but increases time and manual labor. The best results are during the fall season. Intensive follow-up treatments are often necessary. It may be helpful to add a food color or dye to the solution to identify treated plants.

- **Cut stem-wait and spray treatment**. Cut stems to a manageable height for spraying later. Remove biomass and wait three to six weeks for the plants to grow about three to six feet tall, then apply a foliar spray of herbicide solution. Cutting the stems may cause re-sprouting since less herbicide will reach the roots. However, the re-sprouted stands would be roughly uniform at a low height, making all stalks easily accessible to facilitate a consistent and repeating spray pattern. This method may require several herbicidal applications. It may be helpful to add a food color or dye to the solution to identify treated plants.

For dominant native vegetation and mixed-native vegetation areas, which *Arundo donax* is less than 30 percent abundant:

- Hand-pull *Arundo Donax* if able to remove all plant parts; or
- Apply the **Cut stem-spray method** using backpack sprayers, or if road access is available, use street vehicles with 400 liter spray tanks or All Terrain Vehicles equipped with 60 liter tanks.

For *Arundo donax* dominant and mixed *Arundo donax* dominant vegetation areas (with less than 30 percent native vegetation):

- Apply the **Foliar spray method** using aerial spraying by a low-lying helicopter, if appropriate agency permits and permission have been obtained; or
- In the event that aerial distribution is infeasible, apply the **Cut stem-wait and spray method.**

All three *Arundo donax* eradication methods will require follow-up monitoring and treatment. A minimum of three years monitoring is recommended although five years may be necessary. Site visits should be conducted at least once or twice per year during the growing season (mid-summer) of *Arundo donax*.

REMOVAL OF BIOMASS

Common ways of disposing *Arundo donax* biomass include the following methods.

- Prescribed burning is the most cost effective if fire does not threaten other resources and all agency permits and permissions have been obtained.
- Chipping using a drum chipper is more costly in terms of equipment and labor; dead chips that have been dried away from a water source could be used for forming mulch.
- Hauling biomass to landfill is most expensive; most landfills don't accept it unless it is chipped.

Although costly, a combination of burning and chipping of cut stems and leaves may be the best method for the site. Dead *Arundo donax* chips could be used as temporary mulch until the planting plan is implemented. Unused chips could be burned on-site.

CORTADERIA SELLOANA, C. JUBATA

Manual removal of *Cortaderia selloana* and *C. jubata* is highly effective. Seedlings can be manually hand-pulled. Larger clumps of plants would require a pulaski, mattock or shovel. The most effective means of eradicating *C. selloana* and *C. jubata* lies in removing the entire crown and top section of the roots. A weedeater or chainsaw can expose the base of the plant to allow better access for removal of the crown (DiTomaso, 2000). It is also important to remove above-ground vegetative parts to avoid reestablishment, and to remove the inflorescence prior to seed production (before August).

Chemical control is also effective to control *C. selloana* and *C. jubata* species. However, since *Cortaderia* sp. occurs in the salt marsh at McGrath State Beach no chemical control is recommended in the aquatic area.

No biological control methods (insects or fungi) are approved for use in the United States. It is unknown in the United States whether grazing sheep or cattle would be effective in controlling the spread of *C. selloana* and *C. jubata* (DiTomaso, 2000).

Follow-up monitoring is recommended during the spring to determine the success of eradication and to remove any reestablished plants.

REMOVAL OF BIOMASS

Methods of disposing *Cortaderia selloana* and *C. jubata* biomass include the following ways.

- Removed plant material can be stockpiled on upland dry sites out of public view and covered above and below with black landscape fabric or placed in black plastic bags for decomposition. Prescribed burning on stockpiled material on upland sites is the most cost effective if fire does not threaten other resources and all agency permits and permission have been obtained.

Until a revegetation plan is implemented, mulch could be used temporarily to prevent establishment of undesirable opportunistic species at the disturbed location. Only dead *C. selloana* and *C. jubata* should be used as mulch material.

MESEMBRYANTHEMUM CRYSTALLINUM, CARPOBROTUS EDULIS, C. CHILENSIS

Manual hand-pulling is highly effective for removing *Mesembryanthemum crystallinum, Carpobrotus edulis,* and *C. chilensis* especially in areas with native vegetation. Since these species primarily reproduce asexually, all vegetative parts should be removed to prevent reestablishment. Flowers should be removed as well since it is known that these species also reproduce by seed. Chemical control of these species is also effective particularly for large patches, where native species are absent. As described in the Santa Clara Estuary Natural Preserve Salt Marsh Vegetation Management Plan (VMP) for McGrath State Beach, these species can be sprayed with herbicide and left in place. The dead thatch would form a mulch, provide soil stability and prevent other non-native, opportunistic species from establishing. Adding an acidifier to hard tap water before mixing with glyphosate can increase the effectiveness of the chemical treatment (Albert, 2000).

There are no biological controls for these species. It is unlikely that grazing would be effective considering the salty quality of the leaves (Albert, 2000).

Follow-up monitoring is recommended (any time of the year since active growth occurs year round) to determine the success of eradicating these species and to remove any reestablished plants.

REMOVAL OF BIOMASS

If necessary, removed plant material can be stockpiled on site out of public view and covered above and below with black landscape fabric or placed in black plastic bags for decomposition. Until a revegetation

plan is implemented, mulch or seeded erosion control netting could be installed temporarily to prevent establishment of undesirable opportunistic species at the disturbed location.

TAMARIX RAMOSISSIMA

As with *Arundo*, methods other than chemical control are of limited efficacy for controlling *Tamarix ramosissima*. With all but young plants and seedlings, complete plant removal is essentially impossible by mechanical means and roots left to remain will resprout. Research into biological controls has been relatively intensive and a few species of insects are very promising, but approval for release is not expected any time in the near future (Lovich, 2000). Grazing is effective in controlling new sprout and twig growth (Gary, 1960 as cited in Lovich, 2000), but is not effective in plant eradication.

Three methods of chemical control are most common.

- **Direct foliar spraying method**. Direct foliar spraying would require aerial spraying, which would be inappropriate for the small abundance of this species at McGrath State Beach. If this method is used, plants should not be removed for two growing seasons after herbicide treatment (Carpenter, 1998).

- **Basal bark treatment method.** Basal bark treatment involves spraying relatively large amounts of herbicide at the base of each trunk. This method can be effective, particularly after a high-stress event such as a major flood (Neill, 1996) and also on younger plants (Jorgensen, 1996). While this method has some advantages, such as avoiding the labor necessary to initially remove the plants, drawbacks include high amounts of herbicide use (up to five times that needed for the cut-stump method [Carpenter, 1998]) and mortality is generally lower, thus increasing labor necessities for follow-up treatments.

- **Cut-stump method**. Amount of herbicide use is relatively low and the kill rate is usually over 90 percent (Lovich, 2000). Stands of *Tamarix ramosissima* should be cut to near ground level. Cutting should be done in the growing season, late spring to early fall. It is important to spray the stumps immediately after cutting (within 1 to 2 minutes) before the plant tissues stop transporting.

As described in the VMP the **Cut-stump method** is the prescription of choice for McGrath State Beach. This method requires a relatively low amount of herbicide use as compared to the other treatments and the success rate is over 90 percent. Concentrated Rodeo® (i.e., glyphosate) should be considered for use at McGrath due to the presence of open water.

REMOVAL OF BIOMASS

Cut stems of salt cedar can be left in brush piles on-site (away from moist soil). Alternatively, some or all of the biomass may be chipped and left as mulch with the *Arundo donax* mulch.

All three eradication methods will require follow-up monitoring and treatment. A minimum of three years monitoring is recommended although five years may be necessary. Site visits should be conducted at least once or twice per year in the mid-summer to coincide with monitoring for *Arundo donax*.

APPENDIX H

GROUNDWATER DATA FOR MCGRATH STATE BEACH

APPENDIX H

GROUNDWATER DATA FOR MCGRATH STATE BEACH

Site Number	Surface Elevation	Depth to Ground Water Level	Ground Water Elevation	Surface Soil Texture	Conductivity
1	8’	7’ 1”	11”	Clay loam	2.9
2	7’	3’ 10”	3’ 2”	Sandy loam	7.3
3	11’	8’ 6”	2’ 6”	Sand	3.3
4	10’	7’ 10”	2’ 2”	Sandy loam	2.03
5	16’6”	8’ 3”	8’ 3”	Loam / Sandy loam / Sand	3.92
6	7’	5’	2’	Clay loam /sand	5.06
7	7’	5’ 4”	1’ 8”	Sandy gravel	8.80
8	10’	6	4		
9	12’	7’ 6”	4’ 6”		
10	9’	5’ 6”	3’ 6”		
11	10’	7’ 6”	4’		
12	10’	7’6”	3’ 4”		

APPENDIX I

VISITOR STATISTICS FOR MCGRATH STATE BEACH

APPENDIX I

VISITOR STATISTICS FOR MCGRATH STATE BEACH

TABLE I. MCGRATH STATE BEACH 1995–2002

Fiscal Year	Quarter	Paid Day Use	Free Day Use	Overnight	Total
1995-1996	1st	7,050	3,849	43,692	54591
	2nd	2,216	1,529	12,276	16021
	3rd	1,633	3,654	8,872	14159
	4th	4,185	7,923	26,772	38880
	Total	15,084	16,955	91,612	123651
1996-1997	1st	5,241	4,973	83,656	93870
	2nd	270	589	2,217	3076
	3rd	2,115	2,220	23,223	27558
	4th	4,203	5,421	57,573	67197
	Total	11,829	13,203	166,669	191701
1997-1998	1st	5,802	5,998	91,240	103040
	2nd	1,728	2,390	22,830	26948
	3rd	1,320	2,404	5,456	9180
	4th	4,746	6,978	48,872	60596
	Total	13,596	17,770	168,398	199764
1998-1999	1st	5,802	5,998	91,240	103040
	2nd	2,397	3,735	31,528	37660
	3rd	1,749	3,284	23,176	28209
	4th	3,714	5,221	46,416	55351
	Total	13,662	18,238	192,360	224260
1999-2000	1st	5,685	7,544	86,725	99954
	2nd	2,544	3,347	34,896	40787
	3rd	1,578	3,230	25,450	30258
	4th	5,088	7,406	63,752	76246
	Total	14,895	21,527	210,823	247245
2000-2001	1st	6,888	8,492	93,608	108988
	2nd	2,427	5,469	31,832	39728
	3rd	3,065	4,113	18,405	25583
	4th	5,064	7,439	74,784	87287
	Total	17,444	25,513	218,629	261586
2001-2002	1st	5,770	4,937	44,109	54816
	2nd	2,070	4,821	20,516	27407
	3rd	3,906	6,491	33,192	43589
	4th	4,458	13,009	39,608	57075
	Total	16,204	29,258	137,425	182887
TOTAL		**102,714**	**142,464**	**1,185,916**	**1431094**

SOURCE : Environmental Science Associates, 2003