U.S. Fish & Wildlife Service

Salinas River National Wildlife Refuge

Draft Comprehensive Conservation Plan and Environmental Assessment



Comprehensive Conservation Plan and Environmental Assessment

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Chapter 1. Introduction and Background

Content and Purpose of This Document

Comprehensive Conservation Plan

This document is a Comprehensive Conservation Plan (CCP) designed to guide the management of the Salinas River National Wildlife Refuge in Monterey County, California for the next 15 years. The U.S. Fish and Wildlife Service's (Service) management planning process for National Wildlife Refuges involves two phases: (1) the development of a broad Comprehensive Conservation Plan (CCP) that articulates a vision and specific goals for the refuge, and (2) the formulation of more detailed "step-down" management plans that enable the implementation of the CCP's vision.

The purposes of this CCP are:

- To provide a clear statement of direction for the management of the Salinas River National Wildlife Refuge (Refuge) over the next 15 years;
- To provide long-term continuity in Refuge management;
- To communicate the Service's management priorities for the Salinas River NWR to its neighbors and visitors and to the general public;
- To provide an opportunity for the public to help shape the future management of the Salinas River NWR;
- To ensure that management programs on the Salinas River NWR are consistent with the mandates of the National Wildlife Refuge System (Refuge System);
- To ensure that the management of the Salinas River NWR is consistent with Federal, State, and local plans; and
- To provide a basis for budget requests to support the Salinas River NWR's needs for staffing, operations, maintenance, and capital improvements.



Sand verbena (*Verbena* sp.)
USFWS Photo

This document incorporates a CCP, an environmental assessment, and three new step-down plans: an Avian Predator Management Plan, Wildland Fire Management Plan, and Hunt Plan. Other existing step-down plans that will remain in place include an Integrated Predator Management Plan and Recreational Fishing Plan.

When it is implemented, this CCP will further the purposes and goals of the Salinas River National Wildlife Refuge, contribute to the overall mission of the National Wildlife Refuge System (see page 3), and address other relevant mandates, such as recovery of endangered species.

Chapter 2 describes the CCP planning process. Chapter 3 presents the management program proposed in this CCP.

Environmental Assessment

This document also serves as an environmental assessment (EA) under the National Environmental Policy Act[1] (NEPA), the basic national charter for the protection of the environment. This document was prepared as a joint CCP/EA because regulations of the President's Council on Environmental Quality require the U.S. Fish and Wildlife Service (hereafter, Service) to integrate the NEPA review and compliance process with CCP development and implementation as early as possible, in order to ensure a systematic and interdisciplinary approach. The purpose of the EA is to evaluate the environmental effects of implementing the management program proposed by the CCP, including possible management alternatives. The EA also evaluates the effects of the CCP on the quality of the human environment, as required by NEPA. Preparing the EA included:

- Describing alternatives to the proposed CCP (Chapter 3);
- Identifying and analyzing the environmental effects of the proposed management program and the management alternatives (Chapter 5);
- Involving affected State and Federal agencies, Native American Tribes, and members of the public in the CCP process.

Need for This CCP

The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) (Improvement Act of 1997) requires that all Federal refuges be managed in accordance with an approved CCP by 2012. Moreover, the Salinas River National Wildlife Refuge currently has no integrated plan that guides the management of all of its resources and uses. In order to meet the dual needs of complying with the Improvement Act and providing long-term integrated management guidance for the Refuge, the Service proposes this CCP.

The U.S. Fish and Wildlife Service and the National Wildlife Refuge System

U.S. Fish and Wildlife Service Responsibilities

The Service is the primary Federal agency responsible for conserving and enhancing the Nation's fish and wildlife populations and their habitats. Although the Service shares this responsibility with other Federal, State, Tribal, local, and private entities, the Service has specific responsibilities for migratory birds, threatened and endangered species, anadromous fish,

[1] 42 USC 4321 et seq., as implemented by Executive Orders 11514 and 11991 and the Council on Environmental Quality (CEQ) Regulation of November 29, 1978 (43 FR 55978).

and certain marine mammals. The Service has similar responsibilities for the lands and waters it administers to support the conservation and enhancement of fish and wildlife.

The National Wildlife Refuge System

The National Wildlife Refuge System is the world's largest collection of lands specifically managed for fish and wildlife conservation. Operated and managed by the Service, it comprises more than 500 national wildlife refuges with a combined area of more than 92 million acres. The majority of refuge lands (approximately 77 million acres) are located in Alaska. The remaining 15 million acres are spread across the other 49 states and several island territories.

National Wildlife Refuge System Mission and Goals. The mission of the National Wildlife Refuge System, as stated in the Improvement Act, is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (16 USC 668dd et seq.).

The goals of the National Wildlife Refuge System are:

- To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered;
- To perpetuate the migratory bird resource;
- To preserve a natural diversity and abundance of fauna and flora on refuge lands; and
- To provide an understanding and appreciation of fish and wildlife ecology and the human role in the environment and to provide refuge visitors with high-quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

The Service has adopted an ecosystem approach to resource management and has identified 52 ecosystem units within the United States. The Salinas River National Wildlife Refuge is situated in the Service's Southern California Ecoregion. The Draft Conceptual Management Approach for Southern California Ecoregion Goals can be obtained from the Service by request. Specific ecoregion goals relevant to the Salinas River National Wildlife Refuge are discussed in Chapter 3 of this CCP.

Legal and Policy Guidance for Management of National Wildlife Refuges. Individual refuges (refuge units) are guided by the mission and goals of the National Wildlife Refuge System (see preceding section) and by the designated purpose of the refuge unit as described in establishing legislation or executive orders, Service laws and policy, and international treaties. Key concepts guiding the System are contained in the Refuge Recreation Act of 1962, the National Wildlife Refuge System Administration Act of 1966, Title 50 of the Code of Federal Regulations, the Fish and Wildlife Service Manual, and, most recently, the Improvement Act.

The National Wildlife Refuge System is the only network of Federal lands administered first for the protection of wildlife. No use of a refuge may be allowed unless it is determined to be compatible with the refuge's purpose. A *compatible use* is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or

detract from the fulfillment of the mission of the National Wildlife Refuge System or the purposes of the individual refuge unit. *Sound professional judgment* is further defined as a decision that is consistent with principles of fish and wildlife management and administration, available science and resources, and adherence with law. In this context, the Refuge Recreation Act of 1962 authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use when such uses do not interfere with the area's primary purpose.

The National Wildlife Refuge System Administration Act of 1966 provides guidelines and directives for administration and management of all areas in the System, including wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. This Act was amended in 1997 by passage of the Improvement Act, which includes a unifying mission statement for the National Wildlife Refuge System (see page 3), establishes new guidelines for determining compatible uses on refuges, and requires that each refuge be managed under a CCP developed in an open public process. Under the Improvement Act, all refuge units are required to have a CCP in place by the year 2012. The Improvement Act further states that wildlife conservation is the priority of National Wildlife Refuge System lands and that the Secretary of the Interior shall ensure that the biological integrity and diversity and the environmental health of refuge lands are maintained. In addition, the Improvement Act encourages partnerships with Federal and State agencies, Tribes, organizations, industry, and the general public.

The Improvement Act identifies six wildlife-dependent recreational uses as priorities: hunting, fishing, wildlife observation and photography, environmental education, and environmental interpretation. As expressed priorities of the National Wildlife Refuge System, these public uses take precedence over other potential uses in refuge planning and management. However, the Improvement Act also requires identification of existing compatible wildlife-dependent uses that will be permitted to continue on an interim basis pending completion of the CCP development process.

Refuge Vision. A vision statement is developed or revised for each individual refuge unit as part of the CCP process. Vision statements are grounded in the unifying mission of the National Wildlife Refuge System, and describe the desired future conditions of the refuge unit in the long term (more than 15 years), based on the refuge's specific purposes, the resources present on the refuge, and any other relevant mandates.

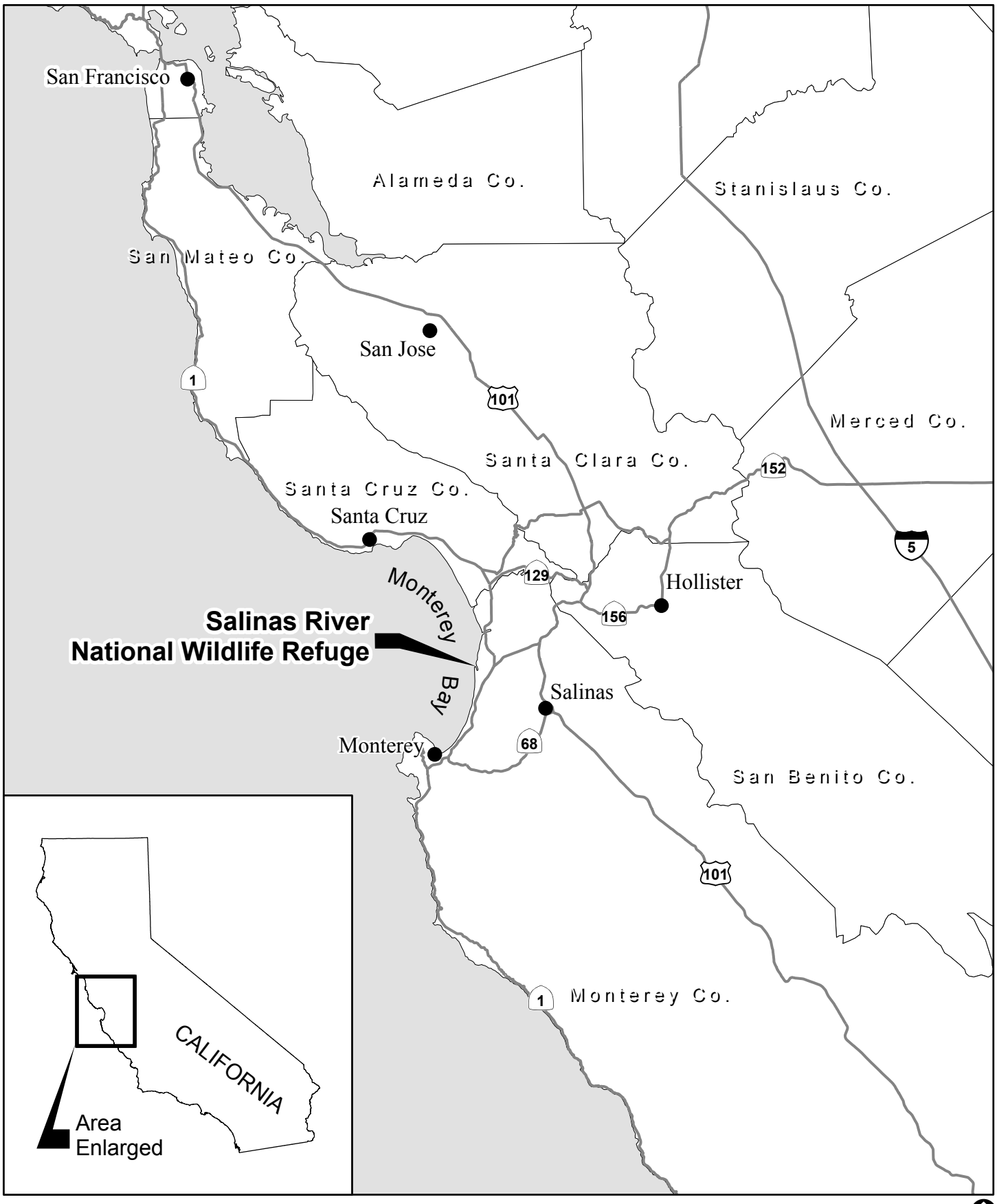
The Salinas River National Wildlife Refuge

Introduction to the Salinas River NWR

The Salinas River National Wildlife Refuge (hereafter, Refuge) encompasses 366 acres located 11 miles north of Monterey, California, where the Salinas River empties into Monterey Bay (Figures 1 and 2). The Refuge is part of the San Francisco Bay National Wildlife Refuge Complex, which has its headquarters in Fremont, California.

Refuge lands include a range of terrestrial and aquatic habitats, including coastal dunes and beach, grasslands, wetlands, and riparian scrub. Because of its location within the Pacific Flyway, the Refuge is used by a variety of migratory birds during breeding, wintering, and migration periods. It also provides habitat for several threatened and endangered

Figure 1. Location Map



CA/NV Refuge Planning Office - July 2001

Figure 2. Refuge Map



species, including western snowy plover, California brown pelican, Smith's blue butterfly, Monterey gilia, and Monterey spineflower. Approximately 40 species that occur or are suspected to occur on the Refuge are considered sensitive by Federal or State agencies (see Appendix C). Current recreational uses on the Refuge include wildlife observation and photography and access to surf fishing and waterfowl hunting. Chapter 4 presents a detailed description of natural resources on the Salinas River National Wildlife Refuge.

Establishment and History of the Salinas River NWR

The Refuge was established in 1973 because of its "particular value in carrying out the national migratory bird management program" (USC Sec. 6676). The land was acquired by the Service through a transfer of surplus military land from the U.S. Army and the U.S. Coast Guard. From 1974 through 1991, what is now the Refuge was operated as a Wildlife Management Area under a cooperative agreement with the California Department of Fish and Game. By the mid-1980s, growing awareness of the Refuge's importance as habitat for sensitive species prompted a shift toward more active management and protection of its resources. In 1991, the Service began managing the area as a National Wildlife Refuge (NWR) under the National Wildlife Refuge System Administration Act of 1966, the Refuge Recreation Act of 1962, and the Improvement Act of 1997.

Refuge Purpose: *The Refuge was established in 1973 because of its "particular value in carrying out the national migratory bird management program" (USC Sec. 6676).*

Since 1991, Refuge management efforts have focused on sensitive species protection, habitat enhancement (including riparian restoration along the Salinas River), and public use management. Limited recreational opportunities have also been available to the public, including waterfowl hunting, access to surf fishing, and wildlife observation and photography. Much of the management and monitoring on the Refuge has been accomplished in cooperation with various partner organizations (see *Existing Partnerships* below). The Service's approach to managing the Refuge has been regional in perspective, and has emphasized balancing appropriate uses among the various public lands in the Monterey Bay area. Additional detailed information on past and current Refuge management is provided in Chapters 3 and 4.

Salinas River NWR Vision Statement

This CCP incorporates the following vision statement for the Salinas River National Wildlife Refuge.

> The Refuge will be managed for the conservation and enhancement of populations of native species of plants, wildlife, fish, and their habitats. Endangered or threatened species will receive management priority, with special emphasis placed on the conservation and recovery of the western snowy plover. Whenever possible, habitats and populations will be managed in partnership with local landowners, local and regional organizations, and local, State, and other Federal agencies to achieve regional conservation goals.

The vision for the Refuge reflects the regional approach that the Service has taken since it began active management of the Refuge in 1991. Under this approach, the Refuge is viewed as part of a mosaic of different types of open spaces (State beaches, private lands, the Refuge, etc.) in the Monterey coastal region. Each type of open space may support different recreational uses that reflect the particular mission of the agency or entity with stewardship responsibility for those lands.

In keeping with this approach and with the mission of the National Wildlife Refuge System, the Refuge will continue to offer limited but unique wildlife-oriented recreational opportunities; however, significant increases in public use will not be encouraged. State and local beaches will continue to provide the primary recreational opportunities for the Monterey Bay area shoreline. State beaches in Monterey Bay typically offer opportunities for recreational activities—such as hang-gliding, camping, and horseback riding—that the Refuge does not allow. These uses, and unlimited public use in general, are incompatible with the Refuge's purpose. The Refuge vision statement reflects the Service's view that, within the wider context of public lands along the Monterey Bay, the Refuge should support relatively undisturbed habitat for threatened and endangered species and other wildlife, where public uses are subordinate to the primary purpose of wildlife conservation.

Table 1 presents the 15-year vision for the Refuge's four primary habitats and for recreation.

Table 1. 15-year vision for the primary habitats and for recreation on the Refuge.

Coastal Dunes and Beach	The natural processes of dune formation will be restored. Native vegetation in the dune complex of the Refuge will be protected and enhanced. Populations of endangered and threatened species such as Smith's blue butterfly, Monterey gilia, Monterey spineflower, brown pelican, and western snowy plover will be protected and enhanced.
Grassland	The native coastal prairie will be restored by mimicking natural processes through active management. The restored coastal prairie will provide excellent foraging habitat for native grassland birds.
Wetlands	The saline pond will be maintained for migratory bird use. The salt marsh habitat will be enhanced for use by migratory and resident birds. Historic wetlands on the Refuge will be identified and restored.
Riparian/Riverine Habitats	Riparian scrub will be restored along the Salinas River to provide habitat for migratory and resident birds while allowing for natural migration of the river channel. Riverine habitat will be enhanced for use by native waterfowl and fish.
Recreation	Limited wildlife-dependent recreation will occur on the Refuge, when compatible with the purpose of the Refuge and the conservation and recovery of endangered species.

Management Goals for the Salinas River NWR

Three goals have been identified to realize the vision proposed for the Refuge.

Goal 1. Protect, restore, and enhance populations of migratory birds and other native species and their habitats.

Goal 2. Protect and enhance populations of endangered, threatened, and rare species and promote their recovery by restoring and enhancing their natural habitats.

Goal 3. Provide opportunities for safe, unique, wildlife-dependent recreation when compatible with the Refuge purpose and with other Refuge goals.

These goals represent broad statements of the priorities for ongoing Refuge management.

Existing Partnerships for Management of the Salinas River NWR

Partnerships are integral to the success of many refuges, and the Service encourages partnerships with local organizations who share the Service's mission to conserve and enhance natural resources. The Refuge currently maintains partnerships with many organizations to help achieve its goals and those of the partner organizations. Table 2 summarizes current partnerships on the Refuge.

Table 2. Current partnerships on the Salinas River National Wildlife Refuge.

Organization	*Nature of Partnership*
U.S. Department of Agriculture Wildlife Services	Assists with the Refuge's predator management program
California Department of Fish and Game	Coordinates programs for managing special-status species, such as western snowy plover, on nearby State lands.
California Department of Parks and Recreation	Assists the Service with public use monitoring, habitat management, and snowy plover management
Watershed Institute of California State University, Monterey Bay	Conducts restoration of native grassland and riparian habitats, erosion monitoring, and scientific research
Point Reyes Bird Observatory	Conducts monitoring of western snowy plover populations
Santa Cruz Predatory Bird Research Group	Assists with the Refuge's experimental avian predator management program
Neighboring landowners	Control nonnative plants on dune habitat

Source: Christopher Barr and Ivette Loredo, USFWS

Adaptive Management

The Service acknowledges that much remains to be learned about the species, habitats, and physical processes that occur on the Refuge, and about the ecological interactions between species. When faced with uncertainty resulting from complex ecological interactions or gaps in available data, the most effective approach to resource management over the long term is an adaptive one. *Adaptive management* refers to a management style in which the effectiveness of management actions is monitored and evaluated, and future management is modified as needed, based on the results of this evaluation or other relevant information that becomes available. The Service has been practicing adaptive management on the Refuge since 1991 and plans to continue this practice. Accordingly, the management scenario proposed in this CCP provides for ongoing adaptive management of the Refuge; its adaptive management component is described more fully in Chapter 6, *Plan Implementation*.

Document Organization

This document is organized into six chapters and eleven appendices. The following table summarizes their contents.

Document Section	*Content*
Chapter 1	Description of CCP development process. Overview of mission and responsibilities of U.S. Fish and Wildlife Service and goals of National Wildlife Refuge System. Summary of history and vision of Salinas River NWR.

Chapter 2	Summary of process for development of this CCP, including specific public concerns identified and addressed during CCP development.
Chapter 3	Descriptions of alternative scenarios for management of the Salinas River NWR, including the proposed management program.
Chapter 4	Description of existing resources on the Salinas River NWR.
Chapter 5	Analysis of environmental effects of management alternatives presented in Chapter 3.
Chapter 6	Overview of process for implementing this CCP.
Appendix A	List of references cited.
Appendix B	Glossary of technical terms.
Appendix C	List of special-status plant and animal species with the potential to occur on the Salinas River NWR or in the surrounding area.
Appendix D	Matrix showing relationship between vegetation classification system used in this document and National Vegetation Classification System.
Appendix E	List of members of the Salinas River NWR CCP planning team and members of the team that prepared this document.
Appendix F	Overview of wilderness review process (process that establishes whether lands should be recommended to Congress for designation as wilderness and inclusion in the National Wilderness System) and results of wilderness review for Salinas River NWR.
Appendix G	Compatibility determinations (results of formal review of compatibility of proposed public uses with stated refuge purpose) for Salinas River NWR.
Appendix H	Salinas River NWR Avian Predator Management Plan (step-down plan).
Appendix I	Salinas River NWR Fire Plan (step-down plan).
Appendix J	Salinas River NWR Hunt Plan (step-down plan).
Appendix K	Mailing list of individuals, agencies, and organizations who will receive review copies of this document.

Chapter 2. The Comprehensive Conservation Planning Process

This CCP/EA for the Salinas River National Wildlife Refuge is intended to meet the dual requirements of compliance with the Improvement Act[1] and NEPA. The development of this CCP/EA was also guided by the refuge planning policy outlined in Part 602, Chapters 1, 3, and 4 of the U.S. Fish and Wildlife Service Manual (May 2000).

Service policy, the Improvement Act, and NEPA provide specific guidance for the planning process. For example, Service policy and NEPA require the Service to actively seek public involvement in the preparation of environmental documents such as EAs. NEPA also requires the Service to give serious consideration to all reasonable alternatives, including the "no action" alternative, which represents continuation of current conditions and management practices. Alternative management scenarios were developed as part of the planning process described in this chapter; the alternatives themselves are described in Chapter 3.

The Planning Process – How This CCP Was Developed

Key steps in the Service's CCP planning process include:

1. Forming the planning team and conducting preplanning;
2. Initiating public involvement and scoping;
3. Identifying issues and developing or revising vision and goal statements;
4. Developing alternatives and assessing their environmental effects;
5. Identifying the proposed action (i.e., the preferred alternative);
6. Publishing the draft plan and NEPA document;
7. Revising the draft plan and publishing a final plan; and
8. Implementing the plan.

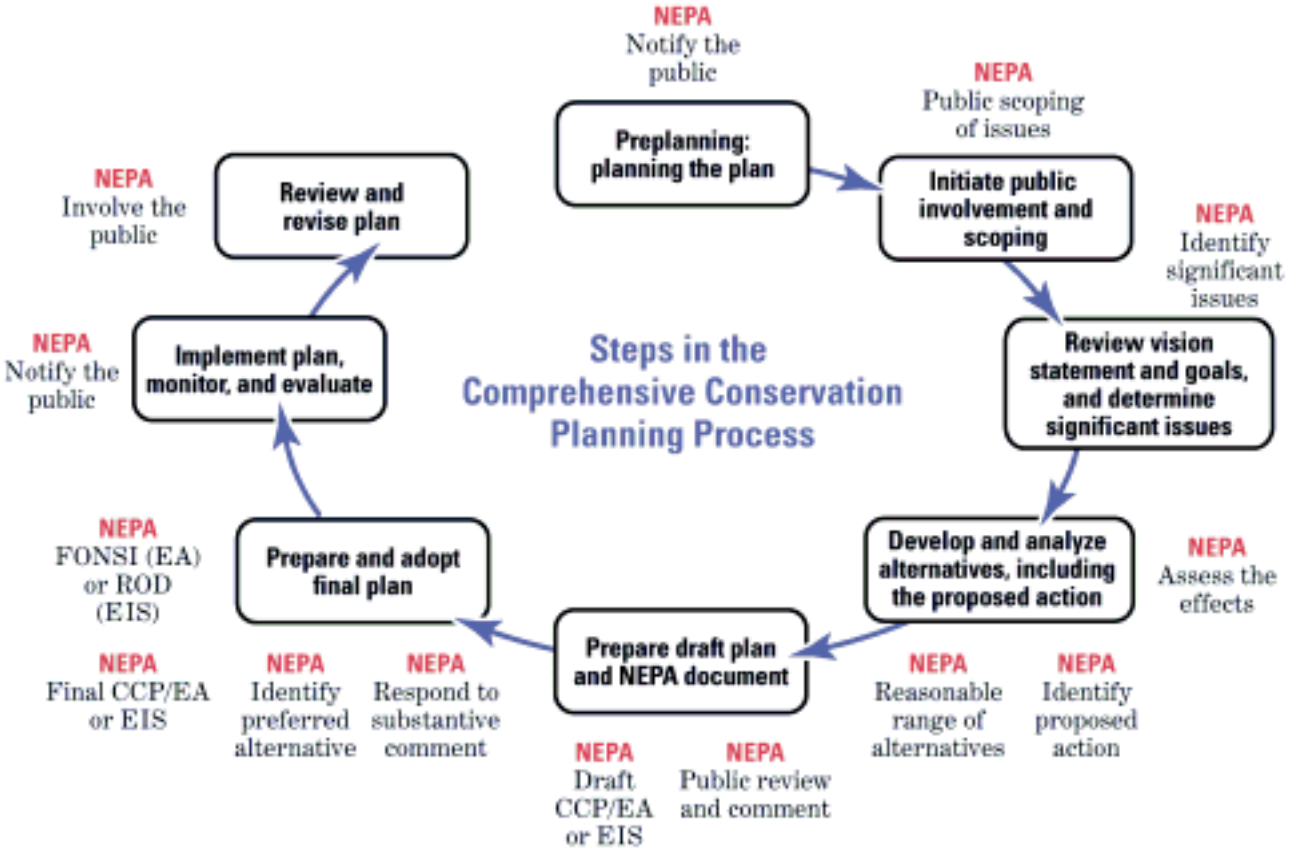
Figure 3 diagrams the CCP planning process; the following sections provide additional detail on individual steps in the process.

The Planning Team

The planning team responsible for leading the CCP effort included Service biologists, planners, and public use specialists from the San Francisco Bay NWR Complex and the California/Nevada Refuge Planning Office. Biologists and planners from Jones & Stokes, an environmental consulting firm, also participated in the planning team effort. This document was prepared by a technical team from Jones & Stokes, under the direction and with the assistance of the Service. Appendix E lists the members of the planning and technical teams.

[1]See discussion in Chapter 1.

Figure 3. Comprehensive Conservation Planning Process



Coordination and cooperation among participating stakeholders was a fundamental element of the CCP/EA development process. The Planning Team considered the interests and expertise of many agencies and organizations, including:

- U.S. Fish and Wildlife Service,
- California Department of Fish and Game,
- California Department of Parks and Recreation,
- Point Reyes Bird Observatory,
- Santa Cruz Predatory Bird Research Group,
- California State University, Monterey Bay Watershed Institute, and
- U.S. Department of Agriculture, Wildlife Services.

Project planning meetings attended by representatives of these entities were held regularly throughout the planning process, from November 1999 through July 2000. Issues, concerns, and opportunities were identified through discussions with planning team members and key contacts and through public involvement.

Public Involvement in Planning

Public involvement is an essential component of the CCP process. The Service announced the initiation of the Refuge planning effort to the public on May 19, 2000 through a planning update newsletter, followed by a formal notice in the Federal Register published on May 23, 2000. A press release was also issued prior to the public meeting.



Public scoping meeting, Monterey, CA
Jones & Stokes Photo

There were several avenues for public involvement in Refuge planning. A public workshop was held on June 1, 2000, in Monterey, California, to inform the public of the planning process, and written public comments were solicited until the public comment period ended on June 22, 2000.

Public Comments on Refuge Planning

The following sections present issues, concerns, and opportunities summarized from all public input received during the scoping process. (The public workshop and written comment period are collectively referred to as the scoping process.)

Recreation and Public Use

Public comments included concerns over recreation use, including both access issues and issues related to impacts. Some respondents felt that access to the portion of the Salinas River mouth below high tide should be prohibited. Concern was also expressed regarding the effects of human population density and recreational use on native plants and wildlife. Commentors suggested that snowy plover signage should be posted in English, Spanish, Chinese, and Tagalog. Some commentors suggested that signage prohibiting dogs should be clarified and increased. Others suggested that the Service issue a map showing areas in the Monterey region where dogs are allowed. Commentors recommended enhanced signage to identify areas of the Salinas River (both within and beyond the Refuge boundaries) where fishing is permitted. A desire for bilingual Spanish and English signage was expressed. Investigation into the impacts of hunting and other recreational activities on wildlife, such as disturbance of non-target species, was requested. The Service was also asked to consider the incompatibility of recreational hunting on the Refuge.

Habitat and Wildlife Management

Many people were concerned about the loss of wildlife habitat and felt that protecting, restoring, and enhancing wildlife populations and habitats should be a Refuge priority. Development of a database of pertinent

scientific information regarding habitats and wildlife on the Refuge was suggested. Some commentors recommended a rigorous biological assessment and inventory of all plant, fish, and wildlife species present on the Refuge, including birds and invertebrates. Respondents suggested that the Service consider the use of prescribed burning to restore grassland. Control of invasive species was also identified as a concern, and respondents recommended that additional approaches to avian predator management be considered, such as creating foraging habitat by mowing grassland. People stressed the need for long-term, effective, humane, and socially acceptable predator-management strategies. In addition, commentors expressed concern for the maintenance of good water quality on the Refuge.

Administration and Management

The Service received a variety of comments related to Refuge administration and management. Some comments suggest that the Refuge requires improved and additional publicity; many members of the public had not heard of the Refuge or the CCP process. Commentors recommended that the Service determine the CCP's consistency with other relevant programs and existing watershed and ecosystem efforts and ensure partnership with the California Department of Fish and Game. They also pointed out the need to comply with each requirement of the Refuge Administration Act, and to prioritize activities proposed in the CCP. Adoption of monitoring, evaluation, and adaptive management strategies was also suggested. Other commentors indicated a need for additional refuse receptacles at the Refuge, recommended that the access road be maintained as unpaved, suggested that the Refuge entrance and parking lot be moved to a location directly adjacent to the highway, and requested that areas in the Salinas River where fishing is allowed be clearly defined. Improved communication with local airports was also recommended, because low-flying airplanes and hang gliders have been spotted over the Refuge; commentors expressed concern about disturbance to wildlife. Participants expressed interest in identification of additional research opportunities. One respondent suggested that additional funding sources to support expanding the Refuge should be identified.

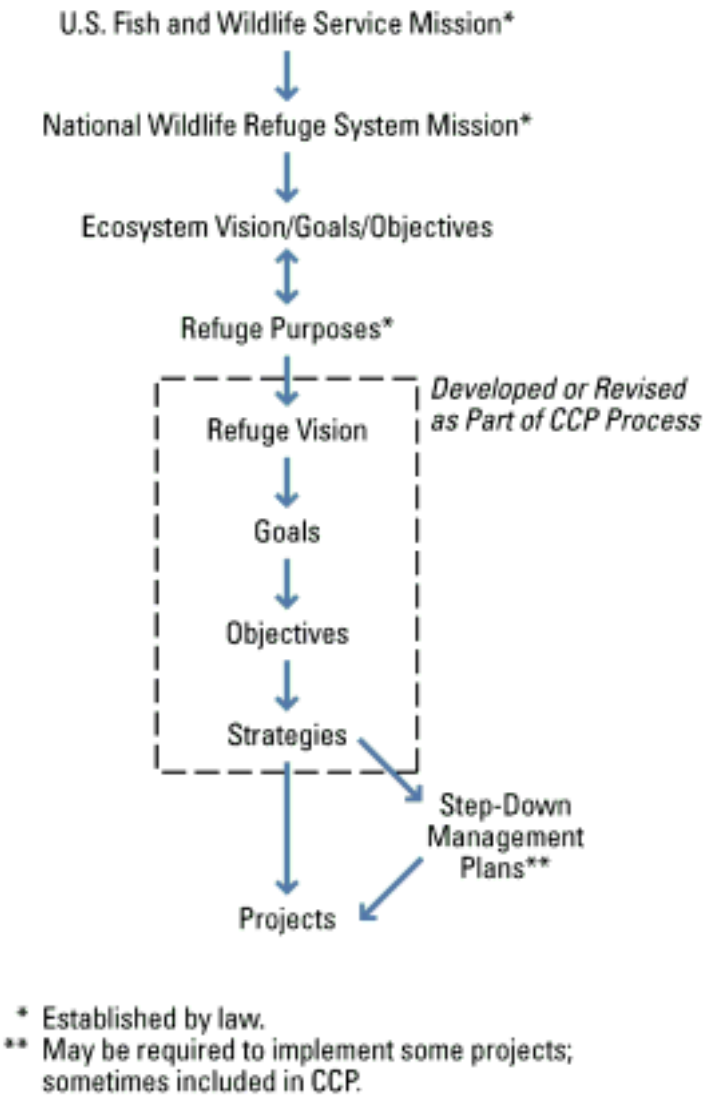
Planning Process

Some meeting participants recommended that mechanisms for providing a response to public comments be established.

Development of Refuge Goals

The purpose of the Refuge is established by law; however, before this CCP effort, the Refuge had no vision statement. Under the Improvement Act, the task of the planning team was to revise and further develop the management focus of the Refuge within the Service's planning framework (Figures 3 and 4). Developing the new vision statement was given high priority because its description of desired future conditions on the Refuge helped guide the remainder of the planning process. The vision statement was based, in part, on the public comments received during the scoping period. Once the vision statement was articulated, the planning team used it to examine and clarify the Refuge's three interim goals. The revised Refuge goals that resulted are presented in Chapter 1.

Figure 4. Hierarchy of Refuge Planning Levels in the National Wildlife Refuge System



Development of Alternatives

Chapter 3 describes the remaining steps in the CCP process, including development of alternatives, assessment of their environmental effects, and identification of the preferred management alternative (proposed action).

Plan Implementation

Chapter 6 describes the process for implementing the management plan proposed in this CCP.

Chapter 3. Current Refuge Management and Management Alternatives

Introduction

Overview: NEPA and This Document

As the basic national charter for the protection of the environment, NEPA requires Federal agencies to consider the environmental effects of all actions[1] they undertake. Agencies must also consider the environmental effects of all reasonable and feasible alternatives to a proposed action, and must make public the environmental effects of the proposed action and possible alternatives. If adverse environmental effects cannot be entirely avoided, NEPA requires an agency to show evidence of its efforts to reduce these adverse effects and to restore and enhance environmental quality as much as possible. An environmental assessment (EA) documents that an agency has addressed all of these issues.

As described in Chapter 1, this document will serve as an EA to address the environmental effects of implementing a new program of Refuge management. This chapter, Chapter 4, and Chapter 5 are the primary components of the EA. This chapter describes current Refuge management and presents four alternatives for future Refuge management, including the proposed management scenario (proposed action). Chapter 4 describes existing environmental resources on the Refuge. Chapter 5 describes the projected environmental effects of the four management alternatives on the Refuge's existing resources.



Wildlife monitoring
USFWS Photo

[1]Under NEPA and implementing regulations, *action* refers to a policy, plan, program, or project that is implemented, funded, permitted, or controlled by a Federal agency or agencies.

Three of the four alternatives presented in this chapter are "action alternatives" that would involve a change in the current management of the Refuge. The remaining alternative is the "no action" alternative, under which the current management of the Refuge would continue. Under all four alternatives, a final CCP would be prepared.

Alternatives Development Process

The alternatives development process was an iterative process that began after the planning team developed the Refuge vision statement and revised the Refuge's goals. The first step in this process was to identify all of the important issues related to Refuge management. The list of issues was generated collaboratively by the core planning team, Service staff, and Refuge stakeholders. (Refuge stakeholders are those individuals or groups currently working or conducting research on the Refuge.) The general public also helped to identify important management issues through the scoping process. All public comments submitted at the June 1, 2000 public scoping meeting in Monterey, California, and through written correspondence were considered.

Once the list of important management issues was generated, the planning team described the No Action Alternative. It was important to describe this alternative accurately because the No Action Alternative serves as the baseline to which all other alternatives are compared.

Next, the planning team listed a wide range of management actions that would address the issues identified and that would achieve one or more of the goals of the Refuge. These actions were refined during several meetings and planning team workshops. The planning team then clustered these actions into logical groupings to form the action alternatives. Many actions are common to more than one alternative, but the actions within each alternative reflect a common management approach, as described in detail below.

Current Management

The Refuge currently has no integrated plan to guide the management of all of its resources and uses. Current management efforts on the Refuge focus on the protection of sensitive species, the enhancement of their habitats, and the management of public access to and use of Refuge lands. A major emphasis of current management is the protection of the western snowy plovers by a variety of means, including: "Sensitive Wildlife Habitat – Closed Area" signs; nest exclosures; symbolic fencing (low cable fence used to keep humans from approaching nests); and law enforcement patrols. Western snowy plovers are monitored each breeding season for reproductive success and all chicks are banded for further monitoring. In addition, mammalian predators (including nonnative red foxes, feral cats, and skunks) are managed to selectively remove problem predators during the snowy plover breeding season. Black legless lizards are surveyed monthly using a standardized protocol. Coastal sand dune habitat on the Refuge is maintained by intensive hand-weeding and chemical control of invasive nonnative vegetation. Native grassland has been restored and is maintained by regular mechanical mowing and weed-whacking, and riparian restoration is an ongoing effort along the Salinas River.

Wildlife and habitat protection has been a clear management priority for the Refuge because of the National Wildlife Refuge System's conservation responsibility. Unlimited or uncontrolled public use is not compatible with this mission nor with the purpose for which the Refuge was created. However, limited recreational opportunities have been available for the

public on the Refuge, including waterfowl hunting, surf fishing access, and wildlife observation and photography. Because the State Lands Commission owns the land below mean high water, the Service cannot, under any alternative, prohibit public access to these tidal lands adjacent to the approved Refuge boundary.

Overview of Management Alternatives

The following section describes the four management alternatives:

- Alternative 1: No Action,
- Alternative 2: Reduce Public Use and Improve and Expand Resource Management,
- Alternative 3: Improve Public Use and Resource Management, and
- Alternative 4: Expand and Improve Public Use and Resource Management.

Alternative 1: No Action

Under the No Action Alternative, the Refuge would continue to be managed as it has been in the recent past (approximately the last ten years). The Refuge currently has no unit-wide management plan; recent management practice has followed existing "step-down" plans:

- Salinas River NWR Hunting Plan (1991),
- Salinas River NWR Recreational Fishing Plan (1985),
- Salinas River NWR Fire Management Plan (1999), and
- Salinas River NWR Predator Management Plan (1993).

In addition to the step-down plans, several other existing documents have provided management direction for the Refuge in recent years, including the Salinas River Lagoon Management and Enhancement Plan (John Gilchrist & Associates 1997), the California Brown Pelican Recovery Plan (U.S. Fish and Wildlife Service 1983), and the Recovery Plan for Seven Coastal Plants and Myrtle's Silverspot Butterfly (U.S. Fish and Wildlife Service 1998). Implementation of the No Action Alternative would include preparation of a CCP describing and formalizing current management on the Refuge.

Existing recreational uses (Figure 5) would continue under the No Action Alternative. For example, the Refuge would continue to provide limited hunting opportunities and surf fishing access. Similarly, wildlife observation and photography would occur on the Refuge. However, there would be no guided tours or docent program and no facilities would be built or improved. Recreational use would likely increase due to population growth in the area and a greater awareness of the existence of the Refuge. The Refuge is currently fenced along its southern boundary only. No new fencing would be added under the No Action Alternative.

Under the No Action Alternative, resource management would include: invasive plant removal and control; mammalian predator management to reduce predation on western snowy plovers; snowy plover monitoring and management; limited species inventories; grassland mowing; planting of native riparian trees and shrubs (mostly along the Salinas River); and mosquito management. The Service would rely primarily on partnerships with local and State agencies, organizations, universities, and adjacent landowners to accomplish many of its resource protection and monitoring goals. The level of staffing and funding currently devoted to the Refuge would remain the same under this alternative.

The No Action Alternative provides a baseline against which the three action alternatives can be compared (see Table 3). The No Action Alternative is described in detail in the *Goals, Objectives, and Strategies* section below as Alternative 1.

Alternative 2: Reduce Public Use and Improve and Expand Resource Management

Under Alternative 2, the Refuge would focus exclusively on protecting, enhancing, and restoring natural resources. The rationale for this alternative is that there are few other public lands in the Monterey Bay area whose primary mission is to protect endangered species and other wildlife. The Refuge supports a regionally important population of the western snowy plover, which is federally listed as threatened. More intensive management of this population and control of public use may be required to increase the size of the population and maintain its long-term viability on the Refuge.

Under this alternative, the Refuge would be closed to all public use except guided tours offered by Service staff for wildlife observation, photography, and environmental interpretation and education. The Refuge would be fenced along most of its borders to prevent unauthorized access. The beach below mean high water would remain open for public use, including surf fishing, because the Refuge does not control lands below mean high water. However, beach access through the Refuge would be discontinued; users would be permitted to access the beach only from the public beaches adjacent to the Refuge. In addition, the Service would pursue a long-term lease with the State Lands Commission so it can manage the beach and tidelands below mean high water.

Alternative 2 would redirect most of the limited resources currently devoted to public use management to support increasing the intensity of natural resources management. All of the current resource management activities would continue under this alternative.

New management tools and techniques would include: use of prescribed fire to augment mowing and herbicide use in the grassland/shrubland habitat; comprehensive inventories of all species on the Refuge; translocation of problem avian predators of the western snowy plover; and creation of a Geographic Information System (GIS) database to track vegetation and population trends. Full implementation of this alternative would require increased staffing and funding (see Table 3).

This alternative is described in more detail in *Goals, Objectives, and Strategies* below. Table 3 compares Alternative 3 to the other alternatives.

Alternative 3: Improve Public Use and Resource Management (Preferred Management Scenario/Proposed Action)

Alternative 3 represents the Service's preferred management scenario/proposed action (see discussion below). Under Alternative 3, public use of the Refuge would be improved but not substantially expanded. For example, informational signs and interpretive exhibits would be installed on the Refuge. In addition, the existing parking lot would be improved (e.g., grated, paved, or covered with gravel). The area in which seasonal waterfowl hunting is permitted would be reduced by approximately 15% to protect roosting California brown pelicans.

Figure 5. Proposed Public Use Alternatives



All of the current management activities would continue under this alternative. Some activities, such as special-status species inventories, would be substantially expanded. New management tools and techniques would include: use of prescribed fire to augment mowing and herbicide use in the grassland/shrubland habitat; inventories of all habitats on the Refuge; translocation of problem avian predators of the western snowy plover; and creation of a GIS database to track vegetation and population trends. In addition, the Service would pursue a long-term lease with the State Lands Commission so it can manage the beach and tidelands below mean high water. Full implementation of this alternative would require increased staffing and funding (see Table 3).

This alternative is described in more detail in *Goals, Objectives, and Strategies* below. Alternative 3 is compared to the other alternatives in Table 3.

Alternative 4: Expand and Improve Public Use and Resource Management

Under Alternative 4, public use of the Refuge would be improved and expanded. For example, informational signs and interpretive exhibits would be installed on the Refuge, a wheelchair-accessible trail to the Salinas River and to the beach (on a boardwalk) would be constructed, hunting blinds would be built along the Salinas River, and a restroom would be installed near the parking lot. In addition, the existing parking lot and privately owned access road would be improved (e.g., paved or covered with gravel), greatly improving access to the Refuge, particularly during the rainy season. The seasonal hunt area would be reduced, as in Alternative 3.



Beach access trail
Jones & Stokes Photo

Table 3. Summary comparison of proposed alternatives.

Topic	*Alternative 1: No Action*	*Alternative 2: Reduce Public Use, Improve and Expand Resource Management*	*Alternative 3: Improve Public Use and Resource Management (Proposed Action)*	*Alternative 4: Expand and Improve Public Use and Resource Management*
Overview				
Refuge Focus	Remains the same: managing wildlife and providing limited but unique recreational opportunities compatible with wildlife preservation	Changes: exclusive focus on protecting and enhancing natural resources	Same as Alternative 1	Same as Alternative 1
Summary of Management Changes	■ Continue current management and public use without change	■ Close Refuge to public use except for guided tours by Service staff for nonconsumptive uses ■ Expand and improve management programs for endangered species and native habitats	■ Improve existing public use through construction of interpretive signs on existing trails ■ Improve current management through inventories, monitoring, and increased protection of threatened and endangered species	■ Increase amount and quality of public use by building facilities and interpretive signs on existing trails ■ Expand and improve management programs for endangered species and native habitats to minimize and offset potential effects of increased public use
Migratory Bird and Native Species' Habitat Management (Goal 1)				
Inventories and Management Tools Used	■ Continue habitat management without change ■ Continue use of current management tool: grassland mowing	■ Conduct comprehensive inventory of species on Refuge ■ Expand management tools to include: prescribed burning of grassland	Same as Alternative 2	Same as Alternative 2
Endangered Species Management (Goal 2)				
Protection of Populations of Endangered, Threatened, and Rare Species	■ Continue habitat management and use restrictions without change ■ Do not implement new programs ■ Do not expand existing programs ■ Limit inventories to a few special-status species such as western snowy plover and Smith's blue butterfly ■ Coordinate management of plover with other groups ■ Continue mammalian predator management	■ Fence Refuge to prevent any unguided access in or near nesting habitat ■ Move closed area signs from current locations to Refuge boundary ■ Increase enforcement patrols ■ Continue monitoring of breeding and wintering plover populations in partnership with Point Reyes Bird Observatory ■ Add translocation of avian predators to predator management program ■ Evaluate and prioritize management of special-status species on Refuge ■ Preserve and enhance populations of priority special-status species ■ Substantially expand special-status species and habitat inventories and monitoring ■ Establish GIS database	■ Restrict access to nesting habitat and protect individual nests by using improved signs and symbolic fencing ■ Continue monitoring of breeding and wintering plover populations in partnership with Point Reyes Bird Observatory ■ Improve interpretation through docent program and displays ■ Increase enforcement of closed areas during nesting season ■ Add translocation of avian predators to predator management program ■ Expand species and habitat inventories and monitoring ■ Establish GIS database	■ Restrict access to nesting habitat through improved signs ■ Continue monitoring of breeding and wintering plover populations in partnership with Point Reyes Bird Observatory ■ Improve interpretation through large docent program and displays ■ Substantially increase enforcement of closed areas during nesting season ■ Add translocation of avian predators to predator management program

Table 3. Summary comparison of proposed alternatives *(continued).*

Topic	*Alternative 1: No Action*	*Alternative 2: Reduce Public Use, Improve and Expand Resource Management*	*Alternative 3: Improve Public Use and Resource Management (Proposed Action)*	*Alternative 4: Expand and Improve Public Use and Resource Management*
Public Use (Goal 3)				
Hunting	Continue to provide waterfowl hunting opportunities in fall on approximately 45 acres (3,600 linear feet) along the Salinas River	Prohibit hunting on the Refuge	Provide waterfowl hunting opportunities in fall on approximately 38 acres (2,800 linear feet) along the Salinas River (reduce by approximately 800 linear feet)	Same as Alternative 3, but improve hunting experience by building 4 hunting blinds
Surf Fishing	Allow access to surf fishing opportunities on State tidelands through Refuge	Prohibit access to surf fishing through Refuge	Same as Alternative 1	Same as Alternative 1
Wildlife Observation and Photography	Provide wildlife observation and photography opportunities within designated areas	Except on beach, allow wildlife observation and photography only through tours guided by Service staff	Same as Alternative 1, but improved by addition of interpretive signs	Same as Alternative 3
Environmental Education and Interpretation	No formal opportunities	Allow environmental education and interpretation only through tours guided by Service staff, conduct cultural resources inventory	Install interpretive signs along trails, develop educational materials, conduct cultural resources inventory	Same as Alternative 3
Facilities/ Trails	No new facilities or trails	Same as Alternative 1	Build/install: ■ Orientation kiosk ■ Improved surface in parking lot	Build/install: ■ 4 hunting blinds ■ Orientation kiosk ■ Wheelchair-accessible boardwalk from parking lot to beach ■ Wheelchair-accessible trail to Salinas River ■ Restroom ■ Emergency phone ■ Improved surface in parking lot and on access road
Public Use Enforcement	Continue with current levels: infrequent visits by Service staff	Increase current levels: frequent visits by Service staff	Increase current levels: visits by Service staff at moderate frequency	Increase current levels: Service staff always present during daylight hours
Staffing and Cost				
Staffing Needs*	Continue current staffing: ■ Part-time Refuge Manager ■ Part-time Refuge Biologist	Increase staff to: ■ Full-time Refuge Manager ■ Full-time Refuge Biologist ■ Full-time Biological Science Technician	Increase staff to: ■ Full-time Refuge Manager ■ Full-time Refuge Biologist ■ Full-time Biological Science Technician ■ Full-time Park Ranger ■ Part-time Maintenance Worker	Increase staff to: ■ Full-time Refuge Manager ■ Full-time Environmental Education Specialist ■ Full-time Public Use Specialist ■ Full-time Park Ranger ■ Part-time Maintenance Worker
Staffing Location	Continue current staffing location out of Refuge Complex Headquarters in Fremont	Establish satellite Refuge office in Santa Cruz or Monterey County	Same as Alternative 2	Same as Alternative 2
Estimated Cost through 2015	Current funding: approximately $125,000/year	Increased funding: approximately $290,000/year	Increased funding: approximately $325,000/year	Increased funding: approximately $390,000/year

* Future staff will have responsibility for managing both of the Monterey Bay National Wildlife Refuges (Salinas River NWR and Ellicott Slough NWR).

All of the current management activities would continue under this alternative. New management tools and techniques would include: use of prescribed fire to augment mowing and herbicide use in the grassland/shrubland habitat; inventories of all habitats on the Refuge; translocation of problem avian predators of the western snowy plover; and creation of a GIS database to track vegetation and population trends. In addition, the Service would pursue a long-term lease with the State Lands Commission so it can manage the beach and tidelands below mean high water. Full implementation of this alternative and management of the expected increase in public use and the potential conflicts between this use and protection of natural resources would require substantially increased staffing and funding (see Table 3).

This alternative is described in more detail in *Goals, Objectives, and Strategies* below. Alternative 4 is compared to the other alternatives in Table 3.

Features Common to All Alternatives

All four alternatives, including the No Action Alternative, incorporate several concepts and management techniques intended to achieve the species, habitat, education, and recreational goals of the Refuge (see also Table 3). These are:

- Establishing, maintaining, and improving partnerships with landowners and local, State, and Federal agencies and organizations,
- Coordinating management actions with local and State land and resource management agencies,
- Controlling problem mammalian predators of the western snowy plover,
- Monitoring breeding and wintering western snowy plover populations in partnership with Point Reyes Bird Observatory,
- Removing nonnative invasive plants,
- Encouraging scientific research on the Refuge,
- Restoring native habitats, and
- Exploring expansion of the Refuge boundaries.

Features Common to All Action Alternatives

Several concepts and management techniques that will help to achieve Refuge goals are common to all of the action alternatives (Alternatives 2, 3, and 4) (see also Table 3). These are:

- Translocating avian predators on western snowy plovers,
- Conducting a comprehensive inventory of species and habitats,
- Evaluating and prioritizing management of all special-status species,
- Conducting a sitewide cultural resources inventory,
- Increasing staffing,
- Establishing a satellite Refuge office in Monterey or Santa Cruz County to permit more efficient management of the two Monterey Bay area National Wildlife Refuges (Salinas River National Wildlife Refuge and Ellicott Slough National Wildlife Refuge), and
- Pursuing a long-term lease with the State Lands Commission to manage tidelands.

Proposed Action

Once several feasible management alternatives have been developed, the planning policy that implements the Improvement Act of 1997 requires the Service to select a preferred alternative that becomes its proposed action under NEPA. The written description of this proposed action is effectively the draft CCP. The Service has chosen Alternative 3 as its

proposed action for the Refuge because it is the alternative that the Service believes best meets the following criteria.

- Achieves the mission of the National Wildlife Refuge System.
- Is consistent with the Service's ecoregion goals.
- Achieves the purpose of the Salinas River National Wildlife Refuge.
- Will be able to achieve the 15-year vision and goals for the Refuge.
- Maintains and restores the ecological integrity of the habitats and populations on the Refuge.
- Addresses the important issues identified during the scoping process.
- Addresses the legal mandates of the Service and the Refuge.
- Is consistent with the scientific principles of sound fish and wildlife management and endangered species recovery.

The proposed action described in this CCP is preliminary. The action ultimately selected and described in the final CCP will be determined, in part, by the comments received on this version of the CCP/EA. The proposed action presented in the final CCP may or may not be the preferred alternative presented in this version; the final CCP may propose a modification of one of the alternatives presented here.

Alternatives Considered but Eliminated from Detailed Analysis

The alternatives development process under NEPA and the Improvement Act is designed to allow the planning team to consider the widest possible range of issues and feasible management solutions. These management solutions are then incorporated into one or more alternatives evaluated in the EA process and considered for inclusion in the CCP.

Actions and alternatives that are infeasible or that may cause substantial harm to the environment are usually not considered in an EA. Similarly, an action (and therefore, an alternative containing that action) should generally not receive further consideration if:

- It is illegal (unless it is the No Action Alternative, which must be considered to provide a baseline for evaluation of other alternatives, even though it may not be capable of legal implementation);
- It does not fulfill the mission of the National Wildlife Refuge System;
- It does not relate to or help achieve one of the goals of the refuge unit; or
- Its environmental impacts have already been evaluated in a previously approved NEPA document.

However, if such actions or alternatives address a controversial issue or an issue on which many public comments were received, they may be considered in detail in a NEPA document to clearly demonstrate why they are infeasible or would cause substantial harm to the environment.

During the alternatives development process, the planning team considered a wide variety of potential actions on the Refuge. The following actions were ultimately rejected and excluded from the alternatives proposed here because they did not achieve Refuge purposes or were incompatible with one or more goals:

- Building new trail alignments,
- Substantially increasing hunting opportunities,
- Introducing new types of public use such as horseback riding or off-leash dog-walking, and
- Substantially increasing nonconsumptive public uses without increasing management of natural resources.

Other public use and management actions were considered but were determined to be infeasible at this time given the limited funds available and the low priority of the actions. These actions included building a Refuge office on the site and building an interpretive center on the Refuge. These actions may be considered in subsequent CCPs for the Refuge.



Coastal sand dunes
USFWS Photo

Refuge Management Direction: Objectives and Strategies

Under the Improvement Act of 1997, specific management direction for NWRs is expressed in terms of objectives and strategies. As discussed in Chapter 1, refuge goals are broad, open-ended statements of refuge emphasis and direction. Refuge goals may or may not be feasible within the 15-year time frame of the CCP. In contrast, refuge objectives are concise statements of what will be achieved to help meet a particular refuge goal. When possible, refuge objectives should be measurable, clear, and specific, and should be feasible within the 15-year lifespan of the CCP. Refuge strategies describe specific actions or combinations of actions that can be used to meet an objective. In some cases, strategies describe specific projects in enough detail to assess funding and staffing needs. In other cases, further site-specific detail is required to implement a strategy; this usually takes the form of a step-down management plan (see Figure 4).

The three Refuge goals stated in Chapter 1 are repeated below to provide the context for the proposed management direction. The alternatives presented in this EA represent different combinations of objectives and strategies. The proposed objectives and strategies are listed below as they apply to each of the three Refuge goals.

NEPA Compliance

Most proposed management activities listed below are described (and analyzed in Chapter 5) in enough detail in this EA to satisfy NEPA. Some activities, however, do not contain site plans or other site-specific information that would be required to analyze their environmental impacts in the detail required by NEPA. The Improvement Act recognizes that some actions will not be defined specifically at the time a

CCP is prepared; the Act allows actions to be developed further during the lifespan of the CCP through the preparation of step-down management plans (see Figures 3 and 4). These "planning actions" are included in the list of strategies. Therefore, this EA functions in two capacities: as a project EA for specific activities and as a programmatic EA for planning activities that are not yet well defined. Once the details of these plans are developed (i.e., the location, timing, type, frequency, and intensity of actions) additional steps, including public review, may be required in order for the Service to comply with NEPA.

Organization

Each objective and each strategy is given a unique numeric code for easy reference. Objectives have a two-digit code (e.g., 1.1, 1.2, 2.1, 2.2). The first digit corresponds to the goal to which the objective applies. The second digit is sequential and corresponds approximately to the priority given to that objective relative to others under the same goal. Similarly, each strategy has a three-digit code (e.g., 1.1.1, 1.1.2, 2.1.1, 2.1.2). The first and second digits refer to the appropriate goal and objective, respectively. The third digit is sequential; it indicates priority only for actions with deadlines. Strategies are sometimes also grouped by subtopic.

As described above, all three goals apply to all four alternatives. All of the objectives apply to all of the alternatives, except for objectives 3.1 and 3.3; these exceptions are noted in the text. The strategies, however, may apply either to some or to all of the proposed alternatives. The table in the left-hand column indicates the alternative (1, 2, 3, or 4) to which each strategy applies. In some cases, a strategy that appears in more than one alternative would be applied to a greater degree under one alternative than under others; in these cases, two check marks (✓✓) are shown where the strategy would be applied to a greater degree. The rationale for each objective is also given.

Goals, Objectives, and Strategies

Goal 1.0. **Protect, restore, and enhance populations of migratory birds and other native species and their habitats**

Objective 1.1:
By 2015, the Refuge will restore native riparian vegetation along at least 1,500 feet of the south bank of the Salinas River to increase the density and diversity of migratory and resident songbirds on the Refuge.

Rationale: Protection and enhancement of riparian habitat, coastal lagoons, and estuaries is a major ecoregional goal. Riparian scrub along the Salinas River upstream of the Refuge provides important habitat for migratory and resident birds; increasing the extent of this habitat will increase their populations. In addition, riparian scrub along the river shades water at the edge, improving habitat for native fish by reducing water temperature. Overhanging vegetation also falls into the river and provides important habitat structure for aquatic organisms. Mature riparian scrub along the Salinas River may also help to slow erosion of the riverbank.

Objective 1.1 – Restore Native Riparian Vegetation *Comparison of Alternatives*					
Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Restore Native Riparian Vegetation					
✓	✓	✓	✓	1.1.1	Continue to plant and maintain riparian trees and shrubs native to the lower Salinas River along the riverbank using cuttings from upstream populations. Continue to provide financial, technical, and logistical support to riparian restoration partners such as the Watershed Institute of CSU Monterey Bay to implement this strategy.
	✓	✓	✓	1.1.2	Work with restoration partners to develop by 2003 a long-term monitoring strategy to evaluate the survival and density of riparian revegetation.
✓	✓	✓	✓	1.1.3	Evaluate the erosion of the south bank of the Salinas River and the effectiveness of riparian restoration in stabilizing this erosion by monitoring its location using Global Positioning System equipment. These data will be entered into the Refuge GIS database.
	✓	✓	✓	1.1.4	By 2010, establish a program to monitor population trends, survivorship, and responses to management actions of migratory and resident birds using the riparian restoration site on the Refuge. Develop partnerships with nonprofit groups such as the Ventana Wilderness Society to help implement this strategy.

Objective 1.2:
Within the mosaic of grassland and northern coastal scrub habitat, the Refuge will maintain between 50% and 75% cover of native grassland composed of at least 90% (by plant cover) grasses and herbs native to the local area.

Rationale: Native grassland is a rare plant community and wildlife habitat in California and in the Monterey Bay area. The presence of native grassland increases the habitat diversity found on the Refuge and provides important foraging and breeding habitat for grassland-dependent birds and mammals. Historically, native grassland was maintained naturally by recurring fires that prevented shrubs from converting the habitat to shrubland. Since the end of agricultural operations on the Refuge in the 1960s, shrubs have been slowly invading the grassland in the absence of fire to suppress them. By maintaining a majority of the shrubland/grassland mosaic in native grassland habitat, the Refuge will likely retain this important habitat in sufficient quantity to maintain the diversity of wildlife that now inhabits the Refuge.

Objective 1.2 – Maintain Native Grassland and Coastal Scrub *Comparison of Alternatives*					
Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Enhance Native Grassland					
✓	✓	✓	✓	1.2.1	Continue to mow the grassland annually and apply herbicide to control invasive plants such as poison hemlock and wild radish.
	✓	✓	✓	1.2.2	By 2001, revise the Refuge Wildland Fire Management Plan to include the use of prescribed fire as an additional management tool (to augment mowing and herbicide use) for the maintenance and enhancement of native grassland. *See Appendix I for proposed text of the revised Fire Management Plan.*
	✓	✓	✓	1.2.3	By 2005, inventory and quantify the composition of the grassland on the Refuge. This inventory will include documenting historical land use of the grassland and the methodology and results of past restoration efforts.

Objective 1.3:
The Refuge will maintain and enhance its wetland and aquatic habitat.

Rationale: Protection and enhancement of wetlands is a major ecoregional goal. The saline pond is a unique resource on the Refuge that is important habitat for waterfowl such as American avocet, black-necked stilt, and other shorebirds. The aquatic habitat of the Salinas River Lagoon is a unique regional resource that provides cover and food for a diverse assemblage of fish, insects, invertebrates, and waterfowl, as well as terns, osprey, and muskrat. The lagoon supports several special-status species, including steelhead (federally listed as threatened). The Salinas River is also the only habitat in which hunting is now permitted on the Refuge.

Objective 1.3 – Maintain and Enhance Wetland and Aquatic Habitats
Comparison of Alternatives

Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Enhance Wetland and Aquatic Habitats					
	✓	✓	✓	1.3.1	By 2005, conduct a hydrologic study of the Refuge that includes quantifying the water balance of the saline pond, conducting water quality testing of the pond, and determining the possible sources of any contaminants in the pond.
	✓	✓		1.3.2	By 2005, determine the historic extent of wetlands on the Refuge and the potential to restore degraded wetlands.
	✓	✓	✓	1.3.3	By 2010, complete a two-year inventory of the species present in the Salinas River Lagoon.
	✓	✓	✓	1.3.4	Manage seasonal water levels within the saline pond for migratory shorebirds, waterfowl, other water birds, and other species that depend on this habitat.

Objective 1.4:
The Refuge will enhance the coastal dune habitat for a diversity of native species.

Rationale: Enhancement of coastal dune habitats is a major ecoregional goal. A majority of the Refuge's listed and special-status species occur in or near coastal dune scrub. Enhancing this habitat will benefit these species, including Smith's blue butterfly, black legless lizard, Monterey gilia, and Monterey spineflower. Removing and controlling invasive plants is critical to enhancement efforts because of their ability to spread rapidly and quickly displace native plants and wildlife (Pickart and Sawyer 1998).



After a prescribed burn on a national wildlife refuge
J&K Hollingsworth Photo

Objective 1.4 – Enhance Coastal Dune Habitat
Comparison of Alternatives

Alternative				*Code*	*Strategy*
1	*2*	*3*	*4*		
Enhance Coastal Dune Scrub					
✓	✓	✓	✓	1.4.1	Maintain and enhance partnerships with State Parks to share information and coordinate monitoring to cooperatively and consistently manage coastal dune habitat.
	✓	✓	✓	1.4.2	Implement techniques to control invasive plants, using a combination of chemical and mechanical means. Chemical control may be conducted only outside of the snowy plover breeding season (from October through March). Hand-pulling may be conducted year-round in the backdunes, but only during October–March in the foredunes, where plovers nest. The method to be used will be determined by weed infestation size, potential for habitat disturbance, effects on non-target species, and efficiency.

Note: Strategies 2.1.2, 2.1.3, 2.1.7, 2.1.8, 2.1.9, 2.3.1, and 2.3.2 also help to achieve this objective.

Goal 2.0. Protect and enhance populations of endangered, threatened, and rare species, and promote their recovery by restoring and enhancing their natural habitats

Objective 2.1:
The Salinas River NWR will implement management actions to protect, conserve, and enhance populations of special-status species on the Refuge. Priority will be given to species that are state- or federally listed, are proposed for listing, or are candidates for listing.

Rationale: The Service manages endangered and threatened species as trust species. Thus, the Service is responsible for assisting in the recovery of endangered and threatened species that occur within the refuge system. In order to implement effective active management for the protection and recovery of endangered and threatened species, a major goal of the refuge

system overall and within the southern California ecoregion is to develop priorities for refuge management among species. Prioritization is important because limitations in funding and staff time prevent targeting all special-status species for management. Limited resources are allocated, in part, through inventories of special-status species and prioritization of management needs.

Objective 2.1 – Protect Populations of Endangered, Threatened, and Rare Species
Comparison of Alternatives

Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Mapping, Species Inventories, and Monitoring					
	✓	✓	✓	2.1.1	By 2004, develop a Geographic Information System (GIS) database for the Refuge and overlay vegetation and wildlife habitat types. This database will be used to record locations of special-status species and to track habitat management actions, restoration projects, and maintenance actions.
	✓	✓	✓	2.1.2	By 2005, complete a 2-year inventory of the species that occur on the Refuge. This inventory will include mapping the distribution and estimating the size of all populations of special-status species. Inventories will consist of field surveys and literature searches for historical records of special-status species. Locations of special-status species will be entered in the GIS database.
	✓	✓	✓	2.1.3	After completion of the 2-year baseline inventory of species on the Refuge, develop and implement a long-term monitoring program that tracks the effects of management actions and public use on special-status species. Monitoring data will be stored in the Refuge's GIS database.
	✓	✓	✓	2.1.4	By 2008, evaluate and prioritize the special-status species that occur on the Refuge to determine which species require active management and the level and type of management needed. Criteria for prioritization will include, but will not be limited to: listing status, status in the Monterey Bay area, taxonomic distinctiveness, population size on the Refuge, threats to survival, and sensitivity to disturbance.
Management and Research					
	✓	✓	✓	2.1.5	Encourage research on each priority special-status species on the Refuge to determine its ecology relevant to conservation. Research could be conducted by local universities or other organizations with assistance from the Refuge in the form of funding, supplies, volunteers, or technical assistance.
	✓	✓	✓	2.1.6	By 2006 (assuming additional lands are acquired), establish a satellite Refuge office in Monterey or Santa Cruz County to permit more efficient management of the two Monterey Bay area National Wildlife Refuges. Currently, Refuge staff are headquartered 80 miles away in Fremont, and a significant amount of time is spent commuting to and from the Refuge. *This strategy will assist the Refuge in achieving all of the goals and objectives in this CCP.*
	✓	✓	✓	2.1.7	By 2010, develop habitat management strategies to preserve and enhance populations of high-priority special-status species on the Refuge. These strategies will include detailed prescriptions for habitat management, protocols to monitor the status of these species, and methods to evaluate the effectiveness of management actions. The strategies will cover federally listed species such as the California brown pelican, Smith's blue butterfly, Monterey gilia, and Monterey spineflower, and high-priority special-status species such as the black legless lizard.

Note: Strategies 2.2.2, 2.2.3, 2.2.7, 2.2.8, and 2.2.9 also help to achieve this Objective.

Objective 2.2:
The Salinas River NWR will enhance the population of the western snowy plover on the foredunes of the Refuge so that by 2015 the snowy plover produces at least 1.0 fledged chick per male and there is at least 35 acres of high-quality breeding habitat for the plover.

Rationale: The western snowy plover relies heavily on coastal beaches from southern Washington to Baja California for food, shelter, and raising its young. The Pacific coast populations of this species have been declining dramatically over the past decade because of substantial habitat loss related to industrial, urban, and recreational development, human disturbance, and encroachment of exotic vegetation. The coastal population of western snowy plover was listed as threatened by the U.S. Fish and Wildlife Service in 1993.

Historically, the Monterey Bay area has supported one of the most productive populations of western snowy plovers on the central California coast (Page pers. comm.). Populations of snowy plovers in the Monterey Bay area have been dramatically reduced as a result of habitat loss and disturbance by thousands of beach visitors in summer. Since 1986, there has been a dramatic decline in plover nest success at the Refuge and on adjacent lands (see Chapter 4). Nonetheless, the plover breeding colony on and near the Refuge is one of California's most important, and protection of this resource is considered essential to the continued success of the species.

Achieving a fledge rate of at least 1.0 chick per male will provide a modest regional growth rate for plovers (U.S. Fish and Wildlife Service 2001). During 1996–2000, the nest hatch rate on the Refuge was 67% and the chick fledge rate was 22%, with an average of 23.6 nests recorded per year. There is currently approximately 20 acres of high-quality nesting habitat for the plover on the Refuge. Maintaining at least 35 acres of suitable habitat for the plover on the Refuge would also ensure modest growth of the plover population on the Refuge. The population of plovers on the Refuge could become a "source" population (a population growing at a rate that is more than self-supporting) for plovers in the Monterey Bay area (Monterey Bay Area Snowy Plover Working Group 1999). Adult plovers on the Refuge have the potential to produce juveniles that could colonize new sites in the area or supplement existing populations elsewhere that are not self-supporting. Achieving this objective would help meet recovery goals for the western snowy plover (U.S. Fish and Wildlife Service in preparation). The strategies outlined to achieve this objective are consistent with the goals of the Draft Recovery Plan for the snowy plover currently being prepared by the Service (Elam pers. comm.).



Western snowy plover chick (*Charadrius alexandrinus nivosus*) on the Salinas River NWR
USFWS Photo

Objective 2.2 – Enhance Western Snowy Plover Population *Comparison of Alternatives*					
Alternative					
1	2	3	4	Code	Strategy
Facilitate Regional Management					
✓	✓	✓	✓	2.2.1	Continue to facilitate regular meetings of the Monterey Bay Area Snowy Plover Working Group to share information and develop successful management strategies to increase the population and geographic extent of snowy plovers throughout the Monterey Bay area.
✓	✓	✓	✓	2.2.2	Continue partnership with Point Reyes Bird Observatory to monitor snowy plover reproductive success on the Refuge. Each nest will be closely monitored and data will be collected on adult breeding population size, hatch rates, and fledge rates. All snowy plover chicks will be banded in order to collect information on survival and movement patterns.
Control Invasive Plants					
✓	✓	✓	✓	2.2.3	Remove all European beach grass, iceplant, and other invasive plants from the foredunes of the Refuge by 2015. Control invasive plants in fall and winter (outside the plover breeding season) using chemical and mechanical means such as herbicide spraying, hand pulling, burning, or heavy equipment. Techniques will be chosen based on their likelihood of success, their financial and labor costs, and their low potential for adverse environmental effects.
Minimize Human Disturbance in Nesting Habitat					
		✓	✓	2.2.4	Install clearer 'closed area' signs at the boundary of sensitive dune habitat by 2002. These signs should be similar to signs used at other plover nesting sites in the region. Install entrance signs that clearly state that dogs and horses are not allowed on the Refuge (except dogs when hunting).
		✓	✓✓	2.2.5	Develop and implement a docent program on the Refuge by 2006, in coordination with other agencies, to educate Refuge users during the sensitive breeding season on the ecology of western snowy plovers and the sensitivity of their habitat and nests to disturbance.

Objective 2.2 – Enhance Western Snowy Plover Population *(continued)*
Comparison of Alternatives

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Code	Strategy
					Minimize Human Disturbance in Nesting Habitat *(continued)*
		✓	✓	2.2.6	Design and install interpretive signs at the entrance to and along the coastal dune trail by 2005 that explain to visitors the ecology of the western snowy plover and the plover's sensitivity to disturbance. Coordinate with other agencies to design interpretive signs with a message that is consistent with interpretive signs for snowy plovers at other sites in the Monterey Bay area.
		✓	✓	2.2.7	By 2005, install symbolic fencing along beach trail around plover nests likely to be disturbed by the public; if trespass into closed areas continues, install symbolic fencing along the edge of foredune habitat to delineate sensitive areas and restrict human access.
	✓			2.2.8	Install high chain-link fencing on the southern boundary of the Refuge and across the beach on the northern and southern boundaries to prevent unauthorized entry into the Refuge.
	✓	✓✓	✓✓	2.2.9	Increase enforcement of the closed dune habitat by increasing the presence of Service staff and law enforcement officers on the Refuge to at least one day per week each (two person-days per week) during the plover breeding season.
	✓	✓	✓	2.2.10	Negotiate a long-term lease with the State Lands Commission to manage the beach, foredunes, and tidelands immediately west of the current boundary.
					Control Predators on Eggs and Chicks
✓	✓	✓	✓	2.2.11	Continue to implement the Monterey Integrated Predator Management Program* on the Refuge to control predation on western snowy plovers by mammals. This program uses humane and target species–specific methods to control problem mammalian predators, primarily red foxes, feral cats, and skunks. Nonlethal methods (e.g., box-type traps, soft-catch padded leghold traps, hazing, bow nets, lures) will be used whenever possible. Lethal methods, including shooting and euthanasia, will be used when necessary. The Service will continue to coordinate this effort with other agencies such as the California Departments of Parks and Recreation and Fish and Game, and the U.S. Department of Agriculture Wildlife Services Program.
	✓	✓	✓	2.2.12	Revise the Goals in the Refuge's Predator Management Plan to the following: "Maintain a 5-year productivity of at least 1.0 fledged chick per male and 40 breeding adults to reflect best available scientific information on requirements for achieving a self-sustaining population."
					Facilitate Regional Management
	✓	✓	✓	2.2.13	Implement the Avian Predator Management Plan to provide for removal and relocation of individual American kestrels, northern harriers, loggerhead shrikes and other problem avian predators that threaten nesting western snowy plovers on the Refuge and adjacent lands (see Appendix H for details of this proposed new project).

* The details of the current Integrated Predator Management Program have been described and the environmental effects of this program evaluated in a previous plan (U.S. Fish and Wildlife Service 1993). This plan and the associated NEPA document are available from the Service upon request.

Objective 2.3:
The Refuge will protect and will encourage protection of as much of the coastal sand dune ecosystem in the Monterey Bay area as possible.

Rationale: Protection and enhancement of coastal dune habitats is a major ecoregional goal and an important recovery action for the federally listed species that inhabit them. The coastal dune

ecosystem is a rare habitat in California and is under increasing threats from development, off-highway vehicle use, and invasive plants. The dune system in the Monterey Bay area is among those in the State threatened by these factors (Big Sur Land Trust 1992). Coastal dunes north of the Refuge are largely protected by State parks and an ecological reserve (Figure 6). However, dunes south of the Refuge are largely unprotected; most dunes are privately owned within the cities of Marina, Sand City, Seaside, or Monterey. A 67% undivided interest in the Martin Dunes site, immediately south of the Refuge, was purchased in 2000 by the Big Sur Land Trust; several large private parcels between the Martin Dunes property and Marina State Beach support sand mining operations (California Department of Conservation 1992). The majority of these parcels remain undeveloped and encompass important coastal dune habitat that supports many listed species (California Department of Conservation 1992; Big Sur Land Trust 1992).



The endangered Smith's blue butterfly (*Euphilotes enoptes smithi*)

Objective 2.3 – Protect Coastal Sand Dune Ecosystem *Comparison of Alternatives*					
Alternative				*Code*	*Strategy*
1	*2*	*3*	*4*		
Protect Coastal Sand Dune Ecosystem					
✓	✓	✓	✓	2.3.1	Establish partnerships with other landowners of coastal dune habitat to manage this habitat for conservation (e.g., controlling invasive plants on coastal dunes) through cooperative agreements, conservation easements, or financial incentives such as funding through the Partners for Wildlife program. The Service could also provide technical assistance, volunteer labor, financial assistance, or supplies to landowner partners.
✓	✓	✓	✓	2.3.2	Explore expansion of the current Refuge boundary by initiating the Service's planning process for expanding refuges, which culminates with a Land Protection Plan, Conceptual Management Plan, and NEPA document.

Goal 3.0. **Provide opportunities for safe, unique, wildlife-dependent recreation when compatible with the purpose and goals of the Refuge**

Objective 3.1:
The Refuge will provide limited opportunities for hunting and access to fishing that are compatible with Refuge goals for protection of special-status species.

Rationale: Hunting and fishing were identified in the Improvement Act as priority uses for refuges when they are compatible with other refuge goals. As a result, the Service encourages hunting and fishing on many NWRs. Because waterfowl hunting opportunities are limited in the Monterey Bay area (see Chapter 4), the Salinas River National Wildlife Refuge provides an important regional recreational opportunity for waterfowl hunters, and is unique in the area in providing opportunities for walk-in hunting (see Chapter 4). Hunting must be limited on the Refuge because of its importance to special-status species that are sensitive to disturbance. For example, the California brown pelican roosts near the current hunt area (see Chapter 4).

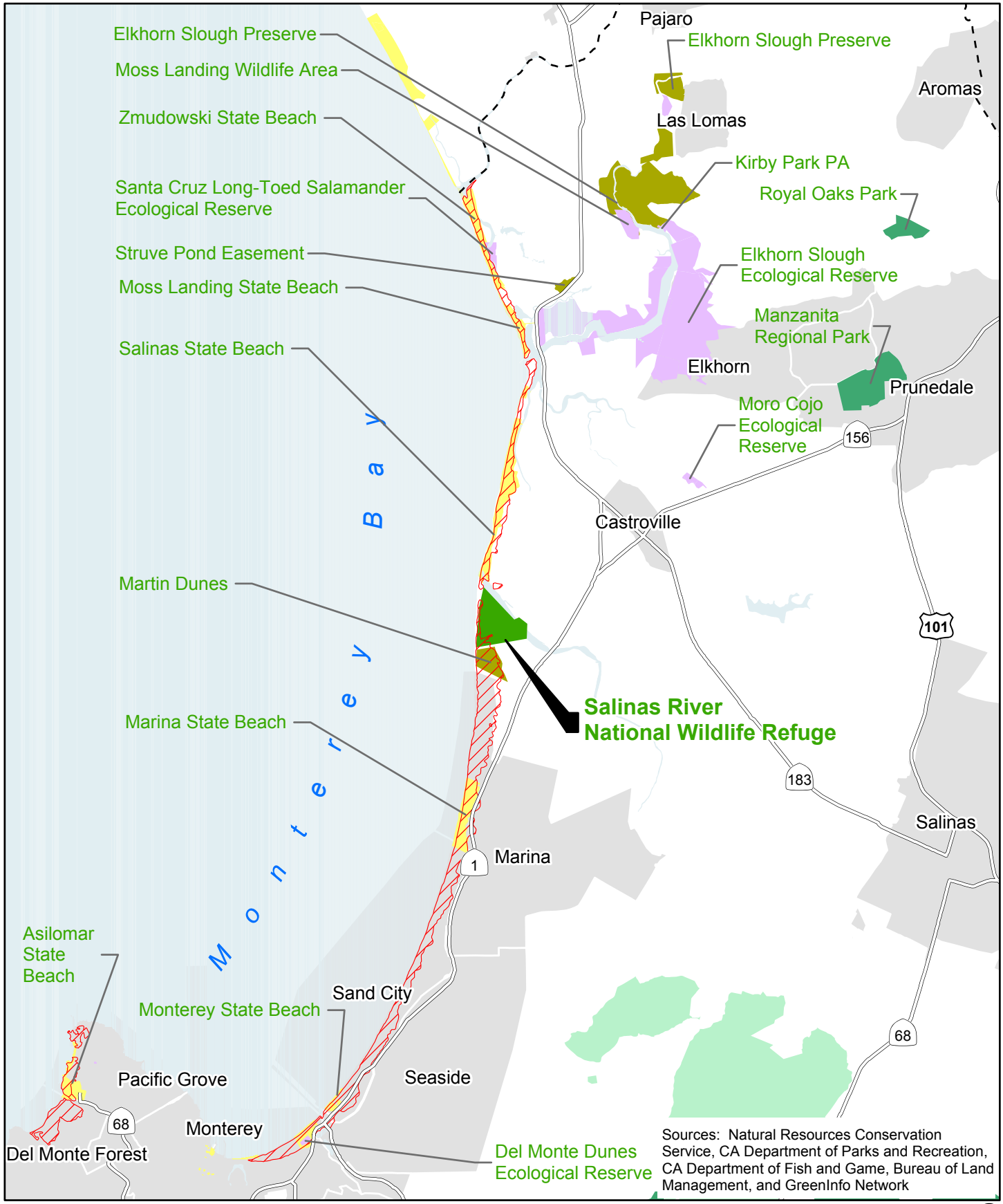


California brown pelicans (*Pelecanus occidentalis*)
USFWS Photo

Objective 3.1 – Provide Fishing and Waterfowl Hunting Access or Opportunities
Comparison of Alternatives

Alternative				*Code*	*Strategy*
1	*2*	*3*	*4*		
Hunting Opportunities					
		✓	✓	3.1.1	Reduce the hunting area on the Refuge from approximately 45 acres to approximately 38 acres (Figures 2 and 5) to reduce disturbance to pelicans roosting on the Refuge's island in the Salinas River.
		✓	✓	3.1.2	Annually monitor hunting use of the Refuge beginning in 2002. The information gathered will be used to review and possibly revise Refuge hunting regulations to enhance the quality and safety of the Refuge's hunting program.
			✓	3.1.3	By 2005, install 4 hunting blinds along the south bank of the Salinas River, including two blinds accessible by disabled hunters, to improve the quality of hunting opportunities.

Figure 6. Coastal Dunes and Land Ownership along Southern Monterey Bay



Objective 3.1 – Provide Fishing and Waterfowl Hunting Access or Opportunities *(continued)* ***Comparison of Alternatives***					
Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Surf Fishing Opportunities					
✓		✓	✓	3.1.4	Continue to provide access to opportunities for surf fishing between the high tide and surf zones.

Objective 3.2:
The Refuge will provide opportunities for wildlife observation and photography that will enable visitors to experience and enjoy the wildlife of the Refuge and develop an appreciation for wildlife species and their unique habitats.

Rationale: The Improvement Act identified wildlife observation and wildlife photography as priority public uses for NWRs. Because these public uses are often compatible with wildlife management goals, the Service encourages wildlife watching and photography on almost all NWRs.

Objective 3.2 – Provide Wildlife Observation and Photography Opportunities ***Comparison of Alternatives***					
Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Wildlife Observation and Photography					
	✓			3.2.1	Establish regularly scheduled wildlife observation and photography tours of the Refuge led by Service staff.
		✓	✓	3.2.2	By 2005, design and install an orientation kiosk at the Refuge entrance that includes three signs: a sign providing a trail map, trail information, and trail regulations; a sign that describes the National Wildlife Refuge System and allowed uses on the Refuge; and interchangeable signs for hunting and snowy plover nesting seasons.
		✓		3.2.3	By 2003, construct and maintain a 1,500-foot wheelchair-accessible trail from the parking lot of the Refuge to the River Trail Loop to improve access to the Salinas River and to minimize the impacts of public use through these sensitive habitats (Figure 5).
			✓	3.2.4	By 2005, construct and maintain a new wheelchair-accessible boardwalk from the parking lot of the Refuge to the beach to improve access to the beach (Figure 5).
			✓	3.2.5	By 2005, install a restroom facility at the parking lot.
		✓	✓	3.2.6	By 2010, improve the parking lot surface to provide visitors with better all-season parking at the Refuge.
			✓	3.2.7	Subject to landowner approval, improve the access road surface to provide visitors with all-season and safer access to the Refuge by 2015.
	✓	✓	✓	3.2.8	Maintain trails on the Refuge and clearly delineate trail portion along the Salinas River.

Note: Strategy 3.1.3 also helps to achieve this Objective (hunting blinds can also be used as wildlife observation blinds).

Objective 3.3:
The Refuge will expand opportunities for interpretation and environmental education that will foster visitors' appreciation, understanding, and stewardship of the Refuge's habitats and protected species.

Rationale: The Improvement Act identifies environmental interpretation and environmental education as priority uses on NWRs. Because these uses are often compatible with other refuge management goals, the Service actively encourages environmental education and interpretation on many refuges. The mission of the National Wildlife Refuge System encourages study sites, facilities, and active support for educational programs that focus on fish and wildlife resources and environmental problems. High-quality interpretive and educational opportunities will greatly enhance visitors' experience of the Refuge. Increased knowledge of Refuge resources will ensure a more comprehensive understanding of NWRs and their significance.

In addition, formal cultural resource surveys are highly recommended for the Refuge to complement ongoing and proposed biological and hydrologic studies; little information now exists on the Refuge's cultural resources, but activities included under all of the management alternatives have the potential to affect cultural resources. At a minimum, cultural resources inventories will be required in areas where ground-disturbing activities are proposed, including the use of prescribed fire and construction of trails or other facilities. In addition, the World War II bomb shelter should be formally recorded by a qualified cultural resources specialist.

Inventories, evaluation, or data recovery on cultural resources on the Refuge could help address important academic questions for the region. Any information gathered during cultural resource surveys will be incorporated into interpretive and educational material.



Salinas River NWR CCP Planning Team on field visit
USFWS Photo

Objective 3.3 – Provide Interpretation and Education *Comparison of Alternatives*					
Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Interpretation and Education					
		✓	✓	3.3.1	By 2007, design and install interpretive signs along existing trails to explain the ecology of native habitats on the Refuge and the species within them.
✓		✓	✓✓	3.3.2	Maintain and enhance existing environmental education partnerships with the California State University and develop new partnerships with other local agencies, schools, universities, and organizations.
		✓	✓✓	3.3.3	Develop environmental education and interpretive materials including a Refuge brochure, fact sheets on specific species and habitats, and a guide for educators on endangered species issues, to enable educators to use the Refuge as an outdoor classroom, without staff assistance.
	✓	✓	✓	3.3.4	Conduct a sitewide inventory of potential archaeological and historic resources on the Refuge; incorporate information about these resources into interpretive and educational material (Strategies 3.3.1 and 3.3.3).
			✓	3.3.5	By 2010, redesign and retrofit the existing bomb shelter in a way compatible with its cultural significance to be used as an open-air shelter for staging interpretive programs.

Note: Strategies 2.2.5 and 2.2.6 also help to achieve this Objective.

Objective 3.4:
The Refuge will take measures to ensure the safety of resources, property, and visitors.

Rationale: Increased safety measures would enable the Refuge to better fulfill its conservation mission, and would ensure improved experiences for Refuge visitors.

Objective 3.4 – Ensure Safety of Resources, Property, and Visitors *Comparison of Alternatives*					
Alternative					
1	*2*	*3*	*4*	*Code*	*Strategy*
Increase Safety Measures					
	✓	✓	✓✓	3.4.1	Increase law enforcement patrols.
	✓	✓	✓✓	3.4.2	Develop cooperative agreements with State and local agencies to support increased law enforcement patrols.
			✓	3.4.3	By 2005, install an emergency phone (i.e., one able to dial 911 only) at the Refuge parking lot.

Chapter 4. Affected Environment

This chapter describes the characteristics and resources of the Refuge. It specifically addresses physical resources, biological resources, cultural resources, socioeconomic resources, and recreational opportunities.

Physical Resources

Climate

Like the rest of the California coast, northwestern Monterey County enjoys a Mediterranean climate, with dry, warm summers and moderately wet, mild winters. Precipitation in the Refuge area averages approximately 16 inches per year, 90% of which falls between November and April (Soil Conservation Service 1978). Prevailing winds throughout most of the year are northwesterly. During the late summer and fall, prevailing winds are southeasterly.

Surface Hydrology

The Refuge is located at the western (downstream) end of the Salinas River watershed. This watershed, between the Santa Lucia and Diablo ranges, is approximately 150 miles long and averages 20–40 miles wide. It is one of the larger watersheds in California, draining an area of 4,231 square miles.



Saline pond on Salinas River NWR
USFWS Photo

Surface drainage in the vicinity of the Refuge is dominated by the gradients associated with the Salinas River and the Pacific Ocean. Much of the surface runoff in the project area drains in a general northward direction into the Salinas River. Some runoff may also drain west, directly into the Pacific Ocean, via overland flow or via subsurface flow under the dune lands. In addition to natural runoff, off-site drainage from agricultural lands south of the project site is conveyed northward into the Refuge. Agricultural runoff apparently flows into the Refuge's large salt pond; if the capacity of the salt pond is exceeded, runoff overflows northward into the Salinas River.

The Refuge's salt pond is likely a remnant of an abandoned meander of the Salinas River. Based on analysis of historic U.S. Coast and Geodetic Survey maps, the pond has existed since at least 1857 (John Gilchrist & Associates et al. 1997) and was connected to the Salinas River until 1913. Since its formation, the pond has gradually shrunk in size and depth, probably in part because of gradual infiltration and in part because of encroachment by the Refuge's eastward- migrating dunes. Nonetheless, this 45-acre pond is noteworthy, as there are few other saline ponds of this type on the central California coast.

In addition to agricultural runoff, the Refuge's salt pond also receives input from rainfall, from seawater that washes over the dunes, from groundwater, and, during major floods, from the Salinas River. The depth of the pond varies in response to the balance among these factors. Between 1989 and 1991, the depth of the pond ranged from 0.5 foot to 2.0 feet; the pond was nearly dry in November 1990. As water levels drop, salt from seawater input concentrates in the pond. Water salinity in the pond ranges from 1 part per thousand (ppt) immediately after heavy rains to 150 ppt during prolonged droughts; for comparison, the salinity of seawater is about 35 ppt.

The Salinas River. Like all rivers, the Salinas River is a dynamic system. Under natural conditions, its course changes because of gradual, ongoing processes of erosion and sediment deposition. During major floods, these processes may be accelerated, resulting in rapid shifts in the location of the active river channel.

Historic maps of the Salinas area show that the course of the Salinas River has altered significantly over the past two centuries (John Gilchrist & Associates et al. 1997). In 1857, the river entered what is now the Refuge from the northeast rather than the southeast. By 1933 the river occupied a channel similar in location and configuration to its present course, which describes a gentle northwestward curve across the Refuge. Since at least the 1930s, the south bank of the river (the outside of the curve) has slowly eroded, while the north bank (the inside of the curve) has built southward through the steady accumulation of sediment. Thus, the Salinas River channel has shifted to the southwest, farther onto the Refuge site; the net result has been to reduce the amount of land and increase the amount of open water within the Refuge boundary. This natural process of channel migration is expected to continue for the foreseeable future.

In an attempt to slow the rate of erosion along the Salinas River's south bank, erosion-control structures were installed along the river near the Highway 1 bridge immediately upstream from the Refuge. Some of the structures have failed and been washed away; others have succeeded in slowing erosion locally. The width of the stabilized reach of the channel has decreased from ~600 feet in 1933 to ~150 feet today, in part because the stabilized south bank is prevented from migrating laterally while sediment deposition continues on the north bank (John Gilchrist & Associates et al. 1997). Flow diversions may also have contributed to the decrease in channel width.

On the Refuge, the Salinas River's south bank is unprotected and experiences significant erosion. One goal of riparian restoration work along the south bank of the river in the Refuge is to slow the rate of bank erosion. The *Biological Resources* section of this chapter contains additional information on riparian restoration on the Refuge.



Riparian restoration along Salinas River
Jones & Stokes Photo

Flooding:
The central California coast, including the Refuge, experiences annual flooding related to winter storms originating over the Pacific Ocean. Extended periods of heavy rainfall produce floods characterized by a rapid rise in streamflow. The subsequent decrease in streamflow may be almost as rapid; however, a series of storms, or a single stalled stormfront, can produce large, catastrophic riverine floods. Flooding in the coastal areas of Monterey County is also associated with simultaneous occurrence of very high tides and large waves. Property damage results from erosion, flotation, and inundation, and from the deposition of debris on downstream properties.

The Federal Emergency Management Agency's Flood Insurance Rate Maps indicate that, except for the coastal dunes and the upper terrace deposits along the site's southern boundary, much of the Refuge is within the 100-year floodplain of the Salinas River. This means that under natural conditions much of the Refuge should be inundated every 100 years on the average. The 100-year water surface elevation ranges from 8.8 feet above mean sea level near the mouth of the Salinas River to 10.6 feet above mean sea level at the eastern boundary of the Refuge (Federal Emergency Management Agency 1991).

Lagoon Breaching:
The mouth of the Salinas River experiences intermittent partial blockage as a result of natural sandbar development. This causes water levels in the Salinas River Lagoon behind the bar to rise; agricultural lands to the north of the Salinas River begin to flood when the stage in the lagoon exceeds approximately 5.5 feet. To prevent flooding, the Monterey County Water Resources Agency (MCWRA) periodically breaches the sandbar in the winter, usually from the north side of the Salinas River Lagoon through adjacent State property, but occasionally from the south, through the Refuge.

MCWRA breaches the rivermouth under the following conditions:
- When flows of approximately 500 cfs or greater are forecast at the U.S. Geological Survey gage at Spreckles;

- When forecast extended flows might cause flooding on nearby farmland if the Salinas River mouth is not breached;
- When the water level in the Salinas River Lagoon is high, and continuous or imminent river flow into the lagoon is forecast; or
- When a forecast by the MCWRA's ALERT flood warning system indicates that flow into the Salinas River Lagoon will result in flooding if the rivermouth is not breached.

It takes approximately 24–48 hours to mobilize and clear a channel through the sandbar with a bulldozer (John Gilchrist & Associates et al. 1997). The timing of breaching affects both water level and water salinity in the lagoon.

Water Quality. Water quality in the Salinas River has been altered by a number of practices, including:

- Surface-water diversion,
- Groundwater pumping,
- Diking and drainage of wetlands,
- Agriculture, and
- Contamination from industrial point sources and from urban runoff.

Alteration of flows alters the salt balance in the Salinas River Lagoon and adjacent marshes, but the greatest threats to water quality in the lagoon and the salt pond on the Refuge are nutrients and pesticides from adjacent and upstream agricultural lands. At present, it is unknown whether the Refuge receives these contaminants from agricultural runoff. Excess nutrients may cause eutrophication, or over-enrichment in nutrients, producing excess growth of algae and mortality of other organisms; this in turn decreases concentrations of dissolved oxygen and contributes to noxious odors. Persistent pesticides in the area may include DDT, toxaphene, dieldrin, endrin, aldrin, and endosulfan, all of which have been used extensively in the Salinas Valley. The use of these pesticides has been banned in California, but they were used for many years, and are known to have been used extensively in the Salinas Valley (John Gilchrist & Associates et al. 1997). These pesticides have been linked to various problems in local wildlife, including widespread mortality resulting from spills, reproductive failure caused by bioaccumulation, behavioral and physiological problems, decreased food consumption, and increased susceptibility to predation and cold.

Geology

Geologic Setting. The Refuge is located in a portion of the California Coast Ranges referred to as Salinia or the Salinian block. Basement rocks in the Coast Ranges are as old as Mesozoic (65–245 million years old) (e.g., Jennings and Strand 1959), and record the long and complex history of the California continental margin. However, the Coast Range itself is a relatively recent feature. Uplift of the Coast Range probably began no earlier than about 5–8 million years ago (Buising and Walker 1995, Atwater and Stock 1998), and uplift of some parts of the range has continued into the past 2 million years (Burgmann et al. 1994, Sedlock 1995). The region is also currently experiencing active strike-slip tectonics related to the San Andreas fault system.

The Salinian block, bounded on the landward side by the San Andreas fault, and on the oceanward side by the offshore San Gregorio-Hosgri fault system, is a geologic orphan, sliced off of rocks to the south and slid into its current location by large-scale translation along the San Andreas

fault (Mattinson and James 1985). Unlike adjacent portions of the Coast Ranges, which are largely underlain by basement rocks belonging to the Franciscan complex, Salinia is characterized by a basement assemblage of plutonic (granitic-granodioritic) and metamorphic rock (e.g., Mattinson and James 1985). In the vicinity of the Refuge, this crystalline basement is overlain by terrestrial and marine sedimentary strata that range from Miocene to Pliocene (approximately 23 million years to 1.6 million years) in age. The Refuge itself is situated primarily on inactive dune deposits of Pleistocene age (1.6 million to approximately 10,000 years old), on active coastal deposits (including active dunes) and on active alluvium of the Salinas River floodplain (see Jennings and Strand 1959).

Seismic Activity. The Refuge is located in a seismically active region. Although the Refuge does not encompass any active faults (defined by the California Division of Mines and Geology as faults that have experienced motion in the last 11,000 years) (Hart and Bryant 1997), the San Andreas fault zone is located less than 15 miles northeast of the Refuge. Several strong earthquakes have occurred within a 50-mile radius of the Refuge. The closest recorded strong earthquake occurred in 1910, approximately 8 miles north of the Refuge; it measured 5.3 on the Richter scale (Ellsworth 1990). The 1989 Loma Prieta earthquake, with a Richter magnitude of 6.9, was epicentered approximately 20 miles northwest of the Refuge (http://www.quake.usgs.gov/prepare/ index.html, accessed June 16, 2001). Because of its proximity to active fault strands, the Refuge can be expected to experience ongoing earthquake activity in the future.

Soils

Overview of Soils on the Refuge. Soils in the Refuge area include the following mapped units: Alviso silty clay loam, coastal beaches, Metz fine sandy loam, Mocho silty loam, Mocho silty clay loam, and Pico fine sandy loam (Soil Conservation Service 1978). Table 4 summarizes the characteristics of the Refuge's soil units.

Soils of the Refuge include floodplain and tidal basin soils, as well as a substantial area of coastal dunes. The Refuge's dune lands represent the northern tip of a dune system that extends more than 12 miles south of the Refuge, reflecting the combined influences of the Salinas River, coastal waves and tides, and prevailing winds. Sand is supplied primarily by longshore transport of sediment delivered by rivers to the north (including the Salinas River) and is reworked and sculpted into dune forms largely by onshore winds. High storm tides subject the dunes to intermittent wave erosion.

The Refuge's dune system is highly dynamic, shifting its position and form in response to changes in the balance between sand supply, wind transport, and wave erosion. Analysis of historic maps shows that between 1937 and 1987, the beach and dunes on the Refuge migrated landward approximately 300–400 feet of their present position, covering approximately 13 acres of the salt marsh and the present location of the salt pond. This change is equivalent to an average of 6–10 feet of landward migration per year. This rate of movement is not unique to the Refuge; similar rates have been measured in the dunes and beaches in nearby Marina, Seaside, and Monterey (John Gilchrist & Associates et al. 1997).



Central dune scrub habitat on Salinas River NWR
Jones & Stokes Photo

Table 4. Soils of the Salinas River National Wildlife Refuge.

Soil Unit	*Description*	*Permeability/Runoff*	*Erosion Hazard*	*Depth to Water Table*
Alviso silty clay loam	Typically <20 inches thick; occurs in basins and on tidal flats.	Low/Very Slow (Very poorly drained under natural conditions.)	Low	6–12 inches
Coastal beaches	Characterized by a narrow sandy strand and adjacent sand dunes; partly inundated during high tide and exposed during low tide. May consist of sand, gravel, and cobbles, in any combination.	Very Rapid/Very Slow	Very High	
Dune lands	Gently sloping to steep landforms composed of loose, wind-deposited quartz and feldspar sands.	Very Rapid/Very Slow	Very High (subject to wind erosion)	
Metz fine sandy loam	Nearly level floodplain deposit.	Moderate/Slow	Slight, but subject to effects of wind	Typically > 60 inches
Mocho silty loam	Formed on floodplains in alluvium derived primarily from sedimentary rocks.	Moderate/Slow	Slight	Typically > 60 inches
Mocho silty clay loam	Formed on floodplains in alluvium derived primarily from sedimentary rocks.	Slow/Slow	Slight	Typically > 60 inches
Pico fine sandy loam	Formed on floodplains in alluvium derived primarily from sedimentary rocks.	Moderately Rapid/Slow	Slight, but subject to effects of wind	Typically > 60 inches

Source: Soil Conservation Service 1978

Soils-Related Hazards on the Refuge. The following paragraphs briefly discuss soils-related hazards that may affect land use decisions on the Refuge.

Expansive soils contain clay minerals (the so-called "swelling clays") that take on water and expand when wetted and contract again as they dry. Structures built on expansive soils—for example, buildings, pavements, and embankments—may be damaged by the movement and settlement that accompany this shrink-swell behavior. At the Refuge, the Alviso, Mocho, and Pico soils exhibit moderate to high shrink-swell potential; the area's other soils have low shrink-swell potential (Soil Conservation Service 1978).

Erosive soils are soils that are particularly vulnerable to erosion by water, typically because of loose textures (low clay content) and/or steep slopes. Excessive erosion generally occurs when human intervention accelerates the natural erosion process. Removal of vegetation and decrease in permeable surface area, both of which are common corollaries of development, can increase surface runoff, which may in turn increase erosion rates. Increased erosion generally causes increased sediment loading in area creeks and rivers, and may result in gullying that undermines remaining vegetation. Some of the Refuge's soils occur on steep slopes or have loose textures, and as a result exhibit moderate to high erosion potential. In addition, the Refuge's coastal beaches, dune lands, and sandy soils are subject to wind erosion.

Corrosive soils are soils whose chemistry is such that they may react with and damage a variety of construction materials when wet. Corrosivity of soils to steel is related to soil moisture, total acidity, and electrical conductivity of the soil; corrosivity of soils to concrete is related to the sulfate content and acidity of the soil. Unless precautions are taken, corrosive soils can eventually cause foundation and structural damage. In the Refuge area, Alviso soils are typically highly corrosive to uncoated steel and concrete and Metz, Mocho, and Pico soils are corrosive to uncoated steel (Soil Conservation Service 1978).

Air Quality

The Refuge is located in California's North-Central Coast Air Basin (NCCAB). The NCCAB is subject to State and Federal air quality standards. Areas that do not meet the standards are designated as nonattainment areas, and those that do comply are designated as attainment areas.

The primary types of pollutants regulated by State and Federal law include:

- Particulate matter less than 10 microns in diameter (PM10),
- Ozone,
- Carbon monoxide (CO),
- Oxides of nitrogen (NO_x),
- Sulfur dioxide (SO_2), and
- Lead.

The NCCAB is an attainment area for both State and Federal CO, NO_x, SO_2, and lead ambient standards, and for Federal PM10 and ozone standards. It is a nonattainment area for State PM10 and ozone ambient standards.

The Monterey Bay Unified Air Pollution Control District (Air District) is the local agency responsible for ensuring compliance with State and Federal air quality standards in the Refuge area (see California Air Resources Board website, http://www.arb.ca.gov/homepage.htm). It is unlikely that Refuge operations would affect ozone levels. However, Refuge management activities that alter the area's hydrology or vegetative cover may expose soil to blowing wind, possibly increasing PM10 emissions.

Hazardous Materials and Contaminants

Because of both past and current land uses, hazardous materials or contaminants may be present on the Refuge. Potential sources of hazardous materials or contaminants include the Refuge's past military

use, past and current agricultural operations, and current mosquito control operations.

Military Use. Between 1942 and 1973, the U.S. military operated several facilities on what are now Refuge lands (see *United States Military at the Refuge* in *Cultural Resources* below for a summary of the Refuge's military history). As discussed below, the exact nature of these operations is unknown. However, when lands that now make up the Refuge were transferred from the Army to the Service, the Army removed several small facilities built in 1945 during the Navy's tenure, including a power substation, a garage, a bomb shelter, and aboveground features associated with two water wells (185 and 196 feet deep, respectively). Records of the removal of these structures provide some indication of the site's former land uses and give some suggestion of the types of contaminants or hazardous materials that may remain on the Refuge as a result of former military operations. Additionally, the Department of Defense recently assessed the potential for contamination on the Refuge under the Defense Environmental Restoration Program (DERP) (U.S. Army Corps of Engineers 1999). Their assessment consisted of a review of the site's history, interviews with individuals familiar with the site and its history, and a site visit to perform random visual search and a metal detector survey.

Records show that the Army had an officers' hunting club at the Refuge site. This may have resulted in some level of lead contamination, but the current concentration of lead in the site's soils and in the sediments of the Salinas River Lagoon is unknown.

Part of what is now the Refuge was used by the Navy for aerial bombing practice. The target was a 550-foot long and 65-foot wide silhouette of a cruiser located behind the active dunes in the northwestern corner of the Refuge. Records indicate that the bombs used contained small spotting charges rather than explosives. In addition, other sites in the vicinity of the Refuge were used for shore bombardment practice by Navy ships; however, the Refuge lands were not used for that purpose. Since the establishment of the Refuge, there has been only one incident of anyone finding live ordnance. This occurred in late 1997 when a visitor found a live 5-inch Navy projectile on the beach. The explosive was detonated on-site by an expert from Moffett Field. Because the Refuge was not used for shore bombardment, the projectile likely washed ashore in the past and was uncovered by the tides. The random visual and metal detector survey conducted by the U.S. Army Corps of Engineers in 1998 did not detect any further ordnance, spent or live, on the Refuge (U.S. Army Corps of Engineers 1999). A second site visit was conducted by the Corps on June 6, 2001 to investigate the potential for unexploded ordnance or other hazardous material on the Refuge; none was found.

The U.S. Army Corps of Engineers uses two measures to prioritize further investigation and remediation of former defense sites: hazard severity and hazard probability. Based on their historic investigation, interviews, and site visit, the Corps gave the Refuge a hazard severity value of 6 on a scale of 0 (lowest severity) to 60 (highest severity), which represents "marginal severity." The site was given a hazard probability value of 13 on a scale of 0 (lowest probability) to 30 (highest probability). Overall, the site was given a risk assessment code of 4, which is the lowest code that corresponds to a recommendation for action by the Corps (U.S. Army Corps of Engineers 1999). The June 2001 site visit confirmed the very low probability of hazards on the Refuge. The Refuge may be

investigated further by the Corps, but in view of the low risk rating and resulting low priority, it may be many years before this investigation is conducted. The former target range is already closed to the public to protect sensitive habitats.

In 1992, a 3,000-gallon underground storage tank was discovered in the southeast corner of the Refuge, approximately 500 feet from the Salinas River and less than one mile from the Pacific Ocean. The tank contained a mixture of diesel fuel and water that had leaked in over time. The tank, an associated pipeline, and the surrounding soil were subsequently removed from the site in June 1997. As part of this remediation, 250 cubic yards of soil were cleaned and spread on the site and 13,300 gallons of groundwater were pumped out of the area and taken to an off-site disposal facility (Regional Water Quality Control Board 1998, U.S. Army Corps of Engineers 1999). The excavation site was backfilled with clean soil. The Monterey County Department of Health confirmed the completion of site remediation and site closure in a letter dated February 12, 1999.

Agriculture. Past and current agricultural use in the area is also a potential source of contamination on the Refuge. Prior to 1973, part of the Refuge was in agricultural production. The Refuge receives runoff from agricultural areas to the south and across the Salinas River to the north. As a result, the salt pond and Salinas Lagoon are probably intermittently contaminated by pesticides and nutrients from upstream agricultural lands. In addition, because the Refuge is located at the downstream end of the highly agricultural Salinas River Valley, the finer-textured soils on the Refuge may contain persistent pesticides such as DDT, toxaphene, dieldrin, endrin, aldrin, and endosulfan (now banned in California).

After heavy flooding in 1995, an area along the Salinas River was exposed and found to contain debris and waste that may have been a former small landfill (U.S. Army Corps of Engineers 1999). The origins of this site are unknown but it may have been established during agricultural operations on the Refuge prior to 1973. There are no records of an active landfill in the records of military use of the Refuge. The possible landfill site has not been observed in the years since 1995, possibly because the debris has washed into the Salinas Lagoon.

Mosquito Control. The Northern Salinas Valley Mosquito Abatement District (NSVMAD) has been conducting mosquito control at the Refuge for many years. Chemical spraying is conducted almost exclusively by helicopter. On rare occasions, when the treatment area is small, spraying is done by hand. Aerial applications are made from an altitude of 5–10 feet at an airspeed of 55 mph. Swath width is 66 feet, so several passes are made. Treatment duration is approximately 15–20 minutes.

Mosquito populations are related to precipitation amounts. In years when rainfall is below normal, mosquito populations are low and control is reduced or nonexistent. Conversely, when rainfall is above normal, mosquito populations are larger and mosquito control is increased. In the last six years, mosquito control applications occurred approximately 2–4 times per year. Spraying typically occurs from December through April in the saline pond and salt marsh habitat on the Refuge.

Since 1996, NSVMAD has used either VectoBac© G or 12AS to treat all or most of the Refuge. BothVectoBac© G and 12AS are aqueous suspensions of *Bacillus thuringiensis,* an insecticidal bacterium. The strain used by NSVMAD specifically targets mosquitoes, black flies, and fungus gnats and is non-toxic to humans, wildlife, and plants (National Integrated Pest Management Network, http://www.colostate.edu/Depts/IPM/, accessed June 2001). Two other chemicals could be used by NSVMAD to increase effectiveness: Golden Bear 1111, a petroleum distillate, and Altosid ALL, otherwise known as S-methoprene. Material selection is based on efficacy, mosquito instar present, water temperature, and species of mosquito.

Currently, NSVMAD does not have a Special Use Permit from the Service. Typically, they notify the Refuge 1–2 days before spraying. In the future, the Service will require a Special Use Permit each year that NSVMAD conducts spraying. This permit will stipulate that all control work will be carried out in conformance with pre-approved Pesticide Use Proposals and Section 7 Endangered Species consultations.

NSVMAD will notify the Refuge five days prior to spraying so that Refuge staff can collect bird use data and survey the pond area for nesting birds before spraying takes place. Spraying is not allowed during the shorebird nesting season (March 15–August 31) if avocets or stilts are known to be incubating or if snowy plovers with chicks are utilizing the pond. Terms and conditions of the Special Use Permit will be subject to annual modification if helicopter disturbance is considered to interfere with or detract from the fulfillment of the purpose of the Refuge. For more information on this activity, see Appendix G (*Compatibility Determinations*).

Biological Resources at the Refuge

Historic and Regional Context

Historic accounts describe the Salinas Valley area as a rich patchwork of shallow lakes, sloughs, vernal pools, marsh vegetation, expanses of grassland, and riparian corridors. The Salinas River was part of a large wetland ecosystem that included Elkhorn Slough and the Pajaro River. This wetland once supported California grizzly bear, tule elk, and a great number and diversity of waterbirds.

Beginning with early European settlement in California, extensive areas were converted for agricultural purposes. By the early 1900s, much of the land in the lower Salinas Valley was under agricultural cultivation. A series of large finger lakes and associated wetlands had been drained, vernal pools were converted to cropland, and riparian habitat was removed. The Salinas and Pajaro Rivers were channelized and their wetlands drained, fragmenting the wetland ecosystem and reducing its size. The conversion of valuable wildlife habitat to cropland and pastures resulted in substantial adverse effects on the area's wildlife. The reduction in wetland area led to a significant drop in the numbers and diversity of the area's bird population (particularly waterbirds and neotropical migrant species), the extirpation of bear and tule elk from the region, and the probable loss of many vernal pool species.

More than 90% of the Salinas Valley's original wetlands have been converted to agricultural production. Lands that now make up the Refuge were spared from conversion because of their close proximity to the ocean, their susceptibility to flooding, and their former military

ownership. The Refuge is now one of only a few places in the area where a significant expanse of wetland and riparian habitat remains.

Today, despite its small size, the Refuge supports some of the most important habitat for wildlife on the central California coast (John Gilchrist & Associates et al. 1997). Its importance reflects its unique wildlife and diversity of habitats, as well as the lack of remaining wetland habitat elsewhere on the central coast. The Refuge now plays a key role in protecting and sustaining wildlife resources, including the many migratory birds that follow the Pacific Flyway.

Vegetation

The Refuge supports seven different types of natural plant communities that are typical of coastal dune, salt marsh, riparian, and disturbed environments on the central California coast (Figure 7).[1] The diversity of plant communities on the Refuge reflects variations in the site's soils, topography, and hydrology. Wetland plant communities are found along the Salinas River, Salinas River Lagoon, Saline Pond, and in low-lying areas in the central portion of the Refuge. Wetland communities include northern coastal salt marsh, coastal brackish marsh, and central coast riparian scrub. Upland plant communities are found at higher elevations in the Refuge. The Refuge's sand dune complex, which includes both active and stabilized dunes and consists of sands deposited by the Salinas River and redistributed by wind and wave action, provides the major topographic relief in the Refuge. The plant communities of the active dune and beach areas include central foredunes and central dune scrub. The dominant plant community in the Refuge is coyote brush scrub, which occupies stabilized dune uplands over most of the southern portion of the Refuge. Some of the plant species found on the Refuge are listed in Table C-1 in Appendix C.

Vegetation in Wetland Areas. Vegetation in the Refuge's wetland areas includes northern coastal salt marsh and coast brackish marsh, as well as freshwater riparian vegetation such as central coast arroyo willow riparian forest and central coast riparian scrub.

Northern Coastal Salt Marsh:

Northern coastal salt marsh is limited to areas with saturated soils and a narrow range of water salinities and water depths. This plant community is typically found at elevations between 0.75 and 2 m above mean sea level (msl) on the Refuge (John Gilchrist & Associates et al. 1997). Much of the central portion of the Refuge immediately inland from the sand dunes (as far north as the Salinas River Lagoon) supports northern coastal salt marsh vegetation. This community also occurs in small depressions within the coastal sand dune complex. Along the Salinas River, salt marsh habitat is replaced by coastal brackish marsh because of decreasing salinity.

The northern coastal salt marsh community is dominated by low-growing (<1 m high) perennial subshrubs that are tolerant of saturation, inundation, and high levels of salinity. The dominant species of northern coastal salt marsh are pickleweed (*Salicornia virginica*), alkali heath

[1]The vegetation classification used in this CCP is based on Holland (1986). A matrix correlating the Refuge's vegetation types with the National Vegetation Classification System (Federal Geographic Data Committee 1997) is presented in Appendix D.

(*Frankenia grandiflora*), and fleshy jaumea (*Jaumea carnosa*). At slightly higher elevations mixed halophytes become dominant, including coastal gumplant (*Grindelia latifolia*), salt grass (*Distichlis spicata*) and alkali heath. The margins (typically the highest elevations) of the salt marshes support a grassland community dominated by salt grass, wet-meadow wild rye (*Leymus triticoides*), and Baltic rush (*Juncus balticus*) (John Gilchrist & Associates et al. 1997).

Coast Brackish Marsh:
Coast brackish marsh occurs in areas lower in elevation and more subject to regular flooding than those that support northern coastal salt marsh. On the Refuge, coast brackish marsh is most widespread at elevations of less than 0.75 m above msl along the Salinas River (John Gilchrist & Associates et al. 1997). Coast brackish marsh is dominated by perennial or annual herbaceous plants such as rabbitsfoot grass (*Polypogon monspeliensis*), threesquare (*Scirpus pungens*), alkali bulrush (*S. robustus*), California bulrush (*S. californicus*), and cattail (*Typha* spp.).

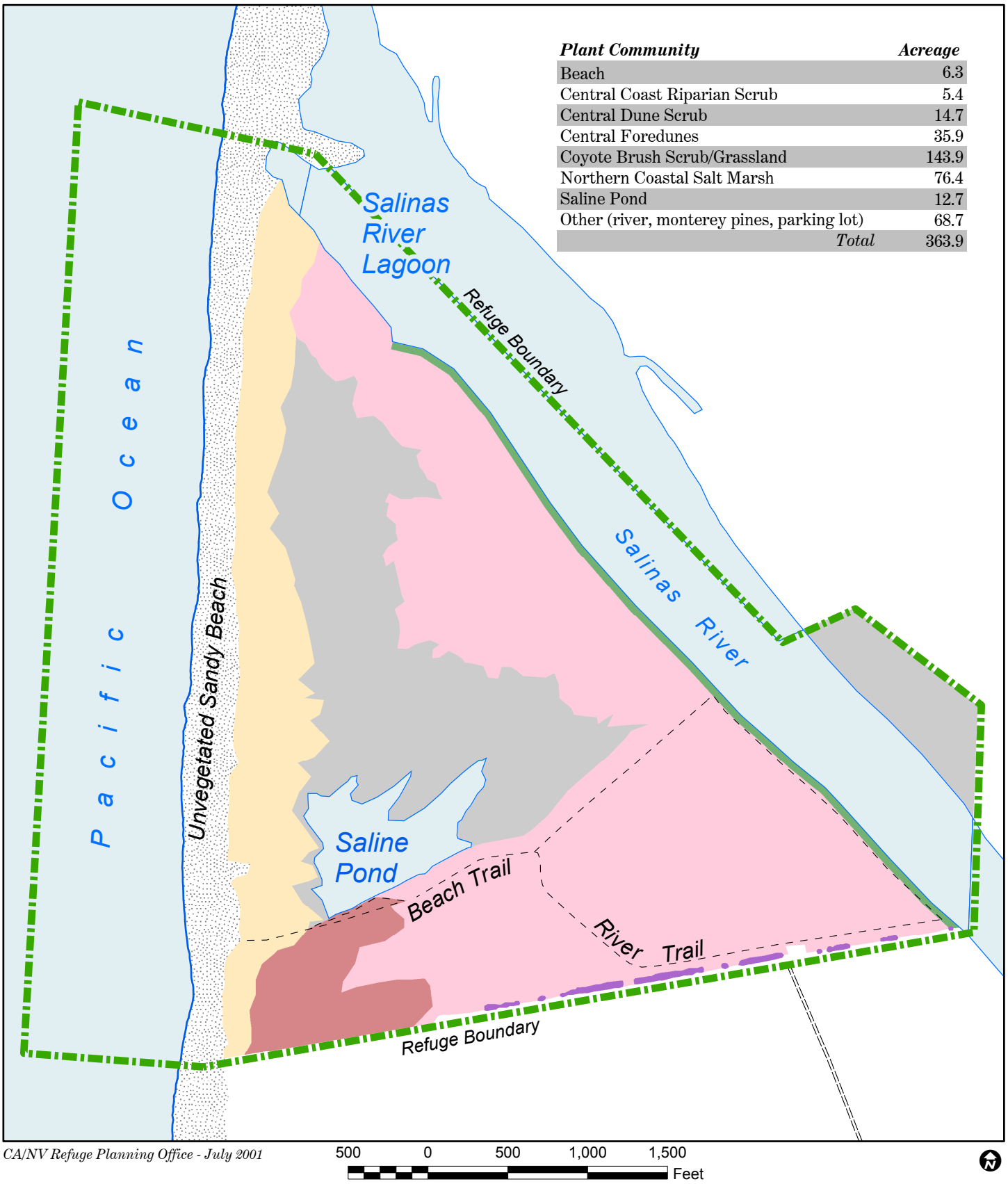
Central Coast Riparian Scrub:
Central coast riparian scrub typically forms a narrow band adjacent to an active stream channel. In some places it may represent an early successional stage that may, if left undisturbed over time, develop into a riparian forest. At the Refuge, central coast riparian scrub occurs along the Salinas River and on islands within the river. Dominant species in this plant community include willows such as arroyo willow (*Salix lasiolepis*), red willow (*S. laevigata*), sandbar willow (*S. hindsiana*), and yellow willow (*S. lasiandra*). The understory is typically dense and consists of young trees and shrubs such as poison oak (*Toxicodendron diversilobum*), Himalayan blackberry (*Rubus ursinus*), flowering currant (*Ribes sanguineum*), tree tobacco (*Nicotiana glauca*), mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis*), mugwort (*Artemisia douglasiana*), and California rose (*Rosa californica*), as well as herbaceous plants such as fleshy jaumea, salt grass, and coastal gumplant (John Gilchrist & Associates et al. 1997).

Researchers and students from the Watershed Institute of California State University, Monterey Bay are conducting intensive restoration activities along the banks of the Salinas River in an effort to reestablish native riparian scrub vegetation and to slow bank erosion. Species that have been planted along the bank include willows, box elder (*Acer negundo*), creekside dogwood (*Cornus sericea* ssp. *occidentalis*), red alder (*Alnus rubra*), and black cottonwood (*Populus trichocarpa*).

Vegetation in Upland Areas. Upland areas on the Refuge support three distinct types of plant communities. Central foredunes and central dune scrub communities are found on the Refuge's active dunes. Coyote brush scrub occurs on the upland areas inland from the active dune system, and is the dominant upland plant community of the Refuge.

Central Foredunes:
The central foredune plant community is typical of dunes in the early stages of colonization and stabilization by plants. Protected somewhat from the wind and from storm surges, the foredunes are commonly stable enough to support a community of low-growing herbaceous and woody perennial plant species. On the Refuge, the northern foredune community occurs on recently stabilized sand dunes above the high tide line. Common species of the northern foredune community include yellow and pink sand verbena (*Abronia latifolia* and *A. umbellata*), silky beach pea (*Lathyrus*

Figure 7. Vegetation Map



littoralis), beach primrose (*Camissonia cheiranthifolia*), sea rocket (*Cakile maritima*), beach morning glory (*Calystegia sordanella*), and beach bur (*Franseria chamissonis* ssp. *bipinnatisecta, F. chamissonis* ssp. *chamissonis*). In addition, some seaside buckwheat (*Eriogonum latifolium*) and seacliff buckwheat (*E. parvifolium*) plants occur in the northern portion of the Refuge (John Gilchrist & Associates et al. 1997) (see related discussion in the *Smith's Blue Butterfly* section in *Federally Listed Species at the Refuge* below).

Central Dune Scrub:
Central dune scrub forms on stabilized dunes and coastal bluffs and consists of a dense cover of low, perennial, woody subshrubs and herbs. Dominant plant species of this community include yellow bush lupine (*Lupinus arboreus* ssp. *arboreus*), lizard tail (*Eriophyllum staechadifolium*), sea lettuce (*Dudleya farinosa*), beach bur, mock heather (*Ericameria ericoides* ssp. *ericoides*), seaside buckwheat, and seacliff buckwheat. Monterey spineflower (*Chorizanthe pungens* var. *pungens*), which is federally listed, also occurs in the Refuge's central dune scrub. Other special-status plants reported to occur in this community include Monterey paintbrush (*Castilleja latifolia* var. *latifolia*), branching beach aster (*Coreothogyne leucophylla*), and coast wallflower (*Erysimum ammophilum*) (John Gilchrist & Associates et al. 1997). At the Refuge, central dune scrub occurs on the southwestern border of the Refuge. Central dune scrub on the Refuge is the northern tip of a large contiguous patch of this plant community that extends south on the dune system for more than two miles across private land and onto Marina State Beach.

Coyote Brush Scrub/Grassland:
In the vicinity of the Refuge, coyote brush scrub represents a successional community that has developed following the abandonment of agricultural fields that were in operation until the Refuge land was transferred from U.S. Coast Guard possession in 1974. It is widespread in the upland areas inland from the Refuge's dunes. The dominant species in this habitat is coyote brush, which forms pure stands in some places. Interspersed within the scrub habitat are large and small patches of grassland dominated by native and nonnative grasses and herbs. Immediately after agriculture ceased, the grassland was dominated by nonnative ruderal species such as poison hemlock (*Conium maculatum*), bristly ox-tongue (*Picris echioides*), field mustard (*Brassica campestris*) and white sweet clover (*Melilotus alba*).

However, intensive restoration efforts by the Watershed Institute in the late 1990s greatly reduced the abundance of nonnative species, replacing them with native annual and perennial grasses such as wild rye (*Elymus glaucus*), California barley (*Hordeum brachyantherum*), annual hairgrass (*Deschampsia caespitosa*), and California brome (*Bromus carinatus*). The native grassland is now maintained through a combination of intensive hand weeding and weed-whacking of exotic species and regular mechanical mowing two to three times each spring. Unless burning or other disturbance occurs, the coyote brush is expected to encroach on grassland patches.

Under natural conditions, fire plays an important role in shaping the plant communities of upland habitats in the Monterey Bay area such as coyote brush scrub and grassland. Repeated fires prevent woody species such as coyote brush from colonizing and eventually dominating grasslands. Historic documents suggest that aboriginal populations deliberately set

fires annually in coastal prairie habitats around Monterey Bay; fires may also have been inadvertently caused (e.g., Greenlee and Langenheim 1990). Prior to aboriginal settlement, the average interval between fires caused by lightning strikes was probably 2–15 years.

Wildlife

The Refuge provides valuable habitat for a diversity of wildlife species, in part because of its location adjacent to other highly productive wetland and marine habitats. Approximately 279 vertebrate species are known or expected to occur in and around the Refuge, including 116 species of waterbirds. Some 40 special-status wildlife species are known or believed to use habitats on the Refuge (see Table C-2 in Appendix C).

Wetland Wildlife. The quality of amphibian and reptile habitat offered by the Refuge's wetlands is highly variable. The Salinas River Lagoon is generally too saline to support many amphibians and reptiles. In upstream areas of the Refuge, which have a stronger freshwater influence and more riparian vegetation cover, the following species are reported to occur: Pacific coast aquatic garter snake (*Thamnophis atratus*), common garter snake (*Thamnophis sirtalis*), western terrestrial garter snake (*Thamnophis elegans*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), sharp-tailed snake (*Contia tenuis*), ringneck snake (*Diadophus punctatus*), common king snake (*Lampropeltis getulus*), California slender salamander (*Batrachoseps attenuatus*), Pacific treefrog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), and western toad (*Bufo boreas*).

The Refuge's wetlands provide habitat for numerous resident and migratory bird species. The sandbar at the mouth of the Salinas River Lagoon, the lagoon shoreline, and islands in the lagoon provide important roosting sites for California brown pelican (*Pelecanus occidentalis californicus*) and roosting and nesting sites for western snowy plover (*Charadrius alexandrinus nivosus*), both of which are federally listed. They also support stilts, avocets, herons, kingfishers, egrets, terns, gulls,



California brown pelican (*Pelecanus occidentalis californicus*)
Dr. Antonio J. Ferreira Photo

ducks and several other species of waterfowl and shorebirds. During periods of low water, such as late summer, exposed mud and sand provide

important foraging habitat for shorebirds. Larger shorebirds, dabbling ducks, herons, and egrets forage in shallow nearshore waters of the lagoon. Areas of deeper water provide foraging for grebes, cormorants, diving ducks, terns and osprey. Areas of northern coastal salt marsh on the Refuge are frequented by a range of species similar to that found in the lagoon, especially those favoring shallow and more saline water. Wintering waterfowl populations on the Refuge vary from 500 to 3,000 depending on the availability of water. Use is also heavy during the spring migration, when as many as 500 dabbling ducks roost and forage in the area. Waterfowl use both the Salinas River and the saline pond. The central coast arroyo willow riparian forest and scrub communities are frequented by insectivorous birds; the larger trees are used as perches by raptors such as northern harrier (*Circus cyaneus*), white-tailed kite (*Elanus caeruleus*), osprey (*Pandion haliaetus*), and barn owl (*Tyto alba*) (John Gilchrist & Associates et al. 1997).

A variety of mammals use the Refuge's wetland habitats. They include: muskrat (*Ondatra zibethica*), beaver (*Castor canadensis*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), longtail weasel (*Mustela frenata*), Virginia opossum (*Didelphis virginiana*), vagrant shrew (*Sorex vagrans*), broad-footed mole (*Scapanus latimanus*), brush rabbit (*Sylvilagus bachmani*), raccoon (*Procyon lotor*), dusky-footed woodrat (*Neotoma fuscipes*), deer mouse (*Peromyscus maniculatus*), and coyote (*Canis latrans*). Foxes and coyotes contribute substantially to predation on ground-nesting birds.

A number of special-status wildlife species may occur in the wetland habitats of the Refuge (Appendix C). The Refuge's federally listed species include western snowy plover and California brown pelican; they are discussed further in the *Federally Listed Species* section below. Other special-status species that occur on the Refuge include California brackish water snail (*Tryonia imitator*), Southwestern pond turtle (*Clemmys marmorata pallida*), steelhead (*Oncorhynchus mykiss*), American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), bufflehead (*Bucephala albeola*), osprey, white-tailed kite, northern harrier, sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), merlin (*Falco columbarius*), American peregrine falcon (*Falco peregrinus anatum*), long-billed curlew (*Numenius americanus*), California gull (*Larus californicus*), elegant tern (*Sterna elegans*), Caspian tern (*Sterna caspia*), Forster's tern (*Sterna forsteri*), short-eared owl (*Asio flammeus*), willow flycatcher (*Empidonax traillii*), California yellow warbler (*Dendroica petechia brewsteri*)), salt marsh wandering shrew (*Sorex vagrans halicoetes*), Monterey ornate shrew (*Sorex ornatus salarius*), and Salinas harvest mouse (*Reithrodontomys megalotis distichlis*).



California gull (*Larus californicus*)
USFWS Photo

Upland Wildlife. The coyote brush scrub habitat of the Refuge's uplands is used by reptiles, birds, and mammals. Common reptiles that occur in coyote brush scrub and the grassland patches that intergrade with it include the western skink (*Eumeces skiltonianus*), racer (*Coluber constrictor*), gopher snake (*Pituophis melanoleucas*), common king snake, and western terrestrial garter snake. Many birds forage in this habitat, including raptors such as northern harrier, red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), white-tailed kite, osprey, and barn owl. Typical upland mammals include gray and red foxes, longtail weasel, California ground squirrel (*Spermophylis beecheyi*), black-tailed jackrabbit, Botta's pocket gopher (*Thomomys bottae*), deer mouse, and western harvest mouse (*Reithrodontomys megalotis*) (John Gilchrist & Associates et al. 1997).

No federally listed species are known to make significant use of the coyote brush scrub on the Refuge. However, several other special-status wildlife species are reported to use this community, including white-tailed kite, northern harrier, Cooper's hawk, merlin, short-eared owl, Monterey ornate shrew, and Salinas harvest mouse (Appendix C).

Wildlife of Dunes and Beaches. Because dune and beach habitats are unstable and typically lack fresh water, cover, and forage, they generally support a limited range of wildlife. Birds are the most commonly observed wildlife in these communities. Several bird species use the beaches and dunes of the Refuge for foraging, roosting, and nesting; they include shorebirds, passerines, gulls, and raptors. Other wildlife species observed or expected in the dune and beach habitats of the Refuge are western fence lizard, gopher snake, deer mouse, gray fox, red fox, and longtail weasel.

Three federally listed species are reported to occur in the dune and beach areas of the Refuge: Smith's blue butterfly, western snowy plover, and California brown pelican (Appendix C). They are discussed further in *Federally Listed Species* below. In addition, the northern foredune and central dune scrub communities provide suitable habitat for other special-status species, including the globose dune beetle (*Coelus globosus*), black legless lizard (*Anniella pulchra nigra*), American white pelican, merlin, peregrine falcon, long-billed curlew, California gull, elegant tern, and Caspian tern.



Black legless lizard (*Anniella pulchra nigra*)
John H. Tashjian Photo

Wildlife in the Salinas River Lagoon. The composition of the fish population in the Salinas River Lagoon is typical of that found in lagoon/rivermouth habitats elsewhere on the central California coast. Native freshwater fish found in the occasionally brackish water of the lagoon include: Sacramento blackfish (*Orthodon microlepidotus*), Sacramento sucker (*Catostomus occidentalis*), Sacramento squawfish (*Ptychocheilus grandis*), California roach (*Lavinia exilicauda*), threespine stickleback (*Gasterosteus aculeatus*) and steelhead/rainbow trout (*Oncorhynchus mykiss*). These species have varying tolerances for saline water; migrating steelhead may use the lagoon to acclimatize themselves to changes in salinity between ocean and river. Introduced freshwater species that can occur in the Salinas River Lagoon include: carp (*Cyprinus carpo*), white bass (*Morone chrysops*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), mosquitofish (*Gambusia affinis*) and threadfin shad (*Dorosoma petenense*).

Saltwater fish are also found in the Salinas River Lagoon. Some saltwater species are found year-round; others are typical of periods when the sandbar at the mouth of the lagoon is breached, creating an open connection with Pacific waters. Year-round users of the lagoon include small numbers of starry flounders (*Platichthyes stellatus*) and staghorn sculpin (*Leptocottus armatus*). Adults of these species spawn in the ocean but juveniles often use the lagoon to rear for as much as a year. During periods of saltwater connectivity, saltwater species commonly found in the lagoon include: Pacific herring (*Clupea harengus*), topsmelt (*Atherinops affinis*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), silver surfperch (*H. ellipticum*), spotfin surfperch (*H. anale*), white surfperch (*Phanerodon furcatus*), surf smelt (*Hypomesus pretiosus*), northern anchovy (*Engralis mordax*), jacksmelt (*Atherinopsis californiensis*), English sole (*Parophrys vetulus*), and striped bass (*Morone saxatilis*). Green sturgeon (*Acipenser medirostris*) are also thought to occur occasionally.

Invertebrates. Invertebrate surveys have not been conducted for the Refuge. However, based on surveys of nearby sites with habitats similar to those on the Refuge, it is likely that invertebrates are abundant at the Refuge. Tube-dwelling amphipods (*Corophium* spp.), water boatmen (*Corixidae*), and the amphipods of the algal mats and pondweed (*Eogammarus* spp.) are all known to be abundant in the Salinas River Lagoon.

Federally Listed Species at the Refuge

The following sections provide more information on selected special-status species that are known to occur or that may occur at the Refuge. Because the Refuge is charged with the mission of management for the benefit of federally listed species, this section focuses on federally listed species. Appendix C provides an overview of all special-status species known or expected to occur on the Refuge, including State-listed species and State species of special concern.

Monterey Gilia (*Gilia tenuiflora* ssp. *arenaria*). Monterey gilia is an annual herb in the phlox family (*Polemoniaceae*), and is federally listed as endangered. It is known from about 15 locations in coastal Monterey County, including Marina State Beach, Sunset State Beach, Salinas River State Beach, Fort Ord, the Refuge, and some private properties south of the Refuge (California Department of Fish and Game 2000). The occurrence at the Refuge represents the northernmost documented

population of the species. Monterey gilia is thought by some botanists to intergrade with the greater yellowthroat gilia (*Gilia tenuiflora* ssp. *tenuiflora*) where the two subspecies co-occur near the mouth of the Salinas River. Monterey gilia is found on sandy soils in openings within maritime chaparral, cismontane woodland, coastal sand dunes, and coastal scrub communities. Within the Refuge, Monterey gilia is expected to be found in open patches within dune scrub, preferring relatively stable sites that have some leaf litter accumulation and soil development, that offer protection from high winds and salt spray, and that experience no wave or storm-surge activity. It was documented on the Refuge in 1992 by the California Native Plant Society (California Native Plant Society 1992); however, more surveys are needed to map its locations and estimate its population size. Threats to the species include small mammal herbivory, loss of habitat because of development and sand mining, and invasion by nonnative plants (U.S. Fish and Wildlife Service 1998).

Menzies' Wallflower (*Erysimum menziesii*). Menzies' wallflower is a perennial or biennial herb of the mustard family (*Brassicaceae*) and is federally listed as endangered. Since the original listing of Menzies' wallflower in 1992, several new subspecies have been recognized. The Service considers the following subspecies as included in the original listing of Menzies' wallflower: *Erysimum menziesii* ssp. *menziesii*, *E. m.* ssp. *yadonii*, and *E. m.* ssp. *eurekense* (U.S. Fish and Wildlife Service 1998). Populations of Menzies' wallflower in the vicinity of the Refuge include those at Marina State Beach and on several private properties near Marina (California Department of Fish and Game 2000). Several populations of the subspecies *E. m.* ssp. *yadonii*, Yadon's wallflower, are known from coastal dunes and coastal strands along Monterey Bay in the vicinity of the Refuge; they bloom between May and September. Threats to the wallflower include natural disturbances such storm surges, changes in the course of the Salinas River, habitat loss because of development and sand mining, off-road vehicle traffic, trampling, and invasion of nonnative species such as common ice plant (*Carpobrotus edulis, C. chilense*).



Menzies' wallflower (*Erysimum menziesii*)
Brother Alfred Brousseau Photo

Menzies' wallflower is not known to occur on the Refuge but suitable habitat exists. Further surveys are needed to confirm its absence from the Refuge. A historic occurrence of Yadon's wallflower within the Refuge

may have been extirpated by storm surges and changes in the Salinas River mouth, as a recent field survey failed to locate any individuals on the Refuge (John Gilchrist & Associates et al. 1997). The beach strand and foredunes on the Refuge offer suitable habitat for both wallflower subpecies, in locations that are above the high-tide line and protected from wave action (U.S. Fish and Wildlife Service 1998).

Monterey Spineflower (*Chorizanthe pungens* var. *pungens*). The Monterey spineflower is an annual herb in the buckwheat family (*Polygonaceae*), and is federally listed as threatened. The spineflower occurs near the coast in northern Monterey County and southern Santa Cruz County. It is found in a wide range of habitats but prefers openings on sandy soils in maritime chaparral, oak woodland, coastal dunes, coastal scrub, and grassland communities (California Department of Fish and Game 2000). In grasslands, the species occurs along road margins, in fuel breaks, and on other disturbed sites (U.S. Army Corps of Engineers 1992). The normal blooming period for the spineflower is mid- to late spring (April–June). Threats to the Monterey spineflower include loss of habitat as a result of development, and invasion by nonnative plants, especially common ice plant (U.S. Fish and Wildlife Service 1998).

Monterey spineflower was observed on the Refuge in 1992 and again in 2001 (California Native Plant Society 1992, 2001). Systematic surveys for the species on the Refuge are still needed because the extent of this population is unknown. The Refuge supports suitable habitat for the Monterey spineflower on open, sandy patches on active dunes and in dune scrub communities. Several populations are also known from the vicinity of the Refuge. Most of the known extant populations are found on the undeveloped western portions of the U.S. Army's Fort Ord (U.S. Army Corps of Engineers 1992). Other known occurrences near the Refuge include those at Marina State Beach, Sunset State Beach, Manresa State Beach, Asilomar State Beach, Fort Ord Dunes State Park, Manzanita County Park, and various locations along U.S. 101 (California Department of Fish and Game 2000).



Monterey spineflower (*Chorizanthe pungens*)
Brother Alfred Brousseau Photo

Smith's Blue Butterfly (*Euphilotes enoptes smithi*). Smith's blue butterfly is federally listed as endangered. It is found in coastal dune scrub and coastal sage scrub plant communities at several Monterey County

localities; the Refuge represents the northern limit of the species' range. Both the larval and adult stages of Smith's blue butterfly rely on seaside buckwheat (*Eriogonum latifolium*) and seacliff buckwheat (*E. parvifolium*) host plants for food. After hatching, the larvae feed for several weeks and then molt to a pupal stage that lasts ten months. Adults emerge in late summer and early autumn to mate and lay eggs on buckwheat flowers. At the Refuge, seaside buckwheat and seacliff buckwheat occur in the central dune scrub and northern foredune vegetation communities, and the Refuge supports a population of Smith's blue butterfly of unknown size. Threats to the species in the vicinity of the Refuge include habitat loss because of land development, and damage to remaining habitat as a result of offroad vehicle use and invasion by nonnative plants such as common ice plant and European beach grass (*Ammophila arenaria*). The Service has identified securing the coastal sand dunes at the Refuge as essential to the recovery of the Smith's blue butterfly (U.S. Fish and Wildlife Service 1984).

Steelhead (*Oncorhynchus mykiss*). The steelhead is federally listed as threatened. Steelhead may be present in small numbers in the Salinas River and the Salinas River Lagoon; they were collected in the Salinas River Lagoon during intensive sampling in 1963 and again in 1991 (John Gilchrist & Associates et al. 1997). Additional surveys for steelhead should be carried out on the Refuge. Steelhead in the Salinas River are part of the South-Central California Coast Evolutionarily Significant Unit (ESU) listed by the National Marine Fisheries Service (NMFS), which has designated the Salinas River Basin as critical habitat for this ESU of steelhead.

Suitable habitat for steelhead is greatly limited in the Salinas River system, in part because yearly flows in the lower reaches of the river are extremely variable and water temperatures are inhospitably high during low-flow periods, and also because the migration required to reach upstream spawning and rearing habitats is excessively long. Steelhead are known to use Arroyo Seco and the Nacimiento and San Antonio Rivers when access is possible. However, these tributaries join the Salinas River 40, 80, and 80 miles upstream from its mouth, respectively.

Western Snowy Plover (*Charadrius alexandrinus nivosus*). The western snowy plover is a small, pale-colored shorebird that ranges from southern Washington to Baja California del Sur, Mexico. It is also known from inland lakes in the western U.S., although the birds that breed at interior lakes are considered mostly disjunct from the coastal population (U.S. Fish and Wildlife Service 1993). The Pacific coast population of the western snowy plover is federally listed as threatened.

The plover inhabits open beaches in marine, estuarine, and lacustrine settings. It nests in sandy or gravelly substrates such as sand dunes and forages for invertebrates on wet, sandy shorelines and receding lake or estuary margins. Its breeding season extends from mid-March though mid-September.

The Refuge is home to an important breeding population of western snowy plovers. This population consists of a combination of year-round residents and migratory birds that are present only during the breeding season. Migratory plovers may winter in southern California or in coastal Mexico. The birds typically return to the same nest locations each year, although individual nests are generally not reused because of the unstable and shifting nature of coastal dunes. At the Refuge, foraging and nesting

areas include the beach strand and foredunes, the unvegetated margins of northern coastal salt marsh habitat, saline pond, and sandy islands within the Salinas River and Salinas River Lagoon.

The primary predators of snowy plover adults, chicks, and eggs at the Refuge include nonnative red foxes, free-roaming cats, skunks, northern harriers, kestrels, and gulls. Other potential threats to nesting success include high winds, storm surges, domestic dogs, and crushing by vehicles or pedestrians (John Gilchrist & Associates et al. 1997).

In 1984, Point Reyes Bird Observatory began monitoring and collecting data on breeding plovers on the Refuge. Data from successive years revealed a drastic decline in plover nest success. Nesting attempts decreased from 40 in 1986 to 24 in 1990. In addition, from 1988 to 1990, mammalian predation accounted for a loss of 47% of all nests found on the Refuge (Point Reyes Bird Observatory file data).

During the 1991 breeding season, Refuge personnel began protecting individual plover nests with fencing (exclosures) in an attempt to decrease predation and human impacts. As a result, nest success increased from 10% in 1987 to approximately 83% in 1994. However, as the use of exclosures continued through the 1992 and 1993 breeding seasons, it became apparent that while exclosures increased nest success they also caused increased adult mortality and possibly decreased chick survival. Between 1991 and 1993, the percentage of chicks fledged per successful hatch (chick fledging rate) decreased below that of the pre-exclosure period; it is believed that predators learned to recognize and target nest exclosures. In addition, both adult and juvenile plovers were at risk from mammalian predators, in particular the nonnative red fox, when they left the nest exclosure.

In an effort to increase fledging success and reduce adult mortality, the Refuge implemented an integrated predator management program in 1994. The plan combined the use of exclosures in high-risk areas with the removal of problem mammalian predators. Nest success and fledging rates both increased in 1994. In addition, adult mortality decreased from 3 in 1992 and 7 in 1993 to zero in 1994. As a result, the Refuge continued the integrated predator management plan in subsequent breeding years.

Nest success has continued to increase from 45% in 1995 to 70% in 1999. However, after an initial increase, the fledging rate again began to decrease by 1999, primarily because of predation by northern harrier; the 1996–2000 fledge rate was 22%. After reviewing the data, the Refuge implemented a three-year avian predator management experiment in 1999. The goal of this experiment is to increase snowy plover fledge rates by capturing and relocating problem avian predators, including northern harrier, kestrel, and loggerhead shrike individuals. Following the 2000 breeding season, the results were evaluated and used to develop an avian predator management program (see Appendix H). This program will be added to the existing integrated predator management plan.

California Brown Pelican (*Pelecanus occidentalis californicus*). The brown pelican ranges from Central California to Chile; California populations are federally listed as endangered. The brown pelican is the smallest of the pelican species. Nonetheless, it weighs as much as 10 pounds, has a 7½-foot wingspan, and can hold up to 3 gallons of water and fish in its bill pouch. Pelicans forage by flying above shallow, coastal marine waters, finding fish with their keen eyesight, and then diving.



Sea otter (*Enhydra lutris*)
Dr. Lloyd Glenn Ingles Photo

They rarely venture far out to sea or far inland. Typically social birds, they nest and roost communally in most years.

The breeding range of the California brown pelican extends from the Channel Islands in southern California south to the state of Nayarit, Mexico. After the breeding season, California brown pelicans disperse along the Pacific coast, ranging as far north as southern British Columbia and as far south as Colima, Mexico. Pelicans are most abundant along the central California coast between July and November (Shuford et al. 1989).

During the nonbreeding season, the central California coast, including the Refuge, becomes important for communal roosting. At the Refuge, California brown pelicans use portions of the beach strand, islands in the Salinas River Lagoon, and the lagoon side of the lagoon-mouth sandspit for day roost areas (John Gilchrist & Associates et al. 1997). Roosting flocks are common at the mouth of the Salinas River and on the islands near the river mouth from April through December. As many as 1,400 pelicans have been observed roosting at the river mouth.

Historic threats to the California brown pelican include loss of nesting habitat, disturbance of nesting and roosting sites, egg harvesting, and the use of DDT, which reduced eggshell strength; pelicans were also killed by fishermen. While these threats have largely been removed and Atlantic coast populations have been delisted by the Service, there are still only about 5,000 breeding pairs of brown pelicans in California, and California populations remain endangered.

California Least Tern (*Sterna antillarum browni*). The California least tern is federally listed as endangered. The species ranges from Baja California northward through the San Francisco Bay area, but nesting is currently restricted to a few sites from San Francisco Bay south to San Diego County. Least terns prefer sparsely vegetated, open, sandy areas. Their nesting habitat is similar to that of the western snowy plover and they are known to nest in close proximity to snowy plovers. Least terns occur on the Refuge as occasional spring migrants and likely forage in the surf adjacent to the Refuge. Although the Refuge provides suitable nesting habitat, there have been no records of nesting terns on the Refuge since 1937 (Roberson and Tenney 1993).

Southern Sea Otter (*Enhydra lutris nereis*). The southern sea otter is federally listed as threatened. The species ranges from Pigeon Point in southern San Mateo County to Purisima Point in Santa Barbara County, but is occasionally observed north and south of its typical range (Zeiner et al. 1990). Southern sea otters generally remain within about 1 mile of the shoreline. They rest and groom in kelp forests, and dive to forage for sea urchins, crabs, clams, mussels, abalone, and other shellfish. Southern sea otters can be observed in the offshore areas in the vicinity of the Refuge (outside the Refuge's mean high water boundary), but they are more likely to be seen in areas where kelp beds are more abundant, such as the northern and southern portions of Monterey Bay, which have a rocky substrate. Historically, the southern sea otter was threatened by overhunting for its fur, and the population was reduced to about 50 animals along the Big Sur coast in the early twentieth century. There are approximately 2000 sea otters in California today. The population appears

to be recovering, but the sea otter is still at risk from oil spills, collisions with power boats, drowning in fishing nets, and disease.

Cultural Resources

Cultural Setting

Prehistoric Context. Based on certain characteristic artifacts, archaeologists working in the Monterey Bay region commonly divide the area's prehistoric record into five time periods (Breschini and Haversat 1980 in Moratto 1984, Jones and Hylkema 1988, Dietz et al. 1988, Milliken et al. 1999). These are:

- The Millingstone Period (8,500–5000 years ago),
- The Early Period (~5,000–2,600 years ago),
- The Middle Period (~2,600–1,250 years ago),
- The Middle/Late Transition (1,250–850 years ago), and
- The Late Period (<850 years ago).

The Millingstone Period (8,500–5000 years ago) is named for the flat stones widely used as grinding surfaces, with a fist-sized handstone as the grinding implement; millingstones are a characteristic artifact in deposits of this age. The Millingstone Period is best represented on the southern California coast, where sites of this age typically contain dense shell middens and large numbers of millingstones and handstones. The Millingstone Period appears to be sparsely represented in the Monterey Bay area, and Milliken et al. (1999) hypothesize that the Refuge area may have been inundated by the sea level rise resulting from melting of Wisconsinan glacial ice at the end of the Pleistocene Epoch (~10,000 years ago). However, Jones and Jones (1992) have identified a component dating to this period at a site near Moss Landing.

Deposits of the Early Period (~5,000–2,600 years ago) are characterized by the presence of large square-stemmed and side-notched projectile points, mortars and pestles, and millingstones and handstones. During the Early Period, the Monterey Bay area was inhabited by people whose archeological signature has been identified as the Sur Pattern (Breschini and Haversat 1980, Moratto 1984, Milliken et al. 1999).

The Middle Period (~2,600–1,250 years ago) is the most commonly represented period in the Monterey Bay region. It is typically associated with smaller projectile points, mortars and pestles, saucer-shaped shell beads, and a variety of bone artifacts. This archeological signature has been identified as the Monterey Pattern (Breschini and Haversat 1984, Moratto 1984, Milliken et al. 1999).

The period from about 1,250 to 850 years ago is referred to as the Middle/Late Transition. During this time, the Monterey Bay area appears to have been used as a coastal collector destination. Sedentary village sites were located in the interior.

The Late Period (<850 years ago) is poorly represented in the Monterey Bay region. It appears to be typified by small side-notched and serrated projectile points, mortars and pestles, and split-punched shell beads. After 400 years ago, clam shell disk beads are also represented. Following European contact, glass trade beads appear in the record (Milliken et al. 1999).

Ethnographic Context. The peoples who inhabited northern Monterey County prior to the European influx have been called the Costanoans. The

term Costanoan is derived from the Spanish Costaños, meaning Coast People (Kroeber 1925). The Costanoans are a linguistically defined group composed of several autonomous groups speaking eight different but related languages; anthropologists have referred to these groups as *tribelets* (Levy 1978). The area that is now the Refuge may have been inhabited by the Calendarruc tribelet (Milliken 1988).

Many Native American descendants of the original peoples of the Monterey Bay area refer to themselves as Ohlone; the term Ohlonean has been used as a synonym for Costanoan (Milliken 1988). The origin of the root *Ohlone* is uncertain. Margolin (1978) has suggested that it is derived from a Miwok word meaning *western people*, or from the name of a village along the San Mateo coast.

The territory of the Costanoan or Ohlone people extended along the coast from San Francisco Bay in the north to a point immediately south of Carmel, and stretched about 60 miles inland. This area encompasses a significant length of coastline as well as several inland valleys (Breschini et al. 1983). The Costanoans were gatherer-hunters, relying heavily on a wide range of foods, including acorns, sea foods, seeds, berries, roots, land and sea mammals, waterfowl, reptiles, and insects (Levy 1978).

Historic Setting.
Spanish Period:
In 1542, Spanish explorer Juan Rodríguez Cabrillo sailed up the California coast in search of the Northwest Passage. Although Cabrillo may have sighted the headland of Monterey Bay, the first European known to have seen the bay was Sebastián Rodríguez Cermeño, who sailed along its shores while searching for an appropriate location for the establishment of a northern Spanish port on the California coast in 1595. In 1602, Sebastian Vizcaíno became the second European to enter Monterey Bay and the first to make a landing there. Vizcaíno's enthusiastic descriptions of the bay gave impetus for the overland expeditions of Gaspar de Portolá (1769–70), who along with Fathers Crespí and Serra founded Mission San Carlos Borroméo, which was moved to its present Carmel site in 1771, and the Presidio of Monterey (Fink 1978, Hart 1978, Hoover 1990).

Eager to establish pueblo settlements and consolidate its political claim to Alta California, the Spanish government authorized the distribution of lands surrounding the mission and presidio to Spanish settlers who would devote themselves to farming and stock raising. By 1793, several pueblo lots and land grants of as much as three leagues (approximately 13,200 acres) had been authorized around Mission San Carlos Borroméo and along the Salinas River. They were awarded both to civilians and to retired soldiers. Some of these lots may have included lands now within the Refuge. The principal economic activities in the region included cattle ranching, agriculture, and various mission-based industries, such as weaving, blacksmithing, masonry, carpentry, hide curing, and tallow rendering. The bulk of the labor was provided by local Native Americans. Agriculture was confined mainly to the mission lands where irrigation systems had been constructed (Fink 1978, Hoover et al. 1990, Swernoff 1981).

Mexican Period:
The fertile lands in the vicinity of the Salinas River mouth attracted a succession of Mexican ranchers and farmers. Located near the mouth of the Salinas River near the present town of Castroville, Rancho Rincón de

las Salinas extended from just east of Twin Bridges to the Pacific Ocean. This 2,220-acre tract, which contained the current Refuge, was granted to Cristina Delgado by Governor Figueroa in 1833. Rafael Estrada acquired the property in 1853 (Beck and Haase 1974, Hoover et al. 1990).

United States Acquisition and Settlement:
The American acquisition of California brought many changes to the Monterey Bay area. The port town of Monterey had been visited by American and other foreign traders during the Spanish and Mexican periods, and had been home to the only United States consul to Alta California, Thomas Larkin. Since Monterey had served as the territorial capital during both Spanish and Mexican periods, the town was pivotal in the transition to American governance. In 1849, the Constitutional Convention met at Colton Hall in Monterey to establish the State government. Over the ensuing decades, a thriving commercial fishing and whaling industry emerged in the coastal regions of Monterey County (established 1850) alongside the growing agricultural economy of the Salinas River valley.

United States Military at the Refuge:
Lands that now make up the Refuge have a significant history of use by the United States military. The U.S. Navy acquired the property in 1942, and established coastal defense fortifications there during World War II. In 1952, the Navy transferred the property to the U.S. Coast Guard. In 1967, approximately 270 acres of the Refuge (all land north of the current trail system) was again transferred, this time to the U.S. Army, who used the site to create the Castroville Amphibious Training Area. The southern portion of the Refuge (approximately 94 acres) remained under U.S. Coast Guard jurisdiction as their Castroville Radio Direction Finder Station. The Coast Guard site was actively farmed in artichokes until operations ceased in 1973. The entire property was then transferred to the Department of the Interior on July 10, 1973. It was managed by the California Department of Fish and Game as a wildlife management area until 1991, when the U.S. Fish and Wildlife Service began managing the site as part of the National Wildlife Refuge System. All surface structures except a WWII bomb shelter were removed from the site prior to transfer to the Department of the Interior.

The 54th Coast Artillery Regiment, an African-American unit, was transferred to the west coast in 1942 (Breschini et al. 1996). A battery of the 54th Regiment was stationed in the Moss Landing area. Remains of the unit's camp have been recorded approximately 4 miles north of the Refuge (Breschini et al. 1996). It is unknown whether this unit operated on the Refuge or whether evidence of their use of the site is found on the Refuge.

Cultural Resource Sites on the Refuge. Very little formal cultural resources survey work has been conducted on the Refuge. One structure on the Refuge may be eligible for listing on the National Register of Historic Places (National Register): the World War II–era bomb shelter located near the parking lot. Another feature of possible interest is a barge marked *Sauce Bros* that grounded offshore of the northwest corner of the Refuge after a storm in December 1983. Neither the barge nor the bomb shelter has been formally evaluated or recorded; additional evaluation is necessary. In addition, because there has been no survey of historic resources on the Refuge, it is unknown whether other sites on the Refuge are eligible for listing in the National Register.

Archaeological Sites in the Vicinity. Several archaeological sites have been recorded and excavated in the general vicinity of the Refuge. Perhaps the two most thoroughly documented are prehistoric archaeological sites (Dondero 1984, Dietz et al. 1988, Jones and Jones 1992, Milliken et al. 1999). Information from these sites has added to a regional understanding of burial practices, subsistence practices, and inter-regional trade (Milliken et al. 1999). Of note is that archaeological evidence from one of these sites indicates that fur seals were probably hunted in rookeries; this is significant because fur seal rookeries are historically known to occur only in more northern latitudes (Milliken et al. 1999).

Social and Economic Environment

Land Use

Overview. The Refuge is surrounded almost entirely by rural and open-space land uses, but the Refuge is near several important population centers, including the City of Castroville (about 2.5 miles to the east) and the City of Monterey (about 11 miles to the south) (Figure 1). Land uses adjacent to the Refuge include Salinas River State Beach to the north; private lands, including agricultural fields (artichokes) and coastal sand dunes, to the east and south; and, to the west, the open ocean of Monterey Bay.

Agricultural Activities. Agriculture has historically been the mainstay of Monterey County's economy, and it remains one of the County's largest economic sectors. The total market value of agricultural production in Monterey County was almost $2.3 billion in 1998 (Monterey County Agricultural Commissioner's Office 1999). Major crops grown in the County include artichokes, grapes, lettuce, strawberries, and a variety of nursery crops (Monterey County Agricultural Commissioner's Office 1999).

Traffic and Public Access

The entrance to the Refuge is located approximately 0.5 mile west of Del Monte Boulevard, which exits off of State Highway 1. Access to the Refuge is provided by a private, unimproved agricultural road. An easement allows visitors to access the Refuge via the roadway, but road conditions can be challenging, and during the winter rainy season the road is typically usable only by 4-wheel drive vehicles. Agricultural equipment and farmworkers' vehicles use the roadway all year; however, agricultural use is heaviest during the peak growing and harvesting season (October–May) (Barr pers. comm.).



Entrance signs at Salinas River NWR
Jones & Stokes Photo

The quality of service provided by a roadway is described by its level of service (LOS), using a letter rating system to describe peak-period driving conditions. The letters A through F represent progressively worse driving conditions. Generally, LOS A indicates free-flow operation with little or no delay, and LOS F denotes jammed flow with substantial delay.

Traffic volumes along State Highway 1 near the Refuge average approximately 43,000 vehicles per day and the roadway operates at LOS B (California Department of Transportation 1999). Traffic counts along the portion of Del Monte Boulevard near the Refuge are not available. However, it is estimated that this segment of Del Monte Boulevard currently operates at a similar level of service.

Recreation

Recreational Activities at the Refuge. Waterfowl hunting, access to fishing, and nonconsumptive uses such as wildlife viewing and photography are the primary activities currently occurring at the Refuge. While some nonmotorized boating (canoeing and kayaking) currently takes place along the Salinas River, the Refuge has no developed boat launching facilities and most boating originates from upstream areas (Barr pers. comm.).

The Refuge provides access to the beach where surf fishing and hiking occur. Fishing in the Salinas River is prohibited. Wildlife viewing and photography is allowed on the Refuge only from designated trails (Figure 2). Dogs and horses are prohibited from the Refuge. Most of the Refuge is closed to public use in an effort to protect rare and endangered species.

The Refuge is one of two sites in the local area open for seasonal public waterfowl hunting typically from October through January, and is the only local site offering walk-in hunting opportunities. The Refuge encompasses approximately 120 acres along the Salinas River that would be conducive to hunting; hunting is currently permitted in an area of approximately 45 acres (3,600 linear feet of riverbank; Figure 2). Species hunted include geese, ducks, coots, and common moorhen. The Refuge is a

key resource for local waterfowl hunters. The nearest alternative location for public waterfowl hunting is the Moss Landing Wildlife Area, approximately 10 miles to the north, which can only be accessed by boat, and other public hunting areas such as the San Luis National Wildlife Refuge near the community of Los Banos are located 80 miles or more away.

Facilities at the Refuge. Because no overnight parking or camping is allowed at the Refuge, existing facilities are limited to an isolated, unpaved parking area and several walking trails (Figure 2). The parking area is small and can only accommodate an estimated 14–18 vehicles during the summer months. During the winter months, when the parking area is wet, capacity falls to an estimated 5–6 parking spaces (Barr pers. comm.). The Refuge has no restroom or picnic facilities and recreationists must carry their own trash off the Refuge. Interpretive signs at the Refuge are limited to one informational sign listing allowed uses, which is located at the entrance to the Refuge. The Refuge has no telephone available for public use.



Waterfowl hunting on a national wildlife refuge
USFWS Photo

There are several safety concerns related to existing facilities at the Refuge. The Refuge entrance is gated to prevent unauthorized vehicle entry, but the gate does not prevent pedestrian trespassers from entering illegally after the Refuge is closed for the day (Barr pers. comm.). Cars parked in the isolated parking lot are occasionally vandalized or burglarized. In addition, an abandoned concrete bomb shelter is used as a camping area by the homeless and also serves as an illegal firearms target practice area (Barr pers. comm.).

Recreational Use. Table 5 shows an estimated breakdown of recreational use at the Refuge by activity, based on observations by Refuge staff (no formal use surveys have been conducted on the Refuge to date). Based on these estimates of use, recreational use at the Refuge averages between 4,010 and 6,380 visitors per year, which is considered low by comparison with use at other nearby parks and recreation sites. Weekday use at the Refuge in particular is low; weekend use is higher. Overall use at the Refuge peaks at the start of the winter hunting season. Permits for hunting access are not issued for the Refuge. However, hunting use is

effectively limited to an estimated 15 hunters per day, as hunting is only permitted on a small portion of the Refuge (Figure 2) (Barr pers. comm.). The Service estimates that approximately 250 hunter-visits take place annually. Visits are estimated to last an average of six hours each, for a total of 1,500 hunting activity hours annually. In the 1995–1996 and 1997–1998 hunting seasons, as many as 8–10 hunters were present on the Refuge at any one time. Hunting use is greatest on the weekends and on Wednesdays.

Table 5. Estimates of annual recreation use at the Salinas River National Wildlife Refuge.

Activity	*Peak Use Period*	*Estimates of Use (visitors per day)*
waterfowl hunting	October–January	4–6*
surf fishing	year-round	6–10
nonconsumptive use	year-round (heavier during waterfowl migration periods)	4–6

* Up to approximately 15 hunters/day use the Refuge at the beginning of the hunt season.

Source: Barr (pers. comm.)

As shown in Table 6, visitation at the Refuge is fairly low compared to that at other local recreation areas. This may reflect the different management priorities in operation on State parklands and Refuge lands. The mission of the State Parks is recreation-oriented, so nearby State parks offer a wider range of nonconsumptive uses (e.g., equestrian uses, windsurfing, hang-gliding, and camping) than the Refuge. In addition, in keeping with their recreational mission, nearby State Beaches are more easily accessed than the Refuge, particularly during the winter rainy season, and offer more public use facilities such as restrooms and picnic tables. Recreation opportunities on the Refuge reflect the wildlife-oriented mission of the Service and the National Wildlife Refuge System. As a result, while the range of uses available on the Refuge is narrower than in nearby State parks, the Refuge provides opportunities for various types of recreation, including waterfowl hunting, that are not available at other nearby sites.

Table 6. Recreation use at public parks along the coast near the Refuge.

Facility	*Size (acres)*	*Estimated Annual Visitor Use*	*Consumptive Activities*	*Non-Consumptive Activities*
Salinas River NWR	366	4,370-6,900	Access to fishing, waterfowl hunting	Wildlife viewing and photography
Marina State Beach	131	843,100	None	Hang-gliding, kiting, picnicking
Moss Landing State Beach	55	73,030	Fishing	Wildlife viewing, equestrian uses, surfing, windsurfing, picnicking, camping
Salinas River State Beach	246	71,635	Fishing	Wildlife viewing
Zmudowski State Beach	177	35,635	Fishing	wildlife viewing and equestrian uses

Source: California State Parks, Monterey, California (2000).

Employment

The Refuge is part of a larger economic region in Monterey County. For the purposes of this environmental assessment, that larger region is considered to include the Salinas Metropolitan Statistical Area (Salinas MSA), as defined by the State Employment Development Department (Employment Development Department 2000). The economy of the

Salinas MSA is dominated by tourism, agriculture, and agriculture-related services and industries.

An estimated 141,500 full- and part-time jobs are held in the Salinas MSA (Table 7). The largest employment sectors are the service sector (i.e., hotels, restaurants, etc.) and the government, retail trade, and agricultural sectors. Services account for 24% of the MSA's total jobs, government accounts for 21% of the MSA's jobs, and retail trade accounts for 18% of the MSA's jobs. Agriculture provides employment in the direct production of the area's crops (14% of the MSA's jobs), and also contributes indirectly to other types of employment in the MSA, such as jobs in manufacturing (e.g., food processing) and wholesale trade (e.g., sale of farm/garden machinery and farm supplies).

Table 7. Employment characteristics of the Salinas MSA (2000).

Industry	*Full-Time and Part-Time Jobs Provided (number and % of total)*	
Agriculture	19,700	(14%)
Mining	100	(<1%)
Construction	5,700	(4%)
Manufacturing	9,600	(7%)
Transportation, Communications, and Utilities	5,200	(4%)
Wholesale Trade	5,500	(4%)
Retail Trade	26,100	(18%)
Finance, Insurance, and Real Estate	6,300	(4%)
Services	33,800	(24%)
Government	29,500	(21%)
All industries	141,500	(100%)

Source: California Employment Development Department (2000)

The average unemployment rate in the Salinas MSA is 14.5%, which exceeds the statewide unemployment rate of 5.0%. In addition, the MSA's traditional reliance on agricultural production and food processing as primary sources of employment has resulted in substantial seasonal fluctuations in the unemployment rate.

Although most visitors to the Refuge are thought to come from the local area, use of the Refuge nonetheless generates income and employment in the region. Refuge visitors make purchases at businesses such as food stores, service stations, and other retail establishments. Moreover, the direct, indirect, and induced effects of purchases by business owners and employees directly affected by Refuge-related spending result in the generation of additional regional employment and income.



Surf fishing at Salinas River NWR
Jones & Stokes Photo

Environmental Justice

Introduction. On February 11, 1994, the President issued Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) which directs the US Environmental Protection Agency (EPA) to ensure that agencies analyze environmental effects on minority and low-income communities. The purpose of the executive order is to avoid the disproportionate placement of any adverse environmental, economic, social, or health impacts resulting from Federal actions and policies on minority and low-income populations.

Ethnic and Income Characteristics. For compliance with Executive Order 12898, zip code level census data were analyzed at a geographic scale commensurate with the potential impact area. Because information on census tracts was not available, zip code level census data was analyzed for an area that includes the Refuge. For this environmental justice assessment, ethnic and income characteristics for zip code area 93908 (Salinas) were compared with the ethnic and income composition of Monterey County to determine whether the zip code area has a relatively high minority or low-income composition.

According to information contained in the 1990 census, the total population of Monterey County was approximately 355,660 in 1990. As shown in Table 8, the county's ethnic composition ranges from 53% white to <1% American Indian. Monterey County is considered ethnically diverse, with minority populations accounting for an estimated 47% of the county's total population. Income characteristics for Monterey County during the 1990 census include a median household income of $33,520 (Table 8). Persons in poverty for the 1990 census year were estimated at 23,299, or 6.5% of the County's total population.

A review of 1990 census data for zip code area 93908 shows that the population of the zip code area is slightly less ethnically diverse than that of the larger County (Table 8), with minority populations accounting for an estimated 31% of total population. Total population of the zip code area was approximately 15,416 in 1990. As shown in Table 8, the zip code area's ethnic composition ranged from 69% white to <1% American Indian in 1990; persons of Hispanic origin accounted for an estimated 18% of the zip

code area's total population. In 1990, median household income for people residing in this area was $42,182, slightly above the median income for the County as a whole. Persons in poverty for the 1990 census year were estimated at 864, or 6% of the zip code area's total population.

Table 8. Income and ethnicity data for Monterey County and zip code area 93908.

		Ethnic Composition (Percentage)					
Area	*Median Household Income*	*White*	*African American*	*American Indian*	*Asian/ Pacific Islander*	*Hispanic*	*Other**
County	$33,520	53	6	<1	7	33	<1
Zip code 93908	$42,182	69	7	<1	5	18	<1

* The *Other* category refers to a residual category used in the census to place individuals who fail to respond to the ethnicity questions.

Source: U.S. Bureau of the Census (1992)

Chapter 5. Environmental Consequences

This chapter analyzes the direct, indirect, and cumulative environmental impacts of the four alternatives described in Chapter 3. Alternative 1, the No Action Alternative, represents a continuation of current management practices; it serves as the baseline against which Alternatives 2, 3, and 4 are compared. Mitigation measures are included at the end of each section, if required.

Analyses of impacts related to human presence on the Refuge assume that overall Refuge use will increase as population in Monterey County grows over the next 15 years. The Association of Monterey Bay Area Governments predicts that the County's population will increase by 27% between 2000 and 2015 (www.ambag.org, accessed May 24, 2001). Thus, the current annual total of 4,010–6,380 visitors could increase to approximately 5,000–8,000 visitors per year by 2015. Hunting use is expected to increase less rapidly than nonconsumptive uses, and may remain stable because hunting is permitted on only a small area of the Refuge. Table 9 summarizes projected Refuge use in 2015.

Table 9. Estimated increase in recreational use at the Salinas River National Wildlife Refuge by 2015.

Activity	*Peak Use Period*	*Current Use (visitors/day)*	*Projected 2015 Use (visitors/day)*
waterfowl hunting	October–January	4–6	may remain stable
surf fishing	year-round	6–10	8–13
nonconsumptive uses	year-round (heavier during waterfowl migration periods)	4–6	5–8

Sources: Barr (pers. comm.), www.ambag.org (accessed May 24, 2001)

The following sections address environmental impacts by resource area. Table 10 (at the end of this chapter) summarizes the environmental consequences of each alternative.

Physical Resources

Hydrology

None of the activities proposed under Alternatives 2, 3, or 4 would have an adverse effect on local hydrology. According to the Federal Emergency Management Agency's flood insurance rate maps, much of the Refuge is within the 100-year floodplain of the Salinas River. However, the parking lot is outside the 100-year floodplain. Therefore, any new structures built next to the parking lot or improvements made to the parking lot under Alternative 4 would not be affected by a 100-year flood.

Water Quality/Contaminants

Under all alternatives, nonnative vegetation would be removed from the Refuge. Removal would be accomplished through a combination of chemical and mechanical means, including herbicide spraying, hand pulling, prescribed burning, and use of heavy equipment. Removal would be carried out in the fall and winter to avoid adversely affecting the Western snowy plover during its breeding season. Depending on the terrain, surfaces exposed by vegetation removal could erode during the winter months and increase sediment input to the Salinas River and/or the

ocean. However, the dunes are naturally composed of dynamic, highly erodible, sandy soil. Increased sediment input in turn could temporarily and adversely affect water quality until vegetation recovers.

Herbicides would be applied by hand to target exotic plants. There could be adverse impacts on non-target plants from pesticide drift, but these effects are expected to be minimal due to the small quantities that will be used and the precautionary measures taken.

Under all alternatives, the existing mosquito control program carried out on the Refuge by the NSVMAD will change. Since 1996, NSVMAD has used the bacterial insecticide *Bacillus thuringiensis (*Bti*)*. The strain used by NSVMAD specifically targets mosquitoes, black flies and fungus gnats and is non-toxic to humans, wildlife, plants, and most non-target insects (Marten et al. 1993), although use of Bti has been shown to reduce abundance of some non-target insect groups in Minnesota wetlands, possibly because it disrupts the insect food chain (Hershey et al. 1998). With the schedule and treatment controls regulated by the Service (see Chapter 4), this insecticide is expected to have no effect on wildlife or plants, and minimal adverse effects on non-mosquito insects. The insecticide Golden Bear will be used as a last resort if Bti and methoprene are ineffective.

Alternative 4 (Expand and Improve Public Use) includes building boardwalks to improve handicap access throughout the Refuge. Site preparation and construction activities associated with boardwalk installation could increase delivery of sediment to the Salinas River and/or the ocean. This increase in sediment delivery is expected to be temporary and small because the terrain is relatively flat. Therefore, construction of boardwalks would not significantly affect water quality.

Paving or otherwise improving the parking lot or access road could increase runoff of oil and grease during storms. Although adverse, this reduction in water quality is not expected to be significant because the flat terrain slows runoff rates, and the parking lot and access road are very small (<1%) relative to the size of the watershed between the parking lot and the Salinas River.

None of the activities proposed under any of the alternatives would change drainage patterns on the Refuge.

Mitigation. All alternatives: Herbicides will be applied at label rates and all label recommendations will be followed. In addition, the following specific precautions will be taken to avoid and minimize impacts related to use of herbicides.

- Herbicides will be selected based on the characteristics of each treatment site, including its location relative to aquatic and wetland habitats. (Existing management practice is to use Roundup™ at sites ≥100 feet from open water or wetlands and Rodeo™ at sites within 100 feet of open water or wetlands.)
- No spraying will take place when wind velocities exceed 5 mph, when inversions exist, when vegetation is wet, or when precipitation is occurring or is forecast in the following 24–36 hours. Wind meters and smoke devices will be used to assess wind direction, wind speed, and inversion conditions; smoke from existing burning activity or smokestacks (such as those at Moss Landing) may be used to check for the presence of inversion conditions, if the source of smoke is near the application site and is similar in elevation to the application site.

- Nozzles with orifice diameters ≥1/16 inch, or low-drift flat spray nozzles, will be used. When appropriate, the lowest possible pressure within the nozzle's ideal range will be used.
- No spraying will occur if western snowy plovers are within 75 meters of the application site. No spraying will occur until all western snowy plover activity within 75 meters of the area to be treated has ceased for 7 days. Refuge staff will consult with Point Reyes Bird Observatory who are monitoring plovers on the Refuge to ensure that the species is absent from the work area.
- No spraying will occur in areas where endangered plants or host plants for Smith's blue butterfly may be affected by drift. Invasive non-natives in these areas will be mechanically removed.

Geology and Soils

As discussed in Chapter 4, the Refuge is located in an area that frequently experiences seismic activity. The hazard of fault-related surface rupture during earthquake events is generally limited to the narrow strip of land immediately adjacent to the fault on which the event occurs. Because the Refuge contains no active faults, the likelihood of fault-related surface rupture within the Refuge is considered very low. However, roads or structures on the Refuge could still be severely damaged by seismic groundshaking or seismically induced liquefaction resulting from earthquakes on faults in the vicinity.

Under the No Action Alternative and Alternatives 2 (Reduce Public Use/Improve Resource Management) and 3 (Improve Public Use and Resource Management), no new structures would be built on-site. Under these alternatives, hazards related to seismic groundshaking and seismically induced liquefaction on the Refuge would remain unchanged from existing conditions and are considered very low.

Under Alternative 4 (Expand and Improve Public Use), several small structures would be constructed, including a restroom and hunting blinds. Seismic groundshaking and seismically induced liquefaction could damage these structures, posing a potential safety hazard to Refuge users. However, appropriate design and construction, described in the following mitigation measure, would reduce this potential impact to a level below significance.

Mitigation. Alternative 4: All facilities will be constructed in accordance with 1997 or latest version Uniform Building Code (UBC) specifications.

Air Quality

Vehicle Emissions. Implementation of the No Action Alternative or of Alternative 3 (Improve Public Use and Resource Management) would not cause an increase in visitor use over current levels or require substantial use of large construction vehicles. Therefore, these alternatives would not significantly increase vehicle traffic associated with Refuge users or create significant construction-related traffic on the Refuge. Neither the No Action Alternative nor Alternative 3 would create emissions in violation of any air quality standards.

Under Alternative 2 (Reduce Public Use/Improve Resource Management), Refuge use would decrease substantially. This would reduce vehicle emissions related to Refuge use.

Alternative 4 (Expand and Improve Public Use) may result in increased vehicle-related emissions. Under Alternative 4, visitor use is expected to increase more than that expected to result from projected local population growth alone. However, the corresponding increase in user vehicle traffic would be limited, because the capacity of the parking lot (a maximum of 18 vehicles in summer) will not change. Under Alternative 4, the Service would build or improve several facilities, generating construction-related vehicle emissions. In addition, under Alternative 4, Refuge staffing would increase by as many as two positions while the three existing Refuge positions would convert to full time, resulting in a slight increase in emissions related to Service staff vehicles. Increased vehicle emissions under Alternative 4 (related to increase visitor usage, construction, and increased staffing) are not expected to have a significant impact on air quality in the Refuge area. Although this impact is not significant, the Service would nonetheless implement mitigation measures during construction to reduce the effects of construction and construction vehicles on air quality.

Prescribed Burning. Alternatives 2 (Reduce Public Use/Improve Resource Management), 3 (Improve Public Use and Resource Management), and 4 (Expand and Improve Public Use) would use prescribed burns to control nonnative vegetation and the spread of woody vegetation in the Refuge's grassland habitat.

The prescribed burn program is outlined in the Refuge's Wildland Fire Management Plan (Appendix I). Additional details will be provided in the Prescribed Fire Plan prepared prior to each burn. The Prescribed Fire Plan describes: the year's burn unit(s) and their predominant vegetation; the primary objectives of the unit(s) and the fire(s); the acceptable range of results; site preparation requirements; weather requirements; safety considerations and measures to protect sensitive features; burn-day activities; communications and coordination for burns; ignition technique; smoke management procedures; and post-burn monitoring.

Burning vegetation could temporarily increase PM10 concentrations in the area. The Monterey Bay area is currently in non-attainment for PM10. The Air District's threshold of significance for PM10 is 82 pounds/day (Brennan pers. comm.). The typical PM10 emissions from a burn on a wet grassland is 2.5 pounds/acre (Wong pers. comm.). The Refuge proposes annual burns of 10–40 acres. Therefore, the range of PM10 emissions is estimated at 25–100 pounds. The *Smoke Management* section of each year's Prescribed Fire Plan will include estimates of total fuel consumed (in tons/acre), emissions in pounds/acre, and total emissions (for entire burn) (in pounds). The estimates will be based on empirical factors relating particulate matter emissions to fuel type (in pounds/ton) and estimated fuel loading and nature of fuels present in each burn unit, and assume 100% consumption.

Before conducting a burn, the Service will be required to obtain a burn permit from the Monterey Bay Area Air Quality Management District (MBAAQMD); in addition, separate NEPA review may be required for prescribed burns. If necessary, appropriate mitigation measures will be developed and incorporated into burn permits and NEPA review based on site- and burn-specific parameters.

Because no residences are located near the Refuge, impacts on the local population as a result of PM10 emissions are not expected to be substantial. One sensitive receptor, Highway 1, is located approximately

0.5 mile east of the Refuge (Figures 1 and 2). Burns will be conducted during periods of optimal smoke lift and dispersal to minimize impacts to motorists on Highway 1.

Hazardous Materials and Safety Issues

Potential concerns related to hazardous materials on the Refuge include: (1) contamination associated with the former underground storage tank and the small landfill exposed by erosion along the Salinas River in 1995, and (2) the possibility that unexploded ordnance may be present on the Refuge as a result of military training operations on the Refuge site (1942–1952 and 1967–1973). In a 1999 evaluation, the USACE recommended further investigation of all of these issues (U.S. Army Corps of Engineers 1999). The former underground storage tank site and the potential former landfill site (if it still exists) are belowground, and are situated away from trails in areas inaccessible to the public, so they do not pose a hazard to Refuge staff or visitors. In addition, the former storage tank site has been remediated to the satisfaction of the Regional Water Quality Control Board and the Monterey County Health Department. As discussed in Chapter 4, unexploded ordnance left over from previous military operations is highly unlikely to be present on the Refuge. In addition, according to the USACE, any ordnance that may occur on the Refuge would be below the ground surface. There would be no risk of public contact with such material unless it was exposed by erosion. None of the management alternatives discussed in this document would change the risk to Refuge visitors relative to existing conditions, because this area is closed to the public and no activity is proposed in or near the location of the former bombing target.

Mitigation. Alternatives 1, 2, 3, and 4: Closed area signs posted in the northwest corner of the Refuge will incorporate a warning about the low risk of encountering unexploded ordnance from past military activities.

Biological Resources

Vegetation

Under Alternative 1 (No Action), the Refuge would continue to implement vegetation management programs such as hand weeding and limited herbicide spraying in the dunes and annual mowing in the grassland to control exotic plants. These management activities would have a beneficial effect on the Refuge's vegetation because they would improve the cover of native plant species. Riparian restoration along the Salinas River would also continue under this alternative. Restoration activities would likely improve the abundance, richness, and structural diversity of native vegetation along the river. Alternative 1 would not include prescribed burning to further enhance native grassland, control nonnative weeds and help prevent the spread of coyote brush into the grassland. Without prescribed burning, nonnative vegetation would continue to threaten restoration efforts and coyote brush may continue to invade the grassland habitat and reduce the extent of grasslands on the Refuge, and nonnative invasive plants may continue to threaten restoration efforts.

Under Alternative 1, a small but unknown number of visitors are expected to ignore closed area signs and walk off trail through the dunes. This disturbance could adversely affect sensitive dune habitat and populations of special-status plants by injuring or killing individual plants.

Alternative 2 (Reduce Public Use/Improve Resource Management) includes construction of a boundary fence around most of the Refuge. The

exact design of this fence is unknown at this time. It would likely consist of a combination of chain link in some areas and symbolic fencing of cable wire with signs in other areas. Installation of fencing could adversely affect sensitive dune habitats or special-status species. The Service will conduct surveys for special-status plants prior to designing the fence so that it can be sited to avoid these resources (see mitigation measure below). The fence will also be designed to minimize impacts on sensitive habitats such as coastal dune scrub and wetlands.

Implementation of Alternative 2 (Reduce Public Use/Improve Resource Management) will benefit botanical resources in several ways. Human disturbance in sensitive dune habitats would likely be reduced because visitor use would decrease, although dune disturbance will not be entirely eliminated because of the difficulty in erecting and maintaining effective barrier fencing on the beach; moreover, some visitors may step over symbolic fencing to enter the Refuge illegally. Management actions included in Alternative 2 will also benefit botanical resources. For example, the Service will restore historic wetlands, if they are found to have occurred on the Refuge. In addition, prescribed burns will be implemented to control the spread of coyote brush scrub and increase and ehnance the area of native grasslands. Careful preparation and management of fires, including fire breaks cut for each fire (see Appendix I for details of the Refuge Fire Management Plan) will prevent the fire from spreading into sensitive native dune habitats. The Service will also remove nonnative plants on coastal dunes and revegetate these areas with native species.

Implementation of Alternative 3 (Improve Public Use and Resource Management) will have no adverse impacts on vegetation and will result in several beneficial impacts. In addition to management actions common with Alternative 2 (restoration of historic wetlands and use of prescribed burns, described in the preceding paragraph), Alternative 3 includes installation of interpretive signs throughout the Refuge. This should help to prevent Refuge users from walking off the trails and disturbing native vegetation and special-status plants. Increased presence of Refuge staff on the site is expected to reduce disturbance of native vegetation and special-status plants. Installation of a symbolic, cable fence along the beach trail will also reduce trespass on the dunes.

Implementation of Alternative 4 (Expand and Improve Public Use) could result in both adverse and beneficial impacts on botanical resources. Under Alternative 4, restrooms would be built adjacent to the existing parking lot. In addition, hunting blinds would be built along the south bank of the Salinas River. Construction of these new facilities could adversely affect populations of special-status plants near the proposed construction sites. The boardwalk through the dunes would be moved periodically (approximately annually) due to shifting sands. This movement may cause additional damage to sensitive vegetation or special-status plants. Mitigation for this alternative would reduce this potential impact. Expected beneficial impacts of Alternative 4 are similar to those of Alternative 2 (for prescribed burns) and Alternative 3.
Under Alternatives 1, 3, and 4, the Refuge would continue to offer limited waterfowl hunting opportunities in a specified area. Hunters would access the hunt area on foot and could trample or otherwise damage vegetation in upland and riparian areas, including restoration plantings. Mitigation for these alternatives would reduce this potential impact.

Mitigation. Alternatives 2 and 4: The Service will conduct field surveys in the proper season for special-status plants in areas where construction is proposed (e.g., sites for boundary fence, building pads, trails, construction vehicle access roads, and staging areas). If special-status plants are found in or near proposed construction areas, the project will be redesigned to avoid these areas and ensure that a suitable buffer zone is established and clearly delineated between the populations and the construction activities. If possible, surveys will be conducted prior to design of these facilities so that their design can incorporate avoidance of sensitive botanical resources.

Alternatives 1, 3, and 4: The Service will maintain a trail through the grassland to the hunt area and will install and maintain signs marking the hunt area boundary. In addition, by 2007, interpretive signs and an orientation kiosk will be installed on the Refuge to inform visitors about the Refuge's habitats and wildlife and ways of avoiding adverse impacts, including staying on trails. The trails and interpretive signs will minimize disturbance to grassland and riparian habitats by providing easy access to the hunt area and by interpreting the importance and sensitivity of Refuge habitats and restoration efforts. Similarly, the trail to the beach will have symbolic cable fencing and interpretive signs. If necessary, cable fence will be installed along the foredune boundary (along the beach) as well.

Wildlife

Under Alternative 1 (No Action), continuation of current management activities will have some beneficial impacts on wildlife, including special-status species. For example, vegetation management programs such as hand weeding and limited herbicide spraying in the dunes and annual mowing in the grassland improve habitat quality for a number of species. Current vegetation management in the foredunes has a beneficial affect on special status species like the western snowy plover by removing invasive nonnative species such as European beach grass and iceplant. These invasive plants would otherwise form dense stands which would be unsuitable habitat for nesting plovers. Annual mowing in the grassland would increases native grass cover, thereby improving habitat conditions for grassland-dependant birds. Riparian restoration activities under this alternative would have a beneficial impact on some songbirds and other riparian-dependant wildlife because the area and quality of their habitat would increase.

Under the No Action Alternative, the current mammalian predator management program will be continued. This would have a beneficial impact on snowy plover populations because it would improve their reproductive success. However, without an avian predator management program, the population of Western snowy plover on the Refuge will continue to be adversely affected by avian predators.

Recreational use of the refuge is expected to gradually increase as the population of the Monterey Bay region grows. Some of these recreational uses are expected to have adverse effects on special-status wildlife species on the Refuge, including California brown pelican, Western snowy plover, Smith's blue butterfly, and black legless lizard. California brown pelicans roost in large numbers on the beach near the mouth of the Salinas River and they are disturbed and often flushed by visitors on the beach, including visitors moving through the Refuge (e.g.,from state parks to the north or south). Disturbance by visitors or other Refuge users may limit

the pelicans' use of this area. Pelicans roosting on the islands in the Salinas River may also be flushed by hunters who use the northern end of the current hunt area. At the nearby Moss Landing Wildlife Management Area, pelicans have been flushed from roosting sites when gunshots are closer than 650 yards (Jaques and Anderson 1988). The northern end of the current hunt area is approximately 300 yards from the nearest pelican roost site. Refuge beach users may also disturb harbor seals that haul out on the beach; harbor seals are protected by the Marine Mammal Protection Act.

Visitors who walk off-trail in the dunes disturb habitat suitable for the Western snowy plover, Smith's blue butterfly, and the black legless lizard. Although illegal use of closed dunes is evident in some areas, the full extent of this disturbance and its effect on these species is unknown. Existing "Closed Area" signs along the beach trail appear to be ineffective in preventing hiking in closed areas (Loredo pers. comm.). Visitors who walk in the dunes during the breeding season (late March–early September) likely disturb Western snowy plovers and reduce nesting success; the extent and effects of this disturbance, however, have not been quantified. The frequent presence of snowy plover monitors (volunteers and staff of the Point Reyes Bird Observatory) reduce, but do not eliminate, the disturbance caused by Refuge visitors during the plover breeding season. Because snowy plovers are very sensitive to human disturbance, hikers on the beach trail may even disturb plover nests that are close to the trail or preclude plover nesting near the trail in otherwise suitable habitat. Refuge users on the beach trail may also disturb or flush shorebirds that use the saline pond because of its close proximity to the trail (see Figure 2).

Limited waterfowl hunting opportunities would continue to be available under the No Action Alternative, and could result in several types of disturbances to wildlife. Hunters accessing the hunt area may disturb wildlife in the Refuge's upland, riparian, and aquatic habitats, and hunters may accidentally take non-target species. In addition, litter discarded by hunters and other Refuge users could be ingested or entangle wildlife, resulting in injury or death. Mitigation for this alternative would reduce all of these potential impacts.

Alternative 2 (Reduce Public Use/Improve Resource Management) would substantially reduce public use of the Refuge except on the beach. This would benefit some wildlife, including special-status species, by reducing human disturbance on and near foraging, roosting, and nesting habitat of Refuge birds. Nesting habitat available to Western snowy plovers may increase and disturbance to existing nesting habitat may decrease. While a fence would likely reduce human disturbance, it may indirectly increase avian predation on western snowy plovers by providing abundant perches for predators close to plover nests. The Refuge's avian predator management program (see Appendix H) may have to be intensified to compensate for any change in avian predator populations induced by the fencing. California brown pelicans may roost on the Refuge in fall and winter in greater numbers and for longer periods of time because disturbance by hunters would decrease.

Under Alternative 2, human access along the beach would not be affected, so pelicans roosting on the beach would likely continue to be disturbed or flushed by beach users. Illegal trespass onto the Refuge would likely still be possible because of the difficulty in erecting and maintaining an effective barrier fence on the beach. Therefore, some human disturbance

to dune habitats is still expected under this alternative. Staff at state parks in the Monterey Bay area have found that some visitors act as stewards of park resources by confronting or reporting people who are in sensitive dunes that are off-limits. A similar pattern probably occurs on the Refuge. Without the help of these visitor/stewards, unauthorized public use of the Refuge and its associated effects on sensitive wildlife and plants may actually increase compared to the No Action Alternative. In addition, litter discarded by Refuge users could be ingested or entangle wildlife, resulting in injury or death. Although dogs are prohibited from the Refuge under all four alternatives, illegal dog-walking currently occurs. Under Alternative 2, this illegal activfity and the associated disturbance to wildlife would likely decrease.

Alternative 2 includes construction of a boundary fence around most of the Refuge. The exact design of this fence is unknown at this time. It would likely consist of a combination of chain link in some areas and symbolic fencing of wood or wire with signs in other areas. Where a chain-link fence is used, the fence could adversely affect larger local wildlife species such as black-tailed deer (*Odocoileus hemionus*) by restricting their movement.

Management actions under Alternative 2 (Reduce Public Use/Improve Resource Management) are expected to benefit wildlife, including federally listed species and other special-status species. For example, closure of the Refuge to unguided public use would increase protection of the western snowy plover. In addition, implementation of an avian predator management program is expected increase the fledge rate of plover chicks (see Appendix H). Based on two seasons' experimental application of this program, the Service expects to capture and permanently move (i.e., translocate) 2–6 native birds per year, mostly northern harriers. Individuals of other bird species, such as kestrels, merlins, and loggerhead shrikes may also prey on plover chicks, and may also have to be translocated. None of the potential problem species are federally or state-listed as threatened or endangered. Because the number of birds translocated annually is expected to be small, and because these species are relatively abundant in the Monterey Bay Area, the impact of this program on native raptor populations would be less than significant.

Prescribed burning under Alternative 2 may have temporary adverse impacts on wildlife species on the Refuge. Prescribed burns will be designed to minimize impacts on wildlife (see Appendix I). Burn areas will be surveyed prior to burn implementation to check for nests of wildlife and individuals of special-status species. When possible, nests will be relocated or small fire breaks will be constructed around the nests to avoid impacts. No listed wildlife are expected to occur in the grasslands planned to be burned. Burns will be conducted during periods of offshore winds (i.e., westerly winds) to avoid smoke blowing toward Highway 1. These burns may temporarily disturb snowy plovers nesting in dunes on or near the Refuge. Some wildlife may benefit from burns in the short-term because burned areas will provide a pulse of available prey such as insects. Prescribed burns conducted regularly on the Refuge are expected to have long-term benefits to wildlife because of the expected increase in native grasses, decrease in nonnative vegetation, and maintenance of a diversity of habitats on the Refuge.

Implementation of Alternative 3 (Improve Public Use and Resource Management) would result in numerous beneficial impacts and potentially

some adverse impacts on wildlife. The beneficial and adverse impacts of proposed management actions and public use are describes in more detail below.

Under Alternative 3, management actions would have a beneficial impact on wildlife including Western snowy plover, Smith's blue butterfly, and other special-status species that occur in the Refuge's dunes. Under this alternative, problem avian predators of the snowy plover will be relocated. As a result, the fledge rate of this rare species is expected to increase (see Alternative 2 and Appendix H). In addition, interpretive signs will be installed to restrict access to snowy plover nesting habitat and to educate Refuge visitors about the species. Symbolic fencing will be installed along the beach trail and around individual nests considered vulnerable to disturbance; if this proves ineffective, symbolic fencing may be used to restrict access to the entire foredune area. This is expected to reduce the disturbance of snowy plover nests and may increase the potential for California least terns to nest on the Refuge again. Symbolic fencing and signage will also reduce disturbance of Smith's blue butterfly habitat.

Implementation of Alternative 3 would also benefit the California brown pelican. Alternative 3 would reduce the area in which hunting is allowed on the Refuge by approximately 7 acres. The area that would be removed from hunting use is near one of two major brown pelican roosting sites. Research has shown that gunshots within 650 yards of brown pelican roosts can flush these birds (Jaques and Anderson 1988). The reduction of the hunt area would ensure that hunting activities are at least 650 yards from the nearest active pelican roost site on the Refuge. The increased presence of Service staff on the Refuge may also deter illegal activities such as dog-walking, which will benefit pelicans and other wildlife. Construction of the new 1,500-foot handicap-accessible trail to the river, and the improvement to the connecting River Trail, would have minimal direct impacts because these trails already exist. However, these trails will bring more visitors closer to the river, potentially increasing disturbance to waterfowl and other birds such as brown pelicans that use the river.

Limited waterfowl hunting opportunities would continue to be available under Alternative 3, and could result in several types of disturbances to wildlife. Hunters accessing the hunt area may disturb wildlife in the Refuge's upland, riparian, and aquatic habitats, and hunters may accidentally take non-target species. In addition, litter discarded by hunters and other Refuge users could be ingested or entangle wildlife, resulting in injury or death. Mitigation for this alternative would reduce all of these potential impacts.

Prescribed burns proposed under Alternative 3 would have similar potential adverse and beneficial effects on wildlife to those described for Alternative 2.

Under Alternative 3, recreational use of the refuge would gradually increase as the population of the Monterey Bay region grows. In addition, the Refuge's improved interpretative displays and wheelchair accessible trail likely attract slightly more users than would visit the Refuge under Alternative 1. These additional users are expected to be primarily birders and those interested in dune ecology.

Impacts from recreational use under this alternative are expected to be similar to those described under Alternative 1. However, the improved

signs, interpretive displays, symbolic fencing, reduced hunt area, and increased staff and law enforcement presence under this alternative would avoid or minimize these adverse impacts.

Implementation of Alternative 4 (Expand and Improve Public Use and Resource Management) may have adverse effects on some wildlife species as compared to the No Action Alternative. Recreational use on the Refuge is expected to increase under this alternative beyond that expected from local population growth alone. This increase in use will be controlled through a combination of more enforcement of user restrictions (through greater presence of Refuge staff) and facilities to better control public use. These controls, however, may not be sufficient to limit illegal access and disturbance to sensitive dune habitats as compared to the No Action Alternative. Improved access to and through the Refuge would likely increase the number of beach users. This would have adverse impacts on birds that use the beach, including shorebirds. Greater numbers of walkers, joggers, children playing, and dog-walking has been shown to increase disturbance and flushing of birds (Burger 1986, Pfister et al. 1992). Alternative 4 will have beneficial impacts on California brown pelican (due to the reduction of the hunt area) similar to those of Alternative 3 discussed above.

Proposed construction of restrooms adjacent to the existing parking lot, hunting blinds along the south bank of Salinas River would take place between October and February. This is outside the breeding season, so construction equipment and personnel would not disturb nesting wildlife, including the western snowy plover. Construction and annual movement of the boardwalk through the dunes could adversely affect wildlife in the dunes. Management activities under Alternative 4 would have beneficial impacts similar to those described for Alternative 2. The beneficial impact of Alternative 4 on California brown pelican is expected to be similar to that described for Alternative 3. Prescribed burns proposed under Alternative 4 would have similar potential adverse and beneficial effects on wildlife to those described for Alternative 2.

Waterfowl hunting opportunities would continue to be available under Alternative 4, and could result in several types of disturbances to wildlife. Hunters accessing the hunt area may disturb wildlife in the Refuge's upland, riparian, and aquatic habitats, and hunters may accidentally take non-target species. In addition, litter discarded by hunters and other Refuge users could be ingested or entangle wildlife, resulting in injury or death. Mitigation for this alternative would reduce all of these potential impacts.

Mitigation. Alternatives 1, 3, and 4: The Service will maintain a trail through the grassland to the hunt area and will install and maintain signs marking the hunt area boundary. In addition, by 2007, interpretive signs and an orientation kiosk will be installed on the Refuge to inform visitors about the Refuge's habitats and wildlife and ways of avoiding adverse impacts, including staying on trails. The trails and interpretive signs will minimize disturbance to wildlife in upland, riparian, and aquatic habitats by providing easy access to the hunt area and by interpreting the importance and sensitivity of Refuge habitats and restoration efforts.

Alternatives 3 and 4: Interpretive signage, including the kiosk, will stress the need to avoid littering on the Refuge.

Alternatives 1, 3, and 4: Hunters will be permitted to have no more than 25 shells in their possession while on the Refuge. This will discourage hunters from taking long shots, reducing noise-related disturbance of wildlife and decreasing the possibility of target misidentification and take of non-target species. Waterfowl hunters will be required to use only approved nontoxic shots while on the Refuge.

Cultural Resources

No formal cultural resources surveys have been carried out at the Refuge. However, the existence of historically significant sites in the vicinity of the Refuge, and the area's general ethnographic context, suggest that cultural resources may exist on-site. Ground-disturbing activities and use of prescribed fire could result in adverse impacts on any cultural resources that may be present.

All of the alternatives, including the No Action Alternative, incorporate ground-disturbing activities. Alternatives 2 (Reduce Public Use/Improve Resource Management), 3 (Improve Public Use and Resource Management), and 4 (Expand and Improve Public Use and Resource Management) all include the use of prescribed fire. Additionally, under Alternative 4, a restroom facility would be constructed.

All of the alternatives, including the No Action Alternative, have the potential to disturb cultural resources. The nature and degree of the impacts would depend on: the specific activities undertaken, the nature of the resource(s) present; and the nature of previous management activities on the site and severity of any previous impacts. All ground-disturbing activities will require review by the Service's Regional Archaeologist, who will determine appropriate procedures to protect cultural resources and will specify any necessary mitigation, guided by the terms of Service's Programmatic Agreement for cultural resources with the State Historic Preservation Officer (SHPO).

Strategy 3.3.5, included in alternatives 2, 3, and 4, is to conduct a sitewide inventory of potential archaeological and historic resources on the Refuge. Once this strategy is implemented, the Service will know the location and significance of most cultural resources on the Refuge. This will allow the Service to design ground-disturbing projects to avoid or minimize impacts on cultural resources. Until this strategy is implemented, however, projects must be evaluated case-by-case.

Mitigation

All alternatives: All undertakings, including but not limited to ground-disturbing activities and prescribed burns, will be coordinated with the Service's Regional Archaeologist, in order to preserve the Refuge's archaeologic and historic resources of the Refuge. Following are specific guidelines that may apply, depending on site-specific conditions.

- A cultural resources survey by a qualified archaeologist may be required in areas where a ground-disturbing activity or prescribed burning is proposed. If burning is proposed entirely within a flood zone or in a previously disked or plowed area, or if burning has been an ongoing practice on the site, a cultural resources survey may not be required. However, cultural resources surveys will likely be necessary for all burns on upland sites, and for burns that require excavation (scraping, plowing, or disking) to establish a fireline. In some cases, it may be appropriate to conduct cultural resources survey work after a prescribed burn has been completed, because (1) visibility of artifacts

or other resources may be increased after burning, and (2) artifacts may be more vulnerable to vandalism or theft when exposed by burning.

- As required by the Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq. or 43 CFR 10), any construction or ground-disturbing activity on the Refuge with the potential to disturb human remains, burial objects, sacred objects, or objects of cultural patrimony will be planned and implemented in consultation with affected Tribes.
- If potentially significant artifacts are found during any activity on the Refuge, work will cease within 100 feet of the find and access will be restricted until a qualified archaeologist and members of local Tribes can assess the significance of the find and propose appropriate methods of treatment, as required by NAGPRA.
- If human remains are found during any activity on the Refuge, work will cease within 100 feet of the find and access will be restricted, and the Monterey County Coroner will been informed of the discovery, under Public Resources Code Section 5050.5. If no investigation of the cause of death is required, remains will be treated in accordance with the requirements of NAGPRA.

Social and Economic Environment

Plans and Polices

All of the proposed alternatives, including the No Action Alternative, would include preparation of a CCP and thus would comply with the Improvement Act.

Agriculture

None of the activities proposed under the No Action Alternative, Alternative 2, or Alternative 3 would have an adverse effect on local agricultural operations.

Alternative 4 (Expand and Improve Public Use) includes several activities that may adversely affect local agricultural operations. Alternative 4 proposes to improve the existing parking lot and access road (located on privately owned land) by gravelling or paving them, subject to landowner agreement. Improving the parking lot and access road would allow more visitors to use the Refuge in the winter months. Increased traffic on the access road could adversely affect local agricultural operations, which use the roadway for agricultural equipment and farm workers' vehicles. However, access through the Refuge gate could be controlled jointly by the Service and the grower who owns the access road. Thus, the grower could close the road when large-scale agricultural operations are in progress to avoid conflict with Refuge visitors. This impact is therefore considered less than significant.

Projects that permanently destroy prime farmlands[1] may have a significant impact on the environment. Historically, portions of the Refuge were used for agriculture. Currently, the area east of the saline pond (between the dunes and the Salinas River) is still considered prime farmland. Under Alternatives 1, 2, and 3, the soil in this area would not be adversely affected by construction or by any proposed changes in land use and would still be viable as agricultural land if the area were to be

[1] *Prime farmlands* are high-quality agricultural lands that meet specific criteria established by the Farmland Protection Policy Act of 1980 (7 USC 4201).

removed from the National Wildlife Refuge System in the future. Under Alternative 4, a restroom would be built near the existing parking lot and handicap accessible boardwalks would be constructed along existing trails. The locations proposed for these new facilities are in the area designated as prime farmland. However, the boardwalk would be built above the ground and would not adversely affect the agricultural viability of the soil, and the restroom facility would have a small footprint. Therefore, implementation of Alternative 4 would not result in a significant impact on prime farmland on the Refuge.

Transportation

Under Alternatives 1, 2, and 3, visitor use is not expected to show an increase greater than that expected to result from projected local population growth alone. Thus, under these alternatives, there would be no adverse impact on local traffic or transportation systems.

Under Alternative 4, visitor use on the Refuge is expected to increase slightly because of improved access and additional facilities. This increase would generate a small amount of additional traffic on Highway 1, the only regional access route to the Refuge. However, this increase is not expected to be significant.

Recreation

Implementation of the No Action Alternative would maintain current Refuge recreational uses and would have no impact on existing recreation.

Under Alternative 2 (Reduce Public Use/Improve Resource Management), the Refuge would be closed to all public use except beach use (including surf fishing which is 'off Refuge') and guided tours offered by Service staff for wildlife observation, photography, and environmental interpretation and education. In addition, the Refuge would be fenced along most of its borders to prevent unauthorized access. Under this alternative, no hunting or unguided hiking would be allowed, except on the beach. Terminating hunting use on the Refuge would have an adverse impact on local hunting activities because the Refuge is one of only two locations in the area open for public waterfowl hunting, and is the only location within a 50-mile radius that offers walk-in hunting access. Hunters would be forced to use the only other nearby site (which can be accessed only by boat) or travel longer distances to hunt. Educational opportunities on the Refuge would decrease under this alternative. Current Refuge visitors forced to use other nearby public lands for hiking or wildlife observation and photography may have a different, and possibly lower-quality, experience on these lands than on the Refuge. For example, wildlife may be less abundant or may represent different species (e.g., species more habituated to humans) on other lands than on the Refuge. Although the public would continue to be able to view wildlife on the Refuge through guided tours, some visitors might consider this restriction a significant impact on local recreational opportunities.

Implementation of Alternative 3 (Improve Public Use and Resource Management) may have an adverse impact on recreational hunting but would have several beneficial impacts on other recreational uses. Under Alternative 3 current Refuge operations would be maintained, but the area where hunting is allowed would be reduced by approximately 7 acres. This reduction could adversely affect the quality of hunting activities. The acreage in question is considered by hunters to be the best hunting area on the Refuge (Barr pers. comm.). The reduction in hunting area is not

expected to change the number of hunters using the Refuge. Instead, hunters would be crowded into a smaller area, which would reduce the quality of the hunting experience. However, limiting the hunt area may improve the quality of waterfowl habitat on the Refuge. The increase in waterfowl abundance may compensate for the loss of the prime hunting area. This impact on recreational hunting is considered less than significant.

Implementation of Alternative 3 would benefit recreation by allowing visitors to park on-site during the winter months (by improving the parking surface). The proposed information kiosk, improved trail, and interpretive signs throughout the Refuge would also improve the recreational experience of most visitors.

Alternative 4 (Expand and Improve Public Use) may have the same adverse effect on the hunting experience as Alternative 3, but would have greater positive effects on the experience of Refuge visitors other than hunters. The existing parking lot and access road would be improved to increase visitor access during the winter. Additional facilities beyond those proposed under Alternative 3 would include a restroom, emergency phone, handicap-accessible boardwalk to the beach, and handicap-accessible trail to the River. The handicap-accessible facilities would substantially improve the accessibility of the Refuge to handicap visitors. The proposed improvements would encourage more people to visit the Refuge, which would have a positive impact on recreation.

Employment
Under the No Action Alternative, current management practices would continue to be followed and no change in Refuge staffing would be required. The No Action Alternative would thus have no impact on local employment conditions.

Under Alternatives 2 (Reduce Public Use/Improve Resource Management) and 3 (Improve Public Use and Resource Management), current management practices would continue, but natural resource management would be increased. This would require the Service to increase the staff of the Refuge by a maximum of 1 FTE. Under Alternative 3, the Service would likely establish a small satellite Refuge office in the Monterey Bay area, and the additional Refuge staff hired under this alternative might be hired from the local community. In addition, Refuge visitation is expected to increase under Alternative 4 (Expand and Improve Public Use). This increase could benefit the local economy and local employment conditions if Refuge visitors patronized local businesses. Alternatives 2–4 could thus result in a small positive impact on local employment conditions.

Environmental Justice
No activities proposed any of the alternatives presented in this CCP would have a disproportionate negative impact on low-income or minority populations.

Local Economy
No activities proposed under Alternatives 1, 3, or 4 would have a negative impact on the socioeconomic well-being of the local community. Alternative 4 could have beneficial impacts on the local economy if the expected additional Refuge visitors patronized local businesses.

Alternative 2 (Reduce Public Use/Improve Resource Management) would close the Refuge to all public use except guided tours offered by Service staff for wildlife observation, photography, and environmental interpretation and education. Reducing the number of recreational visitors to the area may adversely affect some local businesses, such as gas stations, restaurants, and hotels. However, there are many other State parks and beaches in the vicinity that attract a large number of visitors. Therefore, given the small number of visitors that currently use the Refuge and the other recreational opportunities offered in the area, the possible loss of revenue for local businesses would be less than significant.

Unavoidable Adverse Impacts

The selection of any alternative would have no unavoidable adverse direct (or indirect) impact on the environmental parameters evaluated in this chapter, including biological resources. Adverse effects identified in this chapter have been reduced with mitigation measures to the maximum extent possible.

Irreversible and Irretrievable Commitments of Resources

Most management actions identified in this document will require a commitment of funds (see Table 11) that would then be unavailable for use on other Service projects. At some point, commitment of funds to these projects will be irreversible, and once used, these funds will be irretrievable. Non-renewable or non-recyclable resources committed to projects identified in this CCP such as fuel for Refuge vehicles or supplies used in management or maintenance activities (e.g., herbicide, fencing, signs, etc.) will also represent irreversible and irretrievable commitments of resources.

Short-Term Uses vs. Long-Term Productivity

An important goal of the National Wildlife Refuge System is to maintain the long-term ecological productivity and integrity of the biological resources on NWRs. This system-wide goal is the foundation for the goals presented in this CCP. Compared to the No Action Alternative, Alternative 2 favors long-term productivity over short-term uses by reducing public access (the short-term use) in favor of endangered species protection and recovery. Alternatives 3 and 4 attempt to balance these issues by providing some short-term uses (i.e., limited recreational opportunities) while still fostering the long-term productivity of the biological resources on the Refuge.

Table 10. Summary of environmental consequences, Alternatives 1–4.

Environmental Parameter	*Alternative 1 No Action*	*Alternative 2 Reduce Public Use and Improve and Expand Resource Management*	*Alternative 3 Improve Public Use and Resource Management (Proposed Action)*	*Alternative 4 Expand and Improve Public Use and Resource Management*
Hydrology	No impact.	No impact.	No impact.	No impact.
Water Quality	Adverse: Potential increase in erosion of exposed surfaces during the rainy season because of vegetation removal activities (removal of nonnative vegetation).	Same as Alternative 1.	Same as Alternative 1.	Adverse: Potential increase in erosion of exposed surfaces during the rainy season because of vegetation removal activities (removal of nonnative vegetation) and construction of new facilities.
Geology and Soils	No impact.	No impact.	No impact.	Adverse: New structures could be affected by seismic activity if not designed properly.
Air Quality	No impact.	Adverse: Prescribed burns would increase PM10 emissions in the area.	Same as Alternative 2.	Adverse: Construction vehicles and prescribed burns will increase PM10 and other pollutant emissions in the area.
Contaminants	Adverse: Very low probability of Refuge visitors coming in contact with unexploded ordnance.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Vegetation	Adverse: Sensitive dune habitat and special-status plants possibly damaged by visitors walking off-trail through dunes. Beneficial: Nonnative plants removed and native riparian vegetation planted along Salinas River.	Beneficial: Positive impact on sensitive dune habitat and special-status plants in dunes as a result of greatly reduced human disturbance in dunes. Other positive impacts would result from the restoration of historic wetland and riparian habitat, use of prescribed burns, and removal of nonnative plants.	Beneficial: Positive impact on sensitive dune habitat and special-status plants in dunes as a result of reduced human disturbance in dunes. Other positive impacts would result from the restoration of historic wetland and riparian habitat and removal of nonnative plants.	Adverse: Visitors trespassing could damage vegetation or special-status plants. Beneficial: Positive impact on sensitive dune habitat and special-status plants in dunes as a result of reduced human disturbance in dunes. Other positive impacts would result from the restoration of historic wetland and riparian habitat, use of prescribed burns, and removal of nonnative plants.
Wildlife	Adverse: Current use of beach and beach trail may disturb nesting western snowy plovers and reduce availability of suitable habitat. Lack of avian predator management program reduces reproductive success of western snowy plovers. Beach users flush California brown pelicans roosting at mouth of Salinas River. Beach trail users may disturb or flush shorebirds foraging in saline pond in winter. Hunters at north end of hunt area may disturb or flush pelicans roosting on islands in Salinas River. Beneficial: Current resource management activities have positive impacts on wildlife.	Adverse: Movement of large mammals could be restricted by Refuge fencing. Fencing could also provide perches for avian predators on snowy plovers. Prescribed burning may adversely affect some wildlife. Beneficial: Positive impacts from substantial reduction of visitor use and of associated disturbance to wildlife including western snowy plover, California brown pelican, and Smith's blue butterfly.	Adverse: Limited hunting will continue to disturb some wildlife and may accidentally take non-target species. Prescribed burning may adversely affect some wildlife. Improvements to the River Trail may increase its use and disturb wildlife along the river. Beneficial: Positive impact on western snowy plover: birds that prey on the snowy plover will be relocated, signs will be posted to keep people out of plover habitat, and symbolic fencing will be installed along beach trails and around nests considered vulnerable to disturbance or, if necessary, around the entire foredune area to restrict access. Interpretive signs and increased presence of Refuge staff will also reduce trespass. Positive impact on California brown pelican through reduction of hunt area to smaller location more than 650 yards from nearest pelican roost. Positive impact on other wildlife through better control of public use and new resource management actions.	Adverse: Expected increase in public use may increase disturbance to wildlife, including western snowy plover and California brown pelican. Beneficial: Same as Alternative 3.

Table 10. Summary of environmental consequences, Alternatives 1–4 *(continued).*

Environmental Parameter	*Alternative 1 No Action*	*Alternative 2 Reduce Public Use and Improve and Expand Resource Management*	*Alternative 3 Improve Public Use and Resource Management (Proposed Action)*	*Alternative 4 Expand and Improve Public Use and Resource Management*
Cultural Resources	No impact.	Adverse: Ground-disturbing activities could impact cultural resources that may occur on the Refuge.	Same as Alternative 2.	Same as Alternative 2.
Plans and Polices	No impact.	No impact.	No impact.	No impact.
Agriculture	No impact.	No impact.	No impact.	Adverse: Increased visitor use could conflict with adjacent agricultural operations.
Transportation	No impact.	No impact.	No impact.	Adverse: Small increase in traffic expected from increase in visitor use of Refuge.
Recreation	No impact.	Adverse: Recreation would be adversely affected: (1) removal of the unique hunting opportunity on the Refuge would force hunters to travel more than 50 miles to reach a site with walk-in hunting access, and (2) non-consumptive uses would be reduced to guided tours.	Adverse: Reduction of the hunt area by 7 acres may reduce the quality of the hunting experience because prime hunting area would be lost and the remaining area could become overcrowded. Beneficial: Positive impact on all recreation as a result of improved parking lot and signage and new docent program.	Adverse: Same as Alternative 3. Beneficial: Positive impact on all recreation as a result of improved parking lot, access road, signage, and trail, and new handicap accessible boardwalks, restrooms, emergency phone, and docent program.
Employment	No impact.	No impact.	No impact.	No impact.
Environmental Justice	No impact.	No impact.	No impact.	No impact
Socioeconomics	No impact.	Adverse: Substantial reduction in public use of Refuge could adversely impact the revenue of local businesses.	No impact.	Beneficial: Expected increase in public use of Refuge could increase tourism revenue to local businesses.

Chapter 6. Plan Implementation

Once the preferred management alternative has been finalized, the CCP has been approved, and the Service has notified the public of its decision, the implementation phase of the CCP process will begin. During the next 15 years, the objectives and strategies presented in this CCP will be realized; the CCP will serve as the primary reference document for all Refuge planning, operations, and management until it is formally revised at the end of this period. The Service will implement the final CCP with assistance from existing and new partner agencies and organizations and from the public.

Activities needed to realize the management strategies discussed in this CCP are referred to as projects. Every effort will be made to implement these projects by the deadlines established here. However, the timing of implementation of the management activities proposed in this document is contingent upon a variety of factors, including:

- Funding,
- Staffing,
- Compliance with other Federal regulations,
- Partnerships, and
- The results of monitoring and evaluation.

Each of these factors is described briefly below as it applies to the Service's proposed action.

Funding and Personnel

To implement the proposed action and to achieve the objectives and goals of this CCP, the Service will need additional funding and staff. Table 11 describes the budget proposals and staffing needs for the Refuge for each project proposed in this CCP. Projects include: upgrades of existing facilities (e.g., covering the parking lot with a gravel surface), construction of new facilities or amenities (orientation kiosk and interpretive signs), species and habitat monitoring, and management actions such as grassland mowing, prescribed burning, and avian predator translocation. Full implementation of all of the projects proposed in this CCP would require that the Refuge increase its current annual budget by 280% to approximately $325,000.

If the proposed action is implemented, full staffing for both the Salinas River NWR and the nearby Ellicott Slough NWR would include the following.

- Full-time Refuge Manager
- Full-time Refuge Biologist
- Full-time Biological Science Technician
- Full-time Park Ranger
- Part-time Maintenance Worker

In addition, an intern may be hired to help conduct habitat and species inventories and monitoring and to coordinate the new docent program.

Table 11. Budget proposal for Salinas River NWR for Service's proposed action (Alternative 3).

Project Title	*Priority*[1]	*Start Year*	*Completion Year*	*Duration (years)*	*Operational Cost for Startup (thousands)*	*Average Annual Cost (thousands)*	*15-Year Total Cost (thousands)*	*Staffing (FTE/ Grade*[2]*)*	*RONS*[3]
Control nonnative plants on foredunes.	H	2001	2016	15	5.0	14.5	222.5	0.1/GS-9 0.1/GS-11	97704
Develop partnerships with neighboring landowners to control nonnative vegetation on their coastal dunes.	M	2001	2016	15	-	3.2	48.0	0.05/GS-11	n/a
Install "Closed Area" signs at the boundary of sensitive dune habitat.	H	2001	2016	15	8.0	3.6	62.0	0.05/GS-7	00701 97702
Develop and implement a docent program.	H	2001	2016	15	45.0	17.0	300.0	0.3/GS-7 0.05/GS-19	00701
Install symbolic fencing through the foredune habitat.	H	2007	2016	11	15.0	6.0	81.0	0.05/GS-5 0.05/GS-7	97703
Increase the presence of enforcement officers during plover breeding season.	M	2001	2016	15	-	8.5	127.5	0.2/GS-7	00701
Continue to implement the Monterey Integrated Predator Management Program on the Refuge.	H	2001	2016	15	-	40.0	600.0	0.1/GS-11	97701
Implement the Refuge's Predator Management Plan to include relocation of selected birds that prey heavily on plover chicks.	H	2001	2016	15	7.0	22.0	337.0	0.1/GS-11	97701
Complete a 2-year inventory of the species that occur on the Refuge.	M	2003	2005	2	20.0	40.0	100.0	0.5/GS-5 0.1/GS-11 0.3/GS-9	97705
Evaluate and prioritize the special-status species that occur on the Refuge.	H	2008	2008	1	5.2	-	5.2	0.1/GS-9	97705
Encourage research on each priority special-status species on the Refuge.	M	2001	2016	15	-	3.2	48.0	0.05/GS-11	97705
Explore expansion of the current Refuge boundary.	M	2001	2016	15	-	3.2	48.0	0.05/GS-11	n/a
Continue to plant and maintain riparian trees and shrubs and support restoration partners.	H	2001	2016	15	-	15.0	225.0	0.1/GS-5	n/a
Develop and implement a long-term monitoring strategy to evaluate the survival and density of riparian revegetation.	M	2001	2016	15	6.2	5.5	88.7	0.1/GS-5 0.05/GS-9	97705
Continue to mow the grassland annually and apply herbicide to control invasive nonnative plants.	H	2001	2016	15	-	12.0	180.0	0.05/GS-11 0.05/WG-8	97707 97704 00702
Conduct prescribed burning.	M	2001	2016	15	10.0	10.0	160.0	0.05/GS-11	00702
Maintain efforts to monitor plover nesting success and band all chicks.	H	2001	2016	15	-	2.6	39.0	0.05/GS-9	n/a
Construct and maintain 1,500 feet of wheelchair- accessible trail to the river.	M	2005	2007	2	66.0	3.0	105.0	-	n/a

Table 11. Budget proposal for Salinas River NWR for Service's proposed action (Alternative 3) ***(continued).***

Project Title	*Priority*[1]	*Start Year*	*Completion Year*	*Duration (years)*	*Operational Cost for Startup (thousands)*	*Average Annual Cost (thousands)*	*15-Year Total Cost (thousands)*	*Staffing (FTE/ Grade*[2]*)*	*RONS*[3]
Inventory and quantify the composition of the grassland on the Refuge.	M	2001	2016	15	8.6	1.0	23.6	0.1/GS-5 0.1/GS-9	97707 97705
Conduct a hydrologic study of the Refuge.	L	2005	2005	1	75.0	-	75.0	-	01702
Complete a two-year inventory of the species present in the Salinas River Lagoon.	M	2003	2005	2	20.0	28.0	76.0	0.3/GS-5 0.3/GS-9	n/a
Develop and implement a management strategy for the wetlands and aquatic habitats.	M		2010		11.5	1.0	26.5	0.2/GS-9 0.1/GS-11	n/a
Develop and maintain GIS database.	M	2001	2016	15	40.0	10.0	190.0	0.05/GS-11 0.05/GS-9 0.05/GS-5	01701
Maintain and enhance partnerships with State Parks to share information and coordinate monitoring.	H	2001	2016	15	-	3.2	48.0	0.05/GS-11	n/a
Conduct sitewide inventory of potential archaeologic and historic resources and incorporate into interpretive materials.	H	2003	2003	1	10.0	-	10.0	-	n/a
Annually monitor hunting use of the Refuge.	M	2001	2016	15	-	4.2	63.0	0.1/GS-7	00701
Design and install an orientation kiosk at the Refuge entrance.	M	2004	2005	1	35.0	-	35.0	0.05/GS-11 0.05/GS-9 0.1/GS-7	97702 00701 00702
Improve the parking lot surface.	H	2001	2016	15	20.0	3.0	65.0	0.05/WG-8	00702
Design and install interpretive signs along trails.	M	2007	2007	1	32.0	-	32.0	0.05/GS-9 0.05/GS-11 0.1/GS-7	97702 00701 00702
Enhance existing environmental education partnerships.	L	2001	2016	15.0	-	4.2	63.0	0.1/GS-7	00701
Develop environmental education and interpretive materials.	L	2001	2016	15	15.0	9.0	150.0	0.1/GS-7 0.05/GS-11 (EE Supv)	0.3
Conduct routine maintenance.	H	2001	2016	15	50.0	20.0	350.0	0.1/WG-8	n/a
Establish a satellite office in the Monterey Bay area as the Refuge expands.	M	2004	2016	12	120.0	40.0	600.0	-	n/a
Establish program to monitor migratory birds.	M	2001	2016	15	10.0	10.0	160.0	0.1/GS-9 0.1/GS-5	97705

[1] Projects are prioritized as high (H), medium (M), or low (L).
[2] Salary grades are expressed as GS levels 1–15.
[3] The Refuge Operating Needs System (RONS) is a national database that lists the unfunded operational needs of each refuge. RONS project codes are included in order to update this database with the projects in this CCP.

FTE = full-time equivalent (decimal percentage of the hours worked by a full-time staff member).

Step-Down Management Plans

Some projects or types of projects require more in-depth planning than the CCP process is designed to provide; for these projects, the Service prepares step-down management plans. In essence, step-down management plans provide the additional planning details necessary to implement management strategies identified in a CCP. Three step-down plans—the Avian Predator Management Plan, Wildland Fire Management Plan, and Hunting Plan for the Refuge—are included in this CCP as Appendices H, I, and J, respectively. If the Service chooses Alternative 2 as its proposed action, the Refuge's Hunting Plan and Recreational Fishing Plan will be terminated to reflect exclusion of these activities from the Refuge.

Compliance Requirements

This CCP was developed to comply with all Federal laws, executive orders, and legislative acts to the extent possible. Some activities (particularly those that involve revision of an existing step-down management plan, or preparation of a new one) will need to comply with additional laws or regulations besides NEPA and the Improvement Act. In addition to NEPA and the Improvement Act, full implementation of all components of this CCP will require compliance with:

- Executive Order 11988 (Floodplain Management);
- Executive Order 12372 (Intergovernmental Review of Federal Programs);
- Executive Order 11593 (Protection of Historical, Archaeological, and Scientific Properties);
- Executive Order 11990 (Protection of Wetlands);
- Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System);
- Executive Order 12898 (Environmental Justice in Minority Populations and Low-Income Populations);
- Secretarial Order 3127 (Hazardous Substances Determinations);
- Endangered Species Act of 1973, as amended;
- Refuge Recreation Act, as amended;
- National Historic Preservation Act of 1966, as amended; and
- Coastal Zone Management Act of 1972, as amended.

Partnership Opportunities

As described in Chapter 1, a number of landowners, State agencies, and educational and scientific organizations conduct research, monitoring, and management activities on or near the Refuge. These partners play an important role in helping the Service achieve its mission and the Refuge's goals. The Service will continue to rely on these and other partners in the future to help implement this CCP and to provide input for future CCP updates. This CCP identifies many projects that provide new opportunities for existing or new partners. There is great potential for more public participation and assistance in the management and interpretation of the Refuge given its proximity to important population centers such as Monterey, Salinas, and Santa Cruz. The Service welcomes and encourages more public participation in the Refuge.

Adaptive Management

This CCP provides for adaptive management of the Refuge. Adaptive management is a flexible approach to long-term management of biotic resources that is directed by the results of ongoing monitoring activities and new data. Management techniques, objectives, and strategies are regularly evaluated in light of monitoring results, new scientific

understanding, and other new information. These periodic evaluations are used over time to adapt both management objectives and techniques to better achieve the Refuge's goals.

Monitoring is an essential component of adaptive management in general, and of this CCP; specific monitoring strategies have been integrated into the goals and objectives described in this CCP whenever possible. All habitat management activities will be monitored to assess whether the desired effect on wildlife and habitat components has been achieved. In order to conduct an effective monitoring program, it is important to establish the baseline, or starting condition. It will also be important to begin studies to monitor the response of wildlife to increased public use of the Refuge in the form of observation and environmental education.

Plan Amendment and Revision

CCPs are meant to evolve with each individual refuge unit, and the Improvement Act specifically requires that CCPs be formally revised and updated at least every 15 years. The formal revision process will follow the same steps as the CCP creation process (see Figure 3). In the meantime, however, the Service will be reviewing and updating this CCP periodically (at least as often as every five years) based on the results of the adaptive management program. This CCP will also be informally reviewed by Refuge staff while preparing annual work plans and updating the Refuge database. It may also be reviewed during routine inspections or programmatic evaluations. Results of any or all of these reviews may indicate a need to modify the plan. The goals described in this CCP will not change until they are re-evaluated as part of the formal CCP revision process. However, the objectives and strategies may be revised to better address changing circumstances or to take advantage of increased knowledge of the resources on the Refuge. If changes are required, the level of public involvement and associated NEPA documentation will be determined by the Refuge Manager.

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Table 11. Budget proposal for Salinas River NWR for Service's proposed action (Alternative 3). (90)

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