Prisoners Harbor Coastal Wetland Restoration Project

Final Environmental Impact Statement

February 2010

Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001

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Front cover photo:

Mouth of Cañada del Puerto creek, Prisoners Harbor, Channel Islands National Park (Power, 2006)

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PRISONERS HARBOR COASTAL WETLAND

RESTORATION PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

Channel Islands National Park
Santa Cruz Island, Santa Barbara County, California

February, 2010

ABSTRACT

This Final Environmental Impact Statement (FEIS) was prepared in accordance with the Department of Interior National Environmental Policy Act (NEPA), the National Park Service NEPA guidelines (DO-12), and the California Environmental Quality Act (CEQA). This document has been prepared because actions proposed as part of this Final EIS may be a major federal action significantly affecting the quality of the human environment.

The National Park Service (NPS) proposes to restore a functional, self-sustaining ecosystem at a coastal wetland site known as Prisoners Harbor and a 40-acre associated stream corridor in the lower Cañada del Puerto Creek on Santa Cruz Island. The project seeks to: (1) recreate a more natural topography and hydrology by reconnecting the Cañada del Puerto stream with its floodplain and removing non-native eucalyptus trees and other vegetation which have proliferated in the lower drainage; (2) increase biological diversity and productivity by removing fill and restoring the historic wetland; (3) provide an enhanced visitor experience by installing viewing benches and additional interpretive displays; and (4) protect significant cultural and historic resources. The Preferred Alternative, Alternative B, would restore 3.1 acres of palustrine wetlands and deepwater habitat, remove all of the cattle corrals and relocate the scale house to its pre-1960s location, remove eucalyptus, control invasive species, construct a barrier to protect archaeological resources, and improve the visitor experience. In addition, a portion of the berm would be removed, thereby reconnecting the creek to its floodplain.

Two additional alternatives are analyzed in this EIS: Alternative A (No Action) would not conduct any wetlands or riparian restoration activities; Alternative C would restore only 2.1 acres of wetlands, and leave two of the historic cattle corrals in place. For each alternative action, the Park analyzed the potential environmental impacts that would likely occur, divided into the following categories: Hydrologic Function, Wetlands and Floodplains, Water Quality, Wildlife, Vegetation, Archeological Resources, Historic Resources, and Visitor Experience.

Alternative B is the Park's Preferred Alternative, and the Environmentally Preferred Alternative. It would produce the most ecological benefits by enabling more improvements to water quality, stream shading, flood attenuation, and groundwater exchange. It would remove a resource that contributes to the eligibility of the Ranching District to the National Register-eligible Santa Cruz Island Ranching District, but the District would remain eligible. Impacts to the visitor experience from the loss of the corrals would be partially mitigated by documentation and displays of these features at the Park Visitor Center.

As a delegated EIS the official responsible for final approval is the Regional Director, Pacific West Region. Thereafter, the Superintendent, Channel Islands National Park, would be responsible for implementation of the approved project and subsequent monitoring activities.

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

Introduction

Santa Cruz Island is the largest of the Channel Islands off the coast of Southern California. It is home to a variety of wildlife including a significant number of plants and animals found nowhere else in the world, making Santa Cruz Island a bastion of biological diversity. Ninety percent of the island is listed in the National Register of Historic Places (NRHP) for its archeological significance and the island's ranching resources have been determined eligible for the National Register of Historic Places. Channel Islands National Park was established to protect and restore these nationally significant resources.

The National Park Service (NPS) proposes to restore a functional, self-sustaining ecosystem at a former 9-acre backbarrier coastal wetland site known as Prisoners Harbor and a 40-acre associated stream corridor in the lower Cañada del Puerto Creek on Santa Cruz Island. The proposed project area has been altered during the past 150 years by filling of the wetland; planting or accidental introduction of non-native vegetation such as eucalyptus, stone pines, and kikuyu grass, and construction of a berm, buildings, roads and corrals. The project seeks to: (1) recreate a more natural topography and hydrology by reconnecting the Cañada del Puerto stream with its floodplain and removing non-native eucalyptus trees and other vegetation which have proliferated in the lower drainage; (2) increase biological diversity and productivity by removing fill and restoring the historic wetland; (3) provide an enhanced visitor experience by installing viewing benches and additional interpretive displays; and (4) protect significant cultural and historic resources.

The proposed project area supports three types of wetlands: Marine, Palustrine, and Riverine wetlands. Before they were degraded, these wetlands most likely included open water habitat, marsh wetlands dominated by short perennial herbaceous plants, marsh wetlands dominated by cattail and tule, seasonally dry creek bed and associated riparian forest, non-vegetated lagoon habitat, non-riparian willow scrub habitat, and transitional zones between these habitats. Greater diversity and interzonation of wetland habitats at the site would have supported greater diversity and abundance of native flora and fauna.

In addition, the greater pre-historic wetland extent provided greater capacity and diversity of physical ecosystem services for biota. At Prisoners Harbor these would have included nutrient retention and cycling and organic soil development.

Description of the Alternatives

The following screening criteria were used to develop and evaluate alternatives for consideration:

- Achievement of Project Goals and Objectives
- Hydrologic connection of the creek to the floodplain
- Groundwater levels and wetland restoration feasibility
- Area of wetland to be restored and the associated wetland ecosystem values
- Protection of archeological features
- Balanced use of mixed resources in the project area
- Visitor experience
- Protection and maintenance of the pier and road access

The Preferred Alternative, Alternative B, would remove all of the cattle corrals and restore 3.1 acres of palustrine wetlands and deepwater habitat, relocate the scale house to its pre-1960s location, remove eucalyptus, control invasive species, construct a protective barrier around a portion of the archeological site, and improve the visitor experience. In addition, a portion of the berm would be removed, thereby reconnecting the creek to its floodplain.

Alternative C differs from B in that it would remove six of the eight cattle corrals and restore 2.1 acres of palustrine wetlands and deepwater habitat, without relocating the scale house. It would also remove eucalyptus, control invasive species, construct a protective barrier around a portion of the archeological site, and improve the visitor experience. In addition, a portion of the berm would be removed, thereby reconnecting the creek to its floodplain.

Activities proposed for the Prisoners Harbor restoration include:

- <u>Preparing the wetlands restoration area</u>--The Park would start by aggressively targeting, removing, and disposing of known non-native invasive plants on the restoration area – such as kikuyu grass, fennel, and eucalyptus – using appropriate techniques. These removal and disposal techniques may include hand pulling, hand- or machine-excavation, chain sawing, burning, chipping, and/or application of herbicide.
- <u>Corral removal</u>-- Under the supervision of park cultural resource specialists and after consultation with the State Historic Preservation Office, the scale house would be partially dismantled, lifted off its current foundation, stabilized on its new foundation in its pre-1960's location, and reassembled (Alternative B only). The corrals would be dismantled along with other posts, troughs, and old concrete foundations. Alternative B includes dismantling all eight corrals; Alternative C would include dismantling six.
- <u>Partial Berm and Fill Removal</u>—The Park would remove approximately 250 feet of the low berm that severed the hydraulic connection between lower Cañada del Puerto and its floodplain, excavate sand and rock fill to restore a portion of the buried wetlands, and then replant the restoration area with native wetland species.

Work will be initiated in the late spring and completed in late summer or early fall when the Project Area is in its driest condition, and immediately before late-fall rains initiate plant germination and growth. Alternative B would restore 3.1 acres of the wetlands; Alternative C would restore 2.1 acres.

- Wetland Restoration-- The approach to restoration design at Prisoners Harbor has three main components: 1) obtain a thorough understanding of site hydrology; 2) determine the depths and characteristics of fill material over buried wetland surfaces; and 3) use "reference" wetlands as models for restoration of disturbed sites.
- Riparian Restoration-- Riparian restoration in Cañada del Puerto would take place in a two-pronged, step-wise approach. Eucalyptus trees would be removed 1) from downstream to upstream and 2) from the hillside toward the stream bank. The area of eucalyptus removal is approximately 20.02 acres or 33.5% of the project area. Woody native vegetation including established oaks, island cherry, and coffee berry would remain. The eucalyptus would be replaced with species typical of Southern Riparian Woodland, including oak, cottonwood, willow, and maple. Sufficient recovery of the channel restoration area would occur between implementation of the stages to minimize ecological impacts.
- Protect Cultural Resources-- The Park proposes to protect high-value archeological resources at Prisoners Harbor from continuing (though lessened) exposure to erosion by stream flows in Cañada del Puerto, during and immediately after berm and fill removal activities. This would be achieved by placement of a small earth, log, and cobble berm or packing earth, log, and cobble against the base of the resource and planting with compatible native plants, thereby deflecting potential flood waters away from the culturally dense area of the resource.
- Improve the Visitor Experience-- The project would improve the island gateway experience for visitors arriving on Santa Cruz Island at Prisoners Harbor by constructing project-compatible facilities such as temporary wayside exhibits (one or two), a wetland viewing bench, or interpretive signs.

Best Management Practices used during excavation of wetland fill would include properly installed silt fencing along the east side of the creek adjacent to the fill disposal area and along the west side of the creek. Silt fencing would also be installed on the north side of the excavation area to protect the remnant wetland. A monitoring plan to evaluate the success of the project would include installing a network of wells in the project area and establishing vegetation plots around each well.

The following table summarizes the alternatives analyzed in this EIS.

	A No Action	B 2/3 Wetland Restoration with Partial Berm Removal	C 1/3 Wetland Restoration with Partial Berm Removal
Remove fill from former wetland	✗	*most*	*some*
Remove cattle corrals	✗	✓	*some*
Re-locate scale house to its pre-1960's location	✗	✓	✗
Remove portion of berm	✗	✓	✓
Structurally protect archeological resources	✗	✓	✓
Remove eucalyptus from riparian corridor	✗	✓	✓
Improve visitor experience	✗	✓	✓
Control invasive plant species	✓	✓	✓

Alternatives Considered But Dismissed

- Remove all fill material in the Prisoners Harbor area
- Retain the berm
- Reconfigure cattle corral to create a narrow band of corrals and increase size of wetland restoration
- Retain three corrals parallel to the access road
- Removal of the entire berm

Summary of Environmental Consequences

For each alternative action, the Park analyzed the potential environmental impacts that would likely occur. Environmental Impacts were divided into the following categories: Hydrologic Function, Wetlands and Floodplains, Water Quality, Wildlife, Vegetation, Archeological Resources, Historic Resources, and Visitor Experience.

Alternative A is the No Action Alternative, Alternative B is 2/3 Wetland Restoration, and Corral Removal (the Preferred Alternative), and Alternative C is 1/3 Wetland Restoration, partial Corral Removal.

Hydrologic Function

- Alternative A: Current management of the Park would not increase flood frequency or elevation and the historic warehouse would continue to be subject to flood waters when flows exceed the 100-year flood event and floodwaters leave the channel and flow along the existing park access road. A large storm event could alter the flow characteristics of the channel such that major erosion could occur at the Native American site. The result would have a major adverse impact. Failure of the berm during a large storm event could result in a substantial increase in flooding and major impacts to the Native American site and Park infrastructure.

- Alternative B: Partial removal of the berm would have a minor adverse impact related to hydrologic processes due to the increase in flood frequency. However, associated depths and velocities are not predicted to be high due to the enlarged area of the left bank floodplain. Partial removal of the berm would slow velocities, but have a negligible impact related to the potential change in stream sediment transport dynamics. Partial berm removal and removal of fill from the former wetland would have a beneficial effect related to increased stormwater and flood storage by connecting the channel to the floodplain and by increasing wetlands by 3.1 acres.

  Stream channel restoration would have a negligible impact on flood elevation in the downstream reaches of Cañada del Puerto Creek resulting from removal of mature eucalyptus trees from the riparian corridor.

- Alternative C: The impacts on hydrologic function and processes would be qualitatively similar to Alternative B for flood elevation and frequency, hydrologic connectivity, sediment transport dynamics, and water quality. However, the reduction in restoration area compared to Alternative B can be expected to produce roughly proportional reductions in wetlands benefits.

Wetlands and Floodplains

- Alternative A: No change in the acreage of wetland or provide connectivity between the creek and its floodplain; therefore there would be no impact.

- Alternative B: Major beneficial impacts from removal of fill, restoration of 3.1 acres of wetland, and removal of the berm, through increased provision of wetlands functions: improved water quality, stream shading, flood attenuation, and groundwater exchange.

- Alternative C: Similar benefits as 2/3 restoration, but likely not to the same extent as provided in Alternative B, given smaller restoration area.

Water Quality

- Alternative A: Negligible impacts on surface water quality.
- Alternative B: Moderate beneficial impacts from the increased connectivity between stream and wetland, through decreases in sediment loads and nutrient concentrations.
- Alternative C: Similar benefits as 2/3 restoration, but likely not to the same extent as provided in Alternative B, given smaller restoration area

Wildlife

- Alternative A: Negligible to minor adverse impacts on the Island scrub-jay, and no impacts on any of the other special status species. No changes to habitat or abundance of other wildlife under this alternative.
- Alternative B: Long-term moderate beneficial effects on wildlife from creation of high quality habitat. Short-term negligible and minor adverse effects would occur from disturbance and destruction of habitat and disturbance and displacement of species during construction activities.
- Alternative C: Impacts would be similar to Alternative B; however, there would be one less acre of wetlands restoration for wildlife habitat, so the reduced buffer from human activities would limit waterfowl breeding and feeding. In addition, the smaller restoration area would likely limit benefits to species richness compared to Alternative B.

Vegetation

- Alternative A: Moderate adverse effects on native plant communities due to continued spread of eucalyptus, loss in areal extent of native plant communities, and continued degraded conditions without wetland or riparian restoration. The Santa Cruz Island silver lotus would not be affected.

- Alternative B: Long-term major beneficial impacts on native plants from wetland and riparian restoration, which would improve the function and ecological value of native vegetation communities. Short-term negligible and minor adverse effects would occur with construction activities and non-native plant control which would disturb or destroy existing vegetation. Management control of non-native vegetation would have a minor beneficial impact on ecosystem values overall.

Riparian and wetland restoration would not provide any new habitat for re-establishment of special status plant species in the Project Area. There would be no impacts on the Santa Cruz Island silver.

- Alternative C: Similar impacts to Alternative B, but smaller restoration area would produce lesser habitat benefit. There would be no impacts on the Santa Cruz Island silver.

Archeological Resources

- Alternative A: No adverse impacts; moderate beneficial impact from continued maintenance and protection
- Alternative B: Short-term negligible to minor adverse impact on archeological resources from removal of eucalyptus and creation and use of fill disposal site. Long-term moderate to major beneficial impact to the resources from reduced risk of erosion from flooding after berm removal and berm construction.
- Alternative C: Similar impacts to Alternative B, with slightly reduced adverse impact from less disturbance.

Historic Resources

- Alternative A: Minor adverse impacts from natural degradation of features; moderate beneficial impact from continued efforts at maintenance and protection
- Alternative B: Moderate long-term adverse impact on NRHP contributing features from removing corrals; possible but unlikely minor adverse impact if the historic rock retaining wall were uncovered intact while removing the man-made berm
- Alternative C: Reduced impact compared to B, but still moderate long-term adverse impact on contributing features from removing most of the corrals.

Visitor Experience

- Alternative A: No adverse impacts; moderate beneficial impact from potential facilities improvements in GMP
- Alternative B: Short-term minor impacts from inconvenience; moderate long-term adverse impact from corral removal. Minor improvements from viewing bench and new signage
- Alternative C: Same as Alternative B, except long-term adverse impact from corral removal is minor.

Response to Comments

In total, 11 letters or email correspondences were provided to the Park during the 60-day comment period for the Draft EIS. From this correspondence, the Park identified 11 substantive comments. Substantive comments are those that are not simple statements for or against the proposal, but rather those comments requiring additional explanation or analysis of data and those that questioned facts or conclusions contained in the Draft EIS. The comments were divided into 9 categories. In the "Response to Comments" section the Park provides responses to all 11 substantive comments received on the project.

Draft EIS Commentator List

Government Agencies	Groups and Organizations	Individuals
U.S. Environmental Protection Agency	The Nature Conservancy	Interested Individual
California Coastal Commission	The Ventura Audubon Society, Inc.	Interested Individual
Channel Islands National Marine Sanctuary (National Oceanographic and Atmospheric Administration)	Santa Barbara Channel Keepers	Interested Individual
		Interested Individual
		Interested Individual

Comment Categories

Category	General Comment Summary
Visitor Experience	Enchanced interpretation at Prisoners Harbor
Historical Resources	Retention of all historic structures
Removal of Non-Native Vegetation	Management of eucalyptus and other non-natives
Legal/Regulatory Compliance	Coastal Zone Management Act
Flood Flows	Risk of new channelized flood flows
Use of Best Management Practices	Control non-native species and protect human health
Grunion impacts	Impact on grunion spawning areas
Eelgrass bed impacts	Impact on eelgrass habitat
Marine impacts	Impacts on National Marine Sanctuary waters

NPS Response to the Two Most Common Concerns

The Park organized the comments into "public concerns." The two most common public concerns, and the Park's response, are described below.

Concern: The Park should provide more opportunities for visitors to experience and understand the natural and historic resources around Prisoners Harbor.

Response: Through the development of a Comprehensive Interpretive Plan the Park will plan for the interpretation of the natural and cultural resources in the Prisoners Harbor area, with the goal of providing a range of interpretation media and opportunities without jeopardizing the resources themselves. Prior to the completion of this plan, the resources will be interpreted through temporary wayside exhibits, site bulletins, and an interpretive guide.

Concern: More historic resources should be retained as part of the overall restoration project—specifically, the historic former cattle corrals.

Response: The existing corrals were constructed in the 1950's over filled wetland as part of the Stanton's conversion from a sheep operation to a cattle operation. They replaced sheep corrals located against the base of the cliff and constructed in the mid-1800s. The sheep corrals were removed in the 1950s. The cattle corrals were abandoned in 1988 and re-paired by NPS in the 1990's. The proposed project will not affect the pier.

The goal of this project is to restore coastal wetland ecosystem function while protecting archaeological and historical resources. The park developed two alternatives methods for restoring coastal wetland ecosystem function. The preferred alternative calls for removing all cattle corrals. The park has consulted with the California State Historic Preservation Office concerning the impact of removing the cattle corrals on the eligibility of the Santa Cruz Island Ranching District to the NRHP and possible mitigation measures. The results of that consultation are included in this EIS (Appendix G).

In addition, to help interpret the historic ranching use of Prisoners Harbor, the park will build a corral structure similar to the historic sheep corrals in photos dated c. 1900 (Figure 3.8). The corrals will be situated along the row of eucalyptus trees at the base of the cliff, extending toward the pier. Design and materials will approximate the appearance of the historic sheep corrals and be determined by NPS cultural resource specialists in consultation with the State Historic Preservation Office during the design phase of the project.

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CHAPTER ONE

PURPOSE AND NEED

1.0 Purpose and Need

In accordance with Section 102(2)(c) of the National Environmental Policy Act (NEPA) (42 US Code 4321 et seq.), the California Environmental Quality Act (CEQA) (California Public Resources Code Section 21000 et seq.), state CEQA guidelines (14 California Code of Regulations 15000 et seq.), National Park Service policy, and US Department of Interior policy, Channel Islands National Park has prepared this Environmental Impact Statement (EIS) to identify and assess potential impacts associated with proposed wetland restoration actions near Prisoners Harbor on Santa Cruz Island, CA.

The project has two sponsoring entities: landowners The Nature Conservancy (TNC) and the National Park Service (NPS). Each cooperator has a unique role in planning and implementing the project. TNC is responsible for contributing to the project planning effort, providing review to ensure project consistency with TNC objectives, facilitating project implementation on TNC lands, and any post-project monitoring and actions needed on TNC lands. All other actions are the responsibility of the NPS, including overall project planning, fulfilling obligations of federal and local law, implementation, and post-project monitoring on NPS lands.

1.1 Project Area Ownership and Role of Lead Agencies

The 59.7-acre Project Area is located at Prisoners Harbor and along Cañada del Puerto on the north side of Santa Cruz Island. Ownership of the Project Area is divided between the NPS and TNC. The 19-acre Prisoners Harbor area is owned by the NPS. The remaining portion of the Project Area in Cañada del Puerto canyon is owned by TNC (Figure 1.1).

Figure 1.1 Prisoners Harbor Coastal Wetland Restoration Project Area.

The Park's enabling legislation recognizes the value and appropriateness of achieving goals through projects anywhere on the island and authorizes the use of federal funds on privately-held portions of the Park in order to protect and restore resources. The NPS and TNC have similar mandates for conservation and protection of natural resources. The mission of Channel Islands National Park is to protect the nationally significant natural, cultural, scientific, and scenic values of the Channel Islands and adjacent marine waters and to provide present and future generations' opportunities to experience and understand Park resources. The Nature Conservancy, a private non-profit conservation organization, is committed to preserving plants, animals, and natural communities and the biological diversity they represent by protecting the lands and waters they need to survive.

1.2 Guidance and Authority for Resource Management

The 1916 NPS Organic Act (16 USC 1 et seq.) directs the NPS to mange lands of the National Park System "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The Redwoods Act of 1978 (16 USC 1a-1) reaffirmed this principle. In general, these two statutes confer upon the Secretary of Interior the discretion to determine how best to protect and preserve Park resources.

Since the establishment of Yellowstone National Park in 1872 and the subsequent formation of the National Park Service in 1916, the philosophy of natural resources management has evolved. Simple concepts such as protection of wildlife from poaching gradually gave way to recognition of the complexities of comprehensive ecosystem management in a regional and global context (National Parks and Conservation Association 1989).

In 1961 the Secretary of the Interior convened a blue-ribbon panel to evaluate how the NPS should manage large mammals and other animals. The resulting report (Leopold et al. 1963) directed the NPS toward ecosystem management, which is the management of all components of an ecosystem as a whole, rather than single species management. The Leopold Commission promoted the concept that national parks should be managed as "vignettes of primitive America" in order to preserve, to the extent possible, the biota that existed or would have evolved had European humans not colonized North America. Although this has been interpreted by some as a call for "hands-off" management of a static primitive condition or scene, the Leopold Commission actually promoted an aggressive stewardship of parklands with "hands-on" management techniques, and perpetuation of dynamic, evolving ecosystems. For example, the reported called for restoration of natural fire regimes in parks.

More recent work has built upon the findings of the Leopold Commission regarding resource management in NPS parks. Parsons et al. (1986) states that the principal aim of National Park Service resource management in natural areas is the unimpeded interaction of native ecosystem processes and structural elements. Parks should protect not only structural elements such as plants, animals, soil, water, and air, but also dynamic ecosystem processes such as natural fire, biotic evolution, and nutrient cycling.

In 1989 the NPS again convened a blue-ribbon panel to assess the role of resource management and research in the future of national parks. The resulting report (National Parks and Conservation Association 1989) validated findings of the Leopold Commission, affirming that the focus of park management should be to maintain or restore native biota and ecosystems and to resist establishment of alien, non-native organisms. Where possible, ecosystem management should attempt to preserve natural processes operating at a scale consistent with the evolution of the ecosystem being managed. The report recommended that the NPS move well beyond static scene management to provide stewardship for the elements and processes contained in parks.

The Park's enabling legislation, PL 96-199 TITLE II Sec. 201, calls for protecting natural, scenic, wildlife, marine, ecological, archaeological, cultural, and scientific values. Furthermore, Public Law 96-199 Sec. 204 directs the Secretary to utilize statutory authority available for the conservation and management of wildlife and natural and cultural resources as he deems appropriate.

National Park Service management policies (NPS 2006) state that parks will protect and restore the integrity of natural systems. Specific guidance is given for wetlands: "The Service will implement a no net loss of wetlands policy. In addition, the Service will strive to achieve a longer term goal of net gain of wetlands across the national park system through restoration of previously degraded or destroyed wetlands….When natural wetland characteristics or functions have been degraded or lost due to previous or on-going human actions, the Service will, to the extent practicable, restore them to predisturbance conditions."

National Park Service management also is directed to protect, preserve, and foster appreciation of cultural resources through appropriate programs of research, planning, and stewardship (NPS Management Policies, 2006). Guidance for cultural resources management in NPS units is found in National Park Service Management Policies and Cultural Resource Management Guidelines (NPS-28). Management of cultural resources in NPS units is subject to the provisions of the National Historic Preservation Act (16 USC 470 et seq.), the National Environmental Policy Act (42 USC 4371 et seq.), the American Indian Religious Freedom Act (42 USC 1996), the Advisory Council on Historic Preservation's regulation regarding "Protection of Historic Properties (36 CFR 800), the Secretary of Interior's "Standards and Guidelines for Archeology and Historic Preservation (FR 48:44716-40) and "Federal Agency Responsibilities under Section 110 of the National Historic Preservation Act" (FR 53:4727-46). The Prisoners Harbor Coastal Wetland Restoration Plan proposes actions that cause irreversible consequences to contributing elements to the cultural landscape. Section 106 of the Act mandates that federal agencies take into account the effects of their actions on properties listed or eligible for listing in the National Register, and give the Advisory Council on Historic

Preservation a reasonable opportunity to comment. The NPS consulted with the State Historic Preservation Office and the Mission Band of Santa Ynez Indians (Chumash) on project alternatives and mitigation and avoidance measures.

The restoration of the coastal wetland at Prisoners Harbor is consistent with the NPS Management Policies (2006) and the current General Management Plan (GMP) (1985) for Channel Islands National Park. The Park GMP, written prior to the NPS acquisition of the project area, calls broadly for "management strategies for the preservation and restoration of natural ecosystems" and states that the Park should be "managed for the restoration and preservation of natural biotic associations" and to manage cultural resources "in accordance with procedures established by the National Park Service for treatment of archeological, historic, and other cultural properties." The Park Statement for Management (1991) calls for "recontouring of disturbed landscapes … to return park ecosystems to a semblance of natural conditions." The Statement for Management further states that islands "are managed for their cultural value." A new GMP is in the early stages of preparation.

The EIS is tiered to the GMP, which calls for "an interdisciplinary approach to management actions because of the abundance of sensitive resources." In describing management zones for the Park, the Statement for Management recognizes the need for "overlapping development zones" and states that the islands are subject to "dual zoning." The purpose of this plan and environmental impact statement is to apply laws and policy to determine a course of action for the Prisoner's Harbor area and evaluate the effects of the action while maintaining a balanced approach to management of multiple resources.

The federal Endangered Species Act (ESA) requires that actions authorized, funded, or carried out by federal agencies not jeopardize the continued existence of listed species. Under section 7(a)(2) of the ESA (16 USC section 1536), federal agencies are required to consult with the U.S. Fish and Wildlife Service (FWS) on actions which may affect listed species or critical habitat. Because this Prisoners Harbor Wetland Restoration Plan proposes actions that could affect the federally listed species on Santa Cruz Island, NPS will consult with FWS on likely effect to those species.

1.3 Purpose and Need

1.3.1 Project Purpose

During the past two centuries California has lost over 90% of its coastal wetlands (NOAA 1990) due to agriculture and urbanization; in addition, California has lost more wetlands than any other Pacific-coast state (Dahl 1990). The Southern California coast has experienced the greatest intensity of this wetlands loss: high-density urban locations have encroached on all of the large coastal wetland areas causing associated losses in biodiversity. Many of the wetlands on the Southern California coast that have been lost were shallow-water habitats, such as brackish-water and salt marshes and intertidal flats (Macdonald 1990).

In response to this loss of highly productive habitat, the California Fish and Game Commission recommends that the state increase the area of wetlands in the state by 50% through ecological restoration. Save the Wetlands, a non-profit state-sponsored organization is leading a collaboration of more than 90 governmental agencies and non-profit organizations to begin planning statewide, science-based wetland restoration projects (Zedler 1996).

Although much of the Channel Islands - including most of Santa Cruz Island - have escaped the widespread development typical of Southern California, the Prisoners Harbor area was ecologically altered in order to support sheep and cattle ranching operations in the late-19th to mid-20th centuries. Before ranchers developed lower Cañada del Puerto for agricultural activities, the site supported about twelve acres of marsh and creek wetland habitat (Noon 2003). Today the site supports about two acres of wetland habitat, more than a 50% reduction in wetland habitat, and 0.3 miles of stream corridor has been altered by channelization of the creek.

During the ranching era, four species of eucalyptus trees were planted on Santa Cruz Island. Blue gum eucalyptus (*globulous*) was planted in the Cañada del Puerto watershed. Blue gum and red river gum (*Eucalyptus camaludensis*) have colonized much of the rest of the Cañada del Puerto floodplain, creating virtual monocultures of eucalyptus trees in areas that would have been characterized as Southern Riparian Woodland (Junak, et al. 1995).

The purpose of this project is to:

- To restore ecosystem function to the former coastal backbarrier wetland at Prisoners Harbor and initiate ecosystem recovery to its associated stream corridor in the lower Cañada del Puerto to the maximum extent possible while protecting significant cultural resources, the pier, and the access road at Prisoners Harbor.

Project objectives include:

a) Reconnect Cañada del Puerto with its floodplain within the project site, and restore a more natural topography and hydrology to the former wetland, in order to improve wetland functions, particularly native species habitat.

b) Protect the significant archeological resources from erosion and degradation.

c) Provide an enhanced visitor experience for people arriving on Santa Cruz Island at Prisoners Harbor, by providing opportunities to learn about the ecology and human history of the island and the site.

d) Protect the historic warehouse, scale house, and well from degradation, including flooding.

e) Maintain access to the interior of Santa Cruz Island for Park partners.

1.3.2 Need for Action

Action is needed because prior modifications to the site, including filling the wetland, channelizing the stream, and introducing invasive species, degraded the ecosystem function of the coastal wetland and riparian corridor.

1.3.2.1 Restore wetland and riparian ecosystem function

Prior to the early 1800s the Project Area supported about 12 acres of coastal marsh and riparian forest, and also likely supported a mixed live oak savannah on the floodplain terraces immediately upstream of Prisoners Harbor in lower Cañada del Puerto. Prisoners Harbor was the largest wetland complex on Santa Cruz Island, as it sits at the mouth of the island's largest watershed. When agriculturalists filled the wetlands in the 19th and 20th centuries, in order to support sheep and cattle operations at the harbor, important wetland functions and ecosystem services were lost. These functions include wildlife habitat and forage, nutrient retention, and floodwater storage. In addition, establishment of non-native and invasive eucalyptus trees displaced native plant communities that also provided ecosystem services. These services included wildlife habitat and forage and a relatively open vegetation structure on the floodplain to allow for floodwater dispersal. This project seeks to return much of this ecological function to the site through active restoration.

Wetland restoration at Prisoners Harbor has a high potential to return sustainable ecological function to the site, even in the face of climate change. Unlike most other potential coastal wetland restoration projects in the region, the proposed project at Prisoners Harbor provides an opportunity to restore wetlands which are fully connected to the entire watershed. Restored wetlands at this site would have superior ability to migrate up-watershed in the face of sea level rise and potential change in off-shore currents.

1.3.2.2 Recreate habitat for special status species, passerine birds and migratory waterfowl

Santa Cruz Island is sited on one of the great migratory corridors of the continent - the Pacific Flyway. During the spring and fall months, the remaining wetland at Prisoners Harbor hosts waterfowl such as brant, pintails, and mallard, and shorebirds such as stilts, plovers, and gulls, which stop here to rest, feed, and in some cases over-winter.

The Channel Islands represent some of the best remaining undeveloped habitat in Southern California; Prisoners Harbor, at the mouth of Santa Cruz Island's largest watershed, has the greatest potential to improve wetland habitat for Pacific Flyway birds utilizing the Channel Islands.

In addition, although many vertebrates are secretive the Project Area is likely frequented by special status and island-endemic species which are dependent on habitat diversity. These include Santa Cruz Island fox (*Urocyon littoralis santacruzae;* federally endangered, Santa Cruz Island endemic), bald eagle (*Haliaeetus leucocephalus;* former federal listed species), island spotted skunk (*Spilogale gracilis amphiala*; Channel Islands endemic), and Santa Cruz Island deer mouse (*Peromyscus maniculatus santacruzae*; Santa Cruz Island endemic). Restoration of floodplain and wetland habitat in lower Cañada del Puerto and at Prisoners

Harbor will provide high quality and high diversity habitat.

Finally, wetland and floodplain restoration within the Project Area will benefit breeding passerine birds. Fifty-one species of landbird are known to breed on Santa Cruz Island (Diamond and Jones 1980). Eight of island-breeding birds are subspecies endemic to two one more of the Northern Channel Islands, while one bird - the Island scrub-jay (*Aphelocoma insularis*) - is endemic to Santa Cruz Island. Many of these birds utilize native riparian forest and wetland marsh disproportionately to upland habitat - because of the superior cover, habitat complexity, and food availability wetlands and floodplains provide, particularly in dry summer months. Island scrub-jays are frequently observed in the remaining native wetland and riparian habitat within the Project Area. Expansion of native willow and emergent marsh vegetation and native oak savannah will improve both breeding habitat and forage for jays and birds with similar habitat requirements.

1.3.2.3 Protect significant cultural resources

- Prisoners Harbor was the location of an important island Chumash village. This site is located at Prisoners Harbor along both sides of the stream channel. It has special significance to the Native American community and has yielded significant scientific data pertaining to the Late Prehistoric and Early Historic era. A stream channel was cut through the archeological site as an alternate outlet for water flowing in Cañada del Puerto creek. A stone retaining wall was constructed in the lower Cañada del Puerto creek during the Caire era It was damaged by floods and subsequently bulldozed creating an earthen berm separating the creek from filled wetland, its floodplain. Significant portions of the archeological site remain, however, and recent hydrologic studies suggest that the re-creation of the wetlands and the removal of the berm will slow the dynamic water action that currently affects the site, improving the site's long-term survivability.

1.3.2.4 Provide an enhanced visitor experience

Park staff and Park partners disembark at Prisoners Harbor and travel through lower Cañada del Puerto to the Island's Central Valley. In addition, visitors disembark at Prisoners Harbor to begin day hikes, to begin overnight trips to the backpacking campsite at Del Norte, or to spend the afternoon visiting the Project Area. However, these visitors observe a diminished natural landscape compared to its pre-19th century condition. Through this project the NPS seeks to improve the experience of visitors arriving at Santa Cruz Island at Prisoners Harbor by restoring much of the natural landscape while retaining 19th century historic structures. The NPS also seeks to improve education orientation facilities - to promote understanding and enjoyment of the site's natural and cultural resources.

1.4 Public Involvement and Scoping

1.4.1 Notice of Intent (NOI) and Notice of Preparation (NOP)

The NPS formally initiated public scoping for this project on June 11, 2008, with the publication of the NOI in the Federal Register (Volume 73, Number 113, pages 33109-33111). The NOI is included in this document in Appendix A.

1.4.2 Project Scoping

The NPS conducted scoping for this project through two public meetings at the Park Headquarters in Ventura on July 1, 2008 and at the Santa Barbara Public Library in Santa Barbara on July 2, 2008 and interagency consultation, and publication of the project NOI. Scoping for this project is described in more detail in Chapter 5: Consultation and Coordination. A scoping summary including a pre-scoping site visit for the project is provided in Appendix B.

1.4.3 Public Review of the Draft EIS

The draft EIS was published for circulation to local, state, and federal agencies, and to interested organizations and individuals to review and comment on the project and the environmental impacts analysis. There was a 60 day public review period.

1.5 Scope of the Proposed Action

This document describes and analyzes the effects of actions to mitigate damage to wetland and floodplain resources in the Project Area. The scope of the project is to remove targeted non-native plants and to also remove materials that alter natural hydrologic processes within the Project Area. The project also proposes revegetation with native plants and post-project monitoring of ecological parameters at the site.

The National Park Service manages natural resources within an adaptive management framework; that is, if management actions do not result in desired conditions additional action may be planned, evaluated, and implemented. Long-term monitoring informs managers as to the need for additional management to achieve desired conditions. Actions that are needed to achieve desired conditions on NPS lands that are not described in this document and which do not represent on-going site maintenance will be described and analyzed through a future environmental compliance process.

1.6 Environmental Issues

1.6.1 Significant Environmental Issues

Impact topics included in this EIS are described below: they were selected on the basis of internal, public, and agency scoping and baseline studies and are the areas where the Park Service staff believe negligible to major impacts might occur from implementing the proposed alternatives. Further information about these impact topics is provided in Chapter 2 – Feasibility and Chapter 3 – Affected Environment. Potential impacts resulting from implementation of any of the proposed alternatives is the subject of Chapter 4 – Environmental Consequences.

For clarification, a summary statement that defines the scope of the issue for this project will accompany the identified issues.

1.6.1.1 Project Alternatives and likelihood of success

Each alternative is analyzed for how well the proposed action would meet the project purpose, need, and objectives. Alternatives will be analyzed for the likelihood that actions will result in conditions that will enhance wetland and riparian ecosystem function; the relative ecosystem services provided, including native habitat quality, size, and diversity; the relative protection afforded to archeological resources within the Project Area; and the likelihood that alternatives will improve visitor experience at the site.

1.6.1.2 Hydrologic Function

The project seeks to restore natural hydrologic function to the Project Area potentially through removing non-native species which alter hydrology, removing berms that channelize and direct flows in lower Cañada del Puerto, and removing fill from former wetland habitat. Alternatives will be evaluated for their potential performance in reconnecting the stream channel and its floodplain during high-water events, and reduction in number of perturbations to a natural flow regime.

1.6.1.3 Wetlands

A primary purpose of the project is to rehabilitate disturbed lands and restore degraded wetlands at Prisoners Harbor. NPS wetland scientists estimate that the Project Area once supported about 12 acres of coastal wetlands impounded by a cobble bar; today the Project Area supports 6 acres of wetlands - a 50% decline. Alternatives in this document are evaluated for the potential to increase the number of wetland acres at the site; the potential to increase wetland diversity; and the potential to improve wetland ecosystem services, such as wildlife habitat.

1.6.1.4 Water Quality

Wetlands and floodplains play a key role in protecting and improving water quality as wetland plants and soils have the capacity to store and filter pollutants. At the present time the vast majority of the watershed is in a near natural state. Consequently, we would expect the prevailing surface water chemistry be the result of interaction between precipitation, soils, biota and bedrock. Under natural conditions, the combination of variable bedrock geology, steep slopes, degraded soil structure due to historic over-grazing, and intense precipitation events, may result in the generation of large quantities of sediment within the watershed. These sediment events are highly episodic and are influenced by a combination of meteorologic, geologic, biologic, and fluvial factors, and therefore, are not definitively predictable. Project alternatives will be evaluated for the potential to affect sediment concentration in the creek during construction and the short term/long term following project implementation.

1.6.1.5 Island Vegetation

Protection and promotion of native vegetation communities is a foundation of maintaining functioning natural ecosystems. Within the Project Area native vegetation communities have been degraded through alteration of hydrologic processes and establishment of non-native invasive plant species. Project alternatives will be evaluated for the potential to increase the number of acres within the Project Area dominated by native species; the potential to reduce the extent of Eucalyptus and other non-native invasive plant species; the potential to improve habitat conditions for federal and state listed plant species; and the potential to improve habitat conditions for other focal plant taxa, such as live oak.

1.6.1.6 Island Fauna

Providing improved habitat conditions for island fauna - including special status, island endemic, and migratory species - is a primary goal of the project. Alternatives are evaluated for the potential to improve habitat quality for special status and endemic vertebrates, the potential to improve the quality of breeding habitat for birds, and the potential to improve habitat diversity in lower Cañada del Puerto.

1.6.1.7 Archeological Resources

The Project Area is included within the National Register-listed Santa Cruz Island Archeological District. The archeological site, believed to be the historic Chumash village of Xaxas, is located within the Project Area. The Chumash village site, which is located along both sides of the stream channel, has special significance to the Native American community and has yielded significant scientific data pertaining to the Late Prehistoric and Early Historic era (Arnold 2001). The site was bisected in the late 1800s and was damaged again in the early 1900s when the stream was channelized, and has also been affected by subsequent erosion. Significant portions of the site remain, however, and recent hydrologic studies suggest that the re-creation of the wetlands and the removal of the berm will slow the dynamic water action that currently affects the site, improving the site's long term survivability.

1.6.1.8 Historic Resources

The Project Area is included within the National Register-eligible Santa Cruz Island Ranching District. The Prisoners Harbor Ranch and its contributing resources are described in the Cultural Landscape Inventory for the Santa Cruz Island Ranching District (National Park Service 2004).

Small-scale features which are contributing elements to the landscape include cattle corrals and a scale house. The cattle corrals, built in the 1940s and 50s when the ranching operation was converted from a sheep operation to a cattle operation, are located in the area that existed as wetlands until the early 20th century. The scale-house is currently located within the cattle corrals. Prior to construction of the cattle corrals it was located adjacent to the warehouse.

Non-native tree plantings at Prisoners Harbor, including Italian stone pine, Dutch elm, and eucalyptus, are contributing resources within the Santa Cruz Island Ranching District. While many of the historic tree plantings can be identified through historic photographs, such as the row of eucalyptus to the west of the warehouse building, many others no longer exist. Most of the eucalyptus trees that are growing along the stream channel have spread extensively from the early plantings.

Historic photos and an 1892 map of Prisoners Harbor show a rock retaining wall several hundred feet in length that was built along the west side of the stream, presumably to prevent flooding of the ranch area. This wall was either destroyed by later stream modifications or is currently buried beneath the existing berm.

Other historic resources located within the Prisoners Harbor area include an 1887 stone and brick warehouse, a stone-lined well from the same era and a small wooden look-out building on the bluff overlooking the harbor. These resources, which contribute to the National Register-eligible historic ranching district, will not be affected by the undertaking.

1.6.1.9 Visitor Experience

Prisoners Harbor is the point of embarkation for visitors arriving at Santa Cruz Island to either travel to the central valley or the isthmus or to visit NPS resources at the harbor. Alternatives are evaluated for the potential to provide secure access to inland destinations, and for the potential to improve visitor understanding and enjoyment of Park resources.

1.6.2 Dismissed Issues

The following impact areas or topics would not either be affected or would be affected negligibly by all proposed project alternatives. Negligible effects are those that are localized and/or immeasurable. Therefore these topics have been removed from further discussion in the EIS.

1.6.2.1 Conflict between land use plans, policies, or controls

The restoration of the coastal wetland at Prisoners Harbor is not specifically addressed in the current General Management Plan (GMP) for the Park. The Park GMP, written prior to the NPS acquisition of Prisoners Harbor, calls broadly for "management strategies for the preservation and restoration of natural ecosystems" and states that the Park should be "managed for the restoration and preservation of natural biotic associations." Additionally, the GMP calls for "the preservation, restoration, protection, interpretation, use, study, and management of significant cultural resources…in compliance with the requirements of the National Historic Preservation Act of 1966 as amended…" The Park Resource Management Plan and Statement for Management (1991) also call for the restoration of natural ecosystems and protection of cultural resources. The proposed action does not conflict with NPS plans, orders, and guidance documents.

1.6.2.2 Energy requirements and conservation potential

The Project Area has no electric or gas utilities or facilities. The Park's administration of the Channel Islands emphasizes energy conservation. For instance all Park housing on the island is totally self-sufficient for electricity through the use of solar energy and diesel. The Navy maintains a well in the Project Area which also is powered by solar energy. This project will have no impact on the amount of energy required to protect and administer Channel Islands National Park. This project provides no potential for improving the Park's energy efficiency for operations, as there are no utilities within the Project Area.

1.6.2.3 Natural or depletable resource requirements and conservation potential

This project would require consumption of depletable petroleum resources, specifically, gasoline and diesel fuel used to transport and operate equipment to accomplish the restoration and mitigation. In contrast to the petroleum resource consumption in the greater Southern California region, use of non-renewable energy resources for this project would be negligible. The NPS would employ a set of Best Management Practices for energy conservation - such as minimizing equipment idling and minimizing truck runs - for this project to minimize consumption of non-renewable resources and allow for maximum conservation.

1.6.2.4 Urban quality and design of the built environment

Santa Cruz Island does not have an urban center or infrastructure associated with urban areas. This project does not include the addition of buildings or infrastructure and therefore would not impact urban quality or the design of the built environment. Historic features and archeological resources including impacts to contributing elements to the eligibility of the Santa Cruz Island Ranching District to the National Register of Historic Places are analyzed in Chapter 4 – Environmental Consequences.

1.6.2.5 Socially or economically disadvantaged populations

The proposed project would not change the local population’s work, recreation, or social interactions. As such Executive Order 12898 (environmental justice) does not apply to this analysis.

1.6.2.6 Prime and unique agricultural lands

Since the early 1800s Santa Cruz Island has been used for rangeland for domestic livestock. Current ownership emphasizes land conservation and protection over agricultural use. Since no current agricultural practices are occurring on the island no impacts would occur to agricultural lands. The National Park Service interprets historical land use practices to the visiting public. The alternatives would not interfere with this ongoing interpretive program.

1.6.2.7 Sacred Sites

The Park archeologist, in consultation with Chumash Tribal representatives, has not identified any sacred sites on Santa Cruz Island as defined by EO 13007.

1.6.2.8 Indian Trust Resources

It is the policy of the DOI to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Indian tribes and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions affect tribal trust resources, trust assets, or tribal health and safety. There are no Indian Trust resources on Santa Cruz Island.

1.6.2.9 Air Quality

Santa Cruz Island is located in Santa Barbara County. Santa Barbara County is in attainment of the federal eight-hour standard for ozone, but does not meet the one-hour standard. However, the Channel Islands – which experience different air quality from the mainland due to a relative lack of sources of pollutants – are designated as in-attainment for ozone.

1.6.2.10 Socioeconomic Impacts

The project would not impact the work, recreation, or social interactions of island personnel or staff.

1.6.2.11 Traffic and Transportation

On-island transportation is by 4-wheel drive vehicles or All Terrain Vehicles on unpaved roads. This project does not call for the construction of additional roads or infrastructure and implementation would not impact current road use. Island transportation is accomplished mainly by boats owned and operated by the Park..

1.6.2.12 Noise

During implementation there is the potential for localized, short-term elevated noise levels from the use of heavy equipment. There would be no long-term impacts to noise levels on Santa Cruz Island.

1.6.2.13 Visual resources

Santa Cruz Island is known for ocean views, natural landscape vistas, and its cultural landscape values. Alternatives actions would not impact Santa Cruz Island's ocean views and landscape vistas. Cultural landscape values are discussed in Chapter 3 Affected Environment, section 3.4; and Chapter 4 Environmental Consequences, sections 4.2.3.2, 4.3.3.2, and 4.4.3.2.

1.6.2.14 Visitor Safety

Alternative actions would require the use of heavy equipment at Prisoners Harbor and in Cañada del Puerto along the access road to the Central Valley of Santa Cruz Island. The Project Area would be clearly marked and public access may be restricted in the Project Area during the implementation phase.

Fennel (*Foeniculum vulgare*) and Kikuyu grass (*Pennisetum clandestinum*) are invasive plants that have been identified as high priority species for control on Santa Cruz Island. They would be controlled in the Project Area using Garlon 4 on fennel and glyphosate on Kikuyu grass. Glyphosate is a non-selective systemic herbicide that serves as a growth regulator. When released into the environment glyphosate is strongly adsorbed to soil, with little potential for leaching to groundwater. Microbes in the soil readily and completely degrade it even under low temperatures. It tends to adhere to sediments when released in water. Glyphosate does not accumulate in aquatic organisms.

Herbicide would be applied by a certified pesticide applicator following manufacturer's recommendations, specified Best Management Practices, and NPS approvals. Any herbicides which may be considered are all equally subject to strict advance approvals through the servicewide Integrated Pest Management program, which only allows for use of least-toxic chemicals and substances including surfactants which are appropriate for use in or near watersheds and marine waters.

1.6.2.15 Museum Collections

The Project Area includes an archeological site and small scale features of the historic ranching district. Action alternatives propose to document the existing historic cattle corrals at Prisoners Harbor. This information would be included in the NPS archive on the mainland and would not impact museum collections.

1.6.2.16 Waste Management

All waste generated on Park islands is transported off island and disposed of in a designated mainland waste disposal site. There would be no impacts to waste management.

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

CHAPTER TWO

ALTERNATIVES

2.0 Alternatives

This chapter describes the No Action alternative and two action alternatives to be considered for implementation. Alternatives considered but rejected are discussed, and the preferred and environmentally preferred alternatives are identified.

2.1 Development of Alternatives

The development of the range of alternatives included internal scoping by the Interdisciplinary Team of Park Service personnel, feasibility studies by subject matter experts, an evaluation of existing information on Natural and Cultural resources, a screening criteria process, and a diligent effort by the NPS to seek public input on environmental issues and a range of reasonable alternative methods for implementing the project.

2.1.1 Internal Scoping and Public Involvement

2.1.1.1 Internal Scoping

Internal scoping took place between 2003 and 2008. An Interdisciplinary Team was identified and consulted on each member's area of expertise. In 2003 subject matter experts made a site visit and assessed the feasibility of wetlands restoration at Prisoners Harbor. In 2004 18 test wells were installed to evaluate the daily, seasonal, and annual fluctuation in groundwater elevations. From November 2005 to March 2007, Park staff measured water levels in the wells approximately bi-weekly. Less frequent monitoring has continued from April 2007 to present. At the time the test wells were installed a description of the soil column was recorded. From these descriptions, it was possible to determine the extent of fill material in the Project Area. The behavior of the creek at different flood levels was evaluated based on a hydrologic analysis of the area.

The natural resources in the Project Area were evaluated using the following information: The Nature Conservancy's Vegetation Map (2007) and Weed Map (Santa Cruz Island Non-Natives 2009), and the Natural Resources Conservation Service Soil Map of Santa Cruz Island (Aerial Information Systems, Inc. 2007). A eucalyptus and oak survey, vascular plant survey, bird survey (ongoing), and Cowardin wetland delineation were conducted. Subject matter experts on amphibians, reptiles, and mammals were consulted.

Cultural Resources were evaluated by a review of the NPS Cultural Landscape Inventory and Historic Resources Study, pertinent archeological surveys and literature, and the assessment of historic photos housed at the Santa Barbara Public Library and the Santa Cruz Island Foundation.

2.1.1.2 Public Involvement

A preliminary public input meeting was conducted at Prisoners Harbor on Santa Cruz Island on April 5, 2007 with individuals and organizations known to have a stake in the management of the project area. A Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) and formally initiate public scoping was published in the Federal Register on June 11, 2008, followed by a press release announcing public scoping distributed to 75 media outlets. A public scoping letter updating the proposed project was mailed to 240 individuals, agencies, and organizations. Two Open Houses were held; one on July 1, 2008 at the Channel Islands National Park Visitors Center and one on July 2, 2008 at the Santa Barbara Public Library Information, photographs, maps, announcements, results of public scoping, and other information were posted on the Channel Islands National Park website and the NPS planning website. Input from the public was used to refine the purpose, objectives, and alternatives. This is discussed in more detail in Chapter 5.

2.1.2 Alternatives Screening Criteria

The following screening criteria were used to develop alternatives and alternatives considered but rejected:

- Achievement of Project Goals and Objectives
- Hydrologic connection of the creek to the floodplain
- Groundwater levels and wetland restoration feasibility
- Area of wetland to be restored and the associated wetland ecosystem values
- Protection of archeological features
- Balanced use of mixed resources in the project area
- Visitor experiences
- Protection and maintenance of the pier and road access

2.2 Alternatives Considered in Detail

The following sections discuss the No Action alternative and two potential action alternatives for achieving the goals and objectives for the Project.

2.2.1 No Action Alternative—Alternative A

Under Alternative A, the NEPA-required No Action Alternative, the Park would continue its current management practices within the Project Area at Prisoners Harbor on Santa Cruz Island. These activities fall into seven categories: maintenance of cattle corrals, maintenance of the berm and stream channel clearing, control of invasive plant species, maintenance of historic and non-historic trees, maintenance of fencing for archeological resource protection, maintenance of road access to the Central Valley and Navy Site, and maintenance of visitor facilities.

The Park maintains the appearance of the existing cattle corrals through periodic mowing of the plants inside the corrals, painting, gate repair, and replacement of deteriorated boards and hardware. Park staff mows inside the corrals two to four times per year, and paints the corrals approximately one in every five years. These activities would continue under the No Action Alternative.

Historically, the lower end of the creek has become clogged with sediment. Long-term (approximately every 40 years) the stream channel collects enough sand, gravel, and cobble to impair stream flow and interfere with vehicle access across the stream. The last maintenance dredging was in the early 1970's and there may be a need to re-dredge the channel and side cast the material to maintain the existing berm.

The Park currently conducts periodic weeding of the Project Area, predominantly to control the spread of invasive kikuyu grass (*Pennisetum clandestinum*). The Nature Conservancy will continue an on-going effort to control fennel (*Foeniculum vulgare*) along the road to the Central Valley. To control kikuyu grass Park staff would spray kikuyu grass with Roundup®, a target-specific herbicide and allow to dry and to decompose in place. The Nature Conservancy uses Garlon 4 to treat fennel along the road.

In addition, the Park and TNC control the stands of non-historic eucalyptus trees on the west and southeast boundaries of the wetlands Project Area (Figure 1.1). Park staff and contractors periodically trim the eucalyptus (*Eucalyptus globulus*) trees with chain saws to remove tree limbs and bark that pose safety and fire hazards. In addition, Park staff and contractors periodically remove young eucalyptus recruits with chain saws, to prevent them from spreading into new habitat. Park staff chip the eucalyptus slash on-site, and uses it for local road stabilization needs.

The Park maintains the appearance and condition of the historic trees at the Project Area, which include an Italian stone pine (*Pinus pinea*) located near the Prisoners Harbor pier, a row of Eucalyptus (*Eucalyptus gobulus*) extending from the warehouse at the base of the cliff on the west side of the project area, a blackwood acacia (*Acacia melanoxylon*) and a tree misidentified as English walnut (*Juglans regia*) 60 feet down the road and east of the warehouse and Dutch elm. The Park or contractors prune these trees periodically, to maintain their health and historic appearance.

The Park maintains the fence which protects archeological resources at the site, through periodic inspection and repair of the posts, wire and hardware.

The Park maintains the vehicle road through the Project Area, so that park staff and its partners have access to lands in the Central Valley and Navy Site. Park staff periodically grades the vehicle road, and lays down eucalyptus chips, as necessary, to control rutting. The Park also generally maintains the low water crossing across Cañada del Puerto, so that vehicles can access the road to the

Navy Site (Figure 1.1); however, the low water crossing is not accessible year-round due to periodic flooding.

The Park maintains a picnic area and a two-stall comfort station in the Project Area (Figure 1.1). The Park periodically places eucalyptus chips on the ground in an area just west and north of the warehouse, in order to provide ground-cover for staging and picnicking, and maintains several picnic tables for visitor use. No potable water is available at the Project Area.

The Nature Conservancy maintains the access road to the Central Valley on their property by grading when needed. The Nature Conservancy and their contractors periodically treat roads sides for invasive weeds.

A summary of the actions proposed under each alternative is presented in Table 2.1 below:

Table 2.1 Matrix of Principal Actions Proposed under each Alternative

	A No Action	**B** 2/3 Wetland Restoration with Partial Berm Removal	C 1/3 Wetland Restoration with Partial Berm Removal
Remove fill from former wetland	✗	*most*	*some*
Remove cattle corrals	✗	✓	*some*
Re-locate scale house to its pre-1960's location	✗	✓	✗
Remove portion of berm	✗	✓	✓
Structurally protect archeological resources	✗	✓	✓
Remove eucalyptus from riparian corridor	✗	✓	✓
Improve visitor experience	✗	✓	✓
Control invasive plant species	✓	✓	✓

2.2.2 Alternative B - 2/3 Wetland Restoration with Partial Berm Removal

Under Alternative B – 2/3 Wetland Restoration with Partial Berm Removal, the park would remove all of the cattle corrals and restore 3.1 acres of palustrine wetlands and deepwater habitat, relocate the scale house to its pre-1960's location, remove eucalyptus, control invasive species, construct a protective barrier around a portion of the archeological site, and improve the visitor experience. In addition, a portion of the berm would be removed, thereby reconnecting the creek to its floodplain (Figure 2.1).

2.2.2.1 Transportation and Transport of Supplies and Equipment

The Park would transport equipment, vehicles, and other large materials and supplies via marine landing craft to the islands. Each island has a designated area for off-loading and loading the landing craft. The designated loading/unloading area for this Project is located to the west of the pier. From this location heavy equipment, vehicles, fuel totes, and other large material and supplies required for the project would be transported to an area previously used for staging heavy equipment located on the west side of the creek on TNC property. Park staff, contracted personnel, personal gear, and some supplies would be transported to the island by the regularly scheduled park boat or the Park concessionaire, Island Packers.

2.2.2.2 Preparing the Wetlands Restoration Area

The Park would start by aggressively targeting, removing, and disposing of known non-native invasive plants on the restoration area – such as kikuyu grass, fennel, and eucalyptus – using appropriate techniques. These removal and disposal techniques may include hand pulling, hand- or machine-excavation, chain sawing, burning, chipping, and/or application of herbicide. Project staff would also appropriately remove other non-native plant species as they are identified.

Kikuyu grass (approximately 2 acres) and fennel (approximately 3.154 acres or 5.3% of the Project Area) would be treated using glyphosate and 2% concentration of Garlon 4, respectively, in a foliar application using a backpack sprayer by a certified pesticide applicator following manufacturer's recommendations, specified Best Management Practices, and NPS approvals. Any herbicides which may be considered are all equally subject to strict advance approvals through the servicewide Integrated Pest Management program, which only allows for use of least-toxic chemicals and substances including surfactants which are appropriate for use in or near watersheds and marine waters. Each project requires a new request for pesticide use through the NPS Integrated Pest Management Program to ensure use of appropriate herbicide for each project. While herbicides are used on park property, signs would be posted informing the public of the product being used, the location, the date and time of application, the purpose of the application, and park contact information. Project area preparation also will include the removal of 122 eucalyptus trees in the designated fill disposal site. The two fill disposal areas will be located on the east side of the creek upstream and downstream from the creek crossing. Personnel will use chainsaws, chippers, tractor, and a stump grinder to cut trees and grind stumps to 12" below grade. This will eliminate the need to use herbicide in tree removal. Tree material less than 12" in diameter will be chipped and used on roadbeds. Logs greater than 12" will be used to create a protective barrier around a portion of the archeological site and historic well. An archeologist will be on-site to monitor ground-disturbing activities during eucalyptus removal.

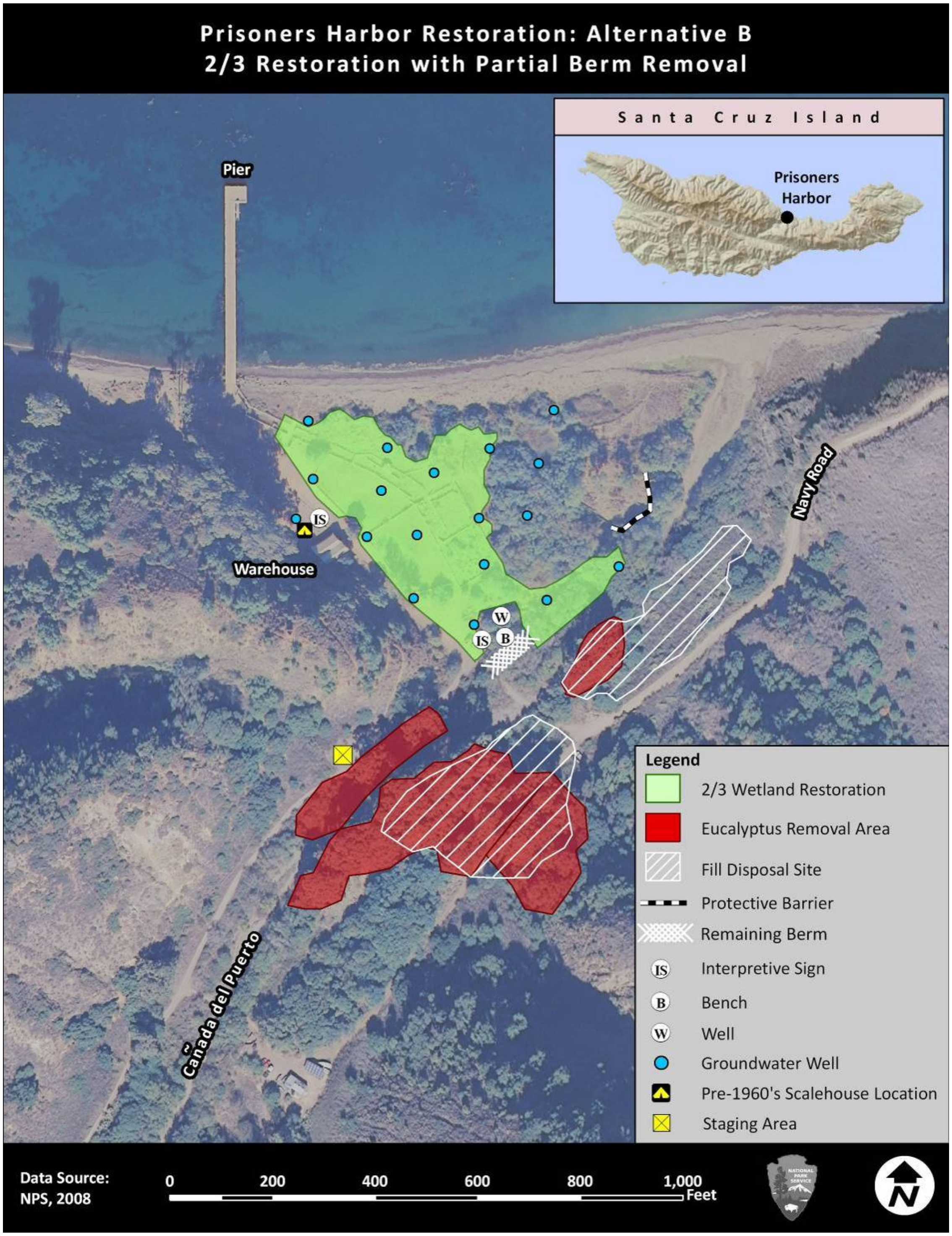

Figure 2.1 Alternative B – 2/3 Wetland Restoration with partial berm removal. Figure shows wetland restoration area only.

Excavation and eucalyptus tree removal in the fill disposal site would require about 4 – 6 weeks. Temporary fencing would be installed parallel to the access road in the Prisoners Harbor area. The fencing would direct visitors along the south side of the access road in the Prisoners Harbor area and away from the excavation site and fill disposal site. There would be access to the bathrooms, Prisoners-Pelican trail, and the Central Valley. Access to the Navy site and Del Norte would be re-routed through the Central Valley during the construction phase. Campers hiking to Del Norte would be allowed to walk across the creek at the low water crossing with permission from the on-site supervisor. Vehicle use of the access road in the Prisoners Harbor area would be limited to boat arrival and departure times to allow for loading and unloading gear, supplies, and equipment at the pier.

2.2.2.3 Corral Removal

Before commencement of earthmoving activities, the corrals would be mapped and photographed and the construction methods and materials for the corrals would be documented. This information would be archived at Park Headquarters. Next project staff would re-locate the scale house from its present-day location to its pre-1960's location immediately west of the warehouse. Under the supervision of park cultural resource specialists and after consultation with the State Historic Preservation Office, the scale house would be partially dismantled, lifted off its current foundation, stabilized on its new foundation in its pre-1960's location, and reassembled. The corrals would be dismantled along with other posts, troughs, and old concrete foundations. Some materials could be stockpiled on island for use in future projects or repairs. The remaining materials would be transported via landing craft to the mainland and disposed of in a designated area.

2.2.2.4 Partial Berm and Fill Removal

In order to fulfill the goal of reconnecting the creek with its flood plain and restoring ecological functioning of the wetland, the project would remove approximately 250 feet of the low berm that severed the hydraulic connection between lower Cañada del Puerto and its floodplain, excavate sand and rock fill to restore 2/3 of the buried wetlands, and then replant the restoration area with native wetland species. Work will be initiated in the late spring and completed in late summer or early fall when the Project Area is in its driest condition, and immediately before late-fall rains initiate plant germination and growth.

Using heavy equipment such as an excavator, a dozer and dump trucks, the project will remove the berm (approximately 2,000 cubic yards +/- 20%) material from the creek bank and grade the bank to a height consistent with naturally-formed creek banks. Using this same heavy equipment, the project will remove rock and sand fill from 2/3 of the former wetland area as needed to create the desired wetland plant communities. Approximately 13,000 +/- 20% cubic yards of fill would be removed from the restoration area and placed at the two designated on-island fill disposal sites near the project area. The top layer of fill potentially containing kikuyu grass propogules will be removed first and buried in the fill disposal area to ensure kikuyu grass is not spread. Small amounts of fill material may be used in several locations to reinforce road beds, fill in small disturbed upland areas located on the east side of the creek above and below the creek crossing, or fill in the protective barrier that would be constructed around a portion of the archeological site. Material in the two disposal sites will be compacted and sloped to natural contours and seeded with native upland plants. Selection of native propaguales suitable for that location would be guided by a GIS analysis prepared for the site (Hayashida 2009). The analysis used soil type, elevation, distance from the ocean, slope, and aspect as relevant factors (included in Appendix C). Project staff and contractors would assure that the restored topography within the restoration area is consistent with depth-to-groundwater project design specifications by constantly checking grades with survey equipment and completing final grading with the excavator and hand tools. A cultural resources specialist would be present during all ground-disturbing activities.

An archeological monitor will be present during removal of the berm. There may be remnants of the historic stone wall buried beneath the berm. The Park is currently discussing with SHPO potential responses to uncovering remnants of the historic stone wall during de-construction of the berm.

2.2.2.4.1 Best Management Practices

Implementation of a Storm Water Pollution Control Plan would be required of the contractor to reduce erosion of the fill disposal site and siltation in the creek and marine resources in the unlikely event of rain during the dry season.

Best Management Practices would be used by the construction contractor during construction to minimize impacts on wildlife including no pets, containment of garbage, and no feeding of wildlife by construction crews that may be housed on the island.

All storage containers used by the construction contractor during construction would meet specifications outlined by the NPS. In particular, food would only be transported in plastic containers using tight fitting lids.

All landing craft would be required to have rodent control in place prior to travel to the island.

Best Management Practices would be used by the construction contractor during construction to minimize the transport of unwanted weeds to the island including inspection of all equipment and clothing for weedy species prior to transport to the island.

All contracted personnel will be educated on the prevention and control of unwanted hitchhikers and the spread of non-native species. Material used in erosion control will be free of weeds and/or weed seeds, chemical additives, and non-biodegradable mesh.

Mitigation measures will be identified that protect air quality including watering dry soil in excavation and fill areas and limiting the speed of vehicles on dirt roads.

2.2.2.5 Wetland Restoration

The approach to restoration design at Prisoners Harbor has three main components: 1) obtain a thorough understanding of site hydrology; 2) determine the depths and characteristics of fill material over buried wetland surfaces; and 3) use "reference" wetlands as models for restoration of disturbed sites.

- Obtain a Thorough Understanding of Site Hydrology - In December 2004, the NPS installed 18 shallow wells throughout the site to monitor daily, seasonal and interannual variations in water table depth and specific conductance (monitoring ongoing through 2008). Wells were installed by having a small backhoe excavate a hole as deep into the water table as possible (typically 6-8 ft. deep). We then inserted a slotted 2" diameter PVC pipe into the hole and backfilled the space around the well with excavated material. Fourteen wells were installed in the filled wetland areas that are being considered for restoration (1-14 in Figure 2.4). Three more wells (15-17 in Figure 2.4) were installed on a transect passing through several relatively undisturbed (unfilled) wetland and upland plant communities adjacent to the filled area.

  From November 2005 to March 2007, NPS measured water levels in the wells approximately bi-weekly. Less frequent monitoring has continued from April 2007 to present. These data have provided information on seasonal and interannual fluctuations in the water table, ground water flow patterns, and water sources. On many of the monitoring dates, we measured water levels in the wells multiple times over a tide cycle to determine how much the water table was influenced by tides. We also measured specific conductance and salinity in the wells to determine if that would be a factor in selection of plants for restoration. We determined that tidal influence on the water table was minor (typically 0.0 - 0.2 ft over a tide cycle), although wells nearest the coast occasionally fluctuated as much as 0.4 ft. during the driest summer periods. Specific conductance was typically in the fresh water to slightly brackish range.

  A hydrologic analysis predicted the frequency of overbank flooding with and without the berm in place and therefore the frequency of connectivity between the creek and the restored wetland area.

- Determine the Depth and Characteristics of Fill Material - At each location where a well was installed, and at thirteen additional test pits scattered across the site, excavated holes were logged to indicate depths and characteristics of soils, fill material, and buried wetland soil surfaces (organic layers). This information will be incorporated into the final restoration grading plans.

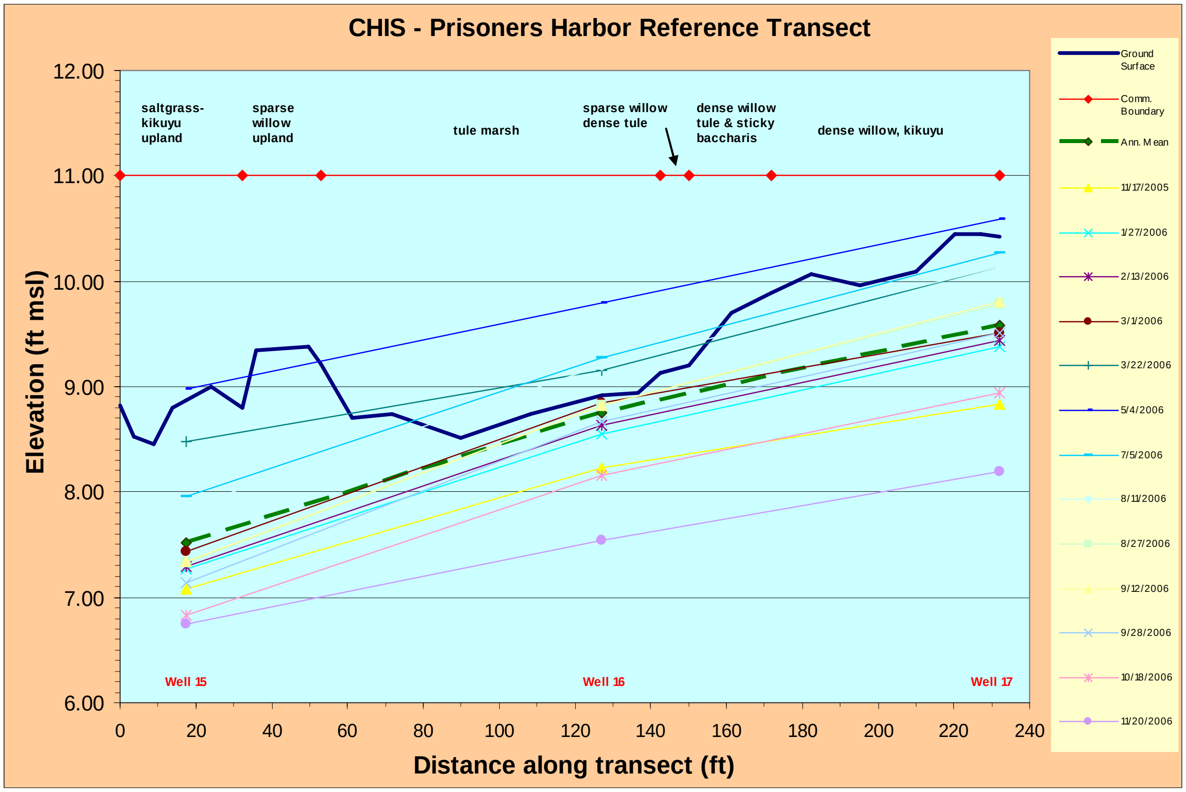

Figure 2.2 Prisoners Harbor reference transect shows groundwater elevation in elation to ground surface.Vegetation communities can be modeled along a continuum of groundwater availability.

- Use "Reference" Transect Information to Create a Model for Restoration - For our approach, it is necessary to understand plant community – depth to water relationships in nearby reference wetlands that have the same hydrologic characteristics as the target restoration area. Once these relationships are known, we can recreate them in the target area by grading the site accordingly in relation to the water table there, and planting with appropriate species. A 240-foot long reference transect was established in one of the only relatively undisturbed wetland areas at Prisoners Harbor (vicinity of wells 15-17 in Figure 2.4). Ground surface elevations were surveyed and plant community boundaries were identified along the transect. Wells 15-17 were installed along the transect to provide the necessary depth to water data. Figure 2.2 shows the ground surface elevations and plant community boundaries along the reference transect, and water level data from the three wells.

Data from the reference transect will be used to develop a wetland plant community-depth to water model that will be used to guide the restoration process (see preliminary model in Figure 2.3. Information from this model will be applied to the hydrologic data from the wells in the filled areas (wells 1-14) to determine the depths of excavation necessary to create the desired wetland community types. For example, Figure 2.3 shows that the willow wetland community is found at 0.3 to 1.1 feet above the mean water table for the period 11/17/05 – 11/20/06. Using this information and the mean water table elevations at the target restoration site for the same time period (see mean water table contours in Figure 2.4), we know how deep to excavate at any location to recreate a willow wetland community.

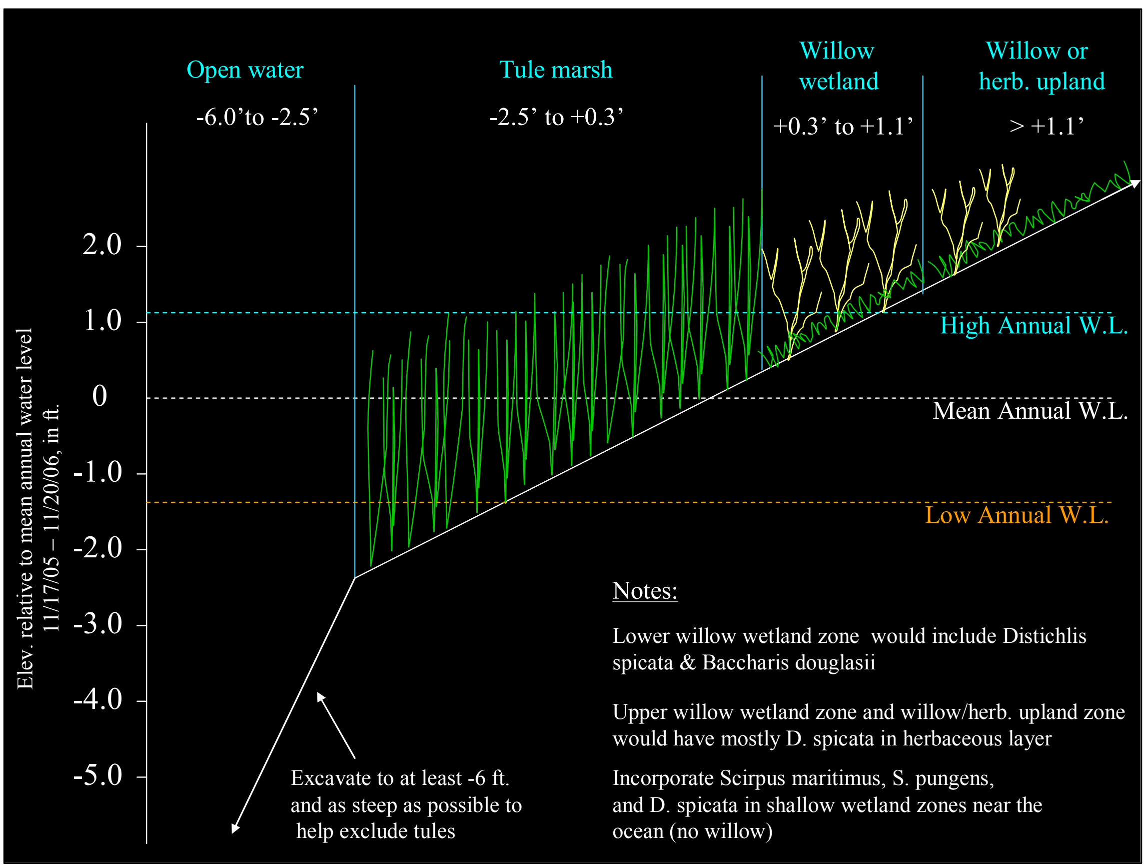

Figure 2.3 Plant community–water table model from reference transect

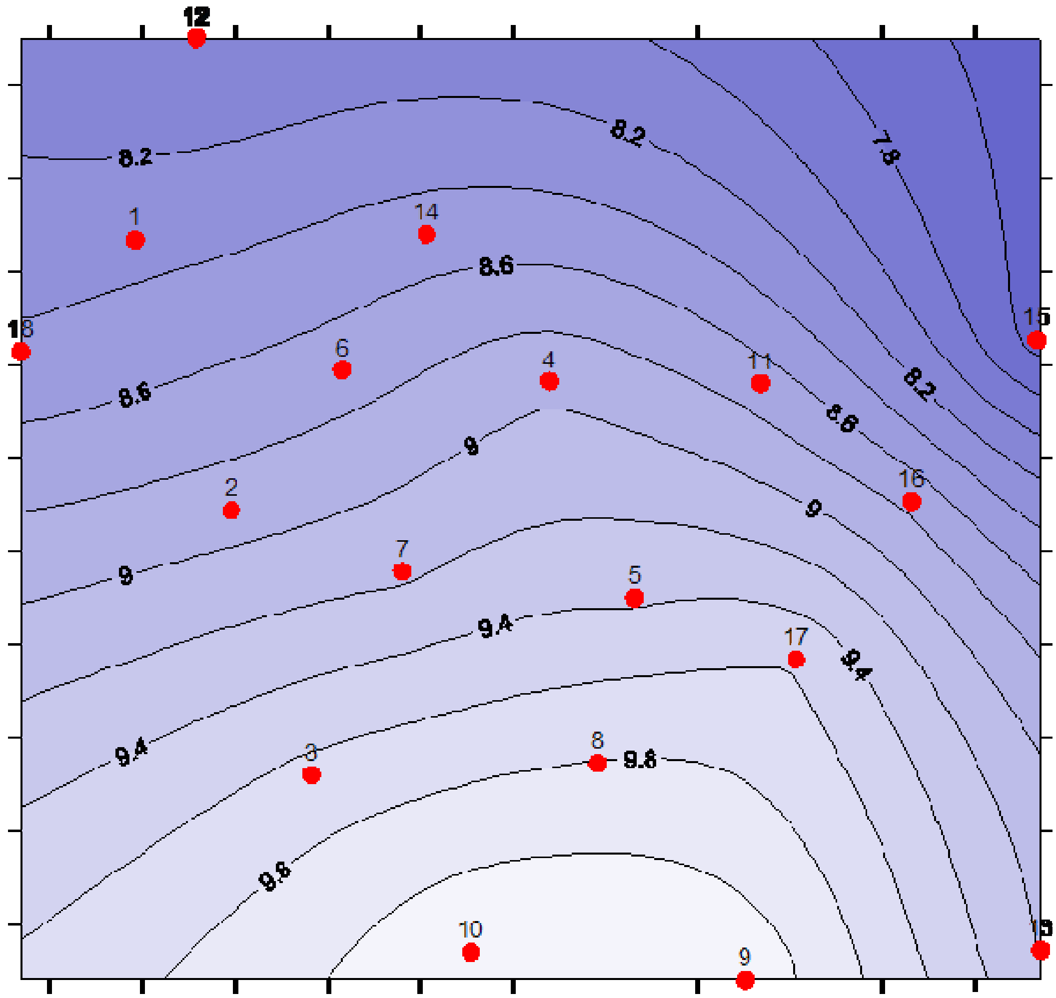

Figure 2.4 Prisoners Harbor mean water table contours Nov 2005 – Nov 2006

A final grading plan will be prepared to achieve the desired wetland types (e.g., willow thicket, tule marsh, open water pond, etc.). Excavation will be completed in the fall when water levels are low, and nursery-grown wetland plants will be installed at the appropriate elevations once winter rains raise the water table near the ground surface.

Before starting earthmoving activities in the wetland restoration area, project staff would collect island-native vegetation materials (seeds, plugs, cuttings) for post-construction staking, propagation and planting. Native plant will be grown out in the on-island plant nursery in the central valley. After grading is complete, willow (*Salix lasiolepis*), saltgrass (*Distichilis spicata*), bulrush (*Scirpus californicus, S. pungens, S. maritimus*), rush (*Juncus* spp.), and other herbaceous wetland plants grown in the nursery will be planted in their appropriate depth-to-water-table zones, as designed in a vegetation planting plan created by subject matter experts. Project staff would also collect seed from Santa Cruz Island upland plants for use in vegetating fill disposal sites.

Soon after grading has been completed and once the rainy season starts, over 52,000 herbaceous wetland plants will be installed on 18” centers in the appropriate wetland community zones, according to the planting plan. Although the project designers anticipate that there will be some natural willow recruitment from seed in the willow zones, these zones will also be planted with over 2,200 live willow stakes to assure successful willow establishment. The resulting 3.1 acres of restored wetland will include open-water habitat, native willow forest, emergent marsh, and saltgrass meadow. The following is a description of each of the habitat types.

Open Water (Pond): The majority of this open water zone would be excavated to at least 6 feet below the mean annual water table. Side slopes would be excavated as steeply as possible at the transitions to adjacent vegetated communities. The deep excavations and steep side slopes would discourage encroachment by vegetation.

Deep/Fringe Marsh: This deep emergent marsh zone would be planted with *Scirpus californicus* (California bulrush, or “tule”). Cattails may establish in portions of this zone through wind-blown seed. This zone would be excavated from 2.5 feet below the mean annual water table up to the mean annual water table (0.0 ft).

Shallow marsh: This shallower emergent wetland zone is transitional between the deep/fringe marsh and willow wetland communities. Species to be planted in this zone would include *Scirpus pungens* (common three-square), *Baccharis douglasii* (sticky baccharis) and *Juncus mexicanus* (Mexican rush), with *Scirpus maritimus* (alkali bulrush) included nearest the coast. This zone would extend from 0.0 to 0.5 feet above the mean annual water table.

Willow: This zone would be planted with *Salix lasiolepis* (arroyo willow) stakes, which eventually will grow to shrub and small tree size. Wetter portions of this zone will also be planted with herbaceous wetland species including *Baccharis douglasii, Juncus patens* (common rush), *Juncus xiphiodes* (iris-leaved rush), and *Distichlis spicata* (saltgrass). Drier understory areas will be planted with *Distichlis spicata*. Wetland portions of this zone would be excavated to 0.5 to 1.1 feet above the mean annual water table, while drier willow areas would be excavated to 1.1 to 1.75 feet above the mean water table.

Saltgrass meadow: This zone will be excavated to 1.1 to 1.75 feet above the mean annual water table of the design year, and will be planted primarily with *Distichlis spicata*. This zone may include small willow clusters or depressions with wetter species such as Mexican rush.

Studies have shown that wetland species, particularly waterfowl, are sensitive to human disturbance (Castelle et al., 1992; Burke and Gibbons, 1995; Semlitsch, 1997). A buffer between wetland habitat and human activity can reduce the negative impact of human activity on waterfowl breeding and feeding. With increasing distance from human activity there is a higher likelihood of finding a greater number of species and greater wetland function (eg. filtering suspended solids from the water). See Table 2.2 The access road from the pier to the Central Valley and isthmus is well traveled because it is the only access to the western 90% of the island. The corral area is mowed on a regular basis. After the corrals are removed a buffer of willow trees would be planted along the road. A gap in the willows would be created across the road from the warehouse and near the historic black wood acacia tree creating a wildlife viewing area and rest area. Removing the corrals and creating a willow buffer will minimize the impacts of human disturbance and maximize the quality of restored wetland habitat. Additionally, visitors walk along the beach. There is a buffer of vegetation which limits disturbance from this area (Figure 2.5).

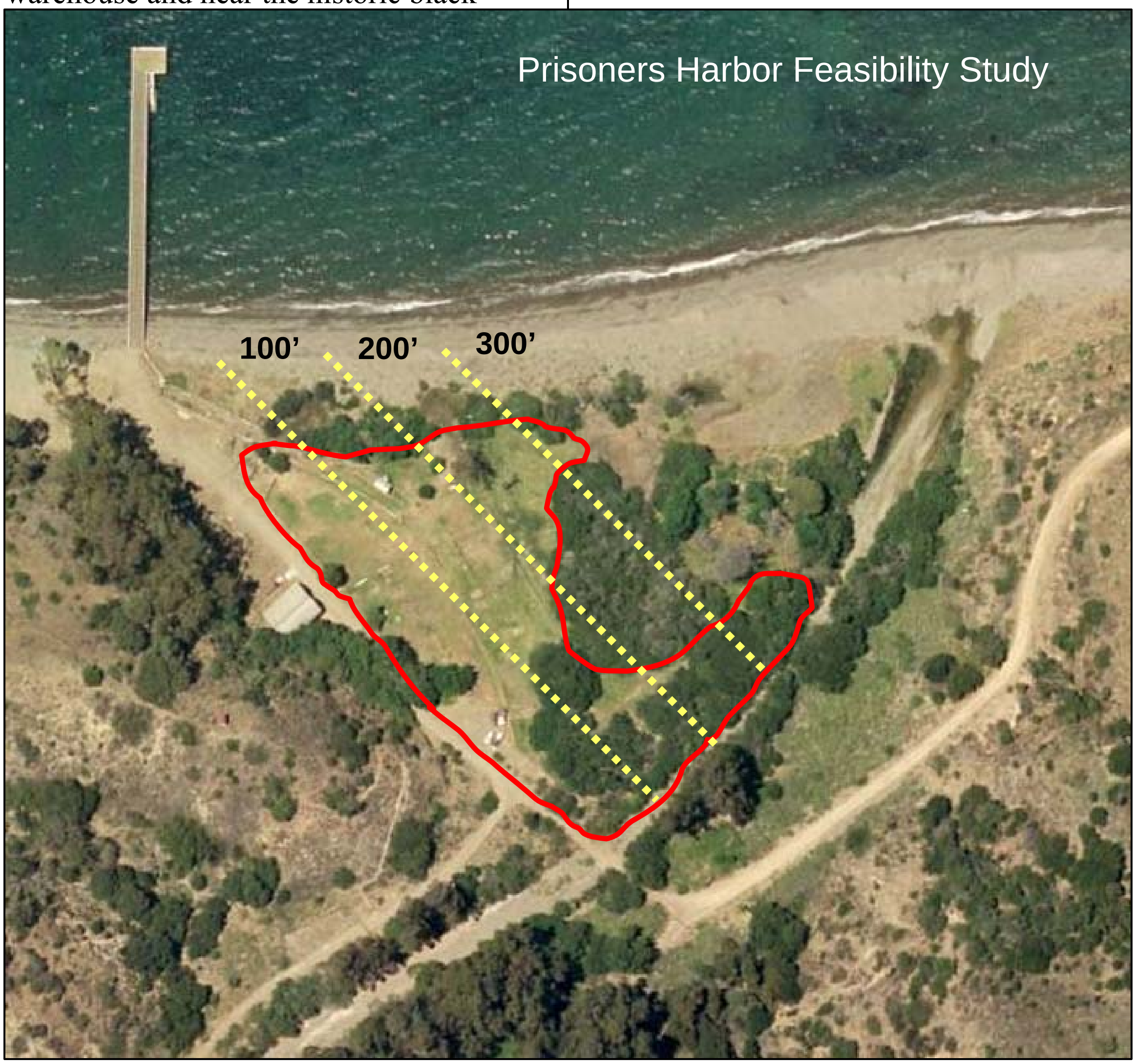

Figure 2.5 Alternative B wetland restoration areawith distance from access road indicated in 100, 200, 300’ increments.

Table 2.2 Responses of wetland values and functions to various buffer sizes

Buffer Size (feet)	Responses of Wetland Values and Functions
300+	•Waterfowl breeding/feeding retained Heron feeding maintained (Castelle et al., 1992) •Amphibian populations retained (Semlitsch, 1997) •Diversity of mammals maintained (e.g., beaver, muskrat) (Castelle et al.,1992) •Cavity nesting duck habitat protected (Castelle et al., 1992) •Bird diversity maintained (Castelle et al., 1992)
200-300	•Waterfowl breeding, but reduced diversity (Castelle et al., 1992) •Reduced mammal diversity, but beaver remain (Castelle et al., 1992) •Most sediment removed (Castelle et al., 1992)
100-200	•Waterfowl breeding, but reduced populations and diversity (Castelle et al., 1992) •Adequate sediment removal (75-80%) (Castelle et al., 1992) •Most nutrients filtered (Castelle et al., 1992) •Reduced salamander diversity (Semlitsch, 1997) vDecreased turtle abundance (Burke and Gibbons, 1995)
50-100	•Loss of many wetland bird species (e.g., belted kingfisher) (Castelle et al., 1992) •Songbird diversity maintained in forested buffers (Castelle et al., 1992)
<50	•Generally ineffective in preserving major wetland functions (Castelle et al., 1992) •Human activities disturb breeding/feeding birds (Castelle et al., 1992) •Degradation of buffer habitats over time more likely (Castelle et al., 1992)

Note: Specific research results were generalized into the above categories for ease of interpretation.

Best Management Practices used during excavation of fill would include properly installed silt fencing along the east side of the creek adjacent to the fill disposal area and along the west side of the creek. Silt fencing would also be installed on the north side of the excavation area to protect the remnant wetland.

A monitoring plan to evaluate the success of the project would include installing a network of wells in the project area and establishing vegetation plots around each well. The groundwater wells would be located primarily in the restored wetland area with three in the riparian corridor and a transducer at the natural creek bank where the berm was removed. The wells and transducer would be a random sample of hydrologic conditions to determine if wetland hydrology has been reestablished. Circular vegetation plots would be located around each well. The methodology described in the "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al. 1979) and the Army Corps of Engineers' 1987 Manual for Wetland Delineation and the 2006 Arid West Supplement to the Manual would be used to record vegetation in each plot.

2.2.2.6 Riparian Restoration

Riparian restoration in Cañada del Puerto would take place in a two-pronged, step-wise approach. Eucalyptus trees would be removed 1) from downstream to upstream and 2) from the hillside toward the stream bank (Figure 2.6). The area of eucalyptus removal is approximately 20.02 acres or 33.5% of the project area. Woody native vegetation including established oaks (*Quercus* spp.), island cherry (*Prunus ilicifolia* subsp. *lyonii*), and coffee berry (*Rhamnus californica*) would remain. At each step of the eucalyptus removal process, care would be taken not to disturb other established native woody plants, stream bank or soils. Revegetation would occur through natural recruitment from the Project Area's seed bank, reproduction of remnant native plants on the floodplain, and active revegetation including seeding and planting, or some combination of these methods. The eucalyptus would be replaced with species typical of Southern Riparian Woodland (Junak, et al, 1995). Species targeted for restoration include oak (*Quercus agrifolia*), cottonwood (*Populus trichocarpa* and *P. fremontii*), willow (*Salix* spp.) and maple (*Acer macrophyllum*). Where Southern Riparian Woodland intergrades into Island Chaparral target species would include manzanita (*Archtostaphylus insularis*), ceonothus (*Ceonothus megacarpus* v. *insularis*), mountain mahagony (*Cercocarpus betuloides*), and wild cherry (*Prunus ilicifolia* subsp. *lyonii*). Seed from these species would be broadcast among existing native plants. Stream banks would be planted with willow stakes. Sufficient recovery of the channel restoration area would occur between implementation of the stages to minimize ecological impacts and reduce the potential for sediment transport to the creek. Similar work at other sites on the Channel Islands have required little to no active revegetation to restore native floodplain communities. Park and TNC managers would utilize an adaptive management strategy to ascertain which riparian revegetation methods are most effective and efficient in achieving restoration goals. Recovery would be determined by Park and TNC biologists based on recruitment of native vegetation, distribution of federal and state listed species, extent of eucalyptus and other weedy species.

Access to eucalyptus removal areas in Cañada del Puerto would be either by the Navy Well road or the access road to the Central Valley. Access to eucalyptus on the east side of the creek will require driving for a short distance, approximately 100 feet in the dry creek bed. During tree removal there would be access to the bathrooms and the Prisoners-Pelican trail. Access to the Central Valley would be re-routed to the Navy Road during this time. Access to the Navy site, the Del Norte campground, and the Isthmus would not be affected.

Best Management Practices used during tree removal would include installation of silt fencing along the side of the creek where tree removal is taking place. Native oak trees would be clearly marked and would not be disturbed during tree removal.

Restoration of habitats at Prisoners Harbor would release greenhouse gasses from heavy equipment used during implementation. In addition, this project might release carbon dioxide to the atmosphere through removal and disposal of eucalyptus trees and other non-native plants. The NPS would employ a set of Best Management Practices to minimize the amount of greenhouse gas emissions - such as minimizing equipment idling, reusing eucalyptus wood when possible, and minimizing truck and boat runs.

Evaluation of the success of the restoration will include continuing the bird survey at previously established survey points and establishing vegetation plots in the riparian corridor.Data collected would include plant species, percent cover, and percent cover bare ground and percent cover litter. Evaluation may also include follow-up surveys of mice, amphibians and reptiles using the same methods and trapping locations as Drost and Gilczis (2007).

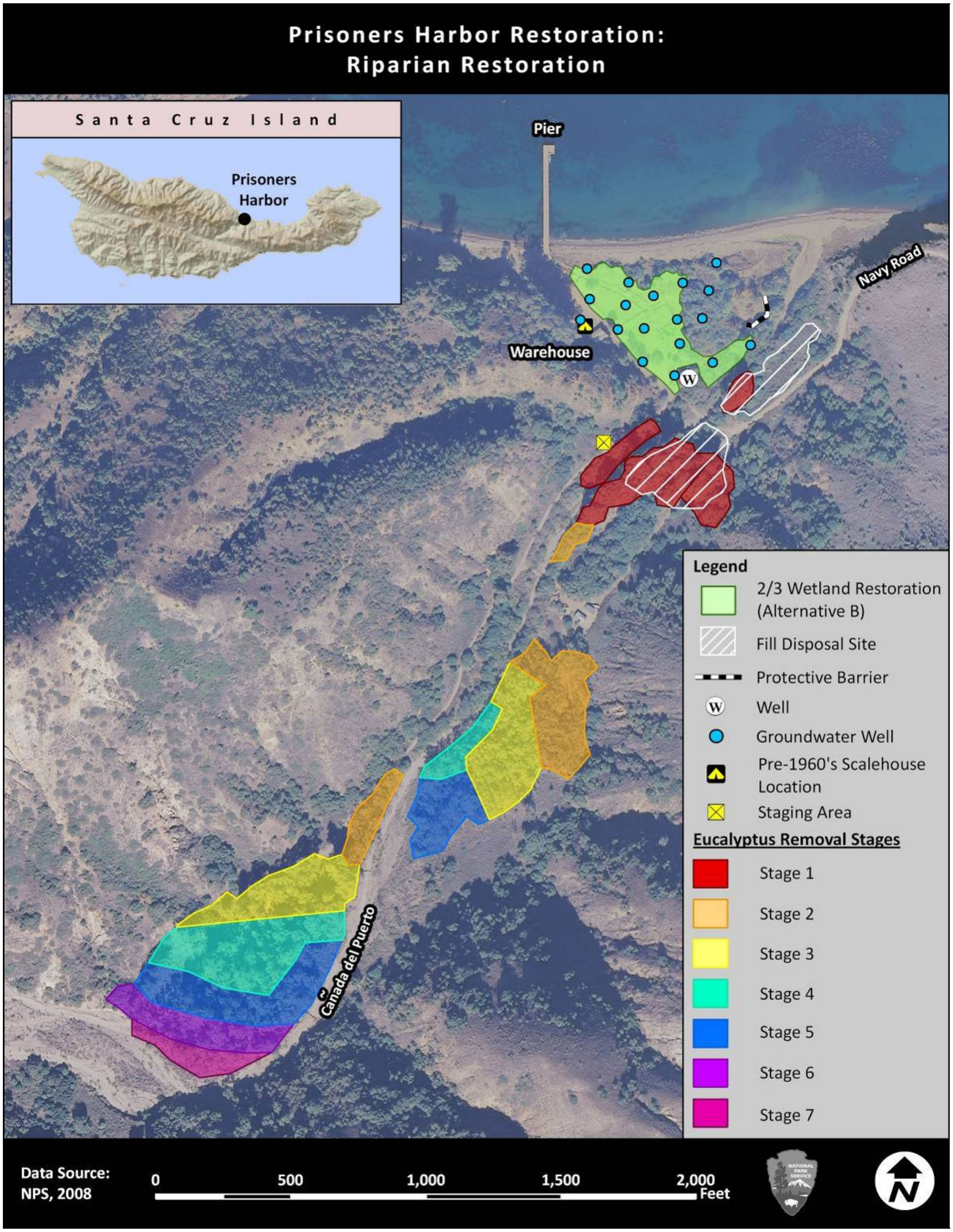

Figure 2.6 Stages in riparian restoration in Cañada del Puerto

2.2.2.7 Cultural Resources

The Park proposes to protect high-value archeological resources at Prisoners Harbor from continuing (though lessened) exposure to erosion by stream flows in Cañada del Puerto, during and immediately after berm and fill removal activities. This would be achieved by placement of a small earth, log, and cobble berm or packing earth, log, and cobble against the base of the site and planting with compatible native plants, thereby deflecting potential flood waters away from the culturally dense area of the site.

2.2.2.8 Improving Visitor Experience

During an on-site scoping meeting about the project, park partners expressed great interest in seeing enhanced visitor experiences at the restoration site. The project would improve the island gateway experience for visitors arriving on Santa Cruz Island at Prisoners Harbor by constructing project-compatible facilities such as temporary wayside exhibits (one or two), a wetland viewing bench, or interpretive signs. Project staff will design these facilities concurrent with its designs for wetland restoration and cultural resource protection.

The park will prepare a Comprehensive Interpretive Plan for long-term interpretation of the natural and cultural resource in the Prisoners area, with the goal of providing a range of interpretation media and opportunities without jeopardizing the resources themselves.

2.2.3 Alternative C -1/3 Wetland Restoration with partial berm removal

Under Alternative C – 1/3 Wetland Restoration with Partial Berm Removal, the park would retain two of the existing cattle corrals adjacent to the access road and restore 2.1 acres of palustrine wetlands and deepwater habitat, remove eucalyptus, control invasive species, construct a protective barrier around a portion of the archeological site, and improve the visitor experience. In addition, a portion of the berm would be removed, thereby reconnecting the creek to its floodplain (Figure 2.7).

2.2.3.1 Transportation and Transport of Supplies and Equipment

The Park would transport equipment, vehicles, and other large materials and supplies via marine landing craft to the islands. Each island has a designated area for off-loading and loading the landing craft. The designated loading/unloading area for this Project is located to the west of the pier. From this location heavy equipment, vehicles, fuel totes, and other large material and supplies required for the project will be transported to a staging area. Park staff, contracted personnel, gear, and some supplies would be transported to the island by the regularly scheduled park boat or the Park concessionaire, Island Packers.

2.2.3.2 Preparing the Wetlands Restoration Area

Preparing the wetland restoration area for project implementation would be similar to Alternative B except in the remaining corral and scale house area native saltgrass (*Distichlis spicata*) would replace invasive kikuyu grass. Planting native saltgrass would take place simultaneously with the wetland re-vegetation. Site preparation actions are described more fully in Section 2.2.2.2--Preparing the Wetland Restoration Area.

2.2.3.3 Corral Removal

Before commencement of earthmoving activities, under the supervision of Park cultural resource specialists and after consultation with the State Historic Preservation Office, all corrals would be photographed and the construction methods and materials for the corrals would be documented. This information would be archived by the NPS. Two corrals adjacent to the road would remain and would be maintained by park staff in their current configuration. The scale house would remain in its current location. The remaining six corrals would be dismantled along with other posts, troughs, and old concrete foundations. Some of these materials could be stockpiled on island for use in future projects or repairs. The remaining materials would be transported via landing craft to the mainland and disposed of in a designated area.

The Park would maintain the appearance of the remaining cattle corrals through periodic mowing or trimming of plants inside the corrals, painting, gate repair, and replacement of deteriorated boards and hardware. Park staff would mow inside the corrals two to four times per year as needed, and paint the corrals and scale house approximately one in every five years.

2.2.3.4 Partial Berm and Fill Removal

Partial removal of the berm and excavation of fill would be similar to the preferred Alternative B in method and time of year, except a smaller volume of fill would be removed. Fill would not be removed from within the two remaining cattle corrals. Approximately 11,000 +/- 2-% yards of fill would be excavated and transferred to two designated fill disposal sites. Partial berm removal would be the same as the preferred Alternative B. A more detailed description of these actions are described in section 2.2.2.4 Partial Berm and Fill Removal.

2.2.3.5 Wetland Restoration

The approach to restoration design would be the same as the preferred Alternative B except that fewer plants would be used and salt grass would be planted within the corral area. In Alternative C 34,000 herbaceous wetland plants and over 1,500 live willow stakes would be installed resulting in 2.1 acres of restored wetland including open-water habitat, native willow forest, emergent marsh, and saltgrass meadow. A more detailed description of the approach to restoration design can be found in section 2.2.2.5 Wetland Restoration.

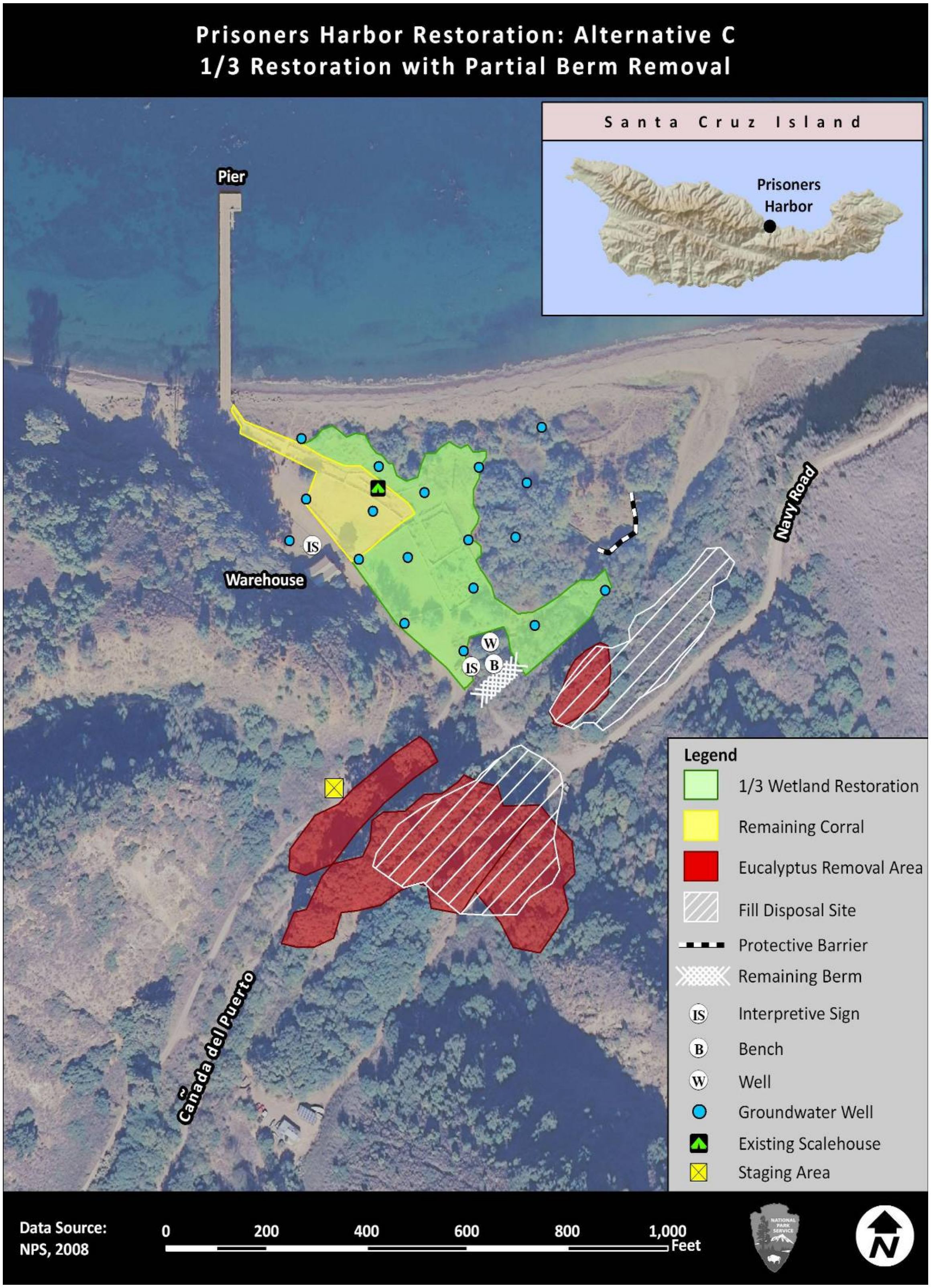

Figure 2.7 Alternative C – 1/3 Wetland restoration with partial berm removal.

The buffer between human disturbance and restored wetland would be less compared with the preferred Alternative B. With two corrals remaining in place, a small portion of the wetland would have a 100’-150’ buffer from human disturbance (Figure 2.5). The majority of wetland area would have a 50’ to 100’ buffer from human disturbance. There would be minor wetland functions and human disturbance of breeding/feeding birds (Castelle et al., 1992). Degradation of buffer habitats over time would be more likely (Castelle et al., 1992).

As with the preferred Alternative B, after restoration actions were completed, the Park would monitor vegetation and hydrology for five years post-project, in order to evaluate whether the restoration area conformed to desired wetland conditions and site-specific management goals.

2.2.3.6 Riparian Restoration

Riparian restoration in Cañada del Puerto would be the same as in the preferred Alternative B. For a more detailed description of these actions see section 2.2.2.6 Riparian Restoration.

2.2.3.7 Cultural Resource Protection

The Park proposes to protect high-value archeological resources at Prisoners Harbor (the Chumash Village site) from continuing (though lessened) exposure to erosion by stream flows in Cañada del Puerto, during and immediately after berm and fill removal activities. This would be achieved by placement of a small earth, log, and cobble berm or by packing earth, log, and cobble against the base of the site and planting with compatible native plants, thereby deflecting potential flood waters away from the culturally dense area of the site.

2.2.3.8 Improving Visitor Experience

During an on-site scoping meeting about the project, park partners expressed great interest in seeing enhanced visitor experiences at the restoration site. The project would improve the island gateway experience for visitors arriving on Santa Cruz Island at Prisoners Harbor by constructing project-compatible facilities such as temporary wayside exhibits (one or two), a wetland viewing bench, or interpretive signs. Project staff will design these facilities concurrent with its designs for wetland restoration and cultural resource protection.

2.3 Alternatives Considered but Dismissed from Detailed Study

The following alternatives were considered by the Interdisciplinary Team or suggested by the public to be potentially viable alternatives but eliminated from further study. The dismissed alternatives and rationales for dismissing them are outlined below.

2.3.1 Remove all fill material in the Prisoners Harbor area

Based on test well results, wetlands were filled adjacent to the warehouse, in the current Park picnic area and beneath the access road. Removing fill to this extent would undermine other Park infrastructure that was subsequently built on the fill, including the access road, and warehouse, and would be in conflict with other park goals. Therefore, to maintain critical infrastructure, including the access road and warehouse, fill material in this area will not be removed.

2.3.2 Retain the Berm

Hydrologic functioning of the former floodplain wetland would require reconnecting the creek with the floodplain to allow periodic surface inundation of the wetland. Without access by the river flood waters, the restored wetland area will be supported by groundwater only and any floodplain processes such as slowing flow velocities, re-channelization, redistribution of sediment, biota, and organic matter, and creation of new habitat conditions could not occur. A portion of the berm must be removed for hydrologic and ecological functioning of the restored wetland. Retaining the berm would not meet the project objective of restoring the hydrology of the area.

2.3.3 Reconfigure cattle corral to create a narrow band of corrals and increase size of wetland restoration

Park staff considered the effects of eliminating some corrals and reconfiguring other portions of the corral fencing and the fenced areas to create a narrow band of corrals parallel to the access road. The loss of some corral areas while maintaining the historic configuration of the remaining areas was considered acceptable, however reconfiguring the remaining cattle corrals would cause them to lose their historic integrity and would not meet project objectives.

2.3.4 Retain three corrals parallel to the access road

Retaining three corrals parallel to the access road would result in a wetland restoration configuration and size that would not support an open water habitat or the desired wetland habitat and would not satisfy the goals of the project.

2.3.5 Removal of the Entire Berm

A stone-lined water well used during the historic ranching era is located near test well #10. Removing the berm between the road and the historic water well could jeopardize the well and would be in conflict with other Park management goals.

2.4 Preferred Alternative

The preferred alternative remains the Park-preferred alternative at the time of the draft EIS. The preferred alternative remains Alternative B: 2/3 Wetland Restoration with Partial Berm Removal. Under this alternative, the park would remove all of the cattle corrals and restore 3.1 acres of palustrine wetlands and deepwater habitat, re-locate the scale house to its pre-1960’s location, remove eucalyptus, control invasive species, including kikuyu grass, fennel, and remove eucalyptus trees from the lower Cañada del Puerto, construct a protective barrier around a portion of the archeological site, improve the visitor experience. A portion of the berm would be removed and the creek connected to its floodplain.

2.5 Environmentally Preferred Alternative

The environmentally preferred alternative is the same as the preferred alternative. Under Alternative B, the park would remove all of the cattle corrals and restore 3.1 acres of palustrine wetlands and deepwater habitat, re-locate the scale house to its pre-1960's location, remove eucalyptus, control invasive species, including kikuyu grass, fennel, and remove eucalyptus trees from the lower Cañada del Puerto, construct a protective barrier around a portion of the archeological site, and improve the visitor experience.

Studies have shown that wetland species, particularly waterfowl, are sensitive to human disturbance (Castelle et al., 1992; Burke and Gibbons, 1995; Semlitsch, 1997). Alternative B will restore a larger wetland area and create a larger buffer between wetland habitat and human activity. The buffer can reduce the negative impact of human activity on waterfowl breeding and feeding. With increasing distance from human activity there is a higher likelihood of finding more species and greater wetland function (eg. filtering suspended solids from the water). Degradation of buffer habitats will be less likely over time in the larger wetland (Castelle et al., 1992).

With two corrals retained under Alternative C, the corral area would remain in a chronic state of disturbance from regular mowing, susceptible to invasion by non-native kikuyu grass, fennel, and other invasives species, and provide low habitat value for wildlife. For these reasons, neither Alternative C nor Alternative A (No Action) are environmentally preferred alternatives.

The preferred alternative, Alternative B, would remove all corrals, convert this area to high-value wetland habitat, increase species diversity, reduce the susceptibility of invasion by non-native species, and reduce ongoing maintenance needs.

The preferred alternative will provide added protection to the historic scale house by moving it out of the wetland floodplain and returning it to its pre-1960's location adjacent to the warehouse.

2.6 Actions Common to All Alternatives

Several management actions are common to either action alternative - the park would structurally protect archeological resources at the Project Area, some portion of the floodplain wetland would be restored, a portion of the berm would be removed, invasive eucalyptus in the riparian corridor in the lower Cañada del Puerto would be eliminated, invasive kikuyu grass and fennel would be controlled as much as practicable, and visitor experiences would be improved.

2.7 Comparison of Alternatives

The two action alternatives differ in the amount of fill removed, area of wetland restored, and the amount of corral fencing and corral area to be preserved. In Alternative C two corrals would be retained, the scale house would remain in its current location, and 2.1 acres of wetland would be restored. In

Alternative B, the preferred alternative, all corrals would be removed, the scale house would be re-located to its pre-1960's location and the maximum wetland restoration practical would be achieved.

Table 2.3 Comparison of Alternatives

	A No Action	B 2/3 wetland restoration with partial berm removal	C 1/3 wetland restoration with partial berm removal
Area of fill removal	0	3.1 acres	2.1 acres
Critical infrastructure	No change	Access road, visitor facilities, warehouse, pier retained	Access road, visitor facilities, warehouse, pier retained
Historic elements	No change	All corrals removed, scale house relocated to original location	Two corrals retained, six corrals removed; scale house remains in current location
Partial berm removal	No change	Partial berm removal downstream from historic well	Partial berm removal downstream from historic well
Protection of archeological resources	Regular maintenance of existing archeologica l site fencing	Protective barrier around toe of archeological site	Protective barrier around toe of archeological site
Eucalyptus control	Maintenance of existing eucalyptus trees on Park land	Remove all eucalyptus from the project area (excluding historic eucalyptus at base of cliff)	Remove all eucalyptus from the project area (excluding historic eucalyptus at base of cliff)
Visitor experience	Maintenance of existing facilities	Additional education signage	Additional education signage

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

CHAPTER THREE

AFFECTED ENVIRONMENT

3.0 Affected Environment

Information presented in this chapter derives from the National Park Service Inventory and Monitoring Program, from Channel Islands National Park natural and cultural resource management staff and partners, from data provided by The Nature Conservancy, from US Fish and Wildlife Service species-protection plans, from independent and academic research studies, and from studies completed specifically to inform decision-making for this project.

This chapter is divided into five sub-chapters:

3.1 Physical Setting: the regional context for the project and land use history of the Project Area

3.2 Physical Resources: soils and geomorphic processes, and hydrology and water quality of the Project Area

3.3 Biological Resources: wildlife and vegetation of the Project Area

3.4 Cultural Resources: archeological features and cultural landscapes within the Project Area

3.5 Social Resources: visitors' experience at the Project Area, aesthetics, and human health and safety

3.1 Physical Setting

This section provides a description of the regional context for the project - its physiographic location, a brief discussion of Santa Cruz Island's physical and biological resources, a description of the Project Area, and a short narrative describing the general land use history of the Project Area.

Main sources for information in this section are cited immediately following the relevant text and listed alphabetically in the References Section. The reader is referred to these reports, scientific papers, and books for more thorough descriptions of the project setting and context.

3.1.1 Regional Context

Off the southern coast California, a set of low rounded ridges rise above sea level to form eight islands – the Channel Islands. The four northern-most of these islands lie in the Santa Barbara Channel paralleling the Point Conception coast. The remaining islands are scattered offshore between Los Angeles and the Mexican border (Figure 3.1). The Channel Islands vary considerably in size, distance from each other, and distance from the mainland. Because these lands remain in a relatively natural state – especially when contrasted with the heavily populated cities on the nearby mainland coast – they provide an ideal place for to protect and restore Southern California native biodiversity and ecosystems.

3.1.2 Santa Cruz Island

The largest of the Channel Islands is the sixty-two thousand acre Santa Cruz Island. Santa Cruz is twenty-four miles long, and its width ranges from two miles across at the isthmus to 6.5 miles across through its great Central Valley. Santa Cruz sits in the Santa Barbara Channel nineteen miles from the nearest mainland point, and southwest from the city of Ventura, California.

The topography of Santa Cruz Island is dominated by two east-west mountain ranges flanking the fault-dominated Central Valley. The Central Valley divides the island into two very different geologic terrains: to the north, a purple-brown ridge of young volcanic rocks rises to Mt. Diablo and then plunges abruptly into the Santa Barbara Channel. At almost 2,500 feet in elevation, Mt. Diablo is the highest point on all the Channel Islands. South of the Central Valley a weathered ridge of reddish metamorphic rocks reaches an elevation of about 1,500 feet. At seaward base of this ridge a submerged shelf extends several miles southward before falling off into the Santa Cruz Basin, which is more than a mile deep.

The island's Central Valley is bisected by the Santa Cruz Island Fault, which juxtaposes older, more eroded 150-million-year old metamorphic rocks on the south side of the island with much younger - 20-million-year old - volcanic formations on the north side of the island. Recent research suggests this fault has been very active lately, causing as much as 600-800 feet of movement in the last 30,000 years. This displacement can be seen in several locations on the island where streambeds jog markedly as they cross the fault. The pronounced but discontinuous Central Valley, formed by stream erosion along the fault zone, runs the length of the island from east to west separating the two major ridges. Other features of geologic interest on the island include sheep-induced erosion, diverse soils, unusual drainage patterns, and Pleistocene fossils of dwarf mammoths and Douglas fir trees.

Cutting through the seaward side of both ridges is a series of steep-sided canyons supporting freshwater springs and intermittent streams leading to the ocean. Some of these creeks expire on gravel beaches at canyon mouths; others plunge from the cliffs directly into the sea. On the interior faces of the ridges the canyons drain to the Central Valley and into the largest stream on the island: Cañada del Puerto. After traveling southeast through the Central Valley this stream turns abruptly northeast to drain through a steep gorge in the northern range to the stream mouth at Prisoners Harbor.

Santa Cruz Island watersheds are generally steep and exhibit many mass slope failures that result in high erosion and sedimentation in the valleys. The major watersheds have a mix of vegetation community types, with coastal sage scrub on south facing slopes, chaparral on north facing slopes on volcanic substrates, and woodland communities in the higher elevations with steeper slopes. Incised gullies are commonplace throughout the drainages, a situation that has been exacerbated by historic sheep ranching. Slope failures of all sizes are also very evident throughout the watershed, although fewer slope failures are evident in watersheds that are in the volcanic geologic types. Most drainages on Santa Cruz Island have only intermittent above ground stream flow. Even the largest watershed on the island – the Central Valley watershed – has only intermittent flow in normal precipitation years. Water surfaces are in the main channel where bedrock is at or near the elevation of the channel bed, while the flow disappears underground in stream reaches characterized by sandy or gravel substrates. Junak et al. (1995) note that there are many freshwater seeps and springs throughout the island. Minimal documentation exists as to water chemistry (nutrients or animal waste) monitoring within the streams of Santa Cruz Island, so concentrations of microbes and nutrients are unknown. Historic sheep and cattle ranching, however, and a feral pig population degraded soil-stabilizing vegetation communities on steep hillsides; this resulted in higher rates of erosion and sediment delivery to streams all over the island, degrading water quality.

The island's terrestrial and near-shore marine habitats are tremendously diverse. Its coastline includes protected coves, sandy beaches, vertical cliff faces, hidden sea caves, and dissected marine terraces. The diversity of the island's topography and microclimates supports a wide array of habitats, from rocky intertidal to chaparral to pine forests. Its size and complexity make the island biologically similar to undisturbed areas on the adjacent mainland. Offshore, warm southern waters mingle with cold currents from the north, creating a transition zone for marine life. The island's biota includes many organisms endemic to the Channel Islands, some found only on Santa Cruz Island. Scientists believe most plants and animals reached the island by chance after swimming, flying, or floating on debris, especially during periods of low sea level.

Considering that it was colonized by overwater dispersal, Santa Cruz Island supports a remarkably rich biota. Some groups, however, are decidedly depauperate, and certain organisms, lacking the usual competitors or predators, have taken on different forms or have invaded niches unavailable to them on the mainland. Only four species of terrestrial mammals inhabit the island - island fox, island skunk, and two species of mice - accompanied by eleven species of bats. The Island scrub-jay is a species of bird which occurs only on Santa Cruz Island. Many species of birds nest on the island including American kestrel and Western flycatcher.

Inhabitants of the Chumash villages on the islands may have introduced some organisms to the island during their extensive travels between the mainland and the islands. Santa Cruz Island's abundant, well-preserved archaeological sites provide insight into past cultures and environmental conditions. The island's seclusion, ruggedness, and history of conscientious private stewardship have protected the island from many of the usual impacts of heavy exploitation following European contact.

Exotic plants and animals have affected the vegetation and soils of the island. Efforts are underway by all stewards of the island to deal with non-native organisms. The most recent successful efforts were removal of sheep from the island in 2000 and removal of pigs from the island in 2005-2006.

3.1.3 Project Area

The 59.7-acre Project Area encompasses the lower reaches of the island's largest stream system: Cañada del Puerto (Figure 3.1).

Nineteen acres of the project area are owned and managed by the National Park Service. This area includes the beach, cobble bar, lower stream channel and its floodplain, cultural resources associated with the prehistoric village at the site, cultural resources associated with the island's ranching history, and stands of eucalyptus trees. The remaining portion of the Project Area is owned and managed by The Nature Conservancy. These lands include the predominantly sandy-bottomed intermittent Cañada del Puerto creek and its narrow floodplain, and two additional stands of eucalyptus trees.

A 0.815-acre polygon along Cañada del Puerto is managed by the US Navy for water production. This project will not propose any management actions for these lands. In addition, the Project Area encompasses a portion of the access road that leads from the island's main dock to the structures and facilities in the Central Valley and the Navy facility. The road to the Central Valley both parallels the creek channel in the project area; the road to the Navy facility crosses the creek channel over a cement low water crossing. Both roads can become impassible during the generally short but occasionally intense winter flooding of the creek channel. Roads are maintained by landowners. In addition, the NPS owns and maintains the

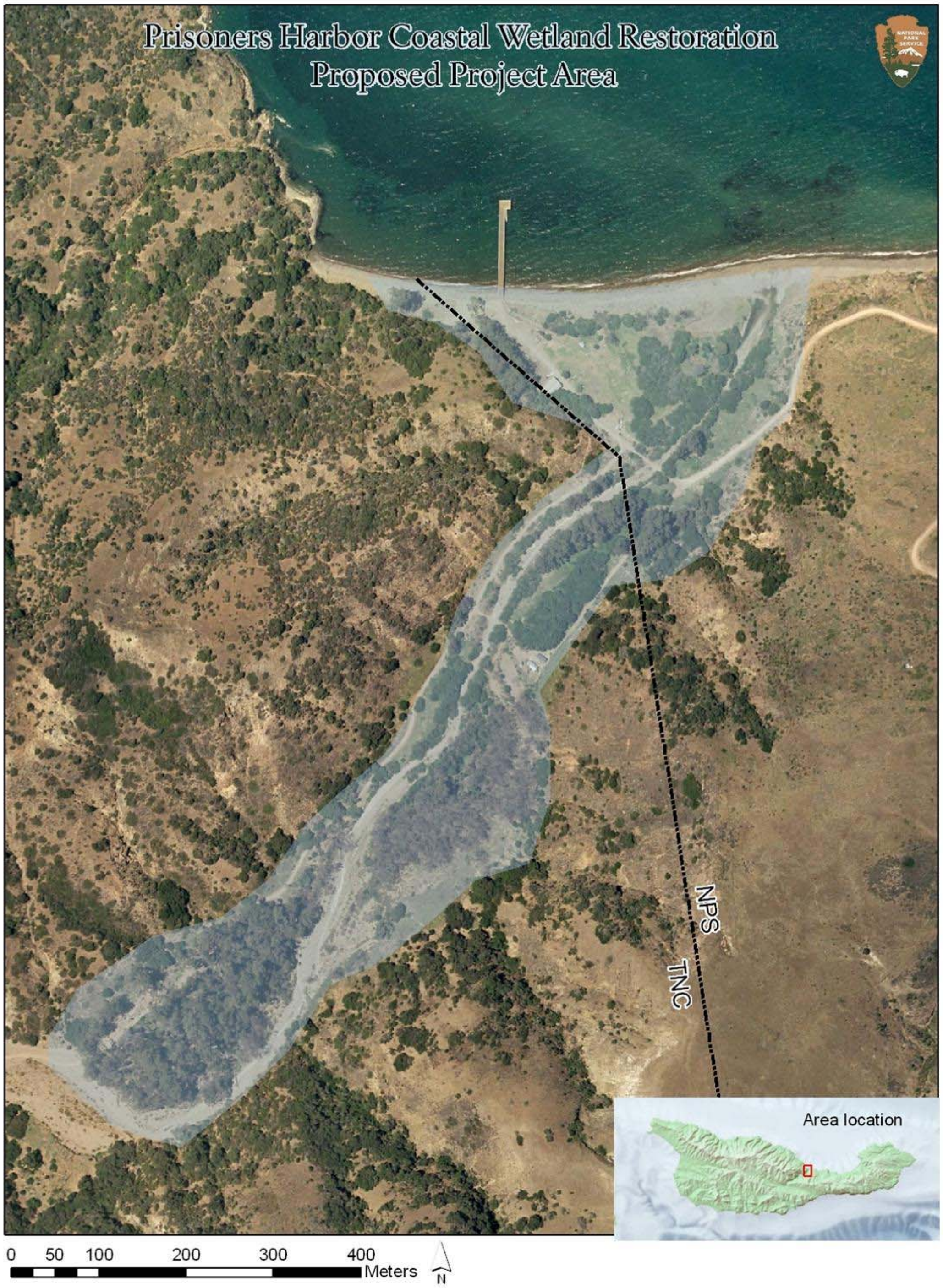

Figure 3.1 Proposed Project Area

Prisoners Harbor dock immediately adjoining the Project Area to the north.

3.1.4 Climate

3.1.4.1 Historic and Current Climate

The Channel Islands exhibit the Mediterranean climate typical of the central and southern California coasts. Precipitation patterns exhibit strong seasonal trends, with heavy rainfall between November to March, and seasonal drought between late May and October when a stable high-pressure system settles off the coast. A shallow coastal marine layer raises atmospheric humidity, frequently visible as fog, and helps to lessen the impact of the summer drought conditions on the islands. Moisture from fog accumulates on vegetation and falls as fog-drip precipitation - which is a significant source of summer soil moisture.

Winds on the southern coast of California are generally southeasterly in winter and northwesterly in summer. These summer winds pick up speed most afternoons and drop off at night, driving summer fog against the island's northwestern slopes and creating more humid conditions than found on the mainland south-facing coastal slopes. Santa Ana winds occasionally disrupt this pattern, generally in the late fall and early winter. These wind events occur 10 to 20 times per year, blowing hot dry air from the high-pressure systems over the interior mainland toward typical low-pressure systems over the Pacific coast.

Two distinctly different oceanic water masses meet just off the shores of the Channel Islands - northern waters cooled by the upwelling common along the West Coast of the US meet the warm southern waters characteristic of oceanic conditions along the Baja and Southern California coast. The convergence of these water masses near the Channel Islands significantly affects the climate and the nearshore marine biota of the island chain.

The typical climate regime is heavily influenced by the El Niño Southern Oscillation, or ENSO, a cyclical global circulation pattern that affects oceanic processes in the Eastern Pacific. The three-to-seven year ENSO cycle alternates El Niño and La Niña events: the El Niño stage of the cycle is characterized by wetter than normal winters, increased risk of flooding, and elevation of sea temperatures; while La Niña events bring cool, dry winters across the region.

The longest continuous weather record on Santa Cruz Island comes from the Central Valley, 3.1 miles upstream from the Project Area. Records from this weather station document amounts of rainfall at the Main Ranch since 1904. The average annual precipitation at the gauge between 1904 and 1993 is 19.9 inches; however there is high variability between years. The low annual rainfall during this period was 6.4 inches, and the high 56.2 inches. The standard deviation of precipitation between years for this period is 44% of the annual mean. Average maximum monthly temperatures in the Central Valley range from 59.8º F in January to 75.7º F in September, while average minimum monthly temperatures range from 39.3º F in January to 52.2º F in August, for temperatures recorded between 1948 and 2007. Although two remote automated weather stations were established on

Santa Cruz Island in 1990 and 2000, at the Main Ranch in the Central Valley and at Del Norte near Prisoners Harbor overlooking the ocean, no long-term precipitation- or temperature-recording weather station exists within the Project Area. Overall weather patterns at the Project Area are generally similar to weather patterns in the Central Valley, with precipitation and temperature extremes moderated by maritime proximity Table 3.1.

Table 3.1 Temperature and Precipitation on Santa Cruz Island

	Ave. Air Temperature (ºF)			**Ave. Precipitation (inches)**		
	Central Valley (1990-2008)	**Del Norte (2000-2007)**		**Central Valley (1904-2006)**	**Del Norte (2000-2007)**	
January	51.56	56.17		4.59	2.98	
February	52.50	55.62		4.56	4.25	
March	53.61	55.44		3.33	3.68	
April	55.88	56.29		1.23	1.40	
May	58.51	60.55		0.36	0.58	
June	61.45	62.06		0.08	0.05	
July	65.18	65.23		0.01	0.03	
August	65.24	65.49		0.04	0.05	
September	63.44	65.24		0.26	0.09	
October	59.78	61.94		0.53	0.90	
November	54.88	59.87		1.60	1.27	
December	50.76	56.46		3.38	2.54	
Annual	57.73	60.11		19.84	18.54	

Source: Air temperature data from Remote Automated Weather Stations (RAWS) near Main Ranch and Del Norte Ranch. Precipitation records recorded manually at the Main Ranch and by RAWS at Del Norte. Data from RAWS were not used when more than 3 days/month were missing.

3.1.4.2 Climate in the Future

Increasing concentrations of greenhouse gasses in our atmosphere are causing changes to global, regional, and local climate regimes. These changes will alter natural physical and biological processes in many predictable and unpredictable ways (IPCC, 2007). The scientific community expects that elevated concentrations of greenhouse gasses will cause 1) increased air and ocean temperatures, 2) sea level rise, 3) alteration in recurrence and intensity of extreme weather events, and 4) alteration in precipitation patterns. The first of these two affects may be relatively predictable: computer models of future climates generally agree that air/sea temperatures will be higher in the future, as will sea elevations. However, computer models generally do not agree about the frequency, distribution, and intensity of extreme weather events in the future. They also do not create consistent predictions of patterns in rainfall intensity and timing, other than agreeing that some or all snowfall precipitation will change to rainfall precipitation with warming temperatures. Computer models are also generally less predictive at regional and local scales than at continental and global scales. However, analysis of recent precipitation trends in the western United States show that human-induced climate change is already altering patterns in snowfall, rainfall, runoff, and air temperatures.

The Intergovernmental Panel on Climate Change (2007) reports that of the twelve years between 1995 and 2006, eleven are in the top-twelve warmest years on record in the instrumental record - since 1850. The linear warming trend for the years between 1956 and 2005 is 0.24 º F per decade, nearly twice the linear trend for the years between 1906 and 2005. Cold days, cold nights, and frosts are becoming less frequent throughout North America, while heat waves are becoming more common. Extreme precipitation events and droughts are also becoming more common. Although warming over land has been accelerating, 80% of the heat added to the climate system since 1961 has been absorbed by the world's oceans. This trend may reach a threshold at which point ocean heat-accommodation capacity will fall and terrestrial systems will absorb a higher percentage of warming.

Warming trends are expected to continue, if not accelerate, the future: the IPCC (2007) predicts warming of 0.36 º F per decade for the next two decades. Beyond that date warming would continue at 0.18 º F per decade if all greenhouse gas emissions were maintained at year 2000 levels. Under this scenario air temperatures would raise by as much as 1.62 º F by the end of the century. Alternate emission scenarios predict warming as much as 11.52 º F over the same period. These predictions are for global averages; however warming rates are greatest at the poles and over land in general, and have tremendous local variability. Humans' ability to predict future changes in precipitation patterns is improving, but still less competent than predictive abilities for temperature. Computer models suggest that Southern California may experience a 10% to 20% reduction in amount of precipitation.

Sea level has risen approximately 400 feet since the peak of the last ice age about 18,000 years ago. Most of that 400-foot rise occurred more than 6,000 years ago (Axelrod 1981). From 3,000 years ago to the start of the 19th century the rate of sea level rise was low and constant, however sea level rise has accelerated in the 20th century. This recent sea level rise is attributable to thermal expansion (57%), melting of continental glaciers and ice caps (28%), and losses from the polar ice sheets (15%).

Human understanding of the potential for positive and negative feedbacks between sea level changes and oceanic circulation is limited. Because of this, the IPCC explicitly declines to predict an upper bound for sea level rise. However, based on current understanding of ocean processes, the IPCC predicts mean global sea level rises between 0.6 feet and 2 feet over the next century, based on computer models under varying emission scenarios. Although many regions exhibit substantial variation from the mean, the IPCC concludes that most of the coastline of the contiguous United States closely follows the global mean. Some climate specialists such as Overpeck et al. (2006) believe that sea level rise could be much more rapid, accelerated by chaotic and rapid melting of polar ice sheets, resulting in seas 10 feet higher than at present within the century. However, the IPCC predictions are the most widely accepted, are considered the best scientific knowledge, and therefore are used for this analysis.

Habitat and landscape maps created for this document presume a 0.7-foot rise in sea level over the next 50 years - half of the moderate "B2" emissions scenario prediction for the year 2099 from the 2007 IPCC synthesis report. The lowest elevation in the wetland area is about 8.5 feet above mean sea level (Figure 2.2). Consequently, the project area is well above any anticipated rise in sea level.

3.1.5 Geology and Geomorphic Processes

3.1.5.1 Geologic Resources and Topography

The Northern Channel Islands are all part of an offshore extension of the Southern California Traverse Ranges, specifically, of the Santa Monica Mountains. These ranges have been subject to displacement, rotation, and uplift, all as a result of complex tectonic processes associated with the Pacific and North American plates (Atwater, 1998). The predominant structural feature on Santa Cruz Island is a major east-west trending fault, referred to as the Santa Cruz Island fault. This strike-slip fault, which plunges steeply to the north, cross-cuts the island, forming the Central Valley. Left lateral movement along this and other associated faults has displaced rock assemblages great distances from the south and east, resulting in rocks of varying age and lithology juxtaposed between the north and south portions of the island (Norris and Webb, 1976). Diablo Peak, which rises to 2450 feet, is part of this translated terrain as are the other aligned peaks of the northern Channel Islands, a submerged, western extension of the Santa Monica Mountains. With that, the Santa Barbara Channel is a submerged extension of the Ventura Basin (Harris and Tuttle, 1977).

The oldest rocks exposed on Santa Cruz Island are the Mesozoic Santa Cruz Schists, which primarily occur on the southern side of the island, forming an elongate ridge south of the Santa Cruz Island fault. On the northern side of the island, much younger Miocene strata rise to relatively high elevations. The Miocene assemblage includes a wide array of lithologies of both sedimentary and volcanic origin. The sedimentary strata ranges from coarse brecchia-conglomerates of the San Onofre Breccia to deep water diatomacaeous, dolomitic, and cherty shales of the Monterey Formation. The Miocene volcanics include andesitic, diabasic, and basaltic flows and contribute about 8000 feet to the geologic section on Santa

Cruz Island. Post Miocene rocks are primarily Pleistocene and younger marine and non-marine terrace deposits. On Santa Cruz Island, locally thick marine terrace deposits occur and alluvium fills most of the valleys to varying depths.

Through recent geologic history, repeated periods of uplift and substantial changes in sea level associated with glacial advance and recession have formed numerous marine terraces above and below present day sea level. Additionally, the uplift and changing in sea level with the corresponding changes in base level have resulted in deep incision of most of the islands drainages.

3.1.5.2 Soil Resources

On-site soil information specific to Prisoners Harbor was derived from 31 test pits excavated in 2004. The locations of these pits were chosen to characterize the depth and nature of fill material placed in the Cañada Del Puerto estuary over the last century or so. The pits generally reached depths of about four to six feet, and all appeared to contain a mixture of anthropogenic fill and natural channel and eolian deposits. In about one-half of the pits (15 of 31) a thin, organic rich layer was identified at depths ranging from about three to five feet. This very thin (1-2 inches) yet rather distinct layer was interpreted as an element of a former wetland soil. For the most part, excavation in undisturbed areas was avoided due to the likely presence of cultural material. However, three observation wells were installed in a wetland portion of the estuary. The soil at these three auger sites was typical of wetland environments.

3.1.5.3 Geomorphic Processes

As mentioned, the greatest thickness of rocks on Santa Cruz Island is the Miocene sedimentary and volcanic strata. These strata have been subjected to uplift and erosion as is evidenced by marine terraces at elevations reaching up to 1200 feet elevation (Harris and Tuttle, 1977). The combination of friable bedrock, extreme uplift, and intense thunderstorms has resulted in deeply incised canyons throughout the island.

Associated with the channel and valley formation is the generation of substantial amounts of sediment from the drainages and associated highlands. These processes were especially evident during the El Nino season of 1997-1998 when numerous soil slips and other mass wasting events took place throughout the Channel Islands. Ultimately, material from these slope failures reaches adjoining drainages becoming channel alluvium, where it is episodically transported downstream by high flows. Given the availability of sediment in the watershed and the low gradient of the Cañada del Puerto stream through Prisoners Harbor, it is surprising that more sediment aggradation has not taken place in this area. Qualitative assessment of the channel alluvium in the Prisoners Harbor area suggests that the predominant grain sizes range from fines (sand and silt) to cobbles. However, much coarser grained channel alluvium exists in upstream reaches. Inspection of aerial photographs and satellite imagery suggest that a great deal of sediment is being stored in the channel and floodplain of Cañada Del Puerto about 3000 feet upstream of the proposed restoration site. The reason for sediment deposition in this reach of the creek is unknown but may be related to the valley gradient.

Natural geomorphic processes in a pristine setting at Prisoners Harbor were primarily a dynamic equilibrium between tectonic, fluvial, and marine influences resulting in the formation of an estuary that probably approached ten acres or more. This dynamic equilibrium was greatly altered by human intervention in the form of stream channelization, berm construction, and wholesale filling of the estuary/floodplain system for agricultural purposes. Consequently, most of the wetland and floodplain habitats associated with this coastal estuary have been reduced to a fraction of their former size. The streamcourse has been re-directed to the east margin of the valley and is maintained in that alignment, at least in part, by the 300+ foot-long berm previously mentioned. The only location where a semblance of natural fluvial process still exists is near the terminus of the creek at the Pacific Ocean.

3.1.5.4 Shoreline Characteristics and Processes

The coastal embayment at Prisoners Harbor is a bar-mouth type of estuary. This kind of estuary system receives freshwater input from the watershed on either a regular or periodic basis, but marine input and processes are mostly excluded due to long-shore sediment transport that results in partial to complete blockage of the outlet. At Prisoners Harbor, there is both high wave energy and a great deal of available coarse-grained, marine sediment and, consequently, the outlet from Cañada Del Puerto Creek to the Pacific Ocean is generally blocked. As a result, conditions prevail where a pool of water forms at the terminus of Cañada Del Puerto Creek when hydrologic input exceeds evaporation and seepage to the ocean. The salinity of this pool varies from near fresh water immediately after runoff events, to brackish concentrations due to salt spray and air-borne cyclic salts. Apparently, when enough hydraulic pressure is exerted on the boulder bar from large streamflows, the boulder bar will fail, rapidly draining the pool. However, it appears that this is a very temporary condition as the boulder bar is quick to reform under prevailing conditions.

The overall hydraulic effect of the marine boulder bar is to reduce the gradient of the stream through Prisoners Harbor. Elevations surveyed on the boulder bar during the 2004 site visit indicate that the crest at that time approached and exceeded many of the ground elevations in the pasture areas. This gentle gradient through the site may result in low velocity, backwater conditions.

Current available data on sea level rise are not sufficient to predict the exact location of the boulder bar in the future. However, long-shore sediment transport, high energy wave action, and transport of coarse-grained marine sediment will continue in the event of sea level rise resulting in the continued formation of the boulder bar and freshwater pool. Additionally, groundwater well no. 15, located in the remnant wetland and less than 200 feet from the shore and boulder bar is approximately 9 feet above mean sea level (Figure 2.2 and Figure 3.2). A 0.7 foot rise in sea level is unlikely to result in a significant change in the location of the boulder bar. In contrast to mainland coastal wetlands where there is very little potential for the migration of habitats due to the constraints of human activity and infrastructure, at Prisoners Harbor, hydrologic conditions exists for the boulder bar and fresh water pool to form and migrate even in the event of greater climate change.

3.1.6 Land Use History

3.1.6.1 Pre-agricultural Period

Largest of the Channel Islands, Santa Cruz Island has supported a human population for more than 8,000 years. Before contact with people of European descent, this island supported the largest population of Island Chumash people who resided in at least eleven villages across the island. The Chumash maintained a village within the Project Area, *Xaxas*, which was probably the second largest village on the island and was occupied for about 5,000 years. Other prehistoric sites on Santa Cruz Island include shell mounds, chert quarries and workshop sites, rock shelters, and rock pavements ethnographically identified as shrines. Some of the rock shelters contain rock art of a simple style quite distinct from that known on the mainland. Formal cemeteries are found close to many villages, especially later sites, and isolated, seemingly random, human burials are recorded for the island as well. The potential number of burials ranges into the tens of thousands. The Chumash supported their large community on the island through terrestrial and marine hunting, fishing, utilization of terrestrial and marine plants and algaes, and trade with communities on other islands and on the mainland.

The Santa Cruz Island Chumash may have first encountered non-Californian people during Spaniard Juan Rodríguez Cabrillo's expedition in 1542. During the next two centuries the island was observed only sporadically by non-Californians. In 1769 the Gaspar de Portolá expedition visited Santa Cruz Island, and claimed ownership of the island for the King of Spain. Members of the Portola expedition were the first recorded Europeans to set foot on the island; they gave the island the name it is known by today.

Documentation of contact between Island Chumash and early European travelers during the late 18th century is sparse, but by the early 19th century outbreaks of measles had decimated Channel Island villages. During the first two decades of the 19th century Spanish and Mexican missionaries encouraged residents of the Santa Cruz Island villages to relocate to missions on the mainland. In 1804 *Xaxas* was a community of 124 people; by the late 1820s no Chumash lived on Santa Cruz Island.

After the decline of the Island Chumash communities on the island, Santa Cruz became largely unpopulated, visited only by mariners and hunters who left some sparse physical evidence of their travels. In the 1830s the island was used briefly - and unsuccessfully - as a penal colony by the Mexican government. This short episode gave the island's main port the name Prisoners Harbor.

3.1.6.2 Early Agricultural Period

After failing at its attempt to employ its lands as a prison, in 1839 the Mexican government deeded Santa Cruz Island to the Alta Californian politician and landowner Captain Andres Castillero. By 1853 Castillero had introduced livestock to the island via his agent Dr. James Barron Shaw. Shaw wrote of his activities on the island: "I have . . . placed cattle, horses, and sheep on [Santa Cruz Island]; built houses on it and made canals and cut roads on it." Castillero had also introduced pigs to the island the previous year; these went feral shortly after their arrival on Santa Cruz. A mid-19th century visitor described the island's hillsides as: "covered in oaks, pines, and chaparral; the latter has several times saved the livestock from starvation, serving as browsing grounds on the dry seasons."

By 1852 the first known European-style residence - a frame house - had been constructed at Prisoners Harbor. By 1857 island managers had converted over 200 acres of floodplain and riparian habitat to orchards and grain fields on the island. Sheep ranching on the valley bottoms and hillslopes intensified during the 1850s; one 19th century writer noted that "most" of the mutton consumed in Los Angeles during this decade was produced on Santa Cruz Island.

Dr. James Barron Shaw continued to manage the island rancho as agent for Castillero and the island's subsequent owners, the Barron and Forbes Company until 1869, developing several ranch outposts and the infrastructure that linked them. In 1869 ten San Francisco investors purchased the island and formed the Santa Cruz Island Company. Justinian Caire, a Frenchman and one of the ten investors, acquired the majority of the shares in the Santa Cruz Island Company during an economic downturn in the 1870s and became sole owner of the island by the end of the 1880s or early 1890s. Caire and his descendants continued and expanded the sheep ranching and agricultural enterprises on the island.

Most of this agricultural activity concentrated in the Central Valley, although Prisoners Harbor persisted as the main dock for travelers and livestock. The earliest known image of the island is of the Central Valley: in 1855 an artist with the US Coast Survey created a watercolor sketch of the pastoral valley, livestock paddocks, and ranch buildings. The main ranch included a residence, bunkhouses for winemakers, shepherds and vaqueros, barns, winery buildings, a dining hall, bakery, laundry, kitchen, shops for wagon makers, blacksmiths and tool and saddle makers, and a chapel. Substantial acreage was planted in grapevines, hay and fruit trees.

Caire's island workforce consisted primarily of French, Italian, Hispanic and Native American workers, reflecting Caire's French origins, his wife's Italian heritage, and the local population. The island operation was a largely self-sustaining community that supported a diversity of permanent and seasonal employees, which included a blacksmith, carpenters, painters, team drivers, dairymen, cooks, stone cutters and masons, gardeners, dairymen, vintners, grape pickers, sheep shearers, wagon and saddle makers, a cobbler, a butcher, a baker, and a sea captain and sailors.

In 1856 the Survey created a detailed map of Prisoners Harbor. The map showed the site with two buildings near the beach, but no pier.

3.1.6.3 Late Agricultural Period

Justinian Caire died in 1897; his widow's unequal distribution of company shares among their six children led to family disagreements and a prolonged period of litigation. Ultimately, the dispute was settled by a court-ordered partition of the island in 1925, which divided the island into parcels with the western 90 percent (54,500 acres) of the island going to Caire's widow and four of their children, and the eastern 10 percent (6,000 acres) going to the two married Caire daughters. The Caire family maintained the western portion of the island until 1937, when they sold their land to Los Angeles businessman Edwin L. Stanton. Stanton attempted unsuccessfully to revive the island's sheep business which had declined dramatically after Justinian Caire's death, and then switched to cattle ranching. Edwin Stanton's son and heir, Carey Stanton, continued the cattle ranching operations after his father's death in 1963.

The east end of the island remained in the hands of the Caire descendants, consolidated under the ownership of Ambrose and Maria Gherini. They continued the sheep ranching operation, with headquarters at Scorpion Ranch and Smuggler's Cove, the two east end satellite ranches. The ranch operations were overseen by a series of superintendents and caretakers until the island was converted to a private hunting, camping and recreational venture in the early 1980s.

3.1.6.4 Conservation Period

In 1978 The Nature Conservancy secured permanent protection of the property from Carey Stanton; the Conservancy gained full control of the property upon Stanton's death in 1987. In 1997 the National Park Service acquired full ownership of the east portion of the island, in order to manage and protect it as part of Channel Islands National Park. In 2000 The Nature Conservancy donated 8,000 acres of its holdings on Santa Cruz Island to the National Park Service. Called "the isthmus" this acreage includes Prisoners Harbor.

3.2 Physical Resources

This section includes descriptions of the physical resources of the Project Area, and also physical resources of Santa Cruz Island and the Channel Islands in general where applicable. In particular, for data that do not exist specifically for the Project Area, this section describes conditions documented elsewhere on Santa Cruz Island or presents current understanding of conditions based on a composite of data from multiple sites in the park or region. Topics covered in this section include hydrologic function, wetlands, and water quality.

3.2.1 Water

3.2.1.1 Hydrologic Function

3.2.1.1.1 Surfacewater

The reach of Cañada del Puerto Creek through the site is an intermittent stream that drains a watershed of about 13 square miles. The upper watershed extends into the Central Valley of the island and includes bedrock exposures, upland soils of varying quality and thickness and alluvium/colluvium. As mentioned, the bedrock is composed of a wide array of formations. Overall, most of the formations are poorly indurated and capable of providing large quantities of sediment to the river systems on the island. A few bedrock outcrops exist in the channel but most of the channel and banks (including the entire lower reach) are composed of alluvium.

No substantial bedrock aquifers are known to exist on Santa Cruz Island, and therefore, baseflow to the streams is minimal and provided primarily by storage in the valley alluvium. The lower reaches of the creek flow only in response to rainfall. Intense frontal storms, characteristic of this region, are capable of producing substantial runoff, and consequently, large flow events are relatively common in the rainy season.

3.2.1.1.2 Floodplain Processes

Storms in the winter of 1961-62 caused damage to the Navy road and the historic adobe at Prisoners Harbor. At the creek draining into Prisoners' Harbor, the Navy proposed construction of a cribbing barricade to prevent winter runoff from overflowing the banks into the corral area. The road crossing at that location was examined as well, with a concrete apron eventually being installed across the creek to the base of the Navy Road (Livingston, 2006). The existing 300'+ berm, likely constructed at this time, is composed of channel alluvium and not built to any design specifications, as is evidenced by an uneven crest and overly steep side slopes. Regardless of the lack of design, the berm serves to contain higher magnitude flows in the channel up to discharges that may approach the 100-year flood. At some high flow level, water will breach the channel at the road crossing and proceed northwest towards the corrals and the coast. The warehouse is located west of the creek with an elevation of about 12.8 feet at the building corners, near the predicted elevation of a 100-year flood. After breaching the road crossing, floodwaters tend to flow north into the corral area before reaching the warehouse. This has occurred on at least one occasion during an extreme period of precipitation in 1997-98. During that event, several small, yet well defined channels were cut into the pasture fill.

3.2.1.1.3 Alluvial groundwater

As mentioned, no substantial bedrock aquifers are known to exist on Santa Cruz Island so practically all groundwater is contained in alluvial aquifers. Very little specific information was known about the characteristics of the alluvial groundwater in the area of Prisoners Harbor until recently. In December 2004, eighteen shallow wells were installed throughout the proposed wetland restoration site to monitor daily, seasonal, and interannual variations in water table depth and salinity (Figure 3.2). Fifteen wells were installed in the filled estuary. Three more wells (numbers 15-17) were located in relatively undisturbed wetlands immediately adjacent to the filled area, including willow, bulrush, and transitional wetland communities. Water levels were measured approximately bi-weekly from November 2005 to March 2007, and less frequent monitoring has continued through 2008. On many monitoring dates, the wells were read multiple times over a tide cycle to determine how tides influenced the water table.

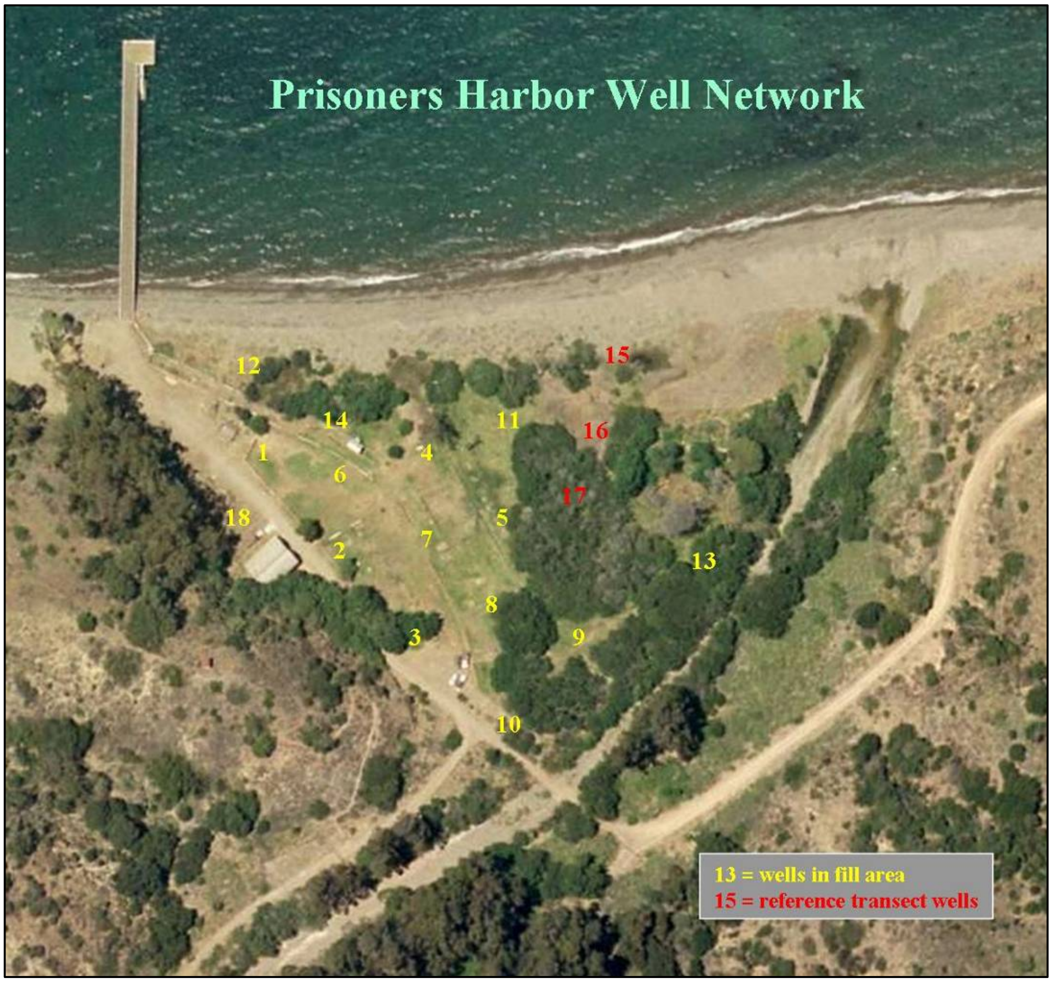

Figure 3.2 Prisoners Harbor Well Network

Salinity was measured to determine if it would be a factor in selection of plants for restoration.

Data from November 2005 to October 2006 are useful for examining seasonal water table fluctuations (Figure 3.3), flow sources and directions, and depths to water below the fill material at Prisoners Harbor. This twelve month period had a total of 16.64 inches of rainfall at the Santa Cruz Island Central Valley station. Although this is somewhat lower than the long-term annual mean of 19.9 inches, it is still considered reasonably characteristic for the site. During this period, water levels in all 18 wells fluctuated in a very similar pattern. All rose steadily in response to wet season rain events and peaked in May, and all followed a very similar pattern of steady decline once rainfall stopped in June. Water table fluctuations in the filled areas and in the adjacent, undisturbed (unfilled) wetland areas were very similar in nature. The ranges of fluctuation in all wells were approximately 1.5 - 2.0 feet over the 12 month period. Tidal influence on the water table was minor (typically 0.0 - 0.2 ft over a tide cycle), although wells nearest the coast occasionally fluctuated as much as 0.4 ft. during the driest summer periods when hydrologic gradients near the coast are greatest. Salinity remained in the fresh water to slightly brackish range.

The water table data indicate that the Cañada del Puerto valley upstream is the primary source of ground water for Prisoners Harbor throughout the year, although hillslope runoff from the west appears to affect the westernmost wells after large rain events. Ground water levels were always highest at wells 9 and 10, which are located where the narrow stream valley opens onto the much broader Prisoners Harbor coastal plain. From there, the water table slopes steadily toward the ocean across the site.

In the filled areas, depth to water during November 2005 to October 2006 averaged approximately 2-3 feet below the ground surface across the site. In the adjacent undisturbed wetland areas, water levels fluctuated seasonally above and below the ground surface, as would be expected for wetland communities.

Fewer water table measurements were made during November 2006 to May 2008, as shown in Figure 3.3. The very low water levels in December 2006 – February 2007 represent a very rare situation – the lowest annual rainfall year on record. However, wet season data from 2008 indicate a quick recovery to water levels comparable to the 2006 wet season.

Overall, the water level data indicate that the filled areas at Prisoners Harbor have a very high potential for wetland restoration. The site has a reliable water source very near the ground surface, with a narrow range of fluctuation during the November 2005 - October 2006 period. Average excavation of only 2-3 feet of fill would re-expose the water table and re-create wetland conditions at the new surface. Also, unfilled wetlands immediately adjacent to the filled areas, including willow, bulrush, and transitional wetlands, have water table dynamics and water sources that are very comparable to the filled areas. Therefore, they can be used as "reference" wetlands and serve as models for how to excavate the filled site to create comparable wetland habitats.

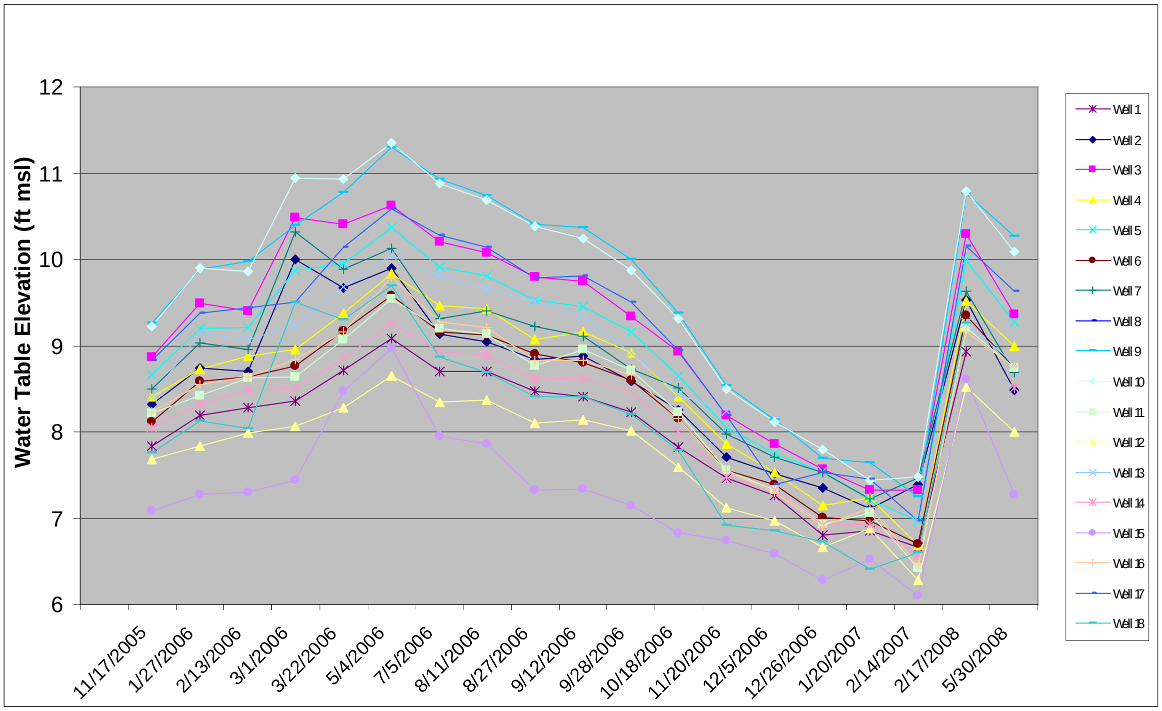

Figure 3.3 Ground Water Surface in Feet Above Mean Sea Level at Prisoners Harbor. Ground water elevation rises in the rainy season and drops in the dry season.

3.2.1.2 Wetlands

3.2.1.2.1 Types of wetlands in the Project Area

Before significant landscape modification in the 19th and 20th centuries, the Project Area supported about 12 acres of wetland habitat. Based on 19th century maps of the site and recent soil pits examining buried wetland soils, the site's wetland complex appears to have included a brackish water to freshwater estuary at the mouth of Cañada del Puerto which opened occasionally onto the Santa Barbara channel; a floodplain wetland west of and including the existing stream channel, and northeast of and including the dock access road. Existing wetland conditions persist today on approximately 6.5 acres, including the intertidal beach and extending into a portion of the corral and pasture areas. Wetlands within the Project Area provide a vital link between land and open sea, exporting nutrients and organic material to ocean waters.

A large proportion of California's coastal wetlands are estuarine salt marshes with associated tidal channels and mudflats. However, the Project Area supports a more rare type of coastal wetland, a freshwater floodplain marsh and associated stream channel. Like salt and brackish-water marshes, the freshwater system at Prisoners Harbor is vegetated mostly with herbaceous plants. Within the Project Area these are predominantly freshwater species such as cattail (*Typha domingensis*), bulrush (*Scirpus californicus*) and willow (*Salix lasiolepis*), with only a small population of salt-loving plants such as saltgrass (*Distichlis spicata*). Coastal freshwater marshes have mineral soils that are less fertile than those of salt marshes, but they exhibit a greater variety of plant species than do salt marshes.

The Project Area supports three types of wetlands, as categorized by the Cowardin (Cowardin *et al.* 1979) classification system: Marine, Palustrine, and Riverine wetlands (Figure 3.4; Appendix D). Along the beach within the Project Area, the boulder bar consists of Marine Intertidal Rocky Shore habitat. This habitat supports little or no vegetation, as it is regularly subjected to ocean spray and wave overwash during higher tides. Above the shoreline the habitat is palustrine (marsh) habitat, which is characterized by a dense willow, forb, and grass canopy. Palustrine wetlands in the Project Area can be further categorized in to three sub-classes: Palustrine Emergent Persistent wetlands, Palustrine Scrub-Shrub, and Broad-Leaved Deciduous wetlands, and Palustrine Forested Broad-Leaved Deciduous wetlands. The remaining wetland within the Project Area is Riverine habitat. This habitat is comprised of the stream channel itself, as defined by side slopes and a channel bottom, classified as Riverine Lower Perennial Rock Bottom. The stream channel is scoured frequently by winter storms. Annual herbaceous plants establish in late spring and summer with low cover (less than 5% canopy), and then are scoured out annually by winter floods.

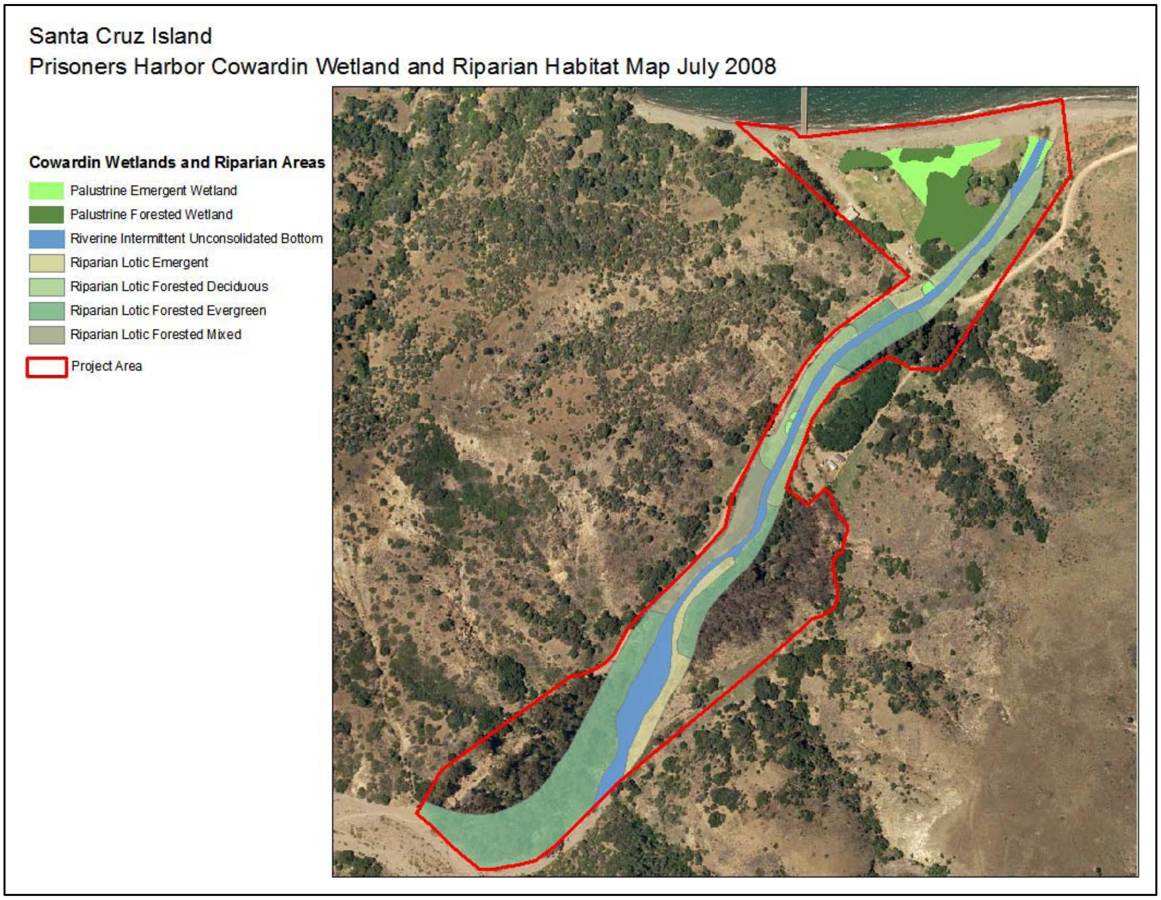

Figure 3.4 Cowardin Wetlands and Riparian Areas at Prisoners Harbor and Lower Cañada del Puerto.

3.2.1.2.2 Wetland functions

Wetland functions are those ecosystem services that wetlands provide to promote natural ecological processes. These include nutrient cycling, floodwater storage, wildlife habitat, drought mitigation, and others. Wetland functions are sometimes also referred to as "wetland values" and described as ecosystem services particularly valuable to human societies, such as sequestration of carbon and retardation of stream channel erosion. Sequestration is the removal of carbon dioxide from the atmosphere by photosynthetic assimilation of carbon dioxide from the atmosphere and sequestration of the carbon in highly-organic wetland soils (Brix et al. 2001). Wetlands can also produce methane and nitrous oxides, which are highly-potent greenhouse gasses. Whether or not wetland restoration activities are neutral, detrimental, or beneficial to the accumulation of greenhouse gasses in the atmosphere and their impact on climate may depend on the type of wetland established post-restoration; this question is currently the focus of research projects around the world.

Wetland functions are associated with specific wetland types - for example, coastal freshwater wetlands have a particular and unique set of functions which include floodwater retention and habitat for migrating birds (Tiner 2003). Ecologists and managers also measure wetland functions directly - generally with intensive, quantitative protocols directed at a limited number of sites. For example, bird density, number of rare plant populations, or annual net sediment storage may be interpreted as metrics of wetland function.

Wetlands at Prisoners Harbor today almost certainly have reduced functionality in comparison to habitats at the site prior to 19th and 20th century alterations. The approximately 12 acres of wetlands present at the harbor provided better habitat for wetland-dependent species and other island fauna not merely due to the larger habitat extent, but also because the larger pre-historic wetlands almost certainly supported a much greater diversity of wetland habitats than exist at the site today. These habitats most likely included open water habitat, marsh wetlands dominated by short perennial herbaceous plants, marsh wetlands dominated by cattail and tule, seasonally dry creek bed and associated riparian forest, non-vegetated lagoon habitat, non-riparian willow scrub habitat, and transitional zones between these habitats. Greater diversity and interzonation of wetland habitats at the site would have supported greater diversity and abundance of native flora and fauna.

In addition, the greater pre-historic wetland extent provided greater capacity and diversity of physical ecosystem services for biota. At Prisoners Harbor these would have included nutrient retention and cycling and organic soil development.

3.2.1.2.3 Alteration of
wetlands at Prisoners Harbor

Lower Cañada del Puerto creek was dredged in the late 19th or early 20th centuries to create a deep channel for an approximate distance upstream from the beach and bar of greater than 1,500 feet, by 40 feet wide, in order to confine and control the creek flows along the east bank. The dredge spoil has been piled to create berms on either side of the channel. A review of historic information suggests that the original stream channel was shallow and spread approximately 75 to 100 feet wide across most of the floodplain in the area above the main road crossing and adjacent to the pump-station area. Approximately 50 percent of the original wetland area has been filled or dredged. Historic photographs show the area as having been mud-flat, which may have been denuded by livestock.

Historic photographs and documentation show workers shoveling fill (spilled from a one-ton mining car that moved on a temporary rail-track system) into what used to be a floodplain wetland that is occasionally influenced by salt water (Figure 3.5). Based on field sampling, the fill material is coarse sand and gravel and was likely dredge material taken from the river channel and material extracted from the adjacent hillslopes.

Over the years, it appears as though some of the fill closest to the beach and bar has been eroded by stream flooding and intertidal events. The remaining fill area is now the corral and most of the surrounding area. The original pre-20th century marsh surface varies from approximately 1 to 4 feet below the present-day land surface.

Figure 3.5 Photo Looking North East at Prisoners Harbor circa 1880. Courtesy of Santa Barbara Museum of Natural History.

3.2.1.3 Water Quality

Very little specific water quality information exists for Cañada Del Puerto Creek in Prisoners Harbor. However, based on knowledge of geology and land-use in the watershed, some reasonable conclusions may be made about the general water chemistry regime. Although previously subjected to intensive agriculture, at the present time the vast majority of the watershed is in a near natural state. Consequently, we would expect the prevailing surface water chemistry be the result of interaction between precipitation, soils, biota and bedrock. Major and minor ion chemistry is likely reflective of relatively dilute precipitation influenced by contact with slightly reactive sedimentary and igneous bedrock and associated soils. It is unlikely that high concentrations of metals, organics or other contaminants ever occur. Near the outlet to Cañada Del Puerto Creek in Prisoners Harbor, there is an additional marine influence on water quality. Cyclic salts and occasional overwash may increase salinity levels to slightly brackish for surface and shallow groundwater, especially in the dry season.

One water quality parameter that could be affected by the project is sediment concentration. Under natural conditions, the combination of variable bedrock geology, steep slopes, degraded soil structure due to historic over-grazing, and intense precipitation events, may result in the generation of large quantities of sediment within the watershed. These sediment events are highly episodic and are influenced by a combination of meteorologic, geologic, biologic, and fluvial factors, and therefore, are not definitively predictable.

Sediments in the Prisoners Harbor area are primarily a combination of river alluvium, marine deposits, and anthropogenic fill. The fill material rages in size from silt and sand to large cobbles. The marine deposits are most obvious at the beach margin where a relatively large cobble/boulder bar is formed by persistent wave action. The river alluvium observable in the channel and banks of the creek is on the small side, ranging from fines to small/medium cobbles. This is somewhat of a surprising gradation given the availability of much larger grain sizes in the watershed. Inspection of aerial photographs and satellite imagery indicate that a large amount of fluvial sediment is being stored in the channel and floodplain of the creek just upstream of the project area. The reason for this storage is not clear but may be related to valley gradient changes, encroachment of riparian vegetation, or both.

Throughout the project area, well developed riparian vegetation provides shade and cover to the stream corridor buffering the temperature regime of the surface water. In the lower reaches, this vegetation is primarily native woody species. In the upper reaches, however, a large portion of this riparian vegetation is made up of mature eucalyptus trees.

3.3 Biological Resources

This section describes the biological resources of the Project Area, including wildlife and vegetation that may be affected by the proposed project.

Wildlife and vegetation patterns are described for the Channel Islands and Santa Cruz Island in general where appropriate - for example, to portray broad-scale patterns of vegetation and describe wildlife populations and assemblages that are not confined to the Project Area. Additional descriptions are provided for special status species found in the Project Area, and for vegetation and wildlife assemblages observed there. Topics covered in this section include non-avian vertebrates (including special-status species), birds (including special-status species), invertebrates, native vegetation communities; special status plant species; and non-native vegetation.

3.3.1 Wildlife

Santa Cruz Island supports fewer animal species than mainland areas of comparable size, because only a subset of the mainland fauna successfully colonized the island. However, the island's isolation from mainland populations created a fauna that includes many species only found on the Channel Islands or only on Santa Cruz Island. In general, island fauna are species-poor, because the low frequency of colonization of islands by either a breeding pair or gravid female. In addition, island animal species are at high risk of extinction relative to their mainland cousins because small founder populations can result in poor genetic resilience, and because natural and anthropogenic disturbances can cause high rates of mortality within small and localized populations.

3.3.1.1 Birds

Fifty-one species of landbird are known to breed on Santa Cruz Island (Diamond and Jones 1980), and dozens more visit the island to forage or rest on migratory journeys. Eight of island-breeding birds are subspecies endemic to two or more of the Northern Channel Islands, while one bird - the Island scrub-jay (*Aphelocoma insularis*) - is endemic to Santa Cruz Island. During 2008, a spring breeding bird survey was conducted in the Project Area. Twenty-eight bird species were observed in the project area during the spring survey (Table 3.2). All species have been reported during breeding season in other locations on the island (Diamond and Jones, 1980) Observation stations were dominated by either native vegetation or non-native eucalyptus trees. Native vegetation in the project area (stations 2, 3, 5, and 7) supported the greatest abundance and diversity of bird species and stations located in areas dominated by non-native eucalyptus trees (stations 1, 4, 6, and 8) supported the lowest abundance and diversity of bird species (Table 3.2).

Table 3.2 Bird species observed in the project area during an 8-station, circular count spring bird survey.

Common Name	Station								Total
	1	2	3	4	5	6	7	8	
Acorn Woodpecker								3	3
Allen's Hummingbird		1	1	1	4	3	7	5	22
Anna's Hummingbird		3	4	2	1		2	1	13
Ash-throated Flycatcher			2	2	1		1	1	7
Barn Swallow	12	9	19		2				42
Belted Kingfisher	1								1
Bewick's Wren	3	2	2	4	6	7	9	9	42
Black Phoebe			4			1	2		7
Black-headed Grosbeak					1	2			3
Brown Pelican			2						2
Bushtit		10					3		13
Chipping Sparrow							1		1
Common Raven	4	7	4	2		2	1		20
House Finch		2	7	14	1		5	7	36
Hutton's Vireo					1				1
Island scrub-jay		1	1	2	1		1	1	7
Killdeer							1		1
Lesser Goldfinch		1	2						3
Mallard	3				20				23
Northern Flicker					1		2	2	5
Orange-crowned Warbler	3	11	2	5	3	2	7	3	36
Pacific-slope Flycatcher					1	3			4
Red-tailed Hawk	1								1
Rufous-sided Towhee					5		4		9
Sharp-shinned Hawk	1								1
Song Sparrow	7	1	6	1	4	4	7	2	32
Western Gull	2								2
Yellow-rumped Warbler		1							1

Total # individuals	37	49	56	33	52	24	53	34	
Total # species	10	12	13	9	15	8	15	10	

Source: Data from Lyndal Laughrin, Director University of California Santa Cruz Island Natural Reserve.

Coastal California is part of the Pacific Flyway - one of the four principal bird migration routes in North America. During peak annual migration periods, hundreds of thousands of birds migrating along the flyway descend upon coastal wetlands, including those on the Channel Islands, in search of refuge and food. Although relatively few bird species are year-round residents, many species temporarily inhabit coastal marshes during their annual migrations. During the spring and fall months in previous years, waterfowl such as brant, pintails, and mallard, and shorebirds such as stilts, plovers, and gulls, which stop here to rest, feed, and in some cases over winter have been observed in the Project Area. A fall bird survey conducted during 2008 identified two sea bird species in the Prisoners Harbor area, brown pelican and western gull.

Several species observed on the island have special legal status under federal or state endangered species laws. Special status species observed near or within the Project Area (Table 3.2) are described in greater detail below.

3.3.1.1.1 Island scrub-jay

The Island scrub-jay (*Aphelocoma insularis*) is found only on Santa Cruz Island. This bird is distinguished from its close cousins - the Western scrub-jay and Florida scrub-jay - by its deeper blue coloring, larger body, and highly inquisitive behavior. The jay breeds in coast live oak woodland or chaparral with a high scrub oak component, and forages in wooded habitats throughout the island, and in the Project Area particularly within the arroyo willow riparian forest. Breeding pairs forage for seeds and invertebrates within established territories. Nesting peaks during the last two weeks in March - coinciding with flowering of chaparral plants and associated arthropod abundance. Birds build stick nests in brush and trees from heights ranging from ground level to 40 feet, and produce two to five eggs per nesting pair. Eggs are subject to heavy predation from vertebrate predators, including common raven, Island fox, Island spotted skunk, and even other Island scrub-jay.

Island scrub-jays are observed within the Project Area by many visitors to Prisoners Harbor. Recently, observations of scrub-jays in the project area have substantially declined. Studies are underway to better understand the population numbers, habitat use, and distribution is Island scrub-jays. During the 2008 spring breeding bird survey a total of 7 birds were observed in the Project Area from 6 of 8 observation stations.

A potential threat to the Island scrub-jay is West Nile Virus, a mosquito-borne disease commonly found in Africa, Asia, and the Middle East. An infected mosquito can bite any animal, but not all animals will become sick. The disease most often affects birds but may occasionally cause disease in other animals. Wild birds serve as the main source of virus for mosquitoes. Infection has been reported in more than 225 bird species. Although many birds that are infected with West Nile Virus will not appear ill, West Nile Virus infection can cause serious illness and death in some birds. The most severe illnesses are seen among the corvid birds, which include crows, jays, ravens, and magpies. No case of human, animal, or bird infected with West Nile Virus has been reported from any islands in the Park.

3.3.1.1.2 Snowy plover

Western snowy plover (*Charadrius alexandrinus nivosus*) - a federally listed threatened species - breeds on beaches from Washington State to Baja California. This bird is threatened primarily due to loss of breeding habitat to human disturbance and invasive dune plants. Most Western snowy plovers return to the same site in subsequent breeding seasons to breed on beaches above the mean high tide line, particularly on dune-backed beaches near estuaries and at river mouths. Their nests typically are shallow scrapes or depressions on the ground on flat, open areas with sandy or saline substrates, where vegetation and driftwood is sparse or absent. The nesting season extends from early March through September, with peak nesting between mid-April and mid-August. Chicks reach fledging age about one month after hatching. Adults forage for invertebrates primarily along the water's edge. On the Channel Islands these birds forage in the wet sand and amidst surf-cast kelp in the intertidal zone and in dry, sandy areas above the high tide. In the non-breeding season snowy plovers are found on many of the beaches used for nesting as well as on beaches where they do not nest, and on estuarine sand and mud flats.

Channel Islands National Park is one of the few locations in southern California that supports breeding and wintering populations of western snowy plovers. Forty to fifty percent of the nests on the islands have been found in backdunes, about 490 to 980 feet from the shoreline. In the 1990s Santa Rosa and San Miguel Islands had both breeding and wintering populations, but numbers have declined precipitously recently. A few birds also lived on The Nature Conservancy portion of Santa Cruz. No snowy plovers have been observed in the Project Area.

3.3.1.1.3 Brown pelican

Brown pelicans (*Pelicanus occidentalis*), are protected by the 1918 Migratory Bird Treaty. DDT in their food supply reduced their numbers in the 1970s and they became protected under the federal Endangeres Species Act. They have recently been proposed for federal and state de-listing. They are observed commonly within the Project Area, particularly bathing in the terminus of Cañada del Puerto and resting and preening on the nearby boulder bar. Brown pelican launch from the Project Area to hunt for fish – primarily northern anchovies (*Engraulis mordax*) - in waters just north of the Project Area. Adult birds have wingspans of over six feet, and weigh up to eleven pounds, with males slightly larger than females. Adults have few terrestrial predators, however, eggs and chicks are at risk from mammalian predators. On Santa Cruz Island predators may include Santa Cruz Island fox and island spotted skunk. Breeding pairs build ground nests of sticks in March and April and hatch about three chicks per pair; nesting has not been observed within the Project Area, however these birds nest sporadically nearby off Santa Cruz Island at Scorpion Rock.

Brown pelican were listed as federally endangered in 1970 due to population declines caused by exposure to the chemical DDT. After the United States banned use of DDT in 1972, pelican populations experienced tremendous recovery, and the species is now under consideration for de-listing by the US Fish and Wildlife Service. Ongoing threats to species viability include completion with humans for sardines, entanglement with fishing equipment, disease due to overcrowding in higher-quality habitat, and unnatural climate variation.

The range for the species extends from the Gulf of California to British Columbia; no critical habitat for this species has been designated. Pelicans are rarely observed inland or far out to sea. A 1983 Recovery Plan for the species is now outdated and has not been replaced.

3.3.1.1.4 Bald eagle

Santa Cruz Island once supported stable permanent populations of bald eagles (*Haliaeetus leucocephalus*), however in the by the mid 20th century the pesticide DDT had brought the species to the brink of extinction. By the mid-20th century bald eagles had been extirpated from Santa Cruz Island (Kiff 1980). Before their expiration, Santa Cruz Island had supported at least five pairs of bald eagles, which nested in trees and on sea cliffs. Known nesting areas included Pelican Bay, San Pedro Point, Blue Banks, Valley Anchorage, Chinese Harbor, Potato Harbor, and Middle Grounds.

A ban on use of DDT in the United States in 1972 and listing of the bird under the federal Endangered Species Act in 1967 supported recovery of the species from 417 nesting pairs in 1963 to over 9,000 breeding pairs by 2007. The bald eagle was removed from the federal Endangered Species Act in 2007, due to its recovery; however the species is still protected by the federal Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act.

Bald eagle is the only eagle endemic to North America. Adult bald eagles are recognized primarily by their large size - wingspan can exceed 80 inches – dark body and underwings accompanied by a stark white head and tail. Juveniles of up to four years old lack the crisp white head and tail markings of adults, and are generally dark with mottled white patches on head, tail, and underwings. Bald eagles are hunters, fishers, and scavengers, and occasionally hunt and forage cooperatively. Birds generally forage and nest near seashores, rivers, estuaries, and palustrine wetlands.

Bald eagles were reintroduced to Santa Cruz Island beginning in 2002 through cooperative efforts of non-profit and governmental entities. As a result of this effort, bald eagles hatched on Santa Cruz Island for the first time in half a century in 2006. Adult and juvenile eagles have been observed in the northwest portion of the Project Area, in the riparian forest above the mouth of Cañada del Puerto.

3.3.1.2 Mammals, reptiles, and amphibians

Eight species of reptiles and amphibians inhabit Santa Cruz Island (Table 3.3). Three of these are endemic to either Santa Cruz Island or the Channel Islands: the Channel Islands slender salamander, the island fence lizard and the Santa Cruz gopher snake. All of the amphibian and reptile species known from Santa Cruz Island have been found in Cañada del Puerto (Charles Drost, email to Paula Power September 15, 2008). Of the fifteen species of mammals that have been observed on Santa Cruz Island, eleven are bats. Of the four non-bat mammals on the island, two are endemic to Santa Cruz, and the other - the island spotted skunk - occurs only on Santa Cruz and Santa Rosa Islands. Although the marine environment in the Santa Barbara Channel just north of the Project Area supports an abundant and diverse marine fish assemblage, the fresh waters of Cañada del Puerto and Santa Cruz Island do not support permanent fish populations.

Several non-avian vertebrate species on the island - including some island endemics - have special legal status under federal or state endangered species laws. Endemic or special status species that have been observed near or within the Project Area (Table 3.3) are described in greater detail below.

3.3.1.2.1 Santa Cruz Island fox

The island fox (*Urocyon littoralis*) is the largest of the Channel Islands' native mammals. A descendent of the mainland gray fox, the island fox evolved into a unique species over 10,000 years ago. The island fox has similar markings to its ancestor, but is one-third smaller. Environmental and ecological factors such as drought or food scarcity may have contributed to the natural selection for a smaller size. At 12 to 13 inches in height and 4 to 5 pounds, the island fox is about the size of a housecat. Island foxes have gray coloring on the back, rust coloring on the sides, and white underneath. The face has distinctive black, white, and rufous-colored patterns.

Island foxes are distributed as six different subspecies, one on each of the six Channel Islands on which they occur. Each population is small, ranging from less than a few hundred to a few thousand individual animals. Foxes from separate islands are still capable of interbreeding, but are physically and genetically distinct enough to be recognized as separate subspecies. Subspecies are named for their island of origin. The subspecies endemic to Santa Cruz Island is *U. littoralis santacruzae*. Due to its limited range and small population numbers, the subspecies was listed as a threatened species under the California Endangered Species Act in 1987.

Island foxes occur in virtually every habitat on the Channel Islands, and forage for a wide variety of prey (Moore and Collins 1995), including mice, ground-nesting birds, arthropods, and fruits. Fox home range size varies by habitat type, season, and gender of the animal (Faucett 1982; Laughrin 1977; Crooks and Van Vuren 1995; Thompson et al. 1998; Roemer 1999).

The fox population on Santa Cruz Island declined disastrously in the late 1990s from about 2,000 individuals on the island in 1994 to perhaps less than 135 animals in 2000 (Roemer 1999). This decline was probably due to predation by golden eagles (*Aquila chrysaetos*) (Roemer 1999; Roemer et al. 2001) which were unnaturally sustained on the island by non-native feral pigs. Recent removal of golden eagles and elimination of feral pigs from the island and a successful fox captive breeding and reintroduction program is resulting in recovery the Santa Cruz Island fox population. About 300 reintroduced foxes inhabit the island today, and their population is increasing. The US Fish and Wildlife Service believe this project will support the Santa Cruz Island fox (US Fish and Wildlife Service, 2008). Proposed Avoidance Measures for the island fox during implementation of the project are described in Chapter 4.

3.3.1.2.2 Santa Cruz Island deer mouse

The deer mouse (*Peromyscus maniculatus*) occurs on all 5 islands in Channel Islands National Park. The species is further divided into subspecies with a separate subspecies on each island. The Santa Cruz Island deer mouse (*Peromyscus maniculatus* subsp. *santacruzae*) has been observed in the Project Area and throughout the island. In a survey conducted between 2004 and 2006, during nearly 1,500 trap nights, deer mice were trapped in 26 of 29 locations throughout the island with a trap success rate of 0-60% (Drost and Gelczis, 2007). The most recent data suggests deer mice are about 4 times as abundant as the western harvest mouse on the island.

3.3.1.2.3 Western harvest mouse

Western harvest mice (*Reithrodontomys megalotis)* are small rodents with long tails and grayish to buffy brown fur. Compared to *Peromyscus maniculatus santacruzae* – the only other small mammal species found on Santa Cruz Island – harvest mice are smaller and have a tail distinctly longer than the body. Western harvest mice are commonly observed on the California mainland where they inhabit a variety of grassy and weedy areas. They have been observed in deserts, pine and oak forests and salt marshes (Webster and Jones 1982), but within in these areas they are still generally found in dense grass and forb habitats.

There is little information available about the distribution of Western harvest mice on the Channel Islands. The Santa Cruz Island harvest mouse is limited to Catalina, San Clemente, and Santa Cruz Islands, but the population on San Clemente is probably a very recent introduction from the mainland. Populations on Catalina and Santa Cruz are believed to be native, and distinct island-endemic subspecies have been proposed for the two islands. However, recent genetic studies do not provide strong support for subspecies recognition (Ashley 1989, Collins and George 1990).

When Oliver Pearson first trapped harvest mice on Santa Cruz Island in 1948 all of his specimens were captured at the interface of a “small grassy field with a small freshwater marsh” at Prisoner’s Harbor. In the 1960s through 1980s biologists trapped harvest mice in the Central Valley on Santa Cruz Island, and there have also been anecdotal reports of harvest mouse nests found on the east end of the island at Scorpion Canyon.

3.3.1.2.4 Channel Islands slender salamander

The Channel Islands slender salamander (*Batrachoseps pacificus*) is a three-inch long amphibian with dark brown moist skin, short limbs, conspicuous caudal and costal grooves along its body, and a worm-like appearance. Typical of slender salamanders, these animals are secretive and cryptic; visitors to the Project Area rarely see them. They inhabit coastal scrub communities, grasslands, oak woodlands, and crevices under beach driftwood (Charles Drost, email to Paula Power September 15, 2008). These animals often estivate underground during the hot dry summer season, and utilize the wetter, cooler fall and winter months to forage for small invertebrates and reproduce. Unlike many other amphibian taxa – which lay eggs in freshwater habitats that later hatch into aquatic larvae such as tadpoles – slender salamanders lay eggs in moist terrestrial environments, which hatch into offspring that resemble adults.

Channel Islands slender salamanders are endemic to Channel Islands National Park – they are found only on Santa Cruz, San Miguel, Santa Rosa, and Anacapa Islands. They are listed as a federal species of concern due to vulnerability associated with their limited range.

3.3.1.2.5 Island fence lizard

This small lizard (*Sceloporus occidentalis becki*) is commonly observed all over Santa Cruz Island, including within the Project Area. Island fence lizards have brown, dark gray, or black sharply keeled dorsal scales, sometimes with light-colored blotches. Adults average four inches long; males exhibit a light-colored whitish belly with iridescent blue bands along the sides, while females have faint or absent blue markings. Fence lizards are diurnal, and are often observed basking on rocks or dark substrates. Mild temperatures on Santa Cruz Island probably allow for year-round foraging and basking activity. When approached adults may exhibit territorial behavior pumping body up and down from forearms. Island fence lizards lay one to three clutches of terrestrial eggs in spring – from April to July. Each clutch contains between three and seventeen eggs that hatch into juveniles within 60 days. The island fence lizard is not listed as a species of concern by any jurisdiction; however, their natural range is limited to Santa Cruz, San Miguel, and Santa Rosa Islands.

3.3.1.2.6 Santa Cruz gopher snake

The Santa Cruz gopher snake (*Pituophis cantenifer pumilus*) is a dwarf subspecies of the Pacific gopher snake; the subspecies is endemic to Santa Cruz and Santa Rosa Islands. Unlike its mainland cousins, which are as long as seven feet, adults of the island endemic subspecies grow no longer than about three feet. Gopher snakes exhibit heavily keeled brown and tan blotched scales, pale tan belly scales, and a narrow head only slightly wider than the neck. Gopher snakes are active in hot weather, especially at dusk and dawn, and are good burrowers, climbers, and swimmers. They opportunistically hunt invertebrates and small vertebrates.

However diet for these snakes is likely limited on Santa Cruz and Santa Rosa Islands due to the depauperate vertebrate fauna, and probably includes nestlings, juvenile mice, lizards, and terrestrial invertebrates. They are most commonly observed in grasslands, oak woodlands, and dry riparian habitat. Santa Cruz gopher snake is a California species of concern, due to its limited range, and possible habitat destruction by domestic and feral animals.

Table 3.3 Non-avian vertebrates on Santa Cruz Island

	Federal Status	**State Status**	**Local Endemism**	**Observed in Project Area?**
Amphibians				
Blackbelly slender salamander *Batrachoseps nigraventrus*				Yes
Channel Islands slender salamander *Batrachoseps pacificus*	FSC		Channel Islands	Yes
Pacific tree frog *Hyla regilla*				Yes
Reptiles				
Southern alligator lizard *Elgaria multicarinata*				Yes
Island fence lizard *Sceloporus occidentalis becki*			Channel Islands	Yes
Side-blotched lizard *Uta stansburiana*				Yes
Santa Cruz gopher snake *Pituophis cantenifer pumilus*	FSC	CSC	Santa Cruz *and* Santa Rosa Islands	Yes
Western yellowbelly racer *Coluber constrictor mormon*				Yes
Mammals				
California myotis *Myotis californicus caurins*				No
Big-eared myotis *Myotis evotis*	FSC			No
Fringed myotis *Myotis thysanodes*	FSC			No
Townsend's big-eared bat	FSC	CSC		No

Corynorhinus townsendii townsendii				
Big brown bat *Episicus fuscus*				No
Pallid bat *Antrozous pallius pacificus*		CSC		No
Silver haired bat *Lasionycteris noctivagans*				No
Hoary bat *Lasiurus cinereus*				No
Red bat *Lasiurus borealis*				No
Mexican free-tailed bat *Tadarida brasiliensis*				No
Western mastiff bat *Eumops perotis californicus*	FSC	CSC		No
Santa Cruz Island deer mouse *Peromyscus maniculatus santacruzae*			Santa Cruz Island	Yes
Western harvest mouse *Reithrodontomys megalotis*			Considered for recognition of endemic subspecies, but genetic studies suggest no endemism	Yes
Santa Cruz Island fox *Urocyon littoralis santacruzae*	FE	ST	Santa Cruz Island	No
Island spotted skunk *Spilogale gracilis amphiala*	FSC	CSC	Santa Cruz *and* Santa Rosa Islands	No

3.3.1.3 Invertebrates and Fish

The invertebrate fauna of Santa Cruz Island is less well known than the vertebrate fauna, due to traditional greater interest in the latter, and the far greater diversity of the former. Powel (1994) estimated that about 70-75% of the butterfly and moth species of the island are known to science - 550 lepidopteron species have been observed on Santa Cruz Island. Three Lepidoptera are endemic to Santa Cruz Island, *Acrocercops insulariella*, *Ephysteris* sp. and *Chlodes sylvanoides* subsp. *santacruza* (Powell, J.A. 1994).

The native bee fauna of Santa Cruz Island is well known, due to research on the effects of non-native European honeybee (*Apis mellfera*) on native bees (Thorpe et al. 1994). Euporean honeybees have been entirely removed from the island.

Wetlands, streams, willow forests and riparian corridors are breeding habitat for freshwater mosquitos. Mosquitos are active within the Project Area and will continue to occur post-project. Mosquitoes are of particular concern because they are primary vectors of infectious diseases – such as West Nile Virus and encephalitis – for humans, livestock, and wildlife in California. The most threatening mosquito-borne diseases in the United States are transmitted by mosquitoes of the *Culex* genus, including California native species *C. pipiens* and *C. tarsalis.* The State of California maintains a regularly updated website with information on West Nile Virus activity by county (http://www.westnile.ca.gov/). To date, West Nile Virus activity has been reported in birds but no human activity in Santa Barbara and Ventura counties. There have been no reported cases of bird, animal, or human West Nile Virus activity in the Park. Some believe the absence of West Nile Virus on the island is because the island is too cool most of the year for the virus to replicate in its mosquito hosts. On the mainland temperatures stay above that replication threshold of 14.3^{0}C longer (Neilsen, et al., 2008) – enabling the virus to propagate in the landscape.

Many species of insects – including mosquitoes – have aquatic larval life stages. As with the other fauna on Santa Cruz Island, the aquatic insect assemblage within the streams on the island, including Cañada del Puerto, is depauperate as compared with mainland habitats (Furlong 1999). The island supports a greater than expected abundance of flies (Order: Diptera) and beetles (Order: Coleoptera) with aquatic larval stages, and an under-representation of caddisflies (Order: Trichoptera) and stoneflies (Order: Plecoptera). This discrepancy may be due to greater dispersal ability of flies and beetles relative to caddisflies and stoneflies, or may reflect the ability of flies and beetles to adapt to more flood-prone and less-shaded stream channels as are found on Santa Cruz Island relative to the rest of Santa Barbara County.

The creek through Cañada del Puerto flows during the winter and spring rainy season, then slowly disappears during the dry summer months. When flowing, the creek eventually reaches the boulder bar which forms a barrier between the ocean and the Prisoners Harbor area where fresh water slowly seeps through the boulder bar to the ocean. There are no known permanent fish species in Cañada del Puerto creek. On at least one occasion, several small fish – most likely top smelt washed over the boulder bar during a high tide – were observed in the remnant wetland (Dan Richards, email to Paula Power June 21, 2007).

3.3.2 Vegetation

3.3.2.1 Santa Cruz Island Vegetation Communities

Vegetation communities on Santa Cruz Island, like those on the other Channel Islands, developed in relative isolation from the mainland. Although many species on the islands are the same as those found on the mainland, almost 50 species are unique - endemic - to the Channel Islands or even to a subset of the Channel Islands. Some endemic island species are the only remaining populations of taxa that were once widespread on the mainland; others evolved into unique species on the Channel Islands - descendents of mainland species that colonized the islands and then adapted to local conditions through speciation.

Santa Cruz Island vegetation communities developed without human influence from the end of the Pleistocene approximately 12,500 years ago until the first sizable human settlements on the islands about 7,000 years ago. Native American settlers on the islands may have influenced these vegetation communities with food gathering activities, harvest of vegetation for building materials, promotion of economically important plants, intensification of fires, and possible introduction of mainland plants and animals. About 150 years ago, people of European descent introduced domestic and feral animals to the island. In addition, these most-recent settlers on Santa Cruz Island engaged in cultivation within the Project Area and in the Central Valley, and introduced numerous alien plant taxa – both purposefully and unintentionally. These actions disrupted the composition and distribution of the island's vegetation, and severely altered natural soil and hydrologic processes on the islands. Cessation of agricultural and commercial grazing in the second-half of the 20th century, and removal of feral pigs from the island in 2006 have allowed for some recovery of native plant communities. However, ongoing damage to vegetation communities from historic sheep and cattle grazing, pig rooting, and invasive plants are evident across the island.

Forest communities on the island are drought-adapted and generally support a heavy representation of hard-leaved evergreen woody plants such as ironwood (*Lyanothamnus floribundus*), Island cherry (*Prunus illcifolia* ssp. *lyonii*), live oaks (*Quercus agrifolia*, *Q. tomentella*, and *Q. chrysolepis*), manzanita (*Arctostaphylus insularis*), and toyon (*Heteromoles arbuti*folia). Bishop pine (*Pinus muricata*) is the only native conifer on the island; on Santa Cruz Island they generally occur with an understory of broadleaved evergreen trees. Other stands of conifers on the island consist of non-native Italian stone pine (*Pinus pinea*) or Monterey cypress (*Cupressus macrocarpa*). Deciduous tree forests are limited to canyons with permanent surface or near-surface water and are dominated by either big leaf maple (*Acer macrophyllum*) or cottonwood (*Populus fremontii* and *P. balsamifera*).

Shrub communities on the island similarly support a preponderance of drought-tolerant, hard-leaved evergreen woody species. The island supports a high diversity of upland shrub communities, including stands dominated by manzanitas (*Arctostaphylus viridissima*, *A. insluaris*, and *A. tomentosa*), chamise (*Adenostoma faciculatum*), ceanothus (*Ceanothus megacarpus* and *C. arborus*), scrub oaks (*Quercus pacifica*, *Q. dumosa*, and *Q. parvula*), coyote brush (*Baccharis pilularis*), sagebrush (*Artemisia californica*), buckwheat

(*Erigonum arboresens*), and monkeyflower (*Mimulus flemingii*). Canyons with surface or near-surface flows for much of the year support riparian communities of mulefat (*Baccharis salicifolia*) and phreatophytic arroyo willow (*Salix lasiolepis*).

A survey of plant species in the project area conducted during 2008 identified 179 plant species (Appendix E). After a search of the California Natural Diversity Database, herbarium specimens, and this and other on-the-ground field surveys, the park and US Fish and Wildlife believe that no federally listed plant species occur in the area of proposed restoration work (US Fish and Wildlife Service, 2008). One state listed species was found in the main stream channel, Santa Cruz Island silver lotus (*Lotus argophyllus* ssp. *argenteus*).

Despite removal of feral and grazing animals from Santa Cruz Island, the island still exhibits large areas dominated by alien herbaceous plant species associated with these animals, particularly fennel (*Foeniculum vul*gare) mixed with non-native annual grasses such as *Avena* spp., *Bromus* spp., and *Hordium* spp. Native herbaceous plant communities on the island generally consist of graminoid species, although several upland plant communities have canopies of forbs including sea blite (*Sueda taxifolia*), San Miguel Island locoweed (*Astragalus miguelensis*), and Tejon milk aster (*Stephanomeria cichoriacca*). Upland graminoid plant communities are widespread on hillslopes and valley bottoms, and are generally dominated by non-native annual grasses, including *Bromus* spp., *Avena* spp, and harding grass (*Philaris aqu*atica), but can also include native grass and forb components such as brome (*Bromus ca*rinatus), barley (*Hordeum* spp.), rye (*Leymus* spp.), needlegrass (*Nassella* spp.), coyote brush, and sagebrush. Wetland graminoid plant communities – those confined to areas with high perennial groundwater – include communities with dominant canopies of bulrush (*Scirpus californica* and *S. maritimus*) and saltgrass (*Distichlis spicata*).

The Project Area supports eleven distinct plant communities (Aerial Information Systems, Inc. 2007; Table 3.4). Proposed restoration activities would occur in some of the mapping units. Fill material would be removed from the Built-up mapping unit and deposited in a Fennel mapping unit. Eucalyptus would be removed from Eucalyptus stands mapping units. The protective barrier for the archeological site would be installed in the Planted Trees and Shrubs mapping unit. These vegetation types are described below as general plant community types found throughout Santa Cruz Island. Also, species observed within these mapping units within the Project Area are described.

Table 3.4 Plant communities in the Project Area

	Acreage within the Project Area	Percentage of the Project Area
Eucalyptus Stands	20.02	33.5
Coast Live Oak Alliance	8.204	13.7
Lemonade Berry Alliance	0.622	1.0
Mixed Arroyo Willow - Mule Fat	2.238	3.8
Arroyo Willow	7.409	12.4
Bulrush - Cattail	0.076	0.1
Fennel	2.598	4.3
Silver Beachbur - Beach Sand Verbena Alliance	1.577	2.6
Stream Beds and Flats	4.964	8.3
Planted Trees and Shrubs	1.130	1.9
Built-up	5.414	9.1
Mulefat Alliance	0.001	0.001
Coastal Bluff Scrub Habitat	0.261	0.4
California Sagebrush-Lemonade berry	1.753	2.9
Water	3.430	5.7

3.3.2.1.1 Eucalyptus Stands

The genus Eucalyptus includes about 450 species and is native to Australia. During the late 19^{th} century, it was widely planted throughout California, including four species on Santa Cruz Island (Junak, et al. 1995) where they were planted for ornamental and utilitarian purposes such as windbreaks and future pier pilings. Some trees planted during the ranching era are now considered contributing elements to the historic landscape (NPS Cultural Landscape Inventory, 2004). Most eucalyptus trees on the island, however, are feral offspring of historic trees. Their presence creates an adverse environment for many native species, including passerine birds. Native plant understory used by birds for foraging and nesting is greatly reduced beneath eucalyptus trees. According to the Audubon Society, the flowers of eucalyptus trees have deep nectar cups, with a tar-like substance at the entrance of the cup. When native birds probe the flowers to get nectar and insects, this substance coats the feathers at the base of the bill and may clog the bird’s nostrils. Additionally, eucalyptus leaf litter is highly flammable creating a fire hazard which poses a threat to historic buildings on Santa Cruz Island.

The Project Area includes four distinct areas dominated by eucalyptus species, all within the riparian corridor of Cañada del Puerto. Three of these stands consist primarily of blue gum (*Eucalyptus globulus*). The other stand consists of red river gum (*E. camaldulensis*). Both species form nearly monotypic stands in riparian areas once established.

Other common species in these stands include coyote brush (*Baccharis pilularis*), mulefat (*B. salicifolia*), English ivy (*Hedera helix*), kikuyu grass (*Pennisetum clandestinum*), stinging nettle (*Urtica dioica*), and Vinca (*Vinca major*). A proposed action will be to remove invasive eucalyptus in a step-wise fashion, allowing each patch to recover with the appropriate compliment of native vegetation before continuing to the next step.

3.3.2.1.2 Coast Live Oak Alliance

In this mapping unit coast live oak (*Quercus agrifolia*) dominates the tree canopy, with 25% to 60% of the total tree cover. Within the Project Area this vegetation community occurs in a mesic riparian setting, with an understory of shrub species including coyote brush (*Baccharis pilularis*), fennel (*Foeniculum vulgare*), and young eucalyptus (*Eucalypus* spp.).

3.3.2.1.3 Lemonadeberry Alliance

This plant community appears in very limited extent in the northeast corner of the Project Area, on the slope above the Cañada del Puerto lagoon. The evergreen shrub lemonade berry (*Rhus integrefolia*) dominates the stand with a sparse canopy. Sagebrush provides a minor component to the canopy.

3.3.2.1.4 Mixed Arroyo Willow - Mule Fat

This area supports a mix of Arroyo willow (Salix lasiolepis) and mule fat (Baccharis salicifolia) in the top-most vegetation canopy. Within the Project Area this vegetation type is very sparsely vegetated with mostly herbaceous and young woody plants. This unit appears to be frequently disturbed by scour from winter flows in Cañada del Puerto.

3.3.2.1.5 Arroyo Willow

This is the dominant native wetland and riparian plant community in the Project Area. Within the Project Area this community type is dominated by a moderate to dense canopy of arroyo willow (*Salix lasiolepis*), and in some areas the tree grows so densely to be virtually impenetrable. Arroyo willow can tolerate seasonally-saturated soils, but can also access deep groundwater during droughts. The herbaceous component under the tree/shrub canopy may fluctuate over time with changing groundwater availability – becoming more characterized by hydrophytic plants such as bulrush (*Scirpus californica*) during wet years, and reverting to more dry-adapted species, such as brome (*Bromus* spp.) and slender wild oats (*Avena barbata*) during dry years.

Within the northern portion of the Project Area this vegetation community's spatial extent may vary greatly over decadal time spans, depending on water availability. During drier periods this plant community may expand into areas that would normally have too-high groundwater to support arroyo willow. During wet periods, generally characterized by frequent winter storms, high flows on floodplains may remove young willows, and allow re-colonization of low-lying areas by more-hydrophytic plant communities, particularly bulrush-cattail.

3.3.2.1.6 Bulrush - Cattail

A small amount of acreage within the Project Area is occupied by a dominant canopy of bulrush (*Scirpus californicus* and *S. maritimus*), with a small subcomponent of cattail (*Typha dominguensis*). This vegetation community persists in the wettest portions of the Project Area that support a high groundwater table year round. This is a rare vegetation community on Santa Cruz Island, due to its aridity and generally small watersheds. Cañada del Puerto is the only watershed in the island to support a vegetation community dominated by obligate wetland vegetation, such as bulrush and cattail.

3.3.2.1.7 Fennel

Although many acres on Santa Cruz Island are heavily infested with this non-native plant, only a small percentage of the Project Area is mapped as dominated by fennel (*Foeniculum vulgare*). Fennel typically thrives on disturbed upland slopes and hillsides, although it can also invade drier portions of floodplains. Fennel stands on island the island typically co-exist with an herbaceous understory of *Avena* spp., *Bromus* spp., and *Hordeum* ssp., and with native shrubs such as coyote bush (*Baccharis pilularis*).

Within the Project Area fennel stands persist on disturbed terraces above the primary Cañada del Puerto floodplain and stream channel. These units are not directly adjacent to the channel, but border on arroyo willow and eucalyptus stands. Fennel is overwhelmingly dominant. Commonly observed species include coyote brush (*Baccharis pilularis*) wood mint (*Stachys bullata*), ripgut brome (*Bromus diandrus*), California brome (*Bromus carinatus*), and horehound (*Marrubium vulgare*). Among these species wood mint and California brome are native to the island.

3.3.2.1.8 Silver Beachbur - Beach Sand Verbena Alliance

This alliance occurs on coastal dune and beach habitats where the sparse canopy is dominated by a mix of silver beachbur (Ambrosia chamissonis) and sand verbena (Abronia maritima), with minor components of sea rocket (Cakile maritima), and salt grass (Distichlis spicata). Of these four plants, only silver beachbur, sea rocket and salt grass have been observed within the Project Area by park staff.

3.3.2.1.9 Stream Beds and Flats

Meandering through Cañada del Puerto, the creek flows during the rainy season, transporting allochthanous material, sand, gravel, and cobble downstream. The stream bed is scoured during the wet season and remains dry and largely unvegetated for much of the year. Low herbaceous vegetation can be found in wet areas during much of the year.

3.3.2.1.10 Planted Trees and Shrubs

During the ranching era, trees and shrubs were planted for ornamental and practical purposes. Some of these plantings have persisted and expanded during the intervening years. The planted trees and shrubs mapping unit can be found directly overtop the archeological site and on an upland site along the Central Valley road. Dominant plants include coyote brush (*Baccharis pilularis*) and kikuyu grass (*Pennisetum clandestinum*). Other commonly observed species include wild rose (*Rosa californica*), buckwheat (*Eriogonum arborscens*), and fennel (*Foeniculum vulgare*), and ripgut brome (*Bromus diandrus*). Coyote brush, wild rose, and buckwheat are native.

3.3.2.1.11 Built-up

The built-up area, former coastal wetland and a focal area for this project, was filled during the ranching era in the late 1800's. The historic warehouse, cattle corrals, picnic area, and access road to the Central Valley are located here. The dominant plant species are yerba mansa (*Amenopsis californica*), Bermuda grass (*Cynodon dactylon*), saltgrass (*Distichlis spicata*), yellow sweet clover (*Melilotus indicus*), Kikuyu grass (*Pennisetum clandestinum*), and curly dock (*Rumex crispus*). Only saltgrass, common in coastal areas, is native to Santa Cruz Island.

3.3.2.1.12 Rare, Special Status and Federally Listed Plant Species

Santa Cruz Island supports 14 plants with special legal status, other special status, and/or Santa Cruz Island endemics (Junack *et al.* 1997) (Table 3.5). Only Santa Cruz Island silver lotus, a state listed species, has been observed in the Project Area

Table 3.5 Plants of Santa Cruz Island with Special Legal Status or Local Endemism

	Legal Status	**Other Special Status**	**Endemic**	**Observed in Project Area?**
Sunflower family (Asteraceae)				
Santa Cruz Island chicory *Malacothrix indicora*	E		Channel Islands	no
Island malacothrix *Malacothrix squalida*	E		Channel Islands	no
Barberry family (Berberidaceae)				
Island barberry *Berberis pinnata* ssp. *insularis*	E		Channel Islands	no
Mustard family (Brassicaceae)				

Hoffman's rock cress *Arabis hoffmanii*	E		Channel Islands	no
Santa Cruz Island lace pod *Thysanocarpus conchuliferus*	E		Santa Cruz Island	no
Rockrose family (Cistaceae)				
Island rushrose *Helianthemum greenei*	E		Channel Islands	no
Stonecrop family (Crassulaceae)				
Santa Cruz Island live-forever *Dudleya nesiotica*	E		Santa Cruz Island	no
Heather family (Ericaceae)				
Santa Cruz Island manzanita *Arctostaphylos insularis*	-		Santa Cruz Island	no
McMinn's manzanita *Arctostaphylos viridissima*	-		Santa Cruz Island	no
Pea family (Fabaceae)				
Santa Cruz Island silver lotus *Lotus argophyllus* var. *nivius*	-	E CA Dept Fish Game	Santa Cruz Island	yes
Gooseberry family (Grossulariaceae)				
Santa Cruz Island gooseberry *Ribes thacariamum*	-		Santa Cruz Island	no
Mallow family (Malvaceae)				
Santa Cruz Island bush mallow *Malacothamnus faciculatus* var. *necioticus*	E		Santa Cruz Island	no
Madder family (Rubiaceae)				
Narrow-leaved bedstraw *Gllium angustifolium*	E		Channel Islands	no
Figwort (Scrophulariaceae)				
Santa Cruz Island monkey flower *Mimulus brandegei*	-		Santa Cruz Island	no

3.3.2.2 Non native plant species

3.3.2.2.1 Vulnerability of Islands

Islands and remote peninsulas are particularly vulnerable to invasion by non-native plant species, potentially due to their low number of native plant species, some lack of competitive vigor among long-isolated native taxa, and numerous "empty niches" of unoccupied habitat that mainland habitat specialists can exploit.

Santa Cruz Island supports 650 plant taxa, of which at least 170 species are introduced. This represents 26% of the island's total flora. Eleven of the 88 plant families represented on the island and 82 of the island's 348 plant genera are represented entirely by non-native plants. Santa Cruz Island in general and the Project Area specifically are at continual risk of colonization and re-colonization by non-native plants from seeds and vegetative material transported to the island by vehicles and visitors, particularly arriving via the island's main dock at Prisoners Harbor.

The Project Area supports a variety of non-native invasive plant species. Some of these species are naturalized to the island, persist only in low numbers, are assumed to not substantially alter ecosystem processes, and therefore are not a primary management priority; these include species such as rabbit's foot grass (*Polypogon monospliensis*), windmill pink (*Silene gallica*), and plantain (*Plantago lanceolata*). Other invasive plant species form dense monocultures that exclude native plants and degrade habitat for native animal species. Some non-native invasive plants also introduce toxic and/or allelopathic chemicals into soils to discourage competition from other plants. Invasive species of management concern within the Project Area include blue gum and red river gum (*Eucalyptus globulus* and *E. camaldulensis* respectively), Kikuyu grass (*Pennisetum clandestinum*), fennel (*Foeniculum vulgare*), and hoary cress (*Lepidium draba*).

3.3.2.2.2 Eucalyptus

The genus Eucalyptus includes about 450 species and is native to Australia. During the late 19th century, it was widely planted throughout California, including 4 species on Santa Cruz Island (Junak, et al. 1995) where they were planted for ornamental and utilitarian purposes such as windbreaks and future pier pilings. Trees planted in a row along the base of the cliff at Prisoners Harbor have persisted from the ranching era to the present and are considered part of the historic landscape (NPS Cultural Landscape Inventory, 2004). In 1908, 500 eucalyptus ("gum") trees were planted at Rincon Papal upstream from the harbor in Cañada del Puerto (Livingston, 2005) The majority of eucalyptus trees at Prisoners Harbor and in Cañada del Puerto have spread unintentionally from seed, displacing native vegetation over time, and are not considered historic.

During 2008 all eucalyptus trees in the project area with a diameter at breast height (dbh) greater than 6" were measured and mapped. The total number of non-historic eucalyptus trees counted in the project area was 1,737. The majority (82%) of trees are less than 24" in diameter. The remaining 18% of trees ranged from 24" to 84" in diameter. A summary of the survey is included in Appendix E

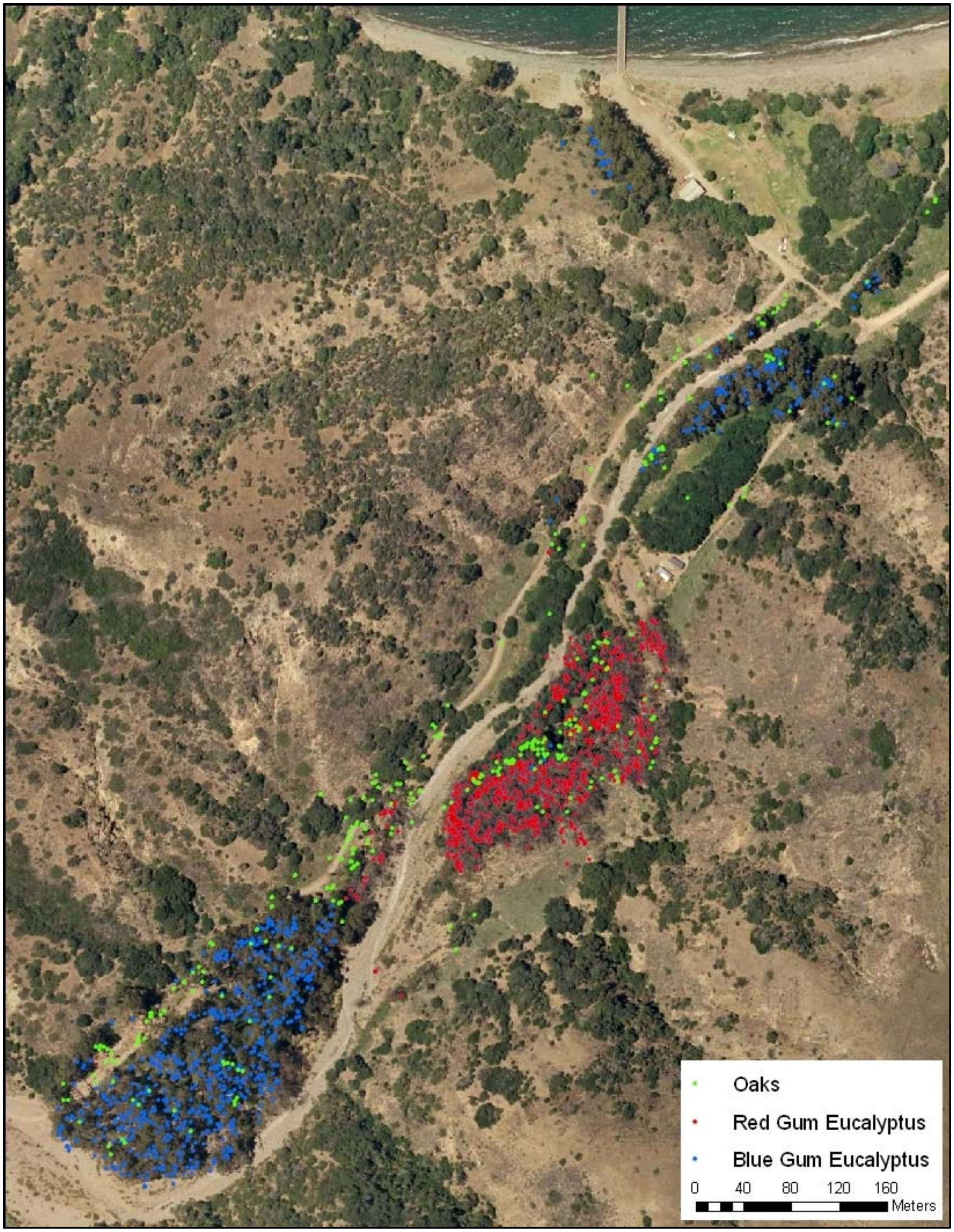

Figure 3.6 Distribution of eucalyptus trees and native oaks in the Project Area.

Growth and establishment of native vegetation is suppressed by competition with eucalyptus for light, water, and nutrients. Eucalyptus trees impair riparian habitat by drawing large amounts of water from the groundwater, introducing soil chemicals toxic to native plants, and excluding native plants and animals by heavy shade and litter. Because of these factors eucalyptus trees tend to form monotypic stands, however Cañada del Puerto retains an understory of native plants – including oak (*Quercus* spp.), island cherry (*Prunus illicifolia*), and coffee berry (*Rhamnus californica*). A survey of oaks identified 342 established oak trees growing in the Project Area (Figure 3.6).

3.4 Cultural Resources

The following is a discussion of the historical and archeological resources in the project area.

3.4.1 Historical Overview

Largest of the Channel Islands, Santa Cruz Island has supported a large human population for more than 8,000 years. Eleven historic villages are known for Santa Cruz Island, equal to the total number recognized for both Santa Rosa and San Miguel Islands. Other sites, ranging in size from only a few meters square to extensive shell mounds covering hundreds of square meters are found along the coastline and within the interior at advantageous locations. Some of these mounds contain distinctive layers of red abalone shell, indicative of occupation about 5000 to 8000 years ago. In addition to shell mounds, prehistoric sites include chert quarries and workshop sites, rock shelters, and rock pavements ethnographically identified as shrines. Some of the rock shelters contain rock art of a simple style quite distinct from that known on the mainland. Formal cemeteries are found close to many villages, especially later sites, and isolated, seemingly random, human burials are recorded for the island as well. The potential number of burials ranges into the tens of thousands.

Some 2,000 archeological sites provide evidence of occupation, development, and flowering of the group known as the Chumash, the inhabitants of the northern Channel Islands and the Southern California area from San Luis Obispo to Malibu. Recent research shows occupation 8900 years ago, and the potential for even older material exists on the island. Like Santa Rosa and San Miguel Islands, deposits on the west end containing pygmy mammoth remains could also contain evidence of older human occupation.

Although Chumash occupation of Santa Cruz Island ended in the early nineteenth century, many individuals who trace their ancestry to specific villages retain a lively interest in the preservation and management of their heritage. Between three and ten thousand Chumash live in California today.

The European presence in the Channel Islands began with Juan Rodriguez Cabrillo's explorations in 1542, followed by the subsequent expeditions of Sebastian Vizcaino in 1602 and George Vancouver in 1769. While sea otter hunters, smugglers, and others visited the islands and left their traces during the historic period, permanent

European settlement did not occur on the islands until the mid-1800s.

The Chumash population were removed from Santa Cruz Island by the 1820s, settling primarily in and around the Spanish Missions in Santa Barbara and San Buenaventura. In 1839, the Mexican government granted title to the island to Andres Castillero, who became the first private owner of Santa Cruz Island. In 1853, Dr. James Barron Shaw, acting as agent for Castillero and the island's subsequent owners, the Barron and Forbes Company, began stocking the island with sheep, horses, cattle and hogs. Shaw managed the island rancho until 1869, developing several ranch outposts and the infrastructure that linked them. In 1869 ten San Francisco investors purchased the island and formed the Santa Cruz Island Company. Justinian Caire, a Frenchman and one of the ten investors, acquired the majority of the shares in the Santa Cruz Island Company during an economic downturn in the 1870s and became sole owner of the island by the end of the 1880s or early 1890s. Caire and his descendants continued and expanded the sheep ranching and agricultural enterprises on the island.

The heart of Shaw's and, later, Caire's operation was located in the island's central valley. The main ranch included a residence, bunkhouses for winemakers, shepherds and vaqueros, barns, winery buildings, a dining hall, bakery, laundry, kitchen, shops for wagon makers, blacksmiths and tool and saddle makers, and a chapel. Substantial acreage was planted in grapevines, hay and fruit trees.

Caire's island workforce consisted primarily of French, Italian, Hispanic and Native American workers, reflecting Caire's French origins, his wife's Italian heritage, and the local population. The island operation was a largely self-sustaining community that supported a diversity of permanent and seasonal employees, which included a blacksmith, carpenters, painters, team drivers, dairymen, cooks, stone cutters and masons, gardeners, dairymen, vintners, grape pickers, sheep shearers, wagon and saddle makers, a cobbler, a butcher, a baker, and a sea captain and sailors.

The island ranching system developed by Shaw included the main ranch and satellite ranches at the east and west ends of the island and at La Playa (Prisoners' Harbor; Figure 3.7). Caire continued to use these ranches and established additional ranches and camps at other locations on the island. The main ranch and the outranches at Scorpion, Prisoners' and Christy remained the primary ranches through the Justinian Caire period. The island's sheep population reached 40,000-50,000 head under Caire, their wool and meat being shipped to market from Scorpion Ranch and Prisoners' Harbor. Caire died in 1897; his widow's unequal distribution of company shares among their six children led to family disagreements and a prolonged period of litigation. Ultimately, the dispute was settled by a court-ordered partition of the island in 1925, which divided the island into parcels with the western 90 percent (54,500 acres) of the island going to Caire's widow and four of their children, and the eastern 10 percent (6,000 acres) going to the two married Caire daughters. The Caire family maintained the western portion of the island until

1937, when they sold their land to Los Angeles businessman Edwin L. Stanton. Stanton attempted unsuccessfully to revive the island's sheep business which had declined dramatically after Justinian Caire's death, and then switched to cattle ranching. Edwin Stanton's son and heir, Carey Stanton, continued the cattle ranching operations after his father's death in 1963. In 1978, the Nature Conservancy purchased the property from Stanton, and acquired control of the property upon Stanton's death, which was in 1987.

The east end of the island remained in the hands of the Caire descendants, consolidated under the ownership of Ambrose and Maria Gherini. They continued the sheep ranching operation, with headquarters at Scorpion Ranch and Smuggler's Cove, the two east end satellite ranches. The ranch operations were overseen by a series of superintendents and caretakers until the island was converted to a private hunting, camping and recreational venture in the early 1980s. The National Park Service acquired full ownership of the east of the island in 1997. In 2000 The Nature Conservancy donated 8,000 acres adjacent to the Gherini property to the National Park Service. Called "the isthmus" this acreage includes Prisoners Harbor.

Figure 3.7 Prisoners Harbor looking south in Cañada del Puerto circa 1900. Courtesy of Santa Barbara Historical Museum.

3.4.2 Cultural Resources

Santa Cruz Island contains thousands of relatively intact archeological sites filled with rich research opportunities. These archeological sites and the islands themselves also have cultural and spiritual significance for living Chumash people. More than 750 archeological sites have been recorded on Santa Cruz Island with intensive survey covering perhaps 20% of the island. The entire island probably contains about 3,000 archeological sites.

Sites on Santa Cruz Island are receiving increasing attention from archeologists because of the relatively long and undisturbed record remaining on the island. Santa Cruz Island archeological sites remain relativey undisturbed because of the lack of intensive development and the absence of burrowing animals, such as gophers and squirrels, on the island. In contrast to the mainland, where development and burrowing have seriously impacted archeologists' ability to understand the Chumash past, the sites on the island and their relatively natural context constitute the best materials for understanding the past of the Chumash. Feral pigs, whose destructive rooting caused much damage to archeological sites, were eradicated in 2006.

The island's archeological resources were listed on the National Register in 1978 as the Santa Cruz Island Archeological District. The district encompasses only the western 90 percent of the island because of the division of ownership at the time of nomination and listing. The previous owners of East Santa Cruz Island did not choose to include their holdings within the District. There is no question that the archeology of the eastern portion of the island is at least as significant as the present archeological district, particularly since it contains most of the chert quarries exploited in the past. The National Park Service is managing the archeological resources on the east end of the island as a property eligible for the National Register until such time as the existing nomination can be amended to add the east end acreage and resources.

In addition to the Chumash record, there is extensive historic archeology centered on the island locations where ranches developed, as well as on the numerous coastal fishing and recreational camps, which flourished around the turn of the 20th century. There are remnants of oil exploration on the island, at least one abandoned World War II military encampment, and the remains of shipwrecks can be found on the beaches and intertidal zone and in the waters surrounding the island.

The ranching and agricultural resources form a historic period cultural landscape over much of the island. The main ranch in the Central Valley is the largest and most significant of the ranch complexes. Most of the earliest buildings constructed under Shaw's superintendence were of adobe or wood, and most have disappeared. During the Caire era, much of the permanent construction was of stone masonry or brick. The design of the buildings with their whitewashed stucco surfaces, large corner quoins and cobble walkways exhibit the Mediterranean heritage of their owners. All of the construction materials except lumber were gleaned from the island; brick was produced in on-island kilns. Corrals and fencelines define the ranching-era work areas, fields and pastures. Furrow lines from the grapevine plantings can still be seen on many of the slopes that were cultivated for wine production.

In addition to the main ranch, significant building complexes remain at Prisoners' Harbor, Scorpion Ranch, Smuggler's Cove and Christy Ranch. Although all of these ranches except Smuggler's Cove were established during Shaw's management of the island, most of the remaining buildings date to the Caire period. The design and construction of the primary buildings on the outranches are similar to that of the main ranch, though they contain fewer buildings and landscape features.

Ranches and outposts once stood at Rancho Punta West, Rancho Nuevo, Buena Vista, Portezuela and Rancho Sur. Their locations are marked now by foundations, plantings and remnants of structures. Stone foundations of barns are found in a number of locations on the east end. A Stanton-period ranch was built at Del Norte in 1952-53. Its frame house and corrals have been maintained by the Santa Cruz Island Foundation.

Most of the island's road system dates to the Caire development period, although the Ridge Road or "Camino Viejo" predated Caire. The central valley roads lined with eucalyptus trees form grand avenues near the main ranch. The Scorpion Valley road supported by an immense dry stone retaining wall illustrates the challenges that the nineteenth-century ranchers faced in developing this difficult terrain. The Stanton family developed many dirt ranch roads in the 1940s through 1960s, especially on the isthmus, and the Navy improved the road from Prisoners' Harbor to the Navy base in 1950.

Dry stone structures, built in the late 1800s by Italian masons and laborers, are found throughout the island. Structures include stone-lined wells, rock retaining walls along stream channels and roads, and more than 200 check dams on the east end alone, built to channel water and slow erosion. Large rock piles dot the east end of the island, created when the fields were cleared for cultivation.

Plantings of eucalyptus, cypress, pepper trees and other ornamental species are found at the ranch sites and elsewhere on the island, dating primarily to the Caire era. A large olive grove survives at Smuggler's Cove. Orchards and plantings of fruit and nut species are located at the main ranch and many of the outranches. A few rare examples of grape plantings remain in the Central Valley.

Fencelines throughout the island delineate pastures. Remnants of the sheep ranching operations include corrals, watering troughs and other features. While the nineteenth-century fencelines and features on the eastern end of the island remain relatively unchanged since their construction, the ones on the western part of the island were altered about 50 years ago to accommodate Stanton's cattle operations.

The ranch complexes and cultural landscape features are significant under several National Register criteria. The Santa Cruz Island Ranching District has been determined eligible for the National Register of Historic Places. The long period of ranching and agricultural development has resulted in a pastoral landscape that reflects the island's management by Shaw, Caire and Stanton and which retains a great deal of historic integrity. The island itself may be considered a significant rural historic landscape, as well as a series of individual historic landscapes.

3.4.3 Historic Resources at Prisoners Harbor

The historic Chumash village of Xaxas is located at the mouth of the Cañada del Puerto at Prisoners' Harbor. Described by Arnold (2001) it was a major port of trade and a departure point for cross-channel travel throughout its long history. The village was occupied nearly continuously for 3,000 years or more. Its proximity to good quality chert quarries made it ideal for micro-drill and shell bead production. At the time of European contact the village was home to many high-ranking families including a powerful chief, and tomol (plank canoe) owners. This village appears to be the last occupied by Chumash residents to leave the Channel Islands. The site was bisected by creek diversions during the ranching period. The archeological site comprising the village is recorded as CA-SCrI-240 and is a contributing resource within the National Register-listed Santa Cruz Island Archeological District.

Prisoners' Harbor was named for a group of prisoners that was shipped north from Baja California in 1830. Rejected by the Presidios in San Diego or Santa Barbara, the ship discharged the prisoners on Santa Cruz Island, where they eventually made their way to the mainland. The Mexican government granted the island to Andres Castillero in 1839. By the 1860s a ranch had been established at the harbor and in 1869 a pier was constructed. A stone and adobe building served as office, house and storage facility. A barn, kitchen and outbuildings were added. The most substantial outbuilding was a stone and brick double-gabled warehouse built in 1887. A stone well with a windmill pumped water to a tank on the hill above the house. A narrow-gauge railroad led from the end of the pier to the warehouse and on to the house and barns, with small cars that carried goods back and forth. Sheep corrals constructed between the warehouse and the pier were later replaced by cattle corrals in the filled wetland area. Ranch workers watched for vessels coming to the island from a small wooden look-out building atop the adjacent bluff. A massive system of stone retaining walls lined the mouth of the creek to help prevent flooding of the ranch structures (Figure 3.8). Fenced fields were located in the Cañada del Puerto and on the hillsides east of the creek. Stone pine, blue gum eucalyptus and other trees were planted in the ranch area and along the creek.

The warehouse and look-out are the only buildings that remain today (Figure 3.9). The stone and adobe house was torn down in 1968 after it was damaged by a flood. The barns and outbuildings burned or were razed. The stone well remains, although the water tank and windmill have disappeared, as has the narrow-gauge railroad. The row of eucalyptus still lines the foot of the bluff, and several other tree plantings and the 20th-century corrals and earlier scale house remain. The stone retaining walls along the creek may be buried under the later alterations to the stream mouth, or

Figure 3.8 Prisoners Harbor looking west circa 1900. Courtesy SBMNH

they may have been destroyed. These remaining buildings, structures and plantings are considered contributing resources within the Santa Cruz Island Ranching District, which has been determined eligible for listing in the National Register of Historic Places.

3.5 Social Resources

3.5.1 Recreation and Visitor Experience

In August of 2000, The Nature Conservancy completed a gift of 8,500 acres of the isthmus area (including part of the project area) to the National Park Service. Since this gift established the boundary line between the National Park Service property and The Nature Conservancy property within the project area, recreation and visitor experience this project area is considered the main access point to the National Park isthmus area and The Nature Conservancy property. Lands owned by the National Park Service are fully open to visitor access and use. Although visitation has increased over the years to the project area, visitor services have remained limited. Further development of visitor services will not be implemented until the General Management planning effort is completed.

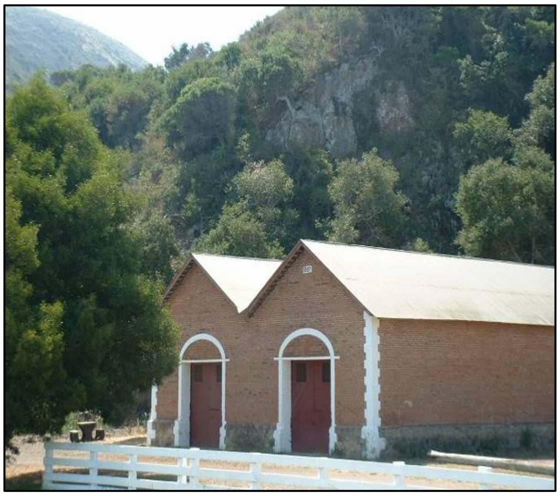

Figure 3.9 Prisoners Harbor warehouse

Although public access to The Nature Conservancy property is limited, this project area serves as the primary point of access to their property. Both permitted private boaters and visitors with park concessioner, Island Packers, use this area as an access point to the popular Prisoners to Pelican Trail. In addition, scientific researchers and educational groups use this area to access the central valley where The Nature Conservancy island headquarters and University of California Santa Cruz Island Reserve field station are located.

3.5.1.1 Key Recreational Opportunities and Uses of the Project Area

A variety of recreation opportunities and uses of the project area are available to the public. On National Park Service property, these include beachcombing, fishing, picnicking, bird watching, viewing historic buildings, beach access to water sports including kayaking and snorkeling, and trail access to day hiking and backpacking. These opportunities and uses are available to visitors who arrive via concession operators Island Packers and Truth Aquatics, private boaters, and special charters for Nature Conservancy and University of California Natural Reserve System guests and researchers.

Also, within this area is the trailhead access to the popular Prisoners to Pelican Bay trail on The Nature Conservancy Property. The Nature Conservancy currently allows only private boaters with a permit and Island Packers led visitors to access this trail.

Overnight visitors accessing the Del Norte campground and Navy site on the isthmus and the Main Ranch and University of California Natural Reserve System Field Station in the central valley pass through the Prisoners Harbor area on their way to these destinations.

3.5.1.2 Recreational Use Patterns in the Project Area

Daily visitor use of the project area by both private boaters and visitors that arrive via concessioner Island Packers and Truth Aquatics occurs during the late spring though early fall. During the rest of the year, use is more common on weekends. Visitation for the past 4 years is included in Table 3.6.

Table 3.6 Visits at Prisoners Harbor from 2005-2008 as recorded by Park Rangers and staff from Island Packers and Truth Aquatics

Month	2005	2006	2007	2008	Average
January	45	387	211	336	245
February	165	284	233	296	244
March	395	537	543	387	466
April	782	719	731	220	613
May	767	782	728	725	750
June	700	773	711	656	710
July	684	835	781	937	809
August	1194	670	786	800	862
September	762	654	857	722	749
October	493	683	681	-	619
November	484	362	550	-	465
December	340	0	267	-	202
Total	**6811**	**6686**	**7079**		

3.5.1.3 Facilities to Support Recreation and Visitor Use in the Project Area

Facilities to support recreation and visitor use in the project are limited at this time to a public pier, informational bulletin board, a picnic area and restroom facilities.

3.5.1.4 Visitor Education

Education is limited within the project area. On National Park Service property, general orientations are offered to visitors by either park staff or concession employees that are trained as island naturalists. Guided walks onto the park property are occasionally offered. Guided walks onto the The Nature Conservancy's Prisoners to Pelican trail (accessed through the project area) are offered routinely throughout the year by Island Packers naturalists and occasionally by Nature Conservancy and University of California staff. A small historic building with interpretive displays is also available to visitors near the beginning of the Prisoners to Pelican trail.

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

CHAPTER FOUR

ENVIRONMENTAL CONSEQUENCES

4.0 Environmental Consequences

This chapter describes the environmental consequences ("impacts" or "effects") of implementing each alternative described in Chapter Two. In addition this chapter will analyze whether the actions proposed will impair park resources.

4.1 Methodology

Environmental consequences are categorized in three broad areas: direct, indirect, and cumulative effects. These effects categories form the basis of the effects analysis in this chapter. Direct effects, as defined by the Council on Environmental Quality (40 CFR 1508.8), are those which are caused by the action and occur at the same time and place. Indirect effects are those caused by the action, but occur later in time or farther removed in distance, and that are still reasonably foreseeable. Cumulative effects are those which result "from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The cumulative impacts analysis will consider the effects of past ranching and natural resource management activities on wetlands, hydrologic processes, flora and fauna, cultural resources and the visitor experience in the Prisoners Harbor area of Santa Cruz Island.

4.1.1 Water Resources

4.1.1.1 Hydrologic Function & Processes

Local, state, and federal agencies have adopted polices regarding hydrologic processes, specifically the need to minimize hydrologic alterations and maintain natural hydrologic processes for improved water quality, viable fish and wildlife populations, and ecologically healthy fish and wildlife habitats. In its 2006 Management Policies, the Park Service urges parks to re-establish natural functions and processes altered by changes in hydrologic patterns and sediment transport, acceleration of erosion and sedimentation, floodplains, and disruption of natural processes to conditions characteristic of the surrounding environment (NPS 2006, Sections 4.1.5 and 4.6.4).

Methodology and Assumptions

- The purpose of the proposed project is to restore natural hydrologic processes and functions, with the degree of restoration varying among the action alternatives.
- The extent of the restoration may be affected by the desire to maintain protection for the significant archaeological site, the need for access, and park facilities.

Impact Thresholds

The following impact thresholds were established in order to describe the relative changes in water resources (both overall, localized, short and long term, cumulatively, adverse and beneficial) under the management alternatives.

Flood Elevation and Frequency
The impact thresholds focus on changes in flood elevations and floodplain storage capacity resulting from connecting Cañada del Puerto Creek to its natural floodplain. The analysis focuses on the 10-year and 100-year flood events relative to the existing condition. The 10-year and 100-year flood events were chosen because the current channel is capable of containing the 100-year flow event (estimated at 2,590 cubic feet per second) and with the berm removed, the channel could contain flows up to the 10-year flood event (estimated at 550 cubic feet per second).

No Impact: There would be no impact to existing flood elevations or flood frequency.

Negligible: There would be a negligible change (≤10%) in vertical flood elevations or frequency of flood events. No flooding of the Native American village site or Park infrastructure would occur.

Minor: There would be a minor change (±11-25%) in the vertical flood elevation or frequency of flood events. No flooding of the Native American village site or Park infrastructure would occur.

Moderate: There would be a moderate change (±26-50%) in the vertical flood elevation or frequency of flood events. If adverse, there would be in increase in the risk of flooding to the Native American village site or Park infrastructure.

Major: There would be a major change (>50%) in the vertical flood elevation or frequency of flood events. If adverse, the increase would potentially increase the risk impacts to the Native American village site or Park infrastructure.

Hydrologic Connectivity
Reconnecting the stream channel to its floodplain would increase hydrologic function of the wetlands and floodplains. Increased connectivity would increase floodplain storage and improve hydrologic function.

No Impact: There would be no change in the amount of floodplain storage and no change in the hydrologic function from the project.

Beneficial: The stream channel would be reconnected with its floodplain and hydrologic connectivity and hydrologic function restored.

Sediment Transport Dynamics

Changes in the sediment transport and deposition regime could affect the existing channel flow characteristics and redirection of stream flows could affect cultural resources and park infrastructure.

No Impact: There would be no change in sediment transport from the project.

Negligible: Sediment transport during high flows would result in negligible aggradation (≤5%) of sediment within the channel with no redirection of stream flow.

Minor: Sediment transport during high flows would result in minor aggradation (±6-10%) of sediment within the channel with no redirection of stream flow.

Moderate: Sediment transport during high flows would result in appreciable aggradation (±11-25%) of sediment within the channel causing moderate redirection of stream flow.

Major: Sediment transport during high flows would result in complete aggradation (±25-50%) of sediment within the channel causing redirection of stream flow and impact of surrounding cultural resources and infrastructure.

Changes in Surface Tidal Processes

The Native American village site has existed for centuries under both natural and unnatural flow conditions, including numerous extreme floods, without being lost through erosion. At least part of the site's persistence through time under natural flow conditions may be attributed to the boulder bar that forms naturally at the mouth of the creek. This boulder bar produces a backwater pool that reduces upstream velocities through the area of effect. Impact thresholds focus on changes in the area subject to tidal processes relative to baseline conditions.

No Impact: There would be no change in the hydraulic effect of the marine boulder bar or tidal processes.

Negligible: There would be a negligible change (≤5%) in the hydraulic effect of the marine boulder bar or tidal processes. No impacts to the cultural resources or infrastructure would occur.

Minor: There would be a minor change (±6-10%) in the hydraulic effect of the marine boulder bar or tidal processes. No impacts to the cultural resources or infrastructure would occur.

Moderate: There would be a moderate change (±11-25%) in the hydraulic effect of the marine boulder bar or tidal processes. If adverse, there would be in increase in the risk of impacts to cultural resources and park infrastructure.

Major: There would be a major change (>25%) in the hydraulic effect of the marine boulder bar or tidal processes. If adverse, the increase would potentially increase the risk impacts to cultural resources or park infrastructure.

4.1.1.2 Wetlands and Floodplains

Wetlands are among the most valuable resources because they provide many functions and values in a complex ecosystem. The function of wetlands include water quality improvement; stream shading; flood attenuation; shoreline stabilization; ground water exchange; and habitat for aquatic, terrestrial, migratory, and rare plant and animal species. The wetlands function to remove pollutants and filter nutrients and organic matter.

Impact Thresholds

Impact thresholds focus on change in wetland resources, specifically changes in the areal extent of wetlands relative to current and historic conditions. Many of the functions associated with the wetlands and floodplains such as floodwater storage, water quality improvement, and wildlife habitat are evaluated separately in other sections. The criteria evaluate change on the basis of whether the proposed project would either permanently impact existing wetlands or floodplains such that they would be eliminated or would no longer function or would create new areas with wetland characteristics and wetland function. The National Park Service Management Policies push parks to strive for a net gain in wetland acreage. For this reason, the thresholds reflect this mandate by establishing more stringent thresholds for adverse impacts.

No Impact: There would be no potential change in the areal extent of wetlands or connectivity to the floodplain associated with the proposed project.

Negligible/Beneficial: There would be negligible increase (0.5 acre) in the overall areal extent of wetlands or connectivity to the floodplain.

Negligible/Adverse: There would be a negligible decrease (0.1 acres) in the overall areal extent of wetlands or connectivity to the floodplain.

Minor/Beneficial: There would be minor increase (between 0.5 and 1 acre) in the overall areal extent of wetlands and connectivity to the floodplain.

Minor/Adverse: There would be a minor decrease (between 0.1 and 0.25 acres) in the overall areal extent of wetlands and connectivity to the floodplain.

Moderate/Beneficial: There would be a moderate increase (between 1 and 2 acres) in the overall areal extent of wetlands and connectivity to floodplain.

Moderate/Adverse: There would be a moderate decrease (between 0.25 and 1 acre) in the overall areal extent of wetlands and connectivity to the floodplain.

Major or Substantial/Beneficial: There would be a major or substantial increase (>2 acres) in the overall areal extent of wetlands and connectivity to the floodplain.

Major or Substantial/Adverse: There would be a major or substantial decrease in (> 1 acre) in the overall areal extent of wetlands and connectivity to the floodplain.

4.1.1.3 Water Quality

Federal Clean Water Pollution Act (Clean Water Act) and subsequent amendments of 1977 (33 USC Section 1251 et seq) provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters, primarily through three sections – Section 404, Section 401, and Section 303(d).

In California, authority for Section 401 and Section 303(d) has been delegated to the State Water Resources Control Board, which is responsible for overseeing California's water quality law, the Porter Cologne Act.

Methodology and Assumptions

- Water quality objectives for the Prisoners Harbor area are currently contained in the Basin Plan (RWQCB 1995) which applies to all waters along the Central Coast.
- Water quality monitoring data are not available for Cañada del Puerto Creek.
- Changes in water quality were not analyzed as part of the hydrodynamic modeling, but modeling results and other hydrologic information collected can be used to qualitatively predict changes in water quality conditions.
- Changes in the functional capacity to intercept and filter pollutants in flood flows from the upstream portions of the watershed are evaluated on a qualitative basis.
- Changes in water quality conditions are discussed for construction and short term/long term.

Wetlands and floodplains play a key role in protecting and improving water quality as wetland plants and soils have the capacity to store and filter pollutants. Calm wetland waters with flat surfaces and flow characteristics allow sediments to settle out of the water column. Wetlands which filter or store sediments for extended periods of time may undergo changes. Sediments may eventually fill in wetlands and eventually modify function over time. Very little specific surface water quality information exists for Cañada del Puerto Creek, and surface water quality data are not available. However, inferences can be made regarding water quality conditions. Currently a vast majority of the watershed is virtually free of structures, impervious surfaces, and hydrologic modifications; therefore prevailing surface water chemistry is the result of interaction between precipitation, soils, biota, and bedrock. It is unlikely that high concentrations of metals, organics, or other contaminants occur in the watershed. Near the outlet to Cañada del Puerto Creek, there is a marine influence on water quality. Cyclic salts and occasional overwash may increase salinity levels to slightly brackish for surface groundwater, especially in the dry season.

Slightly more specific information is known about sediment concentrations in the watershed. Sediment concentrations are generally considered high due to the combination of variable bedrock geology, steep slopes, degraded soil structure due to historic over-grazing, and intense precipitation events. Impact thresholds therefore focus on: (1) the potential change in sediment concentrations in the Project Area based on the functional capacity of the wetlands and the floodplains to filter and store sediments; and (2) change in overall surface water quality and groundwater conditions in the Project Area. The impact analysis does not attempt to assess whether water quality objectives would be met through implementation of the project, because there is no specific water quality data to evaluate. Rather, this analysis represents a qualitative estimation of changes expected with implementation of the project to assess which changes might be beneficial or adverse.

Impact Thresholds

No Impact: There would be no potential for impact to water quality associated with the project.

Negligible: Impacts are chemical, physical, or biological effects that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions. Beneficial (improvement in water quality) or Adverse (deterioration of water quality).

Minor: Impacts would be detectable but would be well below water quality standards or criteria and within historical or desired water quality conditions. Impacts can be beneficial (improvement in water quality) or adverse (deterioration of water quality).

Moderate: Impacts would be detectable but would be at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be altered on a short-term basis. Impacts can be beneficial (improvement in water quality) or adverse (deterioration of water quality).

Major: Impacts would be detectable and would be frequently altered from the historical baseline or desired water quality conditions; and/or chemical, physical, or biological water quality standards or criteria would be slightly and singularly exceeded on a short-term basis. Impacts can be beneficial (improvement in water quality) or adverse (deterioration of water quality).

4.1.2 Wildlife

The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise they are protected from harvest, harassment, or harm by human activities. According to NPS *Management Policies 2006,* the restoration of native species is a high priority (sec. 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals.

Methodology and Assumptions

Vegetation data were available from GIS mapping. The staff biologist, the U.S. Fish and Wildlife Service, and the California Department of Fish & Game provided wildlife information.

Impact Thresholds

The following thresholds were used to determine the magnitude of effects on wildlife and wildlife habitat:

Negligible: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be of short duration and well within natural fluctuations.

Minor: Impacts would be detectable, but they would not be expected to be outside the natural range of variability and would not be expected to have any long-term effects on native species, their habitats, or the natural processes sustaining them.

Population numbers, population structure, and other demographic factors for species might have small, short-term changes, but long-term characteristics would remain stable and viable. Occasional responses to disturbance by some individuals could be expected, but without interference to feeding, reproduction, or other factors affecting population levels.

Key ecosystem processes might have short-term disruptions that would be within natural variation. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species.

Moderate: Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit.

Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability for short periods of time. Population numbers, population structure, and other demographic factors for species might have short-term changes, but would be expected to rebound to pre-impact numbers and to remain stable and viable in the long term. Frequent responses to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, or other factors affecting short-term population levels.

Key ecosystem processes might have short-term disruptions that would be outside natural variation (but would soon return to natural conditions). Sufficient habitat would remain functional to maintain viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat for sensitive native species.

Major: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability for long periods of time or be permanent.

Population numbers, population structure, and other demographic factors for species might have large, short-term declines, with long-term population numbers significantly depressed. Frequent responses to disturbance by some individuals would be expected, with negative impacts to feeding, reproduction, or other factors resulting in a long-term decrease in population levels. Breeding colonies of native species might relocate to other portions of the park.

Key ecosystem processes might be disrupted in the long term or permanently. Loss of habitat might affect the viability of at least some native species.

4.1.3 Vegetation

According to NPS *Management Policies 2006,* the restoration of natural systems and native species are high priorities (sections 4.1 and 4.4). Biological or physical processes altered in the past by human activities may need to be actively managed to restore them to a natural condition or to maintain the closest approximation of the natural condition. Restoration efforts can include removal of exotic vegetation and restoration of native plants.

Methodology and Assumptions

Maps illustrating vegetation cover within (park) and communications with NPS staff were used to identify baseline conditions within the study area.

Impact Thresholds

Vegetation impacts were determined by examining the potential effects of the (activity) and visitor use on vegetation, according to type and sensitivity. The following impact thresholds were established to describe the relative changes in vegetation under the various alternatives being considered:

Negligible: Impacts would have no measurable or perceptible changes in plant community size, integrity, or continuity.

Minor: Impacts would be measurable or perceptible but would be localized within a relatively small area. The overall viability of the plant community would not be affected and, if left alone, would recover.

Moderate: Impacts would cause a change in the plant community (e.g. abundance, distribution, quantity, or quality); however, the impact would remain localized.

Major: Impacts to the plant community would be substantial, highly noticeable, and permanent.

4.1.4 Archeological Resources

Guidance for cultural resources management in NPS units is found in National Park Service Management Policies and Cultural Resource Management Guidelines (NPS-28). Management of cultural resources in NPS units is subject to the provisions of the National Historic Preservation Act (16 USC 470 et seq.), the National Environmental Policy Act (42 USC 4371 et seq.), the American Indian Religious Freedom Act (42 USC 1996), the Advisory Council on Historic Preservation's regulation regarding "Protection of Historic Properties (36 CFR 800), the Secretary of Interior's "Standards and Guidelines for Archeology and Historic Preservation (FR 48:44716-40) and "Federal Agency Responsibilities under Section 110 of the National Historic Preservation Act" (FR 53:4727-46).

Methodology and Assumptions

The intensity of impacts to archeological resources from the project is evaluated in relation to the impact's potential to alter, directly or indirectly, the values that contribute to the historic significance of the Archeological District.

Impact Thresholds

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: The impact would be at the lowest levels of detection barely measurable, with no perceptible consequences, either adverse or beneficial, to archeological resources.

Minor: <u>Adverse Impact</u> – The disturbance of the site would be confined to a small area with little, if any, loss of important information potential.

<u>Beneficial Impact</u> – A site would be preserved in its natural state.

Moderate: <u>Adverse Impact</u> – Disturbance of a site would not result in a substantial loss of important information.

<u>Beneficial Impact</u> – The site would be stabilized.

Major: <u>Adverse Impact</u> – Disturbance of a site would be substantial and would result in the loss of most or all of the site and its potential to yield important information.

<u>Beneficial Impact</u> – There would be active intervention to preserve the site.

4.1.5 Historic Resources

The intensity of impacts to historic resources from the Project is evaluated in relation to the impact's potential to alter, directly or indirectly, the historic values at Prisoners Harbor that contribute to the significance of the Ranching District.

Impact Thresholds

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: The impact is at the lowest levels of detection or barely perceptible and not measureable.

Minor: Adverse Impact – The impact would not affect the character-defining features of a structure, building, or cultural landscape feature listed on or eligible for the National Register.

Beneficial Impact – Character-defining features would be stabilized/preserved in accordance with the Secretary of the Interior's Standards, therefore maintaining the integrity of the structure or building (cultural landscape).

Moderate: Adverse Impact – The impact would alter a character-defining feature of the structure, building, or cultural landscape feature but would not diminish the integrity of the resource to the extent that its national register eligibility would be jeopardized.

Beneficial Impact – The structure, building, or landscape features would be rehabilitated in accordance with the *Secretary of the Interior's Standards*, to make possible compatible use of the property while preserving its character-defining feature.

Major: Adverse Impact – The impact would alter a character-defining features(s) of the structure, building, or cultural landscape feature, diminishing the integrity of the resource to the extent that it would no longer be eligible to be listed on the national register.

Beneficial Impact – The structure, building, or cultural landscape feature would be restored in accordance with the *Secretary of the Interior's Standards* to accurately depict the features and character of a landscape as it appeared during its period of significance.

4.1.6 Visitor Experience

The purpose of the impact analysis is to determine if the proposed restoration alternatives are compatible or in conflict with the purpose of the park and its visitor experience goals. Thus, these policies and goals are integrated into the impact thresholds.

Methodology and Assumptions

The Prisoners Harbor restoration alternatives could impact the visitor experience by reducing or limiting the principal visitor uses:

- access to and from arriving and departing tour boats
- passage through the area towards inland visitor resources, and
- access to existing historical resources onsite—cattle corrals and other ranching structures within the harbor area

Conversely, the visitor experience could gain from the increased opportunity to view and enjoy healthier and more sustainable natural ecosystem in the wetlands, floodplain, and riparian Project Areas.

Impact Thresholds

The following thresholds for evaluating impacts on visitor experience were defined:

Negligible: Visitors would not likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources.

Minor: Visitors would likely be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources; however the changes in visitor use and experience would be slight and likely short term. Other areas in the park would remain available for similar visitor experience and use without derogation of park resources and values.

Moderate: Visitors would be aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and likely long term. Other areas in the park would remain available for similar visitor experience and use without derogation of park resources and values, but visitor satisfaction might be measurably affected. Some visitors who desire to continue their use and enjoyment of the activity/visitor experience would be required to pursue their choice in other available local or regional areas.

Major: Visitors would be highly aware of the effects associated with changes proposed for visitor use and enjoyment of park resources. Changes in visitor use and experience would be readily apparent and long term. The change in visitor use and experience proposed in the alternative would preclude future generations of some visitors from enjoying park resources and values. Some visitors who desire to continue their use and enjoyment of the activity / visitor experience would be required to pursue their choice in other available local or regional areas.

4.1.7 Cumulative Impact Scenario

CEQ regulations (40 CFR 1508.7) require the assessment of cumulative impacts (defined above) in the decision-making process for Federal projects.

Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion analysis. To determine potential cumulative impacts, past actions that created resource impacts in the vicinity of the proposed project site were identified. Other projects identified as cumulative actions included any planning, disturbance or development activity that was currently being implemented or that would be implemented in the reasonably foreseeable future.

These cumulative actions are evaluated in the cumulative impact analysis in conjunction with the impacts of each alternative to determine if they would have any additive effects on the natural or cultural resources analyzed in this document. Because some of these cumulative actions are in the early planning stages, the evaluation of cumulative effects was based on a general description of the project. Known past, current, and reasonably foreseeable future projects and actions in the vicinity of the Project Area are described below:

Past Actions

Human occupation of Santa Cruz Island began approximately 9,000 years ago. European
exploration began in the mid 1500's with actual European occupation occurring in the mid-1800's. It is during this period that much of the decline in the native plant communities began, due to the sheep and cattle ranching that was introduced at that time. By 1839, Mexico was conducting commercial fishing and livestock operations on Santa Cruz Island.

Notable past actions that impacted resources in the Prisoners Harbor Project Area include:

- In 1856 two employees of the Coast Survey laid out many survey signals, being the first to perform a general survey of the island. At that time, a road led to the "Beach" at Prisoners' Harbor, and a large fenced field occupied the flat area northwest of the ranch buildings, with a series of enclosures identified as sheep corrals connected to and southwest of it. Another, semicircular corral was tucked into a hollow a short distance west from the ranch houses. No pier stood at Prisoners' Harbor but two buildings were drawn near the beach on one surveyor sketches. A trail led from Prisoners' Harbor in a southerly direction to Valley Peak and another towards the "High Mountains" to the east (Livingston 2006b).

- A 200-ft wharf at Prisoners Harbor was constructed in 1870, making it easier to load bales of wood and livestock onto commercial ships docking at the harbor. By 1875, the wharf had been extended to over 500 ft in length.

- In 1875, a re-survey was done of the island, and in attempting to locate the original astronomical station, the surveyors found a shifting of the banks of the pond at the base of a huge Indian mound: "the eastern bank of the pond has shifted 40 meters to the eastward, the sand beach has also mud at 20 meters since the survey…in 1859." (Livingston, 2006c). At the time a series of fenced fields, three structures and a pier stood at the harbor. The surveyor Forney described "a well of fresh water, but it is not so good as that in the pond, when not impregnated with salt." (Livingston, 2006d). The survey also noted the presence of a dwelling house and extensive tanks for extracting tallow from the carcasses of sheep.

- In the 1880's Justinian Caire became the sole owner of the Santa Cruz Island Company, which managed the island's commerce, and hence the island itself. He subsequently developed the Prisoners Harbor area as the best landing site on the island for goods (Livingston 2006e). His actions included:

- Planting eucalyptus groves in the Cañada del Puerto Creek for use as pilings when needed
- Enlarging the existing six-room adobe house near the beach to a 10-room residence (see Figures 4-1 and 4-2).
- Landscaping the entire area at the mouth of the Cañada del Puerto Creek with grasses and trees planted in rows. Workers straightened the creek with the aid of stone retaining walls, diminishing the lagoon that had crossed through the area. Laborers planted more eucalyptus trees in a row behind the warehouse and sheep pens, and stone pines near the foot of the pier.
- Filling a large portion of the wetland (Power, 2008a) and constructing a brick-faced, rubble and concrete double warehouse to store wool and wine awaiting shipment. A small-gauge rail system had been laid from a point behind the residence to the end of the pier, passing the loading doors of the warehouse, where goods could be loaded or unloaded from long, wide flatcars and carts. Incoming goods could be either unloaded into the warehouse or loaded onto wagons behind the house for the 3.1-mile trip to the Main Ranch.
- Planting a large vegetable garden closer to the house, as well as alfafa and grain fields upstream from the facilities.
- Adding a poultry raising enterprise to the sheep business, and making use of the tidal lagoon as a means of disposing of the poultry wastes.
- Increasing the importation of number of pigs to the island. During this era significant vegetation type conversion from native woodland and shrubland to nonnative grasslands occurred. The rapid removal of cattle and sheep are also thought to have played an important role in the large fennel expansion that occurred on Santa Cruz Island (NPS, 2002).

Figure 4.1 An early scene at La Playa, Prisoners Harbor prior to the remodeling of the ranch house there. Sheep are gathered in the sand. Courtesy of Santa Barbara Historical Museum.

Figure 4.2 The house and kitchen at Prisoners Harbor as they appeared in 1903, almost two decades after remodeling. The gable-roofed kitchen building replaced two sheds. Courtesy of the California History Room, California State Library, Sacramento, California

- In 1904 laborers planted 39 pine trees on the west side of the pier, and 51 “sundries” on the east side; four years later, in 1908, 500 eucalyptus (“gum”) trees were planted at Rincon Papal upstream from the harbor (Livingston 2006f).

- A 1918 map of the area showed fencing and corrals criss-crossed the areas between the pier and the creek. The map showed an extensive bulkhead made of piles (presumably eucalyptus) that ran about 1,000 feet along the beach on either side of the pier, and a 750-foot retaining wall in the creek. A heart-shaped lagoon remained near the mouth of the creek, apparently cut off from both the creek and harbor. Pictures from that era show a stone wall along the west bank of the creek (Figure 3-7.) (Livingston 2006g).

- In the 1940s the U. S. military, as part of its operations on the island, constructed a causeway across the creek at Prisoners’ Harbor. This diverted waters from the creek during the rainy season into the old house. After consulting with historic preservation officials, Edwin Stanton, who had purchased the Caire portion of the island in 1937, decided to demolish the house, and for safety reasons it was removed in January of 1960. Stanton subsequently converted the ranching operation on the remaining 90 percent of the island from sheep to cattle.

- In 1952, the Navy exercised its rights to explore for a new water source. After a site at Prisoners' Harbor was located and specifications developed, the Navy commenced development of the well in the spring of 1953. Contractors drilled a well and constructed a 190 square-foot pump house and pipeline.

- In the late 1950s storm waters washed into the compound at Prisoners' Harbor, allegedly because of a diversion in the Cañada del Puerto Creek associated with the new Navy well; the flood damaged the cattle facilities and house at Prisoners' Harbor, leading to the demolition of the historic house in 1960. Storms in the winter of 1961-62 caused damage to the Navy road, which required temporary repairs involving a large cut and fill section near the Navy base. The work required that a fence and the water line be moved to accommodate the cut. The Navy later addressed the stabilization of the new cut slope and evaluated the need for improved drainage to prevent a recurrence of damage, a concern of Dr. Stanton's. Navy personnel discussed various methods of stabilizing the slope and installing culverts and ditches before the next rainy season. At the creek draining into Prisoners' Harbor, the Navy proposed construction of a cribbing barricade to prevent winter runoff from overflowing the banks into the stockyards and pier area. The Navy admitted that riprap placed at the Navy well upstream had caused the waters to flow over to the area causing damage. The road crossing at that location was examined as well, with a concrete apron eventually being installed across the creek to the base of the Navy Road (Livingston 2006h). It is widely assumed that the current berm was created by bulldozer by the Navy during these years (Power, 2008b).

- After many periodic repairs, the Park replaced the pier in 2001.

Between 1981-1988, The Nature Conservancy removed 36,000 sheep and 1,500 cattle; the latter were removed in a 6 month period in 1988 (Benton and Klinger 1994). The NPS removed 9,270 sheep from the east-end between 1997 and 1999.

In the late 1990's the NPS and The Nature Conservancy began an island-wide effort to restore Santa Cruz Island. Restoration included the reintroduction of bald eagles, captive breeding of Santa Cruz Island fox, relocating golden eagles, and eradication of feral pigs.

Bald eagles disappeared from the Channel Islands by the early 1960's due to human impacts, primarily from the release of DDT into the ocean off the Palos Verdes peninsula eventually contaminating the regional food web rendering eggs too fragile to reach maturity. Between 2002 and 2006, 61 bald eagles were released on Santa Cruz Island. Today nearly 40 bald eagles reside on Santa Cruz Island including 4 nesting pairs.

By the late 1990's predation by Golden Eagles caused a decline in the Santa Cruz Island fox population by over 90%. In 2000 there were fewer than 70 foxes in the wild. Captive breeding in the island's Central Valley was begun as insurance against the loss of foxes from golden eagle predation. Foxes were bred in captivity and released into the wild. Today there are more than 410 foxes living in the wild island-wide. The captive breeding facility was closed in 2007.

Historically, golden eagles had only been "visitors" to Santa Cruz Island, but they began colonizing the island in the mid-1990's, having discovered an abundant food supply in feral pigs. It is presumed that golden eagles were previously excluded from the islands by the lack of a consistent food supply and by resident bald eagles. Golden eagles also preyed upon foxes causing a precipitous decline in the fox population. More than 40 golden eagles were relocated from Santa Cruz Island to the eastern Sierra Nevada Mountains in northern California. Although there are no known nesting or juvenile golden eagles on the island, biologist are watchful for any new golden eagle sightings.

Between 2005 and 2006 feral pigs were eradicated from the island. A company that specializes in the removal of exotic animals from islands was contracted to dispatch all feral pigs on the island. Over 5000 pigs were dispatched. Since 2006 no pig sign, tracks, or other indication of living pigs has been observed on the island.

The Nature Conservancy was also active since 1990 to find the best way to treat fennel on the island. Two large studies (Dash and Gliessman 1994; Erskine unpublished data) were initiated by TNC during this decade and were used as the basis for the fennel control protocols proposed in the 2002 Santa Cruz Island Primary Restoration Plan. Erskine's study was initiated in 1997 and treated most of the fennel in the east portion of the Central Valley.

During 2008, all fennel growing within 10 feet of roads on land owned by The Nature Conservancy, including within the Project Area, was treated with a 0.5% solution of the herbicide Garlon 4.

The Park currently has a 3 year project to treat 10 priority weed species on the east end and the isthmus of Santa Cruz Island. Priority species include fennel, yellow star thistle, pampas grass, Harding grass, arundo, eucalyptus, Peruvian pepper tree, Italian stone pine, tamarisk, and European olive. Treatment methods include manual removal and chemical means. Eucalyptus less than 12" in diameter were removed from the hillside above the historic row of eucalyptus in June 2008. Eucalyptus stumps were treated with Garlon 4. The downed logs and branches were chipped and spread on the access road.

Since 2004, there has been an ongoing effort to control kikuyu grass in the corral area and among willow trees in the lower Cañada del Puerto Creek by Channel Islands Restoration in partnership with the County of Santa Barbara. Kikuyu was sprayed with RoundupPro using backpack sprayers.

Present Actions

The Park conducts ongoing monitoring and maintenance of resources in the Prisoners Harbor Project Area, including:

- Periodic fox and eagle monitoring
- Ongoing maintenance of the corral area, consisting of mowing the grass, maintaining the warehouse and bathroom, and periodic trimming (or removal, if necessary) of historic trees for safety reasons.

Reasonably Foreseeable Future Actions

- The Park's General Management Plan (GMP) was written in 1985, prior to the acquisition of Prisoners Harbor. It calls broadly for "management strategies for the preservation and restoration of natural ecosystems" and states that the park should be "managed for the restoration and preservation of natural biotic associations." Additionally, the GMP calls for "the preservation, restoration, protection, interpretation, use, study, and management of significant cultural resources…in compliance with the requirements of the National Historic Preservation Act of 1966 as amended…" The park has begun to work on a new GMP. This new GMP will provide a vision for the park's future, as well as broad guidance in resource preservation, protection, facilities, and developments that will help achieve that vision. It will also help identify how the National Park Service may best protect cultural and natural resources while providing for visitor enjoyment of the park. It is unlikely that the revised GMP will be completed prior to 2011. The goals in the current GMP which call for such restoration as this initive will be carried forward unchanged in the new GMP. There are no foreseeable projects being considered as part of the GMP development process that would impact resources within the Prisoners Harbor Project Area.

- The Nature Conservancy, which owns the land adjacent to and upstream of the Prisoners Harbor wetlands restoration area, has an interest in continued restoration of the Cañada del Puerto Creek area. As such, it may propose additional removal of eucalyptus and other introduced species along the creek above the furthest upstream extent of the proposed project. While no specific plans have yet been proposed, it is foreseeable that such a project could be implemented.

4.1.8 Impairment of Park Resources

The fundamental purpose of the National Park System, established by the Organic and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid or minimize to the greatest degree practicable adverse impacts on park resources and values. However, the laws do give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values (National Park Service 2006, Section 1.4.3).

Prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the Park's General Management Plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.

The following process was used to determine whether the alternatives had the potential to impair park resources and values:

1. The park's enabling legislation, the *General Management Plan* and other relevant background were reviewed with regard to the

unit's purpose and significance, resource values, and resource management goals or desired future conditions.

2. Thresholds were established for each resource of concern to determine the context, intensity and duration of impacts, as defined above.
3. An analysis was conducted to determine if the magnitude of impact reached the level of "impairment," as defined by NPS *Management Policies.*

Impairment analysis is considered separately for each natural and cultural resource analyzed in this document, and included in the discussion of that resource.

4.2 Alternative A - No Action Alternative

4.2.1 Water Resources

Currently, Cañada del Puerto Creek is a hydraulically complex system that includes a marine boulder bar at the outlet to the ocean, as well as an archaeological site, and a manmade berm which all serve to alter river hydraulics. The boulder bar is a natural feature. The Native American village site predates American and Mexican settlement of the area and is considered a permanent feature in the hydraulic system. The berm is of modern origin and was constructed and maintained since the 20th century. The berm extends from near the archaeological site to upstream of the road crossing. It is approximately five to six feet high above the natural grade of the channel and was constructed of channel alluvium.

The watershed supporting the creek is about 13 square miles. Most of the formations in the watershed are capable of producing large quantities of sediment to the creek. No substantial bedrock aquifers exist within the terrain, and therefore, baseflow in the stream is minimal and provided primarily by water stored in the alluvium. The creek is ephemeral throughout its lower reaches, flowing in response to rainfall. Intense frontal storms are capable of producing substantial runoff, and consequently, large flow events are relatively common.

The outlet of the creek would empty directly into the Pacific Ocean on the north side of the island, however, persistent wave action results in the formation and maintenance of a relatively high boulder bar at the outlet of the creek. This feature blocks water from leaving the channel and results in substantial backwater pool, which extends at times several hundred feet upstream. As a result of this backwater, flow velocities and the overall erosive capacity of the stream are restricted throughout the area of the pool. The impounded water slowly drains through the coarse beach sediment most of the time. During substantial flow events, hydraulic pressure causes the boulder bar to breach periodically. Once breached, the boulder bar quickly reforms and persists through different tidal stages and is a dynamic yet permanent feature of the fluvial-estuarine system (Martin, 2007a).

About 200 feet upstream of the boulder bar is an archaeological site which is located on the left bank of the creek very near the active channel. The site stands about 10 to 15 feet above the natural grade and restricts the creek flow towards the eastern valley wall for a distance of about 200-300 feet. The earthen berm extends upstream of the archaeological site for about 400 feet to the road crossing. The road crossing is a concrete slab on grade with the bed of the creek which forms a low water crossing. The crossing provides an access point for flood flows to leave the channel and flow along the road and inundate the existing infrastructure in the area including the road and portions of the corral area (Martin, 2007a).

Under Alternative A, the Park would continue its current management activities including maintenance of the cattle corrals, maintenance of the berm and stream channel clearing, control of invasive plant species, maintenance of historic trees, maintenance of fencing for archaeological resource protection, maintenance of the access road to the Central Valley and Navy Site, and maintenance of visitor facilities. These activities have little to no impact on hydrologic or water resources as discussed below.

4.2.1.1 Hydrologic Function and Processes

4.2.1.1.1 Effects of Wetlands and Floodplain Restoration

Flood Elevation and Frequency: Park infrastructure and facilities would remain under Alternative A. The Park would continue its current management practices within the Project Site. Fill would not be removed from the former wetland and the berm along Cañada del Puerto Creek would remain in place.

No stream flow or gage record monitoring data is available for Cañada del Puerto Creek or any other creeks on the Channel Islands. The National Park Service staff used regional flood frequency equations developed for the south coast region of California by the United States Geologic Service (USGS) (Ries and Crouse, 2002) to determine flood frequency and flood magnitude associated with existing conditions in the Project Area. The modeling data were used to determine existing flood flow characteristics, to evaluate channel and overbank flow velocities, and to determine the extent of regulatory 100-year flood elevation in relation to existing and proposed park infrastructure.

Continued maintenance under Alternative A would result in no measurable change in flood elevations or frequency of flooding as the existing condition would continue. Modeling results indicate that the stream channel at the road crossing is not capable of containing flood flows that approach the 100-year flood magnitude (Martin, 2007a). Flood flows that leave the channel at the road crossing follow the road grade towards the historic warehouse and comfort station. Flows also enter the corral area during these flood events. Under Alternative A, flooding would continue to occur at the road crossing during large events approaching the 100-year flood. This places the historic warehouse and the comfort station within the regulatory 100-year floodplain. A Floodplain Statement of Findings would not be required because the location of the historic warehouse is integral to its significance. The project is an "excepted action" and the Procedural Manual does not apply (Procedural Manual 77-2: Floodplain Management V.B). AWetland Statement of Findings would not be required because this restoration alternative would qualify as an "excepted action" under section 4.2.1(h) of NPS Procedural Manual #77-1: Wetland Protection.

The berm was constructed since the later half of the 20th century. It has been maintained since that time; however the berm was not designed or constructed to any set design specifications and is unlikely to withstand any prolonged hydraulic pressure (Martin, 2007a). Failure of the berm could result in substantially increased flooding if failure occurs during a large storm event, putting the Native American village site CA-SCrI-240 at risk.

Stormwater and Floodwater Storage: With the berm in place and the fill material remaining in the former wetland for Alternative A, the flood storage capacity would not change from its current condition. The stream channel would remain disconnected from its floodplain, and no additional floodplain storage would be created. Berm failure could result in a long-term impact of substantially increased flooding. Alternative A would have no impact on flood storage, and no short-term impact on flooding; however there would be a major, adverse impact from substantially increased flooding from a catastrophic berm failure.

Sediment Transport Dynamics: There would be no change in the sediment transport dynamics with implementation of Alternative A. Sediments would continue to deposit primarily near the road crossing. The berm would remain in place and the stream flow velocities and stream power would remain relatively high adjacent to the archaeological site during extreme flow events. Flows on the order of 10 to 12 feet per second near the site would continue because the archaeological site constricts channel flow increasing velocity and power adjacent to the site. The current condition results in minor erosion at the Native American village site and this erosion would be expected to continue. Although long-term channel conditions and sediment transport dynamics of the channel are unknown at this time, a large storm event could alter the flow characteristics and sediment transport dynamics such that the Native American site could be subjected to high stream flow velocities and increased stream power. This condition could result in major effects to the integrity of the Native American site and it could result in damage or loss of Park infrastructure. Therefore, Alternative A could result in minor short-term and major long-term impacts related to sediment transport, stream aggradation, and impacts to cultural resources and Park infrastructure.

Changes in Surface Tidal Processes: There would be no change in the surface tidal processes with implementation of Alternative A. The berm would remain in place and the current dynamic of boulder bar formation and failure would be expected to continue as it currently does. Alternative A would have no impact on surface tidal processes.

4.2.1.1.2 Effects of Stream Channel Restoration

No stream channel restoration would occur with implementation of Alternative A. The existing condition would continue with the presence of mature eucalyptus trees along the channel and at the two spoils disposal sites adjacent to the channel. Alternative A would have no impact on flood frequency or flood elevations. The channel would remain disconnected from the floodplain and fill would not be removed from the former wetland, and therefore, there would be no change in the amount of floodplain storage and no change in hydrologic connectivity. There would be no change in sediment transport dynamics, stream aggradation, and potential impacts to cultural resource or Park infrastructure resulting from not implementing stream channel restoration.

4.2.1.1.3 Cumulative Impacts

The Park would continue its current management practices which would not result in cumulative impacts related to hydrologic processes or hydrologic functions. The Nature Conservancy may implement riparian corridor improvements along Cañada del Puerto Creek; however, these projects would not affect current management of the Park nor would the Park management activities affect The Nature Conservancy's potential future restoration plans.

The Intergovernmental Panel on Climate Change (IPCC, 2007) predicts mean global sea level rises between 0.6 feet and 2 feet over the next century. The Park assumes a 0.7-foot rise in sea level over the next 50 years or approximately half the moderate B2 emission scenario for the year 2099 from the 2007 IPCC synthesis report. A rise in sea level would not change the type of wetland in the Project Area. The palustrine freshwater wetland is maintained by the presence of the boulder bar which physically prevents Cañada del Puerto Creek from draining directly into the ocean. The boulder is formed and maintained by persistent wave action. The frequency at which the boulder bar breaches and reforms would not change with an increase in sea level, and the bar would continue to persist through various tidal stages. The backwater pool created behind the bar would remain with an increase in sea level. The palustrine freshwater wetland would remain behind the bar, because the boulder bar would continue to limit salt water intrusion into the wetland. Given the topography of the Project Area; it is unlikely that the overall extent of wetland habitat would significantly increase or decrease as a result of a rise in sea level.

4.2.1.1.4 Conclusions (including impairment)

Current management of the Park would not increase flood frequency or elevation and the historic warehouse and comfort station would continue to be subject to flood waters when flows exceed the 100-

year flood event and floodwaters leave the channel and flow along the existing park access road. Park management would not change the frequency at which theses types of flood events occur. The Native American site is currently subject to stream flow velocities which cause minor erosion during storm events and result in minor adverse impacts. Although long-term channel conditions and sediment transport dynamics of the channel are unknown at this time, a large storm event could alter the flow characteristics of the channel such that major erosion could occur at the Native American site. The result would have a major adverse impact. Failure of the berm during a large storm event could result in a substantial increase in flooding and major impacts to the Native American site and Park infrastructure.

The level of impact on hydrologic processes would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.2.1.2 Wetlands and Floodplains

4.2.1.2.1 Effects of Wetlands and Floodplain Restoration

Alternative A would not change the acres of wetland or provide connectivity between the creek and its floodplain; therefore there would be no impact. The approximately 6.5 acres of existing wetland would remain.

4.2.1.2.2 Effects of Stream Channel Restoration

Alternative A would not increase or decrease the areal extent of wetlands or provide connectivity between the creek and its floodplain. There would be no impact.

4.2.1.3 Water Quality

4.2.1.3.1 Wetland and Floodplain Restoration

The No Action Alternative would generally have negligible impacts on surface water quality in the Project Area. Under Alternative A, the Park would continue its current management practices within the Project Area including maintenance of cattle corrals, maintenance of the berm and stream channel clearing, control of invasive plant species, maintenance of historic trees, maintenance of fencing for archeological resource protection, maintenance of road access to the Central Valley and Navy Site, and maintenance of visitor facilities. Management practices in the Park would remain the same and therefore no changes to water quality would be expected under this alternative. Sediment concentrations in the watershed are generally considered high due to the combination of variable bedrock geology, steep slopes, degraded soil structure due to historic over-grazing, and intense precipitation events. Continued management of the Park would not change land use, and therefore no changes to water quality would be expected. The berm would remain in place along the western bank of creek, and the wetlands would not be restored. Without berm removal and increased connectivity to the existing floodplain and wetland, there would be no change in water quality or reduction in sediment concentrations. The sediment stored in the channel and floodplain would continue to move through the fluvial system as it does currently.

4.2.1.3.2 Riparian and Stream Channel Restoration

The No Action Alternative would have no impacts on surface water quality in the Project Area. The well developed riparian vegetation which exists along Cañada del Puerto Creek would remain with the No Action Alternative. Eucalyptus trees would not be removed and the native woody species would remain along the lower and upper reaches of the channel. Therefore, the stream temperature buffering capacity associated with well developed vegetative cover would remain.

4.2.2 Biological Resources

Introduction

The effects of the No Action Alternative on biological resources (wildlife and vegetation) in the Project Area would range from moderate adverse to negligible beneficial. Under the No Action Alternative, current management practices at Prisoners Harbor would continue: maintenance of cattle corrals, control of invasive plant species, maintenance of historic trees, maintenance of fencing for archeological resource protection, maintenance of road access to the Central Valley and Navy Site, and maintenance of visitor facilities. Removing fill from the former wetland, removing cattle corrals, moving the scale house, removing a portion of the berm, removing eucalyptus, protecting archeological resources, and improving the visitor experience would not occur.

4.2.2.1 Wildlife

When the wetlands of Prisoners Harbor were filled in the 19th and 20th centuries in order to support sheep and cattle operations at the harbor, important wetland functions and ecosystem processes were lost. These functions included wildlife habitat and forage, nutrient retention, and floodwater storage. In addition, establishment of non-native and invasive eucalyptus trees displaced native plant communities that provided wildlife habitat and forage and a relatively open vegetation structure on the floodplain to allow for floodwater dispersal.

The No Action Alternative would have either no effects or negligible to minor adverse effects on wildlife and wildlife habitat in the Project Area. The acreage of wetland, riparian and other habitats would not change appreciably from current conditions under the No Action Alternative. Although the Arroyo Willow and Coast Live Oak communities may decrease in size due to spread of invasive non-native plants, as described below in Section 4.3.2.2.1, habitat quality and wildlife use in the Project Area would be expected to remain similar to current conditions or decrease slightly. Without restoring wetlands, reestablishing hydrologic connectivity, and removing eucalyptus, there would not be any improvement of habitat quality for special status and endemic vertebrates, improvement of the quality of breeding habitat for birds, nor improvement of habitat diversity in lower Cañada del Puerto Creek.

4.2.2.1.1 Birds

Coastal California is part of the Pacific Flyway, one of the four principal bird migration routes in North America. During peak annual migration periods, hundreds of thousands of birds migrating along the flyway descend upon coastal wetlands, including those on the Channel Islands, in search of refuge and food. Although relatively few bird species are year-round residents, many species temporarily inhabit coastal marshes during their annual migrations. During the spring and fall months, waterfowl such as brant, pintails, and mallard, and shorebirds such as stilts, plovers, and gulls, which stop there to rest, feed, and in some cases over winter, have been observed in the Project Area. The seasonal abundance of migratory waterfowl in the Project Area would be expected to continue under the No Action Alternative, but would not increase as no additional wetland acreage would be created.

The Island scrub-jay breeds in coast live oak woodland or chaparral with a high scrub oak component and forages in wooded habitats throughout the island, and in the Project Area particularly within the Arroyo Willow riparian forest. As this community type may decrease in size under this alternative due to the likely spread of eucalyptus (see analysis in Section 4.3.2.2.1), there could be a negligible to minor adverse impact and Island scrub-jay habitat and abundance of jays could decrease.

Brown pelican are observed commonly within the Project Area, particularly bathing in the terminus of Cañada del Puerto Creek and resting and preening on the nearby boulder bar. Nesting has not been observed within the Project Area. Brown pelican habitat and use would not change from current conditions with the No Action Alternative as no actions would impact habitat or use.

Bald eagles have been observed in the northwest portion of the Project Area in the riparian forest above the mouth of Cañada del Puerto Creek. It is not likely that this area of riparian forest would change under the No Action Alternative; therefore bald eagle habitat and use would remain the same.

4.2.2.1.2 Mammals, reptiles, and amphibians

The eight species of reptiles and amphibians that inhabit Santa Cruz Island, three of which are special status species, all occur in Cañada del Puerto Creek. The Channel Islands slender salamander is a terrestrial species not found directly in the water, but under rocks, logs, and other cover in the floodplain of the drainage. It inhabits coastal scrub communities, grasslands, oak woodlands, and crevices under beach driftwood. The Island fence lizard is widely distributed along the Prisoners Harbor drainage, particularly in areas of shrubs and trees around rocks, logs, and other ground cover. The Santa Cruz gopher snake is most commonly observed in grasslands, oak woodlands, and dry riparian habitat. Current management practices that would continue under the No Action Alternative would not alter wetland, riparian or other habitat that these species occupy. Thus there would not likely be any changes to habitat or abundance of reptiles or amphibians under this alternative.

Of the eleven bat species which are known to occur or may occur at Prisoners Harbor and in Cañada del Puerto Creek, only the California myotis breeds on the island. The other species are rare occurrences and may forage in the area, single individuals may occasionally roost around the remaining buildings, or they may migrate through. It is likely, then, that habitat and use of the Project Area by bats would not change from current levels as there would not be any changes in management actions or habitat alteration under the No Action Alternative.

Of the four mammal species other than bats on the island, all have special status but only two are known to occur in the Project Area. The Santa Cruz Island deer mouse has been observed in the Project Area on the beach and upland areas around the marsh. The western harvest mouse commonly inhabits a variety of grassy and weedy areas, and has been observed in the Project Area around the marsh and grasslands. Current management practices that would continue under the No Action Alternative would not alter habitats where these species occur. Thus there would not likely be any changes to habitat or abundance of the deer mouse or harvest mouse under this alternative.

The island fox occurs in every habitat on the Channel Islands, including southern coastal oak woodland, southern riparian woodland, and coastal marsh habitat types. Foxes currently utilize existing habitats in the Project Area, thus the No Action alternative would not have any effect on habitat availability or abundance of island fox.

4.2.2.1.3 Aquatic Invertebrates and Fish

Many species of insects have aquatic larval life stages. The island streams, including Cañada del Puerto Creek, support flies (Order: Diptera), beetles (Order: Coleoptera) with aquatic larval stages, caddisflies (Order: Trichoptera), and stoneflies (Order: Plecoptera). Wetlands within the Project Area create breeding habitat for freshwater mosquitoes. There are no known permanent fish populations in Cañada del Puerto Creek. Several small fish, most likely top smelt, washed over the boulder bar during a high tide and were observed once in the remnant wetland. As there would not be any changes to the management of Prisoners Harbor under the No Action Alternative, aquatic habitat for invertebrates and fish would not change, nor would abundance of invertebrate species or fish occurring in the creek or wetlands.

4.2.2.1.4 Cumulative Impacts

Past, present, and reasonably foreseeable cumulative impacts on wildlife are described in detail under Alternative B in sections 4.3.2.1.1.3, 4.3.2.1.2.3, and 4.3.2.1.3.3. The additional impacts associated with the No Action alternative, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute negligible adverse or no cumulative impacts on wildlife.

4.2.2.1.5 Conclusions (including impairment)

Current management practices that would continue under the No Action Alternative would not alter wetland, riparian or other wildlife habitat. Thus there would not likely be any changes to habitat or abundance of wildlife under this alternative.

The No Action Alternative would have negligible to minor adverse impacts on the Island scrub-jay, and no impacts on any of the other special status species.

The No Action Alternative would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.2.2.2 Vegetation

The No Action Alternative would have moderate adverse to minor beneficial effects on vegetation resources in the Project Area. There would be continued degradation of a large percentage of the native plant communities which would remain ecologically disturbed due to loss of hydrologic function, past human alteration, and the presence and spread of invasive non-native vegetation. Although wetlands and other vegetation communities would continue to be degraded, the areal extent and species composition of existing vegetation communities would be expected to remain fairly similar to current conditions in the short-term, but may shift to non-native vegetation types over the long-term.

Prior to the early 1800s the Project Area supported coastal marsh and native riparian forest, and also likely supported a mixed live oak savannah on the floodplain terraces immediately upstream of Prisoners Harbor in lower Cañada del Puerto Creek. The Prisoners Harbor area was ecologically altered in the late-19th to mid-20th centuries in order to support sheep and cattle ranching operations. Before ranchers developed lower Cañada del Puerto Creek for agricultural activities, the site supported about 12 acres of marsh and creek wetland habitat. Today the site supports 6.5 acres of wetland habitat, a reduction of about 50%. Within the Project Area native vegetation communities have been degraded through alteration of hydrologic processes with the filling of the wetland, channelizing of the stream, and establishment of non-native invasive plant species.

4.2.2.2.1 Native Vegetation Communities

Without wetland restoration and partial berm removal, the hydrology of the lower reach of Cañada del Puerto Creek would not be restored, and wetland and floodplain functions would not be reestablished. With the continuation of current management practices under the No Action Alternative, native vegetation communities would remain degraded but relatively unchanged from current conditions in the short-term, although over time, the plant species composition may shift somewhat in response to natural fluctuations of water levels and non-native vegetation spread and management.

The extent of the Arroyo Willow and Bulrush-Cattail communities can fluctuate due to natural variability of water availability within the northern portion of the Project Area. During drier periods the Arroyo Willow community may expand into areas that would normally have too-high groundwater to support arroyo willow. During wet periods, generally characterized by frequent winter storms, high flows on floodplains may remove young willows, and allow re-colonization of low-lying areas by more-hydrophytic plant communities, particularly Bulrush-Cattail. However, these natural fluctuations would not be the result of any actions associated with the No Action Alternative.

Current management practices that would continue under the No Action Alternative include periodically removing young eucalyptus recruits to prevent them from spreading into new habitat, particularly the Arroyo Willow and Coast Live Oak communities adjacent to much of the eucalyptus stands. If this spread of young eucalyptus is controlled rigorously, then it is possible that the areal extent of adjacent native plant communities could remain intact. However, the size of the native willow and oak habitats would decrease over time if eucalyptus recruits gain a foothold in the adjacent habitats. Over the long-term, such a spread of eucalyptus is likely to occur, thus there would be a moderate adverse impact on native vegetation communities.

The Coast Live Oak community, which currently comprises about 8.2 acres in the Project Area, could decrease in size over time since it contains fennel and eucalyptus in the understory. These invasive species could outcompete native species in this community and potentially convert some acreage to non-native community types. This loss of native community would constitute a moderate adverse impact over the long-term.

There are not likely to be any changes from current conditions in the Lemonade Berry, Silver Beachbur - Beach Sand Verbena, and Stream Beds and Flats vegetation types because none of the current management actions would occur in these communities or alter them.

Santa Cruz Island supports 14 plants with special legal status, other special status, and/or local endemism (see Table 3.5 in Chapter 3). There are no federally listed Threatened or Endangered plant species in the Project Area.. Only the Santa Cruz Island silver lotus, a state listed endangered species, has been observed in the Project Area. It is common on rocky slopes, exposed ridgetops, sandy flats and washes, gravel floodplains, chaparral, coastal scrub, and riparian communities. In the Project Area a few plants occur in the dry creek bed adjacent to the southern most eucalyptus stand. As no actions would occur to disturb habitat or individuals, the Santa Cruz Island silver lotus would not be affected by the No Action Alternative.

4.2.2.2.1.1 Cumulative Impacts

If current Park management activities can control the spread of young eucalyptus into the Coast Live Oak and Arroyo Willow communities, then it is possible that the areal extent of adjacent native plant communities could remain intact. However, the size of the native willow and oak habitats would decrease over time if eucalyptus recruits gain a foothold in the adjacent habitats. Over the long-term, such a spread of eucalyptus is likely to occur, thus there would be a moderate adverse cumulative impact on native vegetation communities.

4.2.2.2.1.2 CONCLUSIONS (INCLUDING IMPAIRMENT)

The No Action Alternative would have moderate adverse effects on native plant communities due to continued spread of eucalyptus, loss in areal extent of native plant communities, and continued degraded conditions without wetland or riparian restoration.

The Santa Cruz Island silver lotus would not be affected by the No Action Alternative as no actions would occur to disturb habitat or individuals.

The No Action Alternative would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.2.2.2.2 Non-Native Vegetation

Under the No Action Alternative, the Park would implement established invasive plant management programs within the Project Area, targeting some of the highest priority species. Invasive plant species represent a select subset of largely, although not exclusively, non-native species which pose some of the worst threats to viability and persistence of native vegetation communities and functions.

Early non-indigenous settlers planted stands of eucalyptus trees throughout the lower Cañada del Puerto Creek watershed. These invasive trees have colonized much of the rest of the Cañada del Puerto Creek floodplain, creating monocultures of eucalyptus in areas that would have been characterized as native oak savannah. Additionally, fennel and kikuyu grass are invasive plants that have been identified as high priority species for control on Santa Cruz Island.

The NPS would continue to conduct periodic weeding of the Project Area under the No Action Alternative, predominantly to control the spread of invasive kikuyu grass. The Nature Conservancy would continue an on-going effort to control fennel along the road to the Central Valley. These management actions would keep populations of kikuyu grass and fennel from spreading, in areas where they are controlled. However, in other areas, such as in fennel stands, these non-native plants would continue to spread.

In addition, the NPS would control the stands of eucalyptus trees on the northwest and southeast boundaries of the Project Area. NPS staff would periodically trim the eucalyptus trees with chain saws to remove tree limbs and bark that pose safety and fire hazards. In addition, NPS staff would periodically remove young eucalyptus recruits with chain saws, to prevent them from spreading into new habitat. Control of invasive vegetation would have a minor beneficial impact on vegetation resources.

It is likely that the areal extent of vegetation communities supporting predominantly non-native plants would not be reduced under the No Action Alternative. Although some non-native plant control would continue under this alternative, it is mainly targeted at controlling the spread of the high priority species in certain areas rather than decreasing the existing populations. Thus, there would still remain approximately 20.02 acres of Eucalyptus stands, 3.1 acres of Fennel stands, and 5.4 acres of the Built-up area which mainly consists of non-native vegetation. The Eucalyptus and Fennel vegetation communities could even increase in size as these high priority species would continue to spread where they are not controlled. The likely continued spread of invasive species would have a moderate adverse impact on vegetation resources.

4.2.2.2.2.1 CUMULATIVE IMPACTS

It is likely that the areal extent of vegetation communities supporting predominantly non-native plants would not be reduced under the No Action Alternative. The Eucalyptus and Fennel vegetation communities could even increase in size as these high priority species would continue to spread where they are not controlled. The likely continued spread of invasive species would have a moderate adverse cumulative impact on vegetation resources.

4.2.2.2.2.2 CONCLUSIONS (INCLUDING IMPAIRMENT)

The No Action Alternative would have a minor impact on non-native plants with continued control of invasive species through current established management programs. Targeting high priority species, such as kikuyu grass and fennel, would keep their populations from spreading in areas where they are controlled. Such impacts to non-native vegetation produce beneficial impacts to native vegetation and the ecosystem as a whole.

Moderate beneficial impacts on invasives would occur as species such as fennel and eucalyptus would continue to spread in areas where they are not controlled and because current management programs do not focus on reducing existing populations of non-native plants. Beneficial impacts to non-native vegetation often produce adverse effects on native vegetation and the ecosystem as a whole.

The level of impact on non-native vegetation would reduce impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.2.3 Cultural Resources

4.2.3.1 Archeological Resources

As described in Section 3.4.2, the Project Area is situated within the National Register-listed Santa Cruz Island Archeological District (Archeological District). The Archeological District encompasses 90 percent of Santa Cruz Island, contains more than 630 recorded archeological sites, and is estimated to contain over two thousand additional resources that are currently unrecorded. The Archeological District is significant for the large number and diversity of pristine sites found on the island and their ability to yield information important to prehistory and history.

These resources are significant to Chumash tribal history, and are of educational value to the public. Known archeological resources in the Project Area consist of archeological site CA-SCrI-240, believed to be the historic Chumash village of *Xaxas*, which was probably the second largest village on the island. This site has special significance to the Native American community and is a contributing resource within the Archeological District. There is potential within the Project Area for additional archeological resources that are currently unknown to be present because they are entirely below ground or obscured by vegetation.

Under the No Action Alternative, the Park would continue its current management practices to protect known archeological resources at Prisoners Harbor that contribute to the Santa Cruz Island Archeological District (Archeological District) and additional unknown archeological resources that may be present. These practices include regular maintenance of the fencing that protects archeological site CA-SCrI-240 through periodic inspection and repair of the posts, wire, and hardware; and controlling the spread of invasive vegetation, including kikuyu grass, fennel, and young eucalyptus recruits, that otherwise would spread and potentially disturb the integrity of any currently unknown archeological resources. Control methods include herbicide spraying and hand cutting, which have minimal or no affect on archeological resources. The Park also undertakes cultural resources monitoring and/or subsurface testing within areas of potential ground-disturbance associated with proposed projects, and avoidance of any such resources if feasible, or data recovery, if necessary. The Park also protects archeological resources through its ongoing visitor orientation program that includes a discussion of archeological resources at Santa Cruz Island and the regulations in effect to protect these resources. Continuation of the Park's ongoing archeological resource protection measures would have a long-term moderate beneficial long-term impact on archeological resources.

As described in Section 1.6.1.7 Archeological Resources, archeological site CA-SCrI-240 was bisected by Cañada del Puerto Creek in the late 1800s. In the early 1900s the stream was channelized. The new drainage pattern caused by stream channelization diverted storm water, resulting in flood damage to this archeological site in the past, and the potential flooding of this resource in the future. In addition, although this archeological deposit is largely obscured from view by dense vegetation and is surrounded by wire fencing, the potential exists for unauthorized collection of archeological materials from the site.

4.2.3.1.1 Cumulative Impacts

The No Action Alternative would have a long-term impact on archaeological resources at Prisoners. The No Action Alternative would contribute to a cumulative impact on archaeological resources within the Archeological District as a whole.

4.2.3.1.2 Conclusions (including impairment)

Continuation of the Park's ongoing resource protection measures under the No Action Alternative would have a long-term minor to moderate impact on archeological resources at Prisoners Harbor.

The No Action Alternative would diminish the integrity of the Archeological District over time but would not result in impairment of the archeological resources.

4.2.3.2 Historical Resources

This section presents an evaluation of the potential impacts of the Proposed Action and alternatives on historic resources within the Project Area. As described in Section 3.4.3, the Project Area is situated within the National Register-eligible Santa Cruz Island Ranching District (Ranching District). The Ranching District is locally significant for its association with the developing American economy in the area of agriculture, animal husbandry, and frontier cattle ranches and for its potential to provide information regarding development of the ranch. It is also likely locally significant for its ability to express cultural values in the area of architecture through the expression of a distinct style reminiscent of vernacular French Alps architecture, features, and layout.

The Prisoners Harbor area of the Ranching District has undergone modifications over time by human and natural forces to an extent that the area no longer retains individual historic integrity. However, the Prisoners Harbor historic resources contribute to the overall historical character and historic significance of the Ranching District as a whole (NPS 2004). The historic resources at Prisoners Harbor that contribute to the historic significance of the Ranching District are listed below and described in greater detail in Section 3.4 Cultural Resources. The locations of these resources are shown in Figure 4.3.

Buildings and Structures include the 1887 stone and brick warehouse; and a scale house that is currently located within the cattle corrals, but prior to the 1960s was located adjacent to the warehouse.

Small-scale Features include a stone-lined well located east of the corrals and dating from the same period as the warehouse; a complex of cattle corrals; remnants of fencelines that divided the land into fields and pastures, and a series of telephone poles, generally attached to fence posts along Navy Road. A below-ground water pipe runs from the warehouse generally along Navy Road. Three water troughs are located within the corral complex, and two water troughs and remnants of a fenceline are located off Navy Road near the stone-lined wall.. A rock retaining wall may be buried beneath the existing berm along the west side of Cañada del Puerto Creek. Remnants of the circulation system include Navy Road and the road to the Main Ranch.

Vegetation includes native and non-native trees and plants used for specific purposes. These include an Italian stone pine tree located near the Prisoners Harbor pier; a row of eucalyptus trees extending from the warehouse at the base of the cliff; a black acacia that is located across the road from the warehouse; and two American elm trees east of the

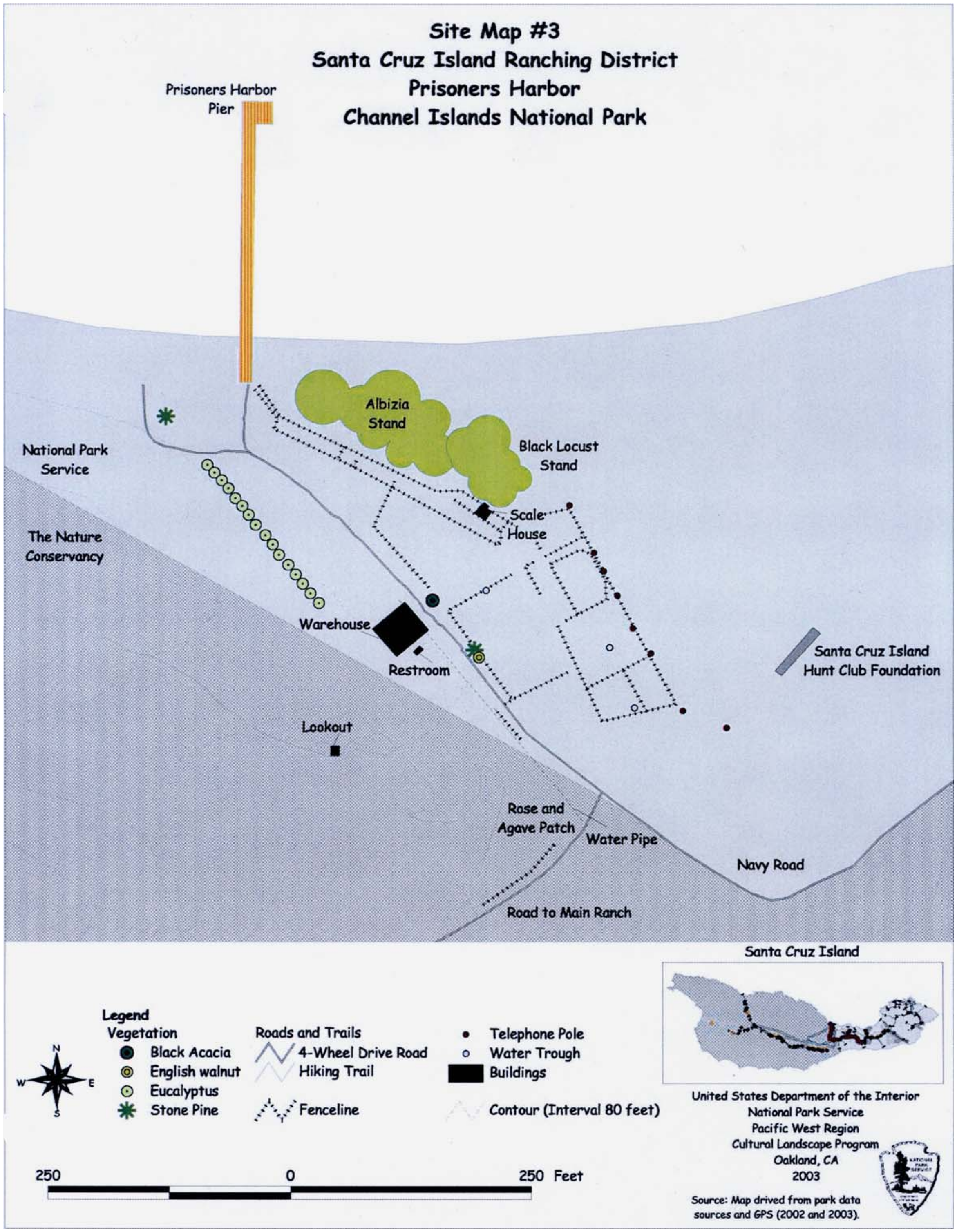

Figure 4.3 Santa Cruz Island Ranching District

warehouse. In addition, some of the eucalyptus trees along the Cañada del Puerto Creek may be historic. A small area of *yerba mansa* that was planted in the early 20th century by the island cowboys is located in the corral area, and the remnants of a garden area containing agave and rose bushes are located near the site of the former ranch house on The Nature Conservancy property.

Under the No Action Alternative, the Park would continue its current management practices to protect historic resources at Prisoners Harbor that contribute to the Santa Cruz Island Ranching District (Ranching District). These practices consist of maintaining the appearance of the cattle corrals and scale house through painting, gate repair, and replacement of degraded boards and hardware; periodic mowing of the plants inside the corrals; implementing an ongoing invasive plant control program that eliminates the potential damage to historic features that these plants and their root systems can cause if left unchecked; maintaining the historic appearance and condition of historic trees by periodically trimming the branches; maintaining the two historic roads within the Project Area--Navy Road and the road to the Main Ranch; and avoiding disturbance to the stone-lined well, the water troughs, and the location of the below-ground water pipe that runs from the warehouse generally along Navy Road. Continuation of the Park's management practices would have a moderate beneficial impact on historic resources at Prisoners Harbor.

The warehouse, which the Park maintains as a historic structure, is currently being used by the Park and TNC for storage of vehicles, equipment and materials. The relatively low left bank of Cañada del Puerto at the road crossing provides an access point for flood waters to follow the road, thereby exposing the warehouse to occasional floodwaters (NPS 2007). Under the No Action Alternative, the occasional exposure of the warehouse to floodwaters would continue. To date, this exposure has not had a noticeable effect on the structure. This is considered a minor long-term adverse impact on this historic resource.

The Park has mapped and photographed the three water troughs that are located within the corral complex and the row of eight telephone poles that generally run along Navy road, and plans to map and photograph the two water troughs in the vicinity of the stone-lined well. No additional management actions are taken, however, to protect these small-scale features from natural degradation. The loss of these resources is considered a minor long-term adverse impact because their loss would not substantially reduce the character-defining features of Prisoner's Harbor and would not substantially diminish the integrity of the Ranching District.

4.2.3.2.1 Cumulative Impacts

Continuation of the Park's management practices would have a moderate beneficial impact on historic resources at Prisoners Harbor and would not contribute to a cumulative adverse impact on the Ranching District as a whole. Although the No Action Alternative would result in the eventual loss of five historic water troughs and eight telephones at Prisoners Harbor, these types of small-scale features are found throughout the Ranching District and their other locations convey to convey its historic character.

4.2.3.2.2 Conclusions (including impairment)

The No Action Alternative would have a minor long-term adverse to moderate long-term beneficial impact on the historic resources at Prisoners Harbor. The Park's management practices to protect historic resources at Prisoners Harbor and throughout the Ranching District would continue under the No Action Alternative, and although some historic small-scale features at Prisoners Harbor (specifically the five water troughs and eight telephone poles) would eventually be lost through natural degradation, the loss of these resources would not substantially reduce the character-defining features of Prisoners Harbor or the integrity of the Ranching District.

The No Action Alternative would not result in impairment of historic resources because it would not result in a major, adverse impact to a resource or value whose conservation is necessary to fulfill specific purposes of the Park; key to the natural or cultural integrity of the Park; or identified as a goal in the Park's planning documents.

4.2.4 Social Resources

4.2.4.1 Recreation and Visitor Experience

Under the No Action Alternative, no restoration activities will be conducted. The Park would continue its current management practices within the Project Area at Prisoners Harbor on Santa Cruz Island. These activities include: maintenance of cattle corrals, maintenance of the berm and stream channel clearing, control of invasive plant species, maintenance of historic trees to minimize risk to visitor safety from potential tree fall or limb drop, maintenance of fencing for archeological resource protection, maintenance of road access to the Central Valley and Navy Site, and maintenance of visitor facilities.

None of these ongoing maintenance actions would change the visitor experience from its current situation. No changes would occur in access to embarkation of tour boats, pedestrian or vehicular passage through the Project Area, or access to existing historic ranching features. Other activities that would enhance the visitor experience may be considered within the proposed General Management Plan, but they have not been identified as yet.

The level of impact on the visitor experience from the No Action Alternative would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3 Alternative B – 2/3 Wetland Restoration with Partial Berm Removal

4.3.1 Water Resources

Introduction

This section presents an evaluation of the potential impacts of the Proposed Action on water resources within the Project Area. Several project components included as part of Alternative B would have no impact on water resources, and therefore are not included in the discussion below. The discussion focuses on impacts associated with the removal of fill from the former wetland, removal of portions of the existing berm along Cañada del Puerto Creek, structural protection of archaeological resources and park infrastructure, and channel restoration through removal of eucalyptus along the riparian corridor. Relocation of the scale house and improved visitor experience are not evaluated below because there would be no impact water resources.

Wetlands and floodplain Restoration

Several project components could affect hydrologic function and processes including changes in flood elevations and frequency, changes in sediment transport dynamics and stream power, and changes in water quality. Under Alternative B, the Park would reconnect Cañada del Puerto Creek to its natural floodplain through removal of a portion of the berm, restore 3.1 acres of palustrine wetlands and deepwater habitat, complete stream channel restoration through a phased removal of eucalyptus trees along Cañada del Puerto Creek, control non-native plant species, construct a protective barrier around the archaeological site, and improve the visitor experience.

To reconnect the creek to the natural floodplain and restore the ecological function of the wetland, the project would remove approximately 250 feet of a low artificial berm that has severed the hydraulic connection between the lower Cañada del Puerto Creek and its floodplain, excavate sand and rock fill to restore approximately 2/3 of the former wetland, and replant the restoration area with native species.

Approximately 2,400 cubic yards of fill material would be removed from the berm and placed at two designated disposal sites. Following removal of the berm, the stream channel would then be graded and reshaped to a height consistent with the naturally-formed channel banks. The project would also include removal of approximately 17,400 cubic yards of rock and sand fill from the former wetland, removing fill to provide sufficient depth to the alluvial groundwater below. The depth of fill removal would range depending on the type of wetland created: up to 6 feet below the mean annual water table for creation of the open water/pond habitat, up to 2.5 feet below the mean annual water table for fringe marsh habitat, up to 0.5 feet for shallow marsh habitat, and between 0.5 and 1.75 feet above the mean water table for willow and saltgrass meadow habitat. Fill material removed from the berm and from the former wetland would be placed at the designated disposal sites.

Approximately 2.8 acres would be needed to dispose of the fill material: 1.0 acres would be needed at the northern disposal site and 1.8 acres at the southern site. The disposal sites would be located on the east side of the creek above the 100-year floodplain, upstream and downstream of the creek crossing. Eucalyptus trees and other vegetation would be removed from the disposal sites to accommodate fill placement.

Trees would be removed from the disposal sites prior to commencing work on the berm and the wetland. Once fill material is placed at the disposal sites, the material would be compacted and sloped to natural grades and seeded with native upland plants.

The project would require use of heavy equipment to remove the berm and excavate the fill from the wetland. The heavy equipment would be used in and around the stream channel as well as the wetland. Excavation work would be completed in the fall when water levels are low to facilitate removal of fill material.

The project includes removal of invasive non-native species, including kikuyu grass, fennel, and young eucalyptus trees which otherwise would spread and potentially interfere with revegetation efforts and natural vegetation recruitment. The control methods would likely include herbicide spraying and hand cutting, which have minimal or no affect on water resources.

Riparian and Stream Channel Restoration

The project would also include riparian restoration along Cañada del Puerto Creek following a phased approach. Eucalyptus trees would be removed in a step-wise approach covering approximately 20 acres. Year 1 would include removal at the northern and southern fill disposal areas as well as an additional 3.08 acres on the north and south banks of the creek outside of the fill disposal sites. Eucalyptus would be replaced with native riparian woodland species and seeded using broadcast seed methods and planting with native species. Removal of eucalyptus would follow the schedule listed below and discussed in Chapter 2:

Step 2 – 2.96 acres
Step 3 – 4.18 acres
Step 4 – 3.60 acres
Step 5 – 3.80 acres
Step 6 – 1.59 acres
Step 7 – 0.81 acres

Sufficient recovery of the channel restoration area would occur between implementation of the stages to minimize ecological impacts and reduce the potential for sediment transport to the creek. The Park would use an adaptive management strategy to determine which riparian revegetation methods are the most effective in achieving the restoration goals and to determine when the area is sufficiently recovered to move onto the next restoration site. The adaptive management strategy and monitoring requirements are discussed in Chapter 2. Smaller eucalyptus trees would be chipped and the chips spread on roadbeds for stabilization purposes. Larger trees would be hauled off the island either for disposal, used in other island project, or used as erosion protection for the Village site.

The impact evaluation presented below includes evaluation of construction-related/short-term impacts and long-term effects of the project.

4.3.1.1 Hydrologic Function & Processes

4.3.1.1.1 Effects of wetlands and floodplain restoration

Flood Elevation and Frequency: Alternative B would have a minor adverse impact on flood elevation and flood frequency, and a beneficial effect of reduced flooding at the road crossing. Removal of the berm would increase the frequency that the creek overflows its banks connecting the flows to the floodplain and the recreated wetland. Predictive hydrologic models indicate that removal of the berm would allow a much greater number of lower magnitude floods to overtop the left bank and access the associated floodplain. This in turn could increase the potential of inundation and erosion of the archeological site. To evaluate the potential impact to the archaeological site and Park infrastructure from increased flooding, hydraulic modeling was performed for the creek with the berm removed. The hydraulic modeling results for the creek with the berm removed are summarized below (Martin, 2007a and 2007b).

1. The channel with the berm removed would be capable of containing flows somewhat beyond the range of the estimated 10-year flood of 546 cubic feet per second. Flows greater than this would overtop the left bank and spread across the floodplain and restored wetlands.

2. The 100-year flood with the berm removed is predicted to achieve an elevation of about 13.7 feet.

3. Removal of the berm is predicted to result in a fairly substantial reduction (about four feet) in the elevation of the 100-year flood at the road crossing. This reduction in the water level is enough to maintain flow within the channel at the road crossing during the 100-year flood.

4. With the berm removed, the velocity and stream power adjacent to the archeological site during a 100-year storm are predicted to be about 3 to 4 feet per second velocity and 4 pounds per foot-second stream power. By comparison, the velocity and stream power adjacent to the archaeological site with the berm in place is estimated at 10-12 feet per second 18-20 pounds per foot second, respectively.

The hydraulic analysis indicates that overbank velocities just upstream of the archaeological site would reach values of about 3 feet per second during extreme events in the range of the 100-year flood. This is well below the erosive range for unconsolidated sediments larger than fine sand (Martin, 2007a). Even though the hydraulic analysis indicates that hydraulic forces of floodwaters would not likely affect the archaeological site, Alternative B includes measures to further stabilize the site given its value as a cultural resource. Protection would include placement of a small earth, log, and cobble berm around the site or packing earth, log, and cobble against the base of the site and planting with compatible native plants. The protective barrier is described in more detail in Chapter 2.

The predicted elevations of the 100-year flood with the berm removed were compared to the surveyed elevations of other infrastructure of concern, including the road, warehouse building, and dock. With the berm removed, the 100-year flood is predicted to achieve an elevation of about 13.7 feet (Martin, 2007b). This elevation would result in overbank flows lapping against the road grade and overtopping the road surface at some locations. The lowest point surveyed on the road is adjacent to the warehouse with an elevation of about 12.8 feet at the building corners. Consequently, in the event of a 100-year flood, the warehouse building and portions of the road could be inundated to a depth of about one foot with very low velocity flood water (Martin, 2007b).

There are no surveyed elevations on the pier deck; however, a nearby ground point has a surveyed elevation of 13.64 feet, very near the predicted elevation of the 100-year flood (Martin, 2007b). Considering that nearby elevation, the location of the pier at the extreme edge of the floodplain, the general slope of the land away from the pier area and towards the channel and ocean, it is very unlikely that the pier would be subjected to any kind of destructive flood flows under condition that are likely to occur and also unlikely that it would experience any increased frequency of flooding (Martin, 2007b).

The hydraulic analysis performed for the creek showed that the road crossing at the upstream boundary of the study area forms a low water type crossing. The relatively low left bank of the creek at the road crossing provides an access point for flood waters to follow the road and inundate the existing infrastructure in this area. Subsequent hydraulic modeling runs with the berm removed predicted a reduction of about four feet in the elevation of the 100-year flood at this cross section (Martin, 2007a). This reduction in stage is enough to maintain flow within the channel, but keep the 100-year flood from overtopping the channel at the road crossing. The frequency flood waters leaving the channel in the vicinity of the road crossing, flowing down the road, and affecting park infrastructure would be substantially reduced with the removal of the berm.

Construction activities could result in a short-term impact; however, removal of the berm and removal of the fill from the wetland would be completed during the driest time of the year when the risk of rainfall is minimal. Placement of fill material at the two disposal sites would result in increased surface runoff from the site, but would not increase flood elevations. Best management practices described in Chapter 2 would minimize the risk of impacts during construction and reduce the risk of surface runoff through proper grading and effective erosion control methods.

Stormwater and Floodwater Storage: Alternative B would have a beneficial effect related to the increased area for stormwater and flood storage. Removal of the berm is predicted to allow a much greater number of higher magnitude floods to overtop the left bank and access the associated floodplain, existing wetlands and recreated wetlands. The recreated wetlands would increase the existing flood storage area by 3.1 acres for a total of 9.6 acres of functioning wetlands. The dense vegetation and location at the lower reaches of Cañada del Puerto Creek would slow stormwater runoff and provide storage area for flood waters. This periodic flooding would be beneficial to the hydrologic and ecological functioning of the restored wetlands and would meet the project objective of reconnecting the stream channel and its floodplain.

Sediment Transport Dynamics: Alternative B would have a negligible adverse impact related to sediment transport dynamics including sediment transport during high flows and potential aggradation of sediments within the channel. Removal of the berm is predicted to allow a much greater number of higher magnitude floods to overtop the left bank and access the associated floodplain. This increase of flow area for flood waters results in a decrease of velocity which may affect the stream's ability to mobilize and transport sediment through this reach of the creek. In terms of hydraulics, removal of the berm would reduce the depth of the higher magnitude flows, possibly reducing the channel velocity and stream power below the threshold of sediment entrainment and transport resulting in deposition and aggradation.

To assess the likelihood of channel aggradation and sediment transport dynamics, the Park performed a comparison of the average channel velocity before and after berm removal through the entire range of design floods, 2-year to 100-year flows. Generally, results indicated that there was no difference between the system with the berm and without the berm for lower magnitude flows up to the 10-year flood. For flows exceeding the 10-year flood, such as the 25-, 50-, and the 100-year flows, a substantial difference was realized in the channel velocity as a result of berm removal and the subsequent flood waters leaving the channel and flowing into the floodplain. The analysis indicated that removal of the berm would reduce channel velocities and stream power in the adjacent reach of the creek from about eight feet per second down to about two feet per second for flows that exceed the 10-year flood (Martin, 2007b). Velocities in the two feet per second range likely occur under the present conditions (with the berm in place) at the road crossing because the channel is wider at the road crossing than the channel above and below the crossing, yet no severe aggradation has been documented at this location (Martin, 2007b).

Based on the hydraulic modeling results, the water in the channel during the 10-year flood would be capable of mobilizing particles in the range of course gravel up to medium cobble (about one- to four-inch diameter material). Examination of photos taken over the past several years suggest that the bedload present in the creek ranges from fine grained silt and sand to small cobbles. Anticipated channel velocities and sheer stress following berm removal would result in minimal aggradation of sediment within the channel. The stream flow would remain in the current channel and not be redirected towards the archaeological site or towards park infrastructure as a result of sediment aggradation.

Construction activities could result in a short-term impact; however removal of the berm and removal of the fill from the wetland would be completed during the driest time of the year when the risk of rainfall is minimal. Best management practices described in Chapter 2 would minimize the risk of impacts during construction.

Changes in Surface Tidal Processes: The boulder bar located at the mouth of Cañada del Puerto Creek physically prevents the creek from emptying directly into the ocean. Rather, the impounded water forms a backwater pool that slowly drains through the course sediments. The boulder bar results in a reduction in flow velocities and erosive capacity of the stream. Substantial flow events can create enough hydraulic pressure to cause the boulder bar to fail periodically.

After failing, the boulder bar is reformed and maintained by persistent wave action and creek deposition. Smaller grain sizes in the bar are likely due to ocean-side, longshore sediment transport, occurring constantly. The larger stones and boulders are likely re-deposited near the mouth of the creek by storm events to re-form the bulk of the boulder bar once it has failed.

The Channel Islands National Park Historic Resources Study includes a U.S. Coast Survey map showing Prisoners Harbor in the year 1856. This map was developed before the berm was built along Cañada del Puerto Creek in the early 1900s. The 1856 map of Prisoners Harbor illustrates a meandering stream draining towards the central portion of the marsh near the beach. It appears that the creek is shown to the west of the present day location on the west side of the Native American village site. The creek was later straightened with the aid of stone retaining walls that diminished the lagoon that previously wandered through the area.

The archaeological site has existed for centuries under both natural and unnatural flow conditions, including numerous extreme floods, without being lost through erosion. Alternative B includes measures to stabilize the archaeological site given its great value as a cultural resource. Protection would include placement of a small earth, log, and cobble berm around the site or packing earth, log, and cobble against the base of the site and planting with compatible native plants as described in Chapter 2.

Following removal of the berm, the channelized configuration of Cañada del Puerto Creek would still have a fairly high left bank (about five feet above channel bottom). All flows up to about 550 cubic feet per second would still be contained completely within the channel, and therefore, there would be no change in sediment transport capacity for the majority of flow events expected to occur. It is these more frequent flows that are considered the primary channel maintenance flows, or channel forming flows.

Hydraulic modeling was performed for the creek with the berm removed. This included a channel velocity analysis that includes modeling for the 25-year flood. The velocity profiles extended through the entire study reach of the creek under existing conditions (berm in place) and under proposed conditions (berm removed). Predictive hydrologic models indicate that velocities at the boulder bar are the same with and without the berm in place. Given these observations, the current dynamic of boulder bar formation and failure would be expected to continue as it currently does. There would be a no change in the hydraulic effect of the marine boulder bar or tidal processes. No impacts to the cultural resources or infrastructure would occur.

The pier at Prisoners Harbor is the oldest pier site in Santa Barbara County. The original pier was constructed in 1871, well before the existing berm in Cañada del Puerto Creek was built. Therefore, the pier was not previously located in an area that relied on the berm for flood control in order to prevent flooding and erosive forces that could undermine its stability. No impact to the stability of the pier would occur.

4.3.1.1.2 Effects of Stream Channel Restoration

Flood Elevation and Frequency: Alternative B would have a negligible impact on flood elevation in the downstream reaches of Cañada del Puerto Creek resulting from removal of mature eucalyptus trees from the riparian corridor along an approximately 0.7 mile stretch of channel. The Park would implement riparian restoration following a step-wise, phased approach removing eucalyptus trees from approximately 20 acres. Step 1 would include removal at the fill disposal sites (2.78 acres) and on 3.08 additional acres along lower Cañada del Puerto Creek and removal from subsequent restoration sites would proceed at a pace set through monitoring recovery of the previously restored areas.

The Park would implement a phased approach to tree removal and riparian restoration to ensure that increased flood elevations are negligible. Trees would be carefully removed to minimize disturbance to the existing native vegetation, streambanks and soils. Woody native vegetation and understory vegetation would remain intact following tree removal. In some areas native species from the Southern Riparian Woodland habitat would be planted at the site to speed recovery efforts. Willow staking would be utilized along streambanks as necessary to ensure rapid and successful revegetation efforts in more critical areas. Seeds from some species would be broadcast over the site in some locations to hasten recovery times. Revegetation efforts would include any of the methods described and would depend on the site characteristics following tree removal. Park staff would utilize an adaptive management strategy to determine which restoration and revegetation methods are most effective in rapidly achieving the restoration goals as described in Chapter 2. Sufficient recovery of the channel restoration area would occur between implementation of the stages to minimize ecological impacts and reduce the potential for sediment transport to the creek. The phased approach and the revegetation efforts would minimize the short-term and long-term hydrologic effects and reduce the potential for increased flood elevations.

Tree removal activities could result in areas of exposed soils in some areas which may be subject to increased runoff from large storm events, and thus potentially result in higher flood water elevation. Implementation of Best Management Practices designed to protect soil surfaces from increased runoff are described Chapter 2. Implementation of the measures ensures that areas of bare soils are kept to a minimum and that soils are protected from the erosive forces of rainfall immediately following construction activities.

Sediment Transport Dynamics: Alternative B would result in a negligible adverse impact related to sediment transport dynamics. Riparian restoration in Cañada del Puerto Creek would take place with a phased approach. Eucalyptus removal would begin at the most downstream reach of the creek and would proceed upstream in sectional reaches. Sufficient recovery of the channel restoration area would occur between implementation of the stages to minimize ecological impacts and reduce the potential for sediment transport to the channel and alteration of sediment transport dynamics. In addition, the Park would implement Best Management Practices designed to reduce potential construction-related impacts and reduce the potential soil deposition to the channel. Riparian restoration activities would not increase or decrease sediment transport during high flows and therefore would not cause aggradation or redirect the stream channel.

4.3.1.1.3 Cumulative Impacts

Wetland and floodplain restoration through partial removal of the berm and removal of the fill material from the wetland at Prisoners Harbor would not result in cumulative impacts in the watershed. There are no other past or reasonably foreseeable projects that would potentially affect restoration efforts.

Stream channel restoration activities conducted by the Park independent of other restoration activities in the watershed would not result in cumulative impacts. The Park would use their adaptive management strategy to ensure that riparian restoration areas are sufficiently recovered to ensure there are no cumulative impacts resulting from the phased approach to the Park's restoration efforts. Recovery would be determined by Park and The Nature Conservancy (TNC) biologists, and the assessment of recovery would be based on successful recruitment of native vegetation, distribution of federal and state listed species, and the extent of eucalyptus and other woody species.

The Nature Conservancy owns a majority of the Cañada del Puerto Creek watershed above the Park Project Area. It is reasonable to assume that TNC has an interest in continued restoration of the Cañada del Puerto Creek area. These plans could include additional removal of eucalyptus trees and other introduced species along the riparian corridor, and the timing could be similar to that proposed by the Park. If TNC implements a riparian restoration plan during the same 20-year period as the Park, then there is the potential for cumulative impacts related to hydrology. However, the impact would be negligible assuming that TNC would implement similar Best Management Practices as those used in the Park.

4.3.1.1.4 Conclusions (including impairment)

Activities under Alternative B would have negligible to moderate adverse impacts and major beneficial impacts on water resources.

Partial removal of the berm would have a minor adverse impact due to the increase in flood frequency. Removal of the berm would increase the frequency of flooding near the archaeological site, however, associated depths and velocities are predicted to be lower due to the enlarged area of the left bank floodplain. In addition, the flat surface of the floodplain and the thick vegetation would slow flood waters further. As a result, the depth and velocity of floodwaters are not predicted to result in substantial velocities on the upstream face of the archeological site. Nevertheless, Alternative B includes design of structural protection to mitigate hydraulic forces to protect this high value site. All other park infrastructure of concern – i.e. the road, historic warehouse, and dock -- are on the farthest margins of the floodplain and would not experience erosive velocities from overbank flows any greater than those at the village site. Though the historic warehouse and village site are marginally located within the regulatory 100-year floodplain, a Floodplain Statement of Findings would not be required because the location of the historic warehouse and village site are integral to their significance; and therefore, the procedural manual does not apply (Procedural Manual 77-2: Floodplain Management, V.B). Furthermore, a Wetland Statement of Findings would not be required because this restoration alternative would qualify as an "excepted action" under section 4.2.1(h) of NPS Procedural Manual #77-1: Wetland Protection.

Partial removal of the berm would slow velocities, but have a negligible impact related to the potential change in stream sediment transport dynamics. Although flow velocities would decrease with removal of the berm, the decrease would not result in conditions where sediment aggradation would cause redirection of stream flow and impacts to cultural resources or park infrastructure.

Partial berm removal and removal of fill from the former wetland would have a beneficial effect related to increased stormwater and flood storage by connecting the channel to the floodplain and by increasing wetlands by 3.1 acres. Periodic flooding would be beneficial to the hydrologic and ecological functioning of the restored wetlands and would meet the project objective of reconnecting the stream channel and its floodplain. Placement of fill material removed from the former wetland at the disposal site could result in some short-term, construction-related impacts associated with potential runoff. Implementation of Best Management Practices would keep the impacts negligible.

Stream channel restoration would have a negligible impact on flood elevation in the downstream reaches of Cañada del Puerto Creek resulting from removal of mature eucalyptus trees from the riparian corridor. There could be short-term impacts related to tree removal; however the Park would minimize impacts through monitoring and adaptive management strategies describe in Chapter 2. Monitoring of the restoration efforts and proceeding with the phased implementation only after the previous section has recovered sufficiently would minimize the potential impacts on flood elevation.

The level of impact on water resources would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.1.1.5 Mitigation and Monitoring

Alternative B includes design and installation of structural protection to mitigate potential hydraulic forces to protect the archaeological site. The protection measures are included as part of the project; and therefore, no additional mitigation measures are required related to flood elevation and flood frequency.

The Park would use their adaptive management strategy to ensure that riparian restoration areas are sufficiently recovered to ensure there are no cumulative impacts resulting from the phased approach to restoration as described in Chapter 2. Recovery would be determined by Park and The Nature Conservancy biologists, and the assessment of recovery would be based on successful recruitment of native vegetation, distribution of federal and state listed species, and the extent of eucalyptus and other woody species.

4.3.1.2 Wetlands and Floodplains

Wetlands are among the most valuable resources because they provide many functions and values in a complex ecosystem. The function of wetlands include water quality improvement; stream shading; flood attenuation; shoreline stabilization; ground water exchange; and habitat for aquatic, terrestrial, migratory, and rare plant and animal species. The wetlands function to remove pollutants and filter nutrients and organic matter.

Groundwater monitoring indicates that the groundwater in the Project Area is contained in the alluvial aquifer. Information gathered from monitoring results during November 2005-October 2006 indicate that groundwater rose steadily in response to wet season rain events and peaked in May and steadily declined once rainfall stopped in June. The ranges of fluctuation in the groundwater wells were approximately 1.5 to 2.0 feet over a 12-month period. Tidal influence on the water table was minor, typically 0.0 to 0.2 feet over a tide cycle. Wells closest to the coast occasionally fluctuated as much as 0.4 feet during the driest periods. The water ranged from fresh water to slightly brackish. Water depth in the wetland fill area averaged approximately two to three feet below the ground surface. Overall, the water level data indicate that the fill areas at Prisoners Harbor have a high potential for successful wetland restoration, because the site had a reliable water source very near to ground surface and the depth the groundwater has a very narrow range and the depth to groundwater had a very narrow range during this near-average rainfall year.

4.3.1.2.1 Effects of wetlands and floodplain restoration

Alternative B would have a major beneficial effect on wetlands and floodplains. Before significant landscape modifications in the 19th and 20th century, the Project Area supported about 12 acres of wetland habitat. Historic wetlands appear to have included brackish to freshwater conditions at the mouth of Cañada del Puerto Creek which opened occasionally onto a floodplain wetland west of the existing stream channel and northeast of the dock access road. Approximately 6.5 acres of wetland exists today including the intertidal beach area. The existing wetlands in the Project Area provide a vital link between land and the ocean, exporting nutrients and organic material to the ocean.

The Project Area supports a rare type of coastal wetland known as a freshwater floodplain marsh and associated stream channel. Alternative B would increase the wetland habitat by 3.1 acres through removal of sand and rock fill material and planting native vegetation. The 3.1 acres of restored wetland would include open-water habitat, native willow forest, emergent marsh and saltgrass meadow and would restore 2/3 of the buried wetlands.

The Park Service has completed groundwater monitoring for the alluvial aquifer under Prisoners Harbor. Groundwater wells were monitored daily, seasonally, and interannually to determine variations in water table depth and salinity and to determine if water level data indicated that the filled areas at Prisoners Harbor could be restored to a properly functioning and sustainable wetland. Results indicated that the site has a reliable water source very near the ground surface, with only a narrow range of groundwater depth. Results also indicated that an average excavation depth of two to three feet of fill would re-expose the water table and re-create the wetland conditions in the excavated areas. The depth of excavation would vary depending on the type of wetland habitat desired: up to 6 feet for open water habitat to approximately 2 feet for creation of saltgrass meadow. Park ecologists studied the wetlands adjacent to the fill area and determined that the existing wetlands have water table dynamics and water sources that support willow, bulrush, and transitional wetlands. Ecologists would use the adjacent wetlands as a reference wetland to serve as a model for how to excavate the filled site to create a functioning wetland. Plantings would mimic the surrounding wetland and floodplain complex increasing the likelihood of developing a sustainable and functioning wetland. Native vegetation including willow (*Salix lasiolepis*) and saltgrass (*Distichlis spicata*), bulrush (*Scirpus* spp), rush (*Juncus* spp), and other herbaceous wetland plants would be planted in their appropriate depth-to-water table zones. Use of species native to the site and found within the reference wetland would increase vegetation survival and function of the wetland.

Fill material removed from the wetland would be placed at one of the two designated disposal sites. The disposal sites would be located outside the 100-year floodplain, and therefore would not affect the amount of wetlands in the floodplain.

Removal of the existing berm along the channel would reconnect the Riverine wetland (Cañada del Puerto Creek) to the existing 6.5 acres of wetlands and floodplain and to the newly created 3.1 acres of wetland. A review of historic information suggests that the original stream channel was shallow and spread approximately 75 to 100 feet wide across most of the floodplain. Removal of the berm would allow the creek to overflow its bank and utilize more of the historic floodplain and provide increased floodwater storage capacity. The berm removal would allow flood waters to inundate the floodplain, the existing wetlands, and the restored wetland, which would inundate the created wetland and allow for hydrologic input on a more regular basis. The more frequent inundation from floodwaters and the continual flow of groundwater from the alluvial aquifer would ensure the viability of the existing wetlands and the restored wetland. This gain in connectivity between the creek, the floodplain, and the wetlands would represent a major beneficial effect.

Minor temporary impacts to the wetlands surrounding the restored wetlands may occur; however, no permanent loss or filling of existing wetlands would occur during removal and stockpile of excavated sediments. Removal of the fill from the wetland and from the berm would require use of heavy equipment to excavate approximately 19,800 cubic yards of sand and rock fill. Removal activities may temporarily impact jurisdictional waters. BMPs would be instituted to minimize construction impacts, and these measures are described in Chapter 2. Activities within wetlands could require permits from the US Army Corps of Engineers under Section 404 of the Clean Water Act, the California Coastal Commission under the federal Coastal Act, and the California Regional Water Quality Control Board under Section 401 of the Clean Water Act. A Wetland Statement of Findings would not be required because this restoration alternative would qualify as an "excepted action" under section 4.2.1(h) of NPS Procedural Manual #77-1: Wetland Protection. Overall, there would be minor adverse effects during construction and temporary impacts to wetlands and the stream channel. However, over the short-and long-term, the benefits of 3.1 acres of restored wetlands and the reconnection of the creek channel to the floodplain and wetland would offset the temporary construction impacts. The increase in wetlands and floodplain would represent a major beneficial effect.

4.3.1.2.2 Effects of Stream Channel Restoration

Alternative B would include 20.2 acres of riparian restoration along Cañada del Puerto Creek over a 20-year timeframe. The restoration activities would have no impact on the areal extent of wetlands or floodplains. Restoration activities would be designed to minimize disturbance to the native woody plant understory, stream banks, or soils. Revegetation would occur through natural recruitment from the Project Area's seed bank, reproduction of remnant native plants on the floodplain, and active revegetation including seeding and planting or a combination of both. There would be no impact to wetlands or floodplains from removal of eucalyptus trees and channel restoration efforts.

4.3.1.2.3 Cumulative impacts

None of the past or foreseeable future activities in the Cañada del Puerto Creek appear to affect the existing wetland or floodplain at Prisoners Harbor. Restoration of wetlands and reconnection of the creek to its floodplain would result in a net increase in wetland habitat.

The Intergovernmental Panel on Climate Change (IPCC 2007) predicts mean global sea level rises between 0.6 feet and 2 feet over the next century. The Park assumes a 0.7-foot rise in sea level over the next 50 years or approximately half the moderate B2 emission scenario for the year 2099 from the 2007 IPCC synthesis report. The rise in sea level could change the frequency and areal extent of tidal inundation of the lower estuary and could possibly convert some of the existing and restored wetlands from a palustrine freshwater wetland type to more intertidal wetland. A rise in sea level would likely increase the extent of areas subject to tidal inundation. However, given the topography of the Project Area; it is unlikely that the overall extent of wetland habitat would increase and upland habitat decrease as a result of a rise in sea level.

4.3.1.2.4 Conclusion (including impairment)

Removal of the fill material and re-creation of 3.1 acres of wetland and removal of the berm would result in a major beneficial effect. Creation of an additional 3.1 acres of wetland increases the total wetlands in the Prisoners Harbor area to 9.6 acres. The existing berm located adjacent to the western bank of the creek would be removed. Removal of the berm would reconnect the left bank floodplain with the channel and allow floodplain storage as well as hydrologic input on a more frequent basis. As result, Alternative B would be beneficial to the hydrologic and ecological functioning of the restored wetlands and would meet the project objective of reconnecting the stream channel and its floodplain.

Removal of eucalyptus trees within the riparian corridor along Cañada del Puerto Creek would not affect wetlands or floodplains.

The level of impact on wetlands would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.1.2.5 Mitigation and Monitoring

No mitigation measures or monitoring requirements are needed beyond those described in Chapter 2.

4.3.1.3 Water Quality

Wetlands and floodplains play a key role in protecting and improving water quality as wetland plants and soils have the capacity to store and filter pollutants. Calm wetland waters with flat surfaces and flow characteristics allow nutrients and sediments to settle out of the water column. Wetlands which filter or store sediments for extended periods of time may undergo changes. Sediments may eventually fill in wetlands and eventually modify function over time. Very little surface water quality information exists for Cañada del Puerto Creek, and surface water quality data are not available. However, inferences can be made regarding water quality conditions. Currently a vast majority of the watershed is in a near natural state; therefore prevailing surface water chemistry is the result of interaction between precipitation, soils, biota, and bedrock. It is unlikely that high concentrations of metals, organics, or other contaminants occur in the watershed. Near the outlet to Cañada del Puerto Creek, there is a marine influence on water quality. Cyclic salts and occasional overwash may increase salinity levels to slightly brackish for surface groundwater, especially in the dry season.

More specific information is known about sediment concentrations in the watershed. Sediment concentrations are generally considered high due to the combination of variable bedrock geology, steep slopes, degraded soil structure due to historic over-grazing, and intense precipitation events. Impact thresholds therefore focus on change in sediment concentrations in the Project Area based on the functional capacity of the wetlands and the floodplains to filter and store sediments.

4.3.1.3.1 Effects of wetlands and floodplain restoration

Alternative B would have a moderate beneficial water quality impact from restoration of 3.1 acres of wetland and reconnection of Cañada del Puerto Creek to its floodplain. Fill removal from the wetland and berm removal would result in a total of 9.6 acres of wetland and floodplain. Improved hydraulic connectivity would be expected to have a beneficial effect on water quality with flows exceeding the 10-year flow event. The wetlands and floodplain would store floodwaters by spreading water out over the area, decreasing flow velocities and allowing sediments to settle out. There is no water quality monitoring data available to determine sediment loads or nutrient content of Cañada del Puerto Creek, so the total sediment load reduction and water quality improvement cannot be calculated. Water quality improvement is based on the known benefits wetlands and floodplain storage provide.

Removal of 17,400 cubic yards of fill from 3.1 acres of former wetlands and partial removal of the berm would have a short-term adverse impact on water quality during fill removal and disposal activities. Water quality impacts during construction would be characterized as negligible, because Best Management Practices would be instituted to reduce potential impacts associated with incidental release of sediments to the adjacent wetlands and the stream channel. These measures are described in Chapter 2.

Moving equipment and materials to and from staging areas could disturb vegetation and soils between the staging area and restoration areas. Repeated disturbance of vegetation and soils (i.e., due to vehicle passes) during these activities in areas where native vegetation occurs would cause surface erosion and temporarily affect water quality if unseasonable precipitation occurred. Construction activities could result in relatively large areas of exposed soils which may be subject to increased runoff from large storm events and thus potentially higher flood water elevation. Construction activities would occur during the driest part of the year to ensure groundwater levels would be low; and the risk of storm events would be low. Implementation of Best Management Practices designed to protect soil surfaces from increased runoff are described in the storm water management mitigation measure described in Chapter 2.

Methods to control invasive vegetation include herbicide spraying, which has negligible or no affect on water quality because the Park would utilize Best Management Practices for herbicide use.

4.3.1.3.2 Effects of Stream Channel Restoration

Alternative B could have a moderate adverse effect related to water quality primarily due to the potential for increased water temperatures resulting from the removal of riparian cover.

Throughout the Project Area, well developed riparian vegetation provides shade and cover to the stream corridor buffering the temperature regime of the surface water. In the lower reaches the vegetation is primarily native woody species and in the upper reaches the vegetation is primarily made up of mature eucalyptus trees. Removal of eucalyptus trees along the channel could increase water temperature; however the project would proceed following a phased approach. This would allow recovery and partial revegetation with native plants before work would proceed to the next section immediately upstream. Park and The Nature Conservancy managers would use an adaptive management strategy including evaluation plant species, percent cover and percent bare ground, and litter accumulations to determine when the subsequent phase of the riparian restoration should occur.

Vegetation removal could have a short-term negligible adverse impact on water quality. Caution would be taken during vegetation removal to limit soil disturbance and protect existing understory vegetation. Water quality impacts during construction would be characterized as negligible adverse, because BMPs would be instituted to reduce potential impacts associated with incidental release of sediments to the adjacent wetlands and the stream channel.

Methods to control of invasive vegetation include herbicide spraying and hand cutting, which have negligible or no affect on water quality because the Park would utilize Best Management Practices for herbicide use.

4.3.1.3.3 Cumulative impacts

There are currently no other proposed projects that would have the potential to cause cumulative impacts.

Stream channel restoration activities conducted by the Park independent of other restoration activities in the watershed would not result in cumulative impacts. The Park would use their adaptive management strategy to ensure that riparian restoration areas are sufficiently recovered to ensure there are no cumulative impacts to water quality, specifically increased water temperatures result from the phased approach to the Park’s restoration efforts. Recovery would be determined by Park and The Nature Conservancy (TNC) managers, and the assessment of recovery would be based on successful recruitment of native vegetation, distribution of federal and state listed species, and the extent of eucalyptus and other woody species.

The Nature Conservancy owns a majority of the Cañada del Puerto Creek watershed above the Park Project Area. It is reasonable to assume that TNC has an interest in continued restoration of the Cañada del Puerto Creek area. These plans could include additional removal of eucalyptus trees and other introduced species along the riparian corridor, and the timing could be similar to that proposed by the Park. If TNC implements a riparian restoration plan during the same 20-year period as the Park, then there is the potential for cumulative impacts related to surface water quality, primarily water temperature.

4.3.1.3.4 Conclusion (including impairment)

Activities under Alternative B would have no impact to negligible adverse effects and moderate beneficial impacts on water quality.
Alternative B would result in a moderate beneficial effect related to water quality. Partial removal of the berm and removal of the fill material from the former wetland would provide increased hydrologic connectivity between the stream and the wetland and floodplain. Access of floodwater and storm flow to the wetlands would result in a decrease in sediment loads and a decrease in nutrient concentrations.

Removal of the eucalyptus trees from the riparian corridor could result in a moderate adverse impact to water quality from potential increases in water temperature, and it could result in short-term negligible adverse impacts due to sedimentation resulting from vegetation removal efforts. The riparian corridor restoration could also result in a cumulative impact related to water quality if The Nature Conservancy implements stream channel restoration efforts during the same 20-year time period.

The level of impact on water quality would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.1.3.5 Mitigation and Monitoring

Best Management Practices and the adaptive management strategy are described in Chapter 2. No additional monitoring would be required.

4.3.2 Biological Resources

Introduction

Under Alternative B, the Park would remove all of the cattle corrals, restore 3.1 acres of palustrine wetlands and deepwater habitat, remove eucalyptus, control invasive species, construct a protective barrier around the archeological site, and improve the visitor experience. A portion of the berm would be removed and the creek connected to its floodplain.

4.3.2.1 Wildlife

4.3.2.1.1 Birds

4.3.2.1.1.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

Wetlands restoration in Alternative B would result in an increase of wetland habitat from 6.5 acres currently to 9.6 acres total. The resulting 3.1 acres of restored wetlands would include open-water habitat, native willow forest habitat, emergent marsh habitat, and saltgrass meadow habitat. The expansion of wetland area would support an increase in use of such species as marsh wrens, song sparrows, Virginia rails, great blue and green herons, as well as migratory waterfowl. An increase in wetland habitats would provide greater foraging opportunities for both dabbling and diving ducks, other species of waterfowl, marsh-associated passerines, and shorebirds that utilize nearby areas during different times of the year. The expansion of wetlands may also increase breeding potential for species such as American coot, mallard, Canada goose and resident and Neotropical migrant passerines. Newly restored wetlands would provide foraging habitat for raptor species, such bald eagles, red-tailed and sharp-shinned hawks, and osprey, which would be drawn to the site by small vertebrates such as mice and snakes. During peak annual migration periods, waterfowl such as brants, teals, and pintails, and shorebirds such as stilts, killdeer, plovers, and gulls, which stop at Santa Cruz Island to rest, feed, and in some cases over-winter, would use the restored wetlands in search of refuge and food. The availability of an additional 3.1 acres of wetlands in this alternative would have a moderate beneficial impact on birds.

Berm removal and restored hydrological connectivity between Cañada del Puerto Creek and its floodplain would allow for more frequent flood events to reach the wetland than with the berm intact. During these flood events, nutrients and organic material would be delivered to the wetland, resulting in enhanced productivity, habitat, and water quality functions. These functions would benefit birds using the wetlands to a greater extent than without berm removal and restored flood regime.

Studies have shown that wetland species, particularly waterfowl, are sensitive to human disturbance (Castelle et al., 1992; Burke and Gibbons, 1995; Semlitsch, 1997). A buffer between wetland habitat and human activity can reduce the negative impact of human activity on waterfowl breeding and feeding. With increasing distance from human activity there is a higher likelihood of finding a greater number of species and greater wetland function (eg. filtering suspended solids from the water). The access road from the pier to the Central Valley is well traveled by day visitors and also researchers, TNC staff, and island residents and the corral area is mowed on a regular basis. After the corrals are removed a buffer of willow trees would be planted along the road. A gap in the willows would be created across the road from the warehouse and near the historic blackwood acacia tree creating a wildlife viewing area and rest area. Removing the corrals and creating a willow buffer would minimize human disturbance and maximize the quality of restored wetland habitat (Figure 2.5). With corrals removed and the wetland revegetated, a portion of the wetland would have a 200' to 300' buffer from human disturbance (Figure 2.5). The area with a 300' buffer would support waterfowl breeding and feeding (Table 2.2). The majority of wetland area would have a 100' buffer from human disturbance. This would support some waterfowl breeding.

Activities associated with wetland restoration would involve disturbance of existing wildlife habitats through vegetation clearing, earth moving, and disposal of fill. These activities would cause adverse impacts on habitat in and adjacent to the wetland restoration area, fill disposal areas, and equipment staging areas. Habitat disturbance would occur on 3.1 acres in the Built Up unit, 1.74 acres of Eucalyptus, and 1.04 acres of Fennel. These habitat types are non-native and altered habitats, but all the areas that would be disturbed during construction provide some suitable habitat for several species of birds. Thus, despite short-term minor adverse impacts on habitat, restoration of wetlands would provide beneficial effects that would outweigh the negative effects from destruction of current habitat. There would also be localized habitat disturbance from foot traffic during vegetation clearing, excavation of fill, fill disposal, non-native plant control, and collection of plant materials; however, these areas would likely be minimal and limited to the area immediately surrounding the work areas with negligible adverse impacts.

Construction activities for wetland restoration and human presence would cause temporary displacement and disturbance of birds for the several months duration of construction. Impacts to bird species would be minor adverse and range from noise and disturbance during construction to changes in the available habitats on site over the short- and long-term. Species are expected to return to the area after construction is completed. Some species may be prevented from using the resources on the project site due to habitat alteration or until the new wetlands and revegetated fill areas become established and mature, and new bird species are likely to occupy the new habitats.

Impacts to nesting birds would be minimized due to timing of restoration activities. Work would be initiated in the late spring and completed in late summer or early fall. Much of this time period is after the spring bird breeding season, although may coincide with some fledging and rearing. Noise of truck operations or other heavy equipment used for vegetation clearing, earth moving, grading, and disposal of fill could adversely impact breeding birds in close proximity. If pre-construction surveys were conducted prior to initiating construction, it would ensure that construction activities do not disrupt breeding, nesting, or fledging/rearing and reduce impacts to short-term negligible to minor adverse.

The Island scrub-jay breeds in coast live oak woodland or chaparral with a high scrub oak component, forages in wooded habitats throughout the island, and in the Project Area occurs particularly within the arroyo willow riparian forest. The new willow forest habitat that would be created with wetland restoration could provide additional, albeit small, foraging habitat for the jay, constituting minor beneficial impacts. The bald eagle would also benefit from newly restored wetlands which would provide additional foraging habitat. Habitat and use patterns of the brown pelican are not likely to change in the long-term. However, there may be short-term adverse effects on the brown pelican during restoration activities with increased noise and activity and from the equipment loading/unloading area sited on the other side of the pier close to the beach where brown pelicans rest. Additionally, the Island scrub-jay and bald eagle could also be temporarily disturbed by noise and activity during wetland restoration. Construction activities would have short-term minor adverse impacts on special status bird species.

Enhanced visitor experiences at the restoration site could increase disturbance of wildlife as visitors would be likely to spend more time in the area with the addition of two wayside exhibits and a wetland viewing bench. Birdwatchers may be attracted to spend more time in the area since more birds are likely to be present and use the restored wetlands. The effects of public access on wildlife can cause immediate adverse responses such as flushing or avoidance, or more indirect or long-term responses such as altered behavior, reduced health and productivity, and changes in abundance or species composition. However, the amount of visitor use in the area would not be likely to change appreciably from current levels. In this context, impacts on birds relative to existing conditions would be expected to be negligible adverse; however, the benefit of additional wetland habitat would likely outweigh the adverse effects of wildlife viewing..

4.3.2.1.1.2 EFFECTS OF STREAM CHANNEL RESTORATION

Riparian restoration in Cañada del Puerto Creek would take place with a phased approach to eucalyptus removal. A total of 20.02 acres would be restored to native riparian vegetation communities consisting of Southern Riparian Woodland and areas where it intergrades into Island Chaparral. Initially, habitat functioning of the restored riparian communities (e.g., shading, bird habitat) would be somewhat limited due to the relatively smaller stature of trees and the absence of snags and dead branches. Over time, habitat value would improve as the riparian habitat matures, and an increase in the areal extent of fully functioning riparian vegetation would occur along Cañada del Puerto Creek. With the phased approach, NPS and TNC biologist would determine when native vegetation becomes established before restoration would proceed to the next phase. This strategy would minimize ecological impacts, reduce the potential for sediment transport, and allow for availability of mature habitat for wildlife species that use the area.

Although a loss of mature riparian habitat, albeit consisting of non-native eucalyptus, would be an unavoidable consequence of project implementation during the short-term with a temporal loss of small areas of riparian habitat along the Cañada del Puerto Creek corridor between the time when eucalyptus trees are removed and new native riparian vegetation is established, over the long-term naturally functioning riparian acreage would increase. This would benefit riparian-associated bird species, such as thrushes, warblers, tanagers, sparrows, and vireos. Restoration of native riparian habitat would be beneficial in the long-term because the areal extent would eventually increase from about 18.8 acres of native riparian habitat currently to 38.82 acres, which would more than double the amount of native riparian habitat over existing conditions. A contiguous native riparian corridor increases riparian value to breeding and migratory birds, as well as resulting in additional snags and cavities for cavity nesters. Over the long-term, riparian restoration would have a moderate beneficial impact on birds.

Loss of riparian habitat would be supplanted by restoration of native riparian habitat in the long term. In the short term, newly planted trees would not have the same value as mature riparian habitat (i.e., established vegetative structure, older trees with cavities), as it would take several decades for trees to mature. The loss of mature riparian habitat would occur in phases, and possibly by the time the later phases are reached, habitat restored during earlier phases would be approaching maturity, thus reducing impacts on cavity-nesting birds and other species to minor adverse. As native riparian habitat expands following removal of eucalyptus, an increase in foraging and breeding habitat for riparian associates (residents and Neotropical migrants) would be expected. Mature riparian habitat would provide structural refuge critical to passerine birds and other wildlife species.

Construction activities during riparian habitat restoration would have short-term minor adverse impacts on birds for several months during each phase of restoration. Work would be conducted in summer after the spring bird breeding season and fall before the rainy season. Impacts would be associated with noise and human disturbance from actions such as creek bank grading, removal of eucalyptus trees, depositing of fill and grading at fill disposal areas, moving equipment and materials to and from staging areas, and revegetation activities. These activities would have temporary adverse effects on birds, such as displacement and disturbance, although restoration would be timed to occur after the end of the breeding season for avian species likely to use eucalyptus.

There would also be changes in the available habitats on site over the short and long term. The removal of eucalyptus would initially displace those species that utilize eucalyptus habitat. Those species displaced by the removal of eucalyptus would return to the adjacent more structurally diverse native plant communities that they originally foraged in or inhabited. Ultimately, existing trees would be replaced by riparian species that would offer higher ecological value for wildlife. When newly restored riparian plant species become established and mature, existing and new birds species are likely to occupy the new habitats.

The Island scrub-jay breeds in coast live oak woodland or chaparral and forages in wooded habitats throughout the island, particularly within the Arroyo Willow riparian forest in the Project Area, and would benefit from riparian restoration. The ecological benefit of removing eucalyptus trees from fill disposal and other areas include opening the area for re-colonization by native plant species, restoring riparian oak woodland ecological function, and improving habitat for many species of birds including the Island scrub-jay. An additional 20.02 acres of native riparian forest would be available for Island scrub-jays once all phases of restoration are completed. Bald eagles are known to forage in riparian areas near rivers, thus would benefit from the expanded areal extent of native riparian vegetation. Riparian restoration under this alternative would have long-term minor to moderate beneficial impacts on these two special status species. The brown pelican would not be affected by riparian restoration as it does not occupy this habitat type.

4.3.2.1.1.3 CUMULATIVE IMPACTS

Past activities which have impacted birds mainly relate to alteration of habitat. Activities associated with American and Mexican settlement of Santa Cruz Island in the nineteenth century included the clearing and farming of certain areas on the island; the establishment of non-native species such as eucalyptus trees; and the introduction of sheep, pigs, cattle, and horses. Bird habitat was altered or destroyed through: overgrazing by sheep; the spread of non-native plants such as fennel and eucalyptus; introducing pigs which caused significant vegetation damage; vegetation type conversion from native woodland and shrubland to non-native grasslands; and filling in a large portion of the wetland at Prisoners Harbor.

Bald eagles disappeared from the Channel Islands by the early 1960's due to human impacts, primarily from the release of DDT into the ocean off the Palos Verdes peninsula eventually contaminating the regional food web rendering eggs too fragile to reach maturity. Between 2002 and 2006, 61 bald eagles were released on Santa Cruz Island. Today nearly 40 bald eagles reside on Santa Cruz Island including four nesting pairs. Golden eagles historically were only visitors to Santa Cruz Island. They began colonizing the island in the mid-1990's, having discovered an abundant food supply in feral pigs. Golden eagles also preyed upon foxes causing a precipitous decline in the fox population. More than 40 golden eagles were relocated from Santa Cruz Island. Although there are no known nesting or juvenile golden eagles on the island, biologist are watchful for any new golden eagle sitings. Past actions combined have contributed minor adverse cumulative impacts on birds.

Present actions which could impact birds include public recreational activities, maintenance of facilities, and research and monitoring. Prisoners Harbor is considered the main access point to the National Park isthmus area and The Nature Conservancy property. Lands owned by the National Park Service are fully open to visitor access and use, and visitation has increased over the years to the Project Area. Hikers use this area as an access for day hiking and backpacking, and scientific researchers and educational groups use this area to access the central valley. Other recreation opportunities and uses of the area include beachcombing, fishing, picnicking, bird watching, viewing historic buildings, and beach access to water sports including kayaking and snorkeling. Birds could be disturbed and displaced temporarily while humans are present in an area. Monitoring of bald and golden eagles provides important data used for making decisions on management of these two species. Present actions combined contribute negligible adverse cumulative impacts on birds.

Future cumulative impacts to birds would include continued human presence via recreation, maintenance, and research as are occurring presently. Restoration of the Cañada del Puerto Creek area on TNC land adjacent to and upstream of the Prisoners Harbor wetlands restoration area could be implemented, which would provide additional high quality native habitat for birds. Future actions would contribute both negligible adverse and negligible beneficial cumulative impacts on birds.

The additional impacts associated with Alternative B, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on birds.

4.3.2.1.1.4 Conclusion (including impairment)

Alternative B would have negligible adverse to moderate beneficial effects on birds in the Project Area. Long-term moderate beneficial impacts would result from 3.1 acres of wetland restoration, which would support an increase in use by many bird species for refuge and forage. Long-term moderate beneficial impacts would also result from 20.02 acres of riparian restoration by eradication of eucalyptus trees and revegetation to re-establish native riparian plant communities. Riparian restoration would benefit riparian-associated bird species by increasing riparian value to breeding and migratory birds, as well as resulting in additional snags and cavities for cavity nesters.

Short-term negligible and minor adverse effects would occur on existing wildlife habitats with disturbance and destruction from construction activities associated with wetland and riparian restoration. However, these impacts would be outweighed by the availability of native habitats with improved ecological integrity once restoration is complete.

There would also be short-term negligible and minor adverse effects on birds, including special status birds, during construction activities for wetland and riparian restoration as species would be temporarily disturbed or displaced by noise and human activity. Impacts to nesting birds would be minimized as most activities would be scheduled after the spring breeding season.

This alternative would have minor beneficial impacts on two of the special status bird species in the Project Area, the Island scrub-jay and the bald eagle, with restoration of wetlands and riparian habitat which would provide additional foraging habitat for both species.

The level of impact on birds would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.2.1.1.5 Mitigation and monitoring

NPS and TNC biologists will survey stands of eucalyptus trees identified for removal for nests of federally protected or island endemic bird species. If protected or endemic nests of actively breeding birds are located, eucalyptus removal will not proceed until the end of breeding season.

The NPS spring and fall bird survey in the Project Area will continue through construction and for five years post construction. Data collected in the bird surveys will be entered into the Park's landbird database.

4.3.2.1.2 Mammals, reptiles, and amphibians

4.3.2.1.2.1 Effects of wetlands and floodplain restoration

Wetlands restoration in Alternative B would result in an increase of wetland habitat from 6.5 acres currently to 9.6 acres total. The resulting 3.1 acres of restored wetlands would include open-water habitat, native willow forest habitat, emergent marsh habitat, and saltgrass meadow habitat. The expansion of wetland area would support an increase in use of mammals, reptiles, and amphibians. An increase in wetland habitats would provide greater foraging and refuge opportunities for the deer mouse, western harvest mouse, bats, and the island fox. The expansion of wetlands may also increase breeding opportunities for species such as the Pacific tree frog which lays eggs in water and salamanders which lay eggs in moist places on land. Wetland restoration in Alternative C would have long-term moderate beneficial impacts on mammals, reptiles, and amphibians.

Berm removal and restored hydrological connectivity between Cañada del Puerto Creek and its floodplain would allow for more frequent flood events to reach the wetland than with the berm intact. During these flood events, nutrients and organic material would be delivered to the wetland, resulting in enhanced productivity, habitat, and water quality functions. These functions would benefit wildlife using the wetlands to a greater extent than without berm removal and restored flood regime.

Overall habitat extent, function and quality would be improved with wetland restoration. The new habitat would provide ecologically functional hydroperiod, vegetation, and microhabitat features for species that would occupy the wetlands. Loss of habitat from construction, as well as long-term changes in habitat mosaics as a result of wetland restoration would result in adverse and beneficial effects on populations. In general, a suitable mix of habitat would exist for most, if not all, common species currently found on the site. Populations would likely adapt to long-term habitat changes and occupy suitable habitat as needed.

Activities associated with wetland restoration would involve disturbance of existing wildlife habitats through vegetation clearing, earth moving, and disposal of fill. These activities would cause adverse impacts on habitat in and adjacent to the wetland restoration area, fill disposal areas, and equipment staging areas. Habitat disturbance would occur on 2.1 acres in the Built Up unit, 1.74 acres of Eucalyptus, and 1.04 acres of Fennel. These habitat types are non-native and altered habitats, but all the areas that would be disturbed during construction provide some suitable habitat for several species of mammals, reptiles, and amphibians. Thus, despite short-term minor adverse impacts on habitat, restoration of wetlands would provide beneficial effects that would outweigh the negative effects from destruction of current habitat. There would also be localized habitat disturbance from foot traffic during vegetation clearing, excavation of fill, fill disposal, non-native plant control, and collection of plant materials; however, these areas would likely be minimal and limited to the area immediately surrounding the work areas with negligible adverse impacts.

Construction activities for wetland restoration and human presence would cause temporary displacement and disturbance of wildlife for the several months duration of construction. Impacts to mammals, reptiles, and amphibians would be minor adverse and range from noise and disturbance during construction to changes in the available habitats on site over the short and long term. Species are expected to return to the area after construction is completed. Some species may be prevented from using the resources on the project site due to habitat alteration or until the new wetlands and revegetated fill areas become established and mature, and new wildlife species are likely to occupy the new habitats.

Construction activities could result in mortality of reptiles and amphibians through individual animals being crushed by construction equipment or being excavated from burrows or other refugia during ground disturbing activities. These actions also have the potential to disrupt breeding cycles. Work would be initiated in the late spring and completed in late summer or early fall; this time period does not coincide with salamanders which lay eggs in winter and hatch in early spring, but it does coincide with lizard and snake egg laying in late spring and summer and hatching in late summer and early fall. Thus the potential exists for crushing eggs and juveniles during restoration construction. These construction impacts would be short-term, minor and adverse as it is likely that few individuals or eggs would be affected. The tree frogs would not be affected as there would not be any work taking place in aquatic habitats. If preconstruction surveys are conducted prior to construction, wildlife could either be relocated or encouraged to leave the area, thus minimizing the potential for construction-related mortality.

Wetland restoration under Alternative B would have both adverse and beneficial impacts on special status species. Bat species, some of which are federally listed as species of concern or are protected by the Migratory Bird Treaty Act, could occur in the Project Area. Removal of hollow snags as part of restoration construction and fill disposal could have adverse effects on roosting habitat. Long-term effects would be beneficial with additional open water and emergent marsh habitat that would function as foraging areas and a reliable drinking water source. Impacts would be negligible adverse over the short-term and minor beneficial over the long-term.

The island fox could be affected by construction activities since it is known to occur in the Project Area. If an individual is observed at the restoration site, proper mitigation measures would be employed to insure that impacts are minimized or avoided. There could be long-term minor beneficial effects with the increase in wetland habitat, as island fox is known to occupy coastal marshes.

The deer mouse and western harvest mouse could be adversely affected by wetland restoration activities as described above. However, mitigation measures, such as avoiding disturbance of part of the known habitat so that a portion of the population can survive until the restored wetland becomes established, would reduce construction impacts to negligible to minor adverse in the short-term. Long-term impacts could be moderate beneficial with the availability of 3.1 additional acres of wetlands for forage and cover.

The slender salamander inhabits coastal scrub communities, grasslands, oak woodlands, and crevices under beach driftwood and lays eggs in moist terrestrial environments. In the Project Area, the slender salamander is known to occur along moist banks of the stream, thus it is not likely that wetland restoration activities, which would occur in the dry Built Up area, would adversely impact slender salamander habitat or individuals. However, availability of 3.1 additional acres of wetlands, which could provide moist breeding habitat, could have long-term minor beneficial impacts on the slender salamander.

The island fence lizard prefers open sunny areas, occurs along stream banks and around human settlements, and lays eggs in terrestrial environments. Thus it is possible that construction activities associated with wetland restoration could adversely impact this species as described above, including disturbance and mortality of individuals, crushing of eggs, and habitat destruction. These impacts would have short-term minor adverse consequences during construction and long-term minor adverse consequences since some habitat in the human settlement area would be lost. However, enough suitable habitat would remain for this species to inhabit. Island fence lizards are not likely to use newly restored wetland habitat, thus restoration would not provide any beneficial impacts to this species.

The Santa Cruz gopher snake occupies grasslands, oak woodlands, dry riparian habitat, and dry stream beds. In the Project Area it has been observed along the stream, although it is possible that it could occur in the dry Built Up area where wetland restoration would be implemented. It is likely that construction would not impact the gopher snake. If individuals do inhabit the Built Up area, then the impacts from construction activities described above would apply and be negligible and adverse. Since this species prefers dry habitats, it is not likely that wetland restoration would provide any new habitat or beneficial effects.

4.3.2.1.2.2 EFFECTS OF STREAM CHANNEL RESTORATION

Riparian restoration in Cañada del Puerto Creek would take place with a phased approach to eucalyptus removal. A total of 20.02 acres would be restored to native riparian vegetation communities consisting of Southern Riparian Woodland and areas where it intergrades into Island Chaparral. Initially, habitat functioning of the restored riparian community (e.g., shading, wildlife habitat) would be somewhat limited due to the relatively smaller stature of trees and the absence woody debris and ground litter. Over time, habitat value would improve as the riparian habitat matures, and an increase in the areal extent of fully functioning riparian vegetation would occur along Cañada del Puerto Creek. With the phased approach, NPS and TNC biologist would determine when native vegetation becomes established before restoration would proceed to the next phase. This strategy would minimize ecological impacts, reduce the potential for sediment transport, and allow for availability of mature habitat for wildlife species that use the area. Riparian restoration in Alternative B would have long-term moderate beneficial impacts on mammals, reptiles, and amphibians.

Although a loss of mature riparian habitat, albeit consisting of non-native eucalyptus, would be an unavoidable consequence of project implementation during the short-term with a temporal loss of small areas of riparian habitat along the Cañada del Puerto Creek corridor between the time when eucalyptus trees are removed and new native riparian vegetation is established, over the long-term naturally functioning riparian acreage would increase. This would benefit riparian-associated species, all the reptiles and amphibians known to occur in the Project Area. Restoration of native riparian habitat would be beneficial in the long-term because the areal extent would eventually increase from about 18.8 acres of native riparian habitat currently to 38.82 acres, which would more than double the amount of native riparian habitat over existing conditions. A contiguous native riparian corridor increases riparian value to wildlife that breeds and forages in this habitat. Over the long-term, riparian restoration would have a moderate beneficial impact on mammals, reptiles, and amphibians.

Loss of riparian habitat would be supplanted by introduction of new riparian habitat, which would not have the same value as mature riparian habitat (i.e., established vegetative structure) during the short-term. The loss of existing mature non-native riparian habitat would occur in phases, and possibly by the time the later phases are reached, habitat restored during earlier phases would be approaching maturity. As native riparian habitat expands following removal of eucalyptus, wildlife would benefit from an increase in higher quality foraging and breeding habitat. Riparian habitat also provides structural refuge critical to mammals, reptiles, and amphibians.

Construction activities during removal of small areas of eucalyptus riparian habitat would have short-term minor adverse impacts on wildlife for several months during each phase of restoration. Adverse effects would be associated with noise and human disturbance from actions such as creek bank grading, removal of eucalyptus trees, depositing of fill and grading at fill disposal areas, moving equipment and materials to and from staging areas, and revegetation activities. These activities would have temporary adverse effects, such as displacement and disturbance, on species currently using eucalyptus habitats. There would also be changes in the available habitats on site over the short and long term. Ultimately, eucalyptus trees would be replaced by native riparian vegetation that would offer higher ecological value for wildlife. Species are expected to return to the area after construction is completed.

Construction activities could result in mortality of reptiles and amphibians through individual animals being crushed by construction equipment in riparian habitats or being excavated from burrows or other refugia during ground disturbing activities. These actions also have the potential to disrupt breeding cycles. Work would be conducted during the summer and fall months; this time period does not coincide when salamanders lay eggs in winter and hatch in early spring, but it does coincides with lizard and snake egg laying in late spring and summer and hatching in late summer and early fall. Thus the potential exists for crushing eggs and juveniles during riparian construction. These construction impacts would be short-term, minor and adverse as it is likely that few individuals or eggs would be affected. The tree frog eggs and tadpoles would not be affected as there would not be any work taking place in the stream. If preconstruction surveys are conducted prior to construction, wildlife could either be relocated or encouraged to leave the area, thus minimizing the potential for construction-related mortality.

Riparian restoration under Alternative B would have both adverse and beneficial impacts on special status species. Bat species, some of which are federally listed as species of concern or are protected by the Migratory Bird Treaty Act, could occur in the Project Area. Removal of hollow snags as part of restoration construction and fill disposal could have adverse effects on roosting habitat. Long-term effects would be beneficial with additional riparian and oak woodland habitat that would function as roosting areas once trees mature. Impacts would be negligible adverse over the short-term and negligible beneficial over the long-term.

The island fox could be affected by construction activities since it is known to occur in the Project Area; however, if an individual is observed at the restoration site, proper mitigation measures would be employed to insure that impacts are minimized or avoided. There could be long-term minor beneficial effects with the 20.02-acre increase in riparian habitat as island fox is known to occupy Southern Riparian Woodland.

The deer mouse and western harvest mouse could also be adversely affected by riparian restoration. These two species generally occupy marshy, grassy, and weedy habitat in the Project Area, thus are not as likely to occur in forested riparian habitat. Eucalyptus removal and other construction activities would, therefore, not have any impacts on the deer mouse and harvest mouse. However, there may be short-term minor beneficial effects with the availability of open, immature restored riparian habitat and fill disposal areas that can be used for forage and cover, particularly during the first phase of riparian restoration which would occur close to known mouse habitat in Prisoners Harbor. As restored riparian habitat matures, these species may no longer occupy these habitats.

The slender salamander inhabits coastal scrub communities, grasslands, oak woodlands, and crevices under beach driftwood and lay eggs in moist terrestrial environments. In the Project Area, the slender salamander is known to occur along moist banks of the stream, thus riparian restoration activities would have minor adverse effects on habitat, individuals, and breeding as described above. However, availability of 20.02 acres of restored riparian habitat, which could provide high quality breeding habitat, would have long-term moderate beneficial impacts on the slender salamander.

The island fence lizard prefers open sunny areas, occurs along stream banks and around human settlements, and lays eggs in terrestrial environments. Thus it is possible that construction activities associated with riparian restoration could adversely impact this species as described above, including disturbance and mortality of individuals, crushing of eggs, and habitat alteration. These impacts would have short-term minor adverse consequences during construction and long-term minor beneficial consequences with restored riparian areas that would provide new streamside habitat.

The Santa Cruz gopher snake occupies grasslands, oak woodlands, dry riparian habitat, and dry stream beds. In the Project Area it has been observed along the stream, thus there could be short-term minor adverse impacts during riparian restoration as described above, and long-term, minor, beneficial effects from newly available riparian habitat.

4.3.2.1.2.3 CUMULATIVE IMPACTS

Past activities which have impacted mammals, reptiles, and amphibians, mainly relate to alteration of habitat. Activities associated with American and Mexican settlement of Santa Cruz Island in the nineteenth century included the clearing and farming of certain areas on the island; the establishment of non-native species such as eucalyptus trees; and the introduction of sheep, pigs, cattle, and horses. Wildlife habitat was altered or destroyed through: overgrazing by sheep; the spread of non-native plants such as fennel and eucalyptus; introducing pigs which caused significant vegetation damage; vegetation type conversion from native woodland and shrubland to non-native grasslands; and filling in a large portion of the wetland at Prisoners Harbor. Between 2005 and 2006 feral pigs were eradicated from the island. Over 5000 pigs were dispatched. Since 2006 no pig sign, tracks, or other indication of living pigs has been observed on the island.

Introduction of nonnative fauna to Santa Cruz Island in the past has also negatively affected native island fauna. This effect is best understood with the decline of the Island fox and its negative association with golden eagles. Golden eagles historically were only visitors to Santa Cruz Island. They began colonizing the island in the mid-1990's, having discovered an abundant food supply in feral pigs. Golden eagles also preyed upon foxes causing a precipitous decline in the fox population. By the late 1990's predation by golden eagles caused a decline in the Santa Cruz Island fox population by over 90%. In 2000 there were fewer than 70 foxes in the wild. Captive breeding in the island's Central Valley was begun as insurance against the loss of foxes from golden eagle predation. Foxes were bred in captivity and released into the wild. Today there are more than 410 foxes living in the wild island-wide. Golden eagles have been relocated from Santa Cruz Island and there are no longer any known nesting or juvenile golden eagles on the island. Relocation of golden eagles from the island has increase survivorship of island foxes. Past actions combined have contributed moderate adverse cumulative impacts on mammals, reptiles, and amphibians.

Present actions which could impact mammals, reptiles, and amphibians include public recreational activities, maintenance of facilities, and research and monitoring. Prisoners Harbor is considered the main access point to the National Park isthmus area and The Nature Conservancy property. Lands owned by the National Park Service are fully open to visitor access and use, and visitation has increased over the years to the Project Area. Hikers use this area as an access for day hiking and backpacking, and scientific researchers and educational groups use this area to access the central valley. Other recreation opportunities and uses of the area include beachcombing, fishing, picnicking, bird watching, viewing historic buildings, and beach access to water sports including kayaking and snorkeling. Wildlife could be disturbed and displaced temporarily while humans are present in an area. Present actions combined contribute negligible adverse cumulative impacts on mammals, reptiles, and amphibians.

Future cumulative impacts on mammals, reptiles, and amphibians would include continued human presence via recreation, maintenance, and research as are occurring currently. Restoration of the Cañada del Puerto Creek area on TNC land adjacent to and upstream of the Prisoners Harbor wetlands restoration area could be implemented, which would provide additional high quality native habitat for wildlife. Future actions would contribute both negligible adverse and negligible beneficial cumulative impacts on birds.

The additional impacts associated with Alternative B, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on mammals, reptiles, and amphibians.

4.3.2.1.2.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative B would have negligible adverse to moderate beneficial effects on mammals, reptiles, and amphibians in the Project Area. Long-term moderate beneficial impacts would result from 3.1 acres of wetland restoration, which would support an increase in use by wildlife for breeding, refuge and forage. Long-term moderate beneficial impacts would also result from 20.02 acres of riparian restoration by eradication of eucalyptus trees and revegetation to re-establish native riparian plant communities. Riparian restoration would benefit wildlife species by increasing riparian value as the habitat matures and an increase in the areal extent of fully functioning riparian communities.

Short-term negligible and minor adverse effects would occur on existing wildlife habitats with disturbance and destruction from construction activities associated with wetland and riparian restoration. However, these impacts would be outweighed by the availability of native habitats with improved ecological integrity once restoration is complete.

There would also be short-term negligible and minor adverse effects on mammals, reptiles, and amphibians, including special status species, during construction activities for wetland and riparian restoration as species would be temporarily disturbed or displaced by noise and human activity or could be crushed and killed during ground disturbing activities. Restoration actions also have the potential to disrupt breeding cycles as some work would coincides with lizard and snake egg laying periods.

Specials status species would benefit from wetland or riparian restoration or both. Wetland restoration would provide additional habitat for bats, island fox, deer mouse, harvest mouse, and slender salamander. Riparian restoration would provide additional habitat for bats, island fox, slender salamander, island fence lizard, and gopher snake.

The level of impact on mammals, reptiles, and amphibians would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.2.1.2.5 MITIGATION AND MONITORING

Santa Cruz Island Fox (*Urocyon littoralis santacruzae)*

If an individual(s) Santa Cruz Island fox is observed within the immediate vicinity of the Project Area, Park staff or the on-site project supervisor would stop operations. NPS biologists would then be notified immediately in order to determine the potential impacts that could result from the attendant human activity. Specific mitigation measures would then be developed to best avoid or minimize impacts from conflicts between humans and island fox. Mitigation could include, but is not limited to, restricting park operations or visitor use within the active den area or relocating individual foxes to more remote areas of the island.

Staging areas would be thoroughly inspected by the construction contractor to ensure no foxes have taken refuge within stockpiled materials or equipment. If a fox is found and does not leave on its own accord, NPS biologist would be informed and the fox would be removed in a manner determined by the biologist that would cause the least amount of harm and stress to the animal.

Monitoring the Santa Cruz Island fox will continue under the Santa Cruz Island Fox Recovery Plan.

Western Harvest Mouse (*Reithrodontomys megalotis*)

Avoidance measures may include avoiding disturbance of part of the known habitat, so that a portion of the population can survive until the restored wetland becomes established. If post-excavation monitoring shows a considerable decrease in western harvest mouse numbers in the project area compared with 2007 pre-project monitoring (Drost and Gelczis, 2007) translocating harvest mice from another area such as Scorpion Valley should meet this concern.

4.3.2.1.3 Aquatic Invertebrates and Fish

4.3.2.1.3.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

Wetlands restoration in Alternative B would result in an increase of wetland habitat from 6.5 acres currently to 9.6 acres total. The resulting 3.1 acres of restored wetlands would include open-water habitat, native willow forest habitat, emergent marsh habitat, and saltgrass meadow habitat. The expansion of wetland area would likely support use by insects with aquatic life stages, such as flies, beetles with aquatic larval stages, caddisflies, and stoneflies. Abundance and areal extent of aquatic invertebrate species would likely increase with the increase in aquatic habitat, and there would be long-term minor beneficial impacts. Additional wetlands acreage would also create new breeding habitat for freshwater mosquitoes. Mosquitoes are of particular concern because they are primary vectors of infectious diseases, such as West Nile Virus and encephalitis, which affect humans, livestock, and wildlife.

Construction activities associated with wetland restoration would not impact aquatic invertebrates since none of the actions would occur in wet environments. There is the potential for mortality of some individual insects, such as beetles, while they are in their terrestrial life stages to be crushed by construction equipment or excavated from burrows during ground disturbing activities. These impacts would be short-term and negligible adverse.

As there are no known permanent fish species in Cañada del Puerto Creek or the remnant wetland, there would not be any adverse or beneficial impacts on fish from wetland restoration. Fish that could wash over the boulder bar during a high tide, as has been observed in the past in the remnant wetland, may or may not be present at the time when restoration activities are implemented. It is unknown whether new wetland habitat, particularly the open water habitat, would be populated by fish in future.

4.3.2.1.3.2 EFFECTS OF STREAM CHANNEL RESTORATION

Riparian restoration in Cañada del Puerto Creek would take place with a phased approach to eucalyptus removal. A total of 20.02 acres would be restored to native riparian vegetation communities, but this would not provide aquatic habitat or affect use by aquatic invertebrates. Partial berm removal, which would restore hydrologic connectivity between the creek and its floodplain, would inundate the floodplain at regular frequencies. These temporary wet areas would not likely provide aquatic habitat or support aquatic invertebrates beyond possible short-term periods. Thus riparian restoration would have negligible beneficial impacts on aquatic invertebrates.

Construction activities associated with riparian restoration would not directly impact aquatic invertebrates since none of the actions would occur in the creek and would be conducted during the dry season. There is the potential for mortality of some individual insects, such as beetles, while they are in their terrestrial life stages to be crushed by construction equipment or excavated from burrows during ground disturbing activities. These impacts would be short-term and negligible adverse.

Grading creek banks after eucalyptus removal, berm removal, and fill disposal has the potential to negatively affect aquatic organisms through incidental sediment discharge during earthmoving and removal of trees that provide overhanging shade and habitat complexity in surface waters. Increased turbidity and sedimentation could also be caused by the release of fine sediment during the first few years after each phase of restoration is completed until roots of newly revegetated plants become established and stabilize creek banks. Best Management Practices would be implemented to reduce such impacts to negligible and adverse.

Construction could lead to releases of fuels, oils, and other construction-related hazardous materials, which could reach surface or groundwater. Accidental spills from construction equipment could also result in increased contaminant levels. Even if materials were released at lethal levels, project timing would be limited to the dry season which would likely protect aquatic invertebrate populations from adverse effects. In addition, implementation of a spill prevention and protection plan would outline measures to reduce the potential for spills and isolate accidental spills should they occur. The plan would also identify and limit areas of contaminant storage and transfer to outside of sensitive aquatic habitats. Thus impacts on aquatic invertebrates from possible hazardous material spills would be negligible and adverse.

As there are no known permanent fish species in Cañada del Puerto Creek, there would not be any adverse or beneficial impacts on fish from riparian restoration.

4.3.2.1.3.3 CUMULATIVE IMPACTS

Past activities which have impacted aquatic invertebrates occurred with American and Mexican settlement of Santa Cruz Island in the nineteenth century. Activities associated with settlement that altered aquatic habitats included establishment of non-native eucalyptus trees which use large amounts of water, filling in a large portion of the wetland at Prisoners Harbor, and straightening Cañada del Puerto Creek with the aid of stone retaining walls thus diminishing the lagoon that had wandered through the area. Such decrease in areal extent of surface water has resulted in less available habitat for aquatic invertebrates. Past actions combined have contributed minor adverse cumulative impacts on aquatic invertebrates.

There are no present actions that would contribute cumulative impacts on aquatic invertebrates.

The foreseeable future action by TNC which would continue restoration of the Cañada del Puerto Creek area on TNC land adjacent to and upstream of the Prisoners Harbor wetlands restoration area by removal of eucalyptus trees would have positive effects on the creek and aquatic habitat. Future actions would contribute negligible beneficial cumulative impacts on aquatic invertebrates.

The additional impacts associated with Alternative B, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute minor beneficial cumulative impacts on aquatic invertebrates. As there are no known permanent fish species in Cañada del Puerto Creek, there would not be any associated cumulative impacts on fish.

4.3.2.1.3.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative B would have negligible adverse and negligible to minor beneficial effects on aquatic invertebrates in the Project Area. Long-term minor beneficial impacts would result from 3.1 acres of wetland restoration, which would support an increase in use by aquatic invertebrates. Long-term negligible beneficial impacts would also result from 20.02 acres of riparian restoration which would benefit aquatic invertebrates by reconnecting hydrologic function between Cañada del Puerto Creek and its floodplain.

There would also be short-term negligible adverse effects on aquatic organisms during construction activities for wetland and riparian restoration as there is the potential for mortality of some individual insects while they are in their terrestrial life stages to be crushed by construction equipment or excavated from burrows during ground disturbing activities.

Restoration activities could have negligible adverse impacts on aquatic habitat from sediment release during construction or during the first few years after each phase of restoration until riparian vegetation becomes established. Negligible adverse impacts can also be cause by fuel and oil spills from construction equipment that could reach surface or groundwater.

As there are no known permanent fish species in Cañada del Puerto Creek or the remnant wetland, there would not be any adverse or beneficial impacts on fish from riparian or wetland restoration.

The level of impact on aquatic invertebrates and fish would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.2.1.3.5 MITIGATION AND MONITORING

The Park and its contractor will develop a Storm Water Pollution Control Plan to be implemented during fill excavation and eucalyptus removal.

4.3.2.2 Vegetation

4.3.2.2.1 Native Vegetation Communities

4.3.2.2.1.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

Alternative B would result in an increase of wetland communities from 6.5 acres currently to 9.6 acres total with wetlands restoration. A portion of the Built Up area would be converted to wetlands through eradication of non-native vegetation, removal of rock and sand fill from 2/3 of the former wetland area, and revegetation to create the desired wetland plant communities. The resulting 3.1 acres of restored wetland would include open-water, native willow forest, emergent marsh, and saltgrass meadow. Wetland restoration would result in improved functioning and ecological value of native vegetation communities in the Project Area. The wetland would be sub-irrigated by groundwater; fill would be removed to sufficient depth to reconnect the restored wetland to the groundwater, forming the hydrologic basis for sustaining the wetlands and vegetation communities.

Additionally, the created wetland would have restored hydrological and geomorphic connectivity to Cañada del Puerto Creek with partial berm removal, improving the natural processes that form and sustain wetland vegetation over time. The 10-year flood event would overtop the channel and flood waters would move into the floodplain and into the created wetlands. The 100-year flood event would do the same thing. The restored wetlands in the Project Area are anticipated to have enhanced productivity, habitat, and water quality functions compared to the wetlands in their existing degraded condition. Under this alternative, wetland restoration with partial berm removal would have major beneficial impacts on native vegetation communities. Additionally, the major beneficial impacts in Alternative B would affect native vegetation to a greater extent than Alternative C as more acres of wetlands would be restored.

Restoration activities would involve revegetation and other actions to restore ecological function and integrity as rapidly as possible following restoration. Before starting earthmoving activities, project staff would collect island-native vegetation materials (seeds, plugs, cuttings) for post-construction staking, propagation and planting. After grading is complete, willow, saltgrass, bulrush, rush, and other herbaceous wetland plants that exist in nearby reference wetlands would be planted in their appropriate depth-to-water-table zones. Project staff would also collect seed from Santa Cruz Island upland plants for use in vegetating fill disposal sites. Collection of native plant material would minimally disturb native plants due to possible trampling of adjacent vegetation by foot traffic and cutting small amounts of targeted plant species, which would have negligible adverse effects on native vegetation.

Activities associated with wetland restoration would involve disturbance of existing vegetation communities through non-native plant removal, vegetation clearing, earth moving, grading, staging areas for construction equipment and materials, and disposal of fill. Site disturbance during earth moving would occur in the Built Up area, which is a previously disturbed, non-natural vegetation community. Although some native plant species would be cleared, such as saltgrass, many non-native species would be removed as well, such as kikuyu grass and Bermuda grass. This disturbance would cause minor adverse impacts on existing native vegetation and minor beneficial effects on non-native vegetation. Revegetation and restoration of the site with native vegetation would provide beneficial effects that would compensate for and outweigh the negative effects from vegetation removal.

Removal and disposal techniques for non-native plants on the restoration site, including hand pulling, hand- or machine-excavation, chain sawing, burning, chipping, and/or application of herbicide, would likely disturb, damage, or destroy native vegetation on-site as well. However, as the whole restoration site would be cleared of vegetation during earth moving activities, vegetation disturbance during exotic plant control would be inconsequential. There may, however, be some vegetation disturbance in areas immediately adjacent to the restoration site, for example, during transport of machines for excavation or from herbicides that may land on plants other than target species. However, disturbance of native vegetation in such adjacent areas would likely be minimal as Best Management Practices would be followed.

Moving equipment and materials to and from staging areas, removal of fill, grading, and disposal of fill would disturb vegetation in and adjacent to these areas. Repeated disturbance of vegetation (i.e., due to vehicle passes) during these activities in areas where plants are not cleared would cause damage to plants and destruction of the vegetation mat. The majority of vegetation disturbance would occur in the previously disturbed Built Up area, minimizing adverse impacts on vegetation. There would also be localized vegetation disturbance from foot traffic during wetland restoration, fill disposal, and access of the staging area; however, these areas would likely be minimal and limited to the areas immediately surrounding the sites. Site disturbance would be minimized to the greatest extent possible by concentrating the area of disturbance associated with restoration actions to the minimum necessary to complete the project, thus impacts would be negligible and adverse.

With part of the berm removed from the left bank of the creek, higher magnitude flows (approximately at the 10-year flood level) would overtop the left bank and spread across the floodplain. Removal of the berm would increase the frequency of overbank flooding substantially compared to leaving the berm intact. With the berm in place, the riparian system of the left bank only rarely, if ever, receives hydraulic input directly from the river, whereas, under natural conditions it would occur roughly once every 10 years. With regular frequency of flooding events restored to the Arroyo Willow vegetation community, which occurs adjacent to the left bank of channel, there could be some vegetation dieback, change in species composition, or other effects affecting vegetation that has not been flooded at regular intervals for years. This could be similar to the natural fluctuations in groundwater levels. During wet periods, high flows on floodplains may remove young willows, and allow re-colonization of low-lying areas by more-hydrophytic plant communities, particularly Bulrush-Cattail. Berm removal would have major beneficial impacts on native vegetation since the natural flood regime and ecological processes in vegetation communities would be restored.

Activities associated with partial berm removal would involve disturbance of existing vegetation in the area surrounding the deconstruction site. Heavy equipment would remove the artificial berm material from the creek bank and grade the bank to a height consistent with naturally-formed creek banks. Site disturbance on 100 feet of berm during deconstruction would occur in the Arroyo Willow vegetation community. Some native plant species would be cleared, which would cause adverse impacts on existing vegetation. However, since the area has been previously disturbed when the berm was built, and revegetation and restoration of the site would result in replacement of destroyed plants, the impact would be reduced to minor and adverse in the short-term.

With berm removal, high-value archeological resources at Prisoners Harbor (the Chumash Village site) would need to be protected. The site would be protected by stabilizing it in a manner to deflect potential flood waters away. Protection would include placement of a small earth, log, and cobble berm around the site or packing earth, log, and cobble against the base of the site and planting with compatible native plants. Disturbance of native vegetation in the Arroyo Willow community would comprise 164 feet of protective barrier during construction activities, which would constitute a short-term negligible adverse impact.

A variety of special status plant species associated with various habitat types occur on Santa Cruz Island. While only one special status plant species is known to occur currently in the Project Area, the Santa Cruz Island silver lotus, restoration activities could alter the amount of habitat available for future colonization by special status plant species. Restoration actions that increase the areal extent or reduce nonnative species cover in target habitats could increase the potential for special status species to colonize the Project Area. However, none of the special status species on Santa Cruz Island occupy wetland habitats, thus it is not expected that there would be any re-establishment by special status species in the restored wetland.

4.3.2.2.1.2 EFFECTS OF STREAM CHANNEL RESTORATION

Riparian restoration in Cañada del Puerto Creek under Alternative B would take place with a phased approach to eucalyptus removal. Trees would be removed from downstream to upstream and from the hillside toward the stream bank so as to protect existing native vegetation and disturb the stream bank and soils as little as possible. A total of 20.02 acres would be restored to native riparian vegetation communities. Eucalyptus would be replaced with species typical of Southern Riparian Woodland including oak (*Quercus agrifolia*), cottonwood (*Populus trichocarpa* and *P. fremontii*), willow (*Salix* spp.) and maple (*Acer macrophyllum*). Where Southern Riparian Woodland intergrades into Island Chaparral, target species would include manzanita (*Archtostaphylus insularis*), ceonothus (*Ceonothus megacarpus* v. *insularis*), mountain mahagony (*Cercocarpus betuloides*), and wild cherry (*Prunus ilicifolia* subsp. *lyonii*). Revegetation would occur through natural recruitment from the site's seedbank, reproduction of remnant native plants on the floodplain, and active revegetation including seeding and planting.

Initially, habitat functioning of the restored riparian community (e.g., shading, bird habitat) would be somewhat limited due to the relatively smaller stature of trees and the absence of snags and dead branches. Over time, habitat value would improve as the riparian habitat matures, and an increase in the areal extent of fully functioning riparian vegetation would occur along Cañada del Puerto Creek. Sufficient recovery of the channel restoration area would occur between implementation of the stages to minimize ecological impacts and reduce the potential for sediment transport to the creek. There would be major beneficial impacts to native vegetation from riparian restoration.

Activities associated with riparian restoration could disturb existing native vegetation communities through vegetation clearing and transport of construction equipment and materials. Site disturbance during removal of eucalyptus trees would occur in the Eucalyptus habitat type, which is a previously disturbed, non-native vegetation community. Although some native plant species may be disturbed or destroyed, such as coyote brush and mulefat, many non-native species would be removed as well, such as kikuyu grass and English ivy, as well as eucalyptus. This disturbance would cause minor adverse impacts on existing vegetation; however, revegetation and restoration of the site would provide beneficial effects that would outweigh the negative effects from vegetation disturbance. Additionally, care would be taken not to disturb existing native woody plants. The eucalyptus would be replaced with willow stakes along the streambank, and acorns, seeds from ceonothus, manzanita, wild cherry and other appropriate species in more upland areas.

In order to fulfill the goal of reconnecting the creek with its floodplain and restoring ecological functioning of the wetland, Alternative B would remove the low artificial berm that severed the hydraulic connection between lower Cañada del Puerto Creek and its floodplain. Restored hydrologic function would support and sustain obligate wetland vegetation in the restored wetland as well as improve ecological conditions for restored riparian vegetation communities.

Moving equipment and materials to and from staging areas would disturb vegetation between the staging area and restoration areas. Repeated disturbance of vegetation (i.e., due to vehicle passes) during these activities in areas where native vegetation occurs would cause damage to plants and destruction of the vegetation mat. Care would be taken to transport equipment on unvegetated surfaces, such as roads and dry stream bed, thus minimizing adverse impacts. There would also be localized vegetation disturbance from foot traffic during riparian restoration; however, these areas would likely be minimal and limited to the areas immediately surrounding the work sites. Such impacts would be minor and adverse in the short-term during the construction period.

Although fill disposal is an action associated with wetland restoration, the fill areas would be located in the riparian corridor, but above the 100-year floodplain. Fill disposal would occupy 2.78 acres at two distinct sites in Eucalyptus and Fennel community types. Disturbance to existing native and non-native vegetation at the disposal sites would result from truck delivery of fill material, turn-around areas used by trucks, potential temporary stockpiles, and the placement of fill for long-term storage. Trees and brushy material in areas to be filled would be cut prior to these activities. Additionally, small amounts of fill material may be used in several other locations to reinforce road beds or fill in small disturbed upland areas located on the east side of the creek above and below the creek crossing. Some fill material would be used in the construction of a protective barrier around the archeological site. The fill disposal areas would be compacted, recontoured, and revegetated with native upland and riparian plant species. The ecological benefit of removing the non-native trees include opening the area for re-colonization by native plant species and restoring riparian oak woodland ecological function, improving habitat for many species of birds including the Island scrub-jay and animal species including the island fox. Impacts on vegetation in the fill disposal areas would be minor and adverse in the short-term and moderate and beneficial over the long-term.

The Santa Cruz Island silver lotus, special status species, is common on rocky slopes, exposed ridgetops, sandy flats and washes, gravel floodplains, chaparral, coastal scrub, and riparian communities. In the Project Area, a few plants occur in the dry creek bed adjacent to the southern most eucalyptus stand. Additionally, silver lotus plants are common in the dry creek bed upstream of the Project Area. No activity is anticipated in the creek while eucalyptus trees are removed for riparian restoration. Equipment would access the adjacent eucalyptus stand from the road, not from the creek. Trees would be felled to avoid falling in the creek in this area so as to avoid impacting the silver lotus. Thus there would not be any impacts on the silver lotus.

Riparian restoration would not provide any new habitat for re-establishment of other special status species in the Project Area. The 13 special status plants that occur on Santa Cruz Island, not including the silver lotus, all occupy upland habitat types, such as coastal bluffs, dry or moist canyons, rocky cliffs and ridges, chaparral, and scrub. No new special status plants would be expected to occupy the Project Area as a result of riparian restoration.

4.3.2.2.1.3 CUMULATIVE IMPACTS

Past activities which have impacted native vegetation likely first occurred from the manipulation and use of plant communities by Native Americans prior to the arrival of Americans and Mexicans who harvested plants for food, may also have altered habitats near their villages, and may have deliberately set fires for vegetation management purposes. Impacts also occurred and were greatly accelerated with American settlement of Santa Cruz Island in the nineteenth century. Activities associated with settlement included the clearing and farming of certain areas on the island; the establishment of non-native species such as eucalyptus trees; and the introduction of sheep, pigs, cattle, and horses. Of these activities, the one that would most impact the native vegetation was the introduction of sheep. By 1875, there were an estimated 60,000 sheep on the island. In 1939, a systematic roundup of the sheep was begun. By 1980, after decades of overgrazing by sheep, all of the island's plant communities had been adversely affected. These effects included changes in population structure and species diversity, and changes in species distribution. Additionally, the rapid removal of cattle and sheep are thought to have played an important role in the large fennel expansion that occurred. Introducing pigs to the island caused significant vegetation damage as pigs disturbed the soils and ate corms, bulbs, and acorns. Type conversion from native woodland and shrubland to non-native grasslands occurred during this era. By 2006 all feral pigs were eradicated from the island allowing for recovery of native vegetation. At Prisoners Harbor, the entire area at the mouth of the Cañada del Puerto Creek was landscaped with grasses and trees planted in rows, a large portion of the wetland was filled, eucalyptus trees were planted, and sheep and cattle ranching occurred. Past actions combined have contributed major adverse cumulative impacts on native vegetation.

Present activities which could impact native plant communities include public recreational activities and road maintenance. Prisoners Harbor is considered the main access point to the National Park isthmus area and The Nature Conservancy property. Lands owned by the National Park Service are fully open to visitor access and use, and visitation has increased over the years to the Project Area. Hikers use this area as an access for day hiking and backpacking, and scientific researchers and educational groups use this area to access the central valley. Other recreation opportunities and uses of the area include beachcombing, fishing, picnicking, bird watching, viewing historic buildings, and beach access to water sports including kayaking and snorkeling. Hiking outside of trails can trample and crush native vegetation and is usually most noticeable immediately adjacent to hiking trails and high use areas. The use of these areas also compacts the soil, which locally increases water run-off and soil erosion. The constant disturbance of trails facilitates the spread and establishment of invasive non-native plant species. Similar effects are seen with road grading and maintenance. Present actions combined contribute negligible adverse cumulative impacts on native vegetation.

Future cumulative impacts to native plant communities would include recreation and road maintenance which are occurring presently and would continue in the future, as well as continued restoration of the Cañada del Puerto Creek area on TNC land adjacent to and upstream of the Prisoners Harbor wetlands restoration area. While no specific plans have yet been proposed, it is foreseeable that additional riparian restoration could be implemented. Future actions would contribute both negligible adverse and minor to moderate beneficial cumulative impacts on native vegetation.

The additional impacts associated with Alternative B, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on native vegetation.

4.3.2.2.1.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative B would have negligible adverse to major beneficial effects on native vegetation communities in the Project Area. Long-term major beneficial impacts would result from 3.1 acres of wetland restoration, which would improve functioning and ecological value of native vegetation communities in the Project Area. Long-term major beneficial impacts would also result from 20.02 acres of riparian restoration by eradication of eucalyptus trees and revegeation of native plants to restore native riparian vegetation communities. With berm removal, the hydrological connectivity of the system between Cañada del Puerto Creek and the new wetlands and riparian areas would be restored. Restored hydrological connectivity would allow native plant communities to function naturally and sustainably over the long-term and fully meet project objectives. Additionally, the major beneficial impacts in Alternative B would affect native vegetation to a greater extent than Alternative C as more wetland area would be restored.

Short-term negligible and minor adverse effects would occur with construction activities associated with wetland and riparian restoration and non-native plant control which would disturb or destroy existing vegetation. However, these adverse effects would be balanced or outweighed by the beneficial effects of the restoration efforts.

There would be no impacts to the Santa Cruz Island silver lotus or other special status plant species. Restoration activities would take place in the area where silver lotus plants occur but care would be taken not to impact them, and no new habitat would be created in which any of the special status plants on Santa Cruz Island can re-establish.

The level of impact on native vegetation would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.2.2.1.5 MITIGATION AND MONITORING

Federally listed species

A botanical survey of the Project Area was conducted in August 2008 and no federally listed species were found. The state listed Santa Cruz Island silver lotus (*Lotus argophyllus niveus*) was found in the dry creek bed in a number of locations at the upper end of the Project Area.

During implementation personnel working within the Project Area will be trained to identify the six listed species known to occur in the project action area (USGS quad *Santa Cruz Island C*), Hoffmann's rock-cress(*Arabis hoffmannii*), box-leaved bedstraw (*Galium buxifolium*), island rush-rose (*Helianthemum greenei*), Santa Cruz Island malacothrix (*Malacothrix indecora*), island malcothrix (*M. squalida*), and Santa cruz Island lacepod (*Thysanocarpus conchuliferus*). If one of the listed species is observed in the Project Area and it is possible that impacts could occur from project activities, then project operations would cease until appropriate mitigation could be enacted. Mitigation could include, but is not limited to, clearly marking the location of the plant(s) and restricting park operations or visitor use within a limited distance of the plant(s) during the implementation phase. Additionally all listed plant locations found will be identified with a GPS device and appropriate data forms filled out for each occurrence or local population.

California state listed species

Santa Cruz Island silver lotus *(Lotus argophyllus niveus)*

Known occurrences of Santa Cruz Island silver lotus in the Project Area will be located and clearly marked. Contractors and NPS personnel will be apprised of the location and no project activity will take place that could impact the plant.

Post-project monitoring will include placement of monitoring plots in the Project Area using methodology developed by USGS (Drost and McEachern [in draft]). Data collected from plots will be included in the Park's releve database. Permanent line transects may be installed in the Project Area following the methodology of the Park's I&M Vegetation Monitoring

Program. Data collected from transects will be entered into the Park's vegetation data base and be included in I&M Vegetation Monitoring Report.

4.3.2.2.2 Non-Native Vegetation

Proposed actions in Alternative B would affect the extent of invasive plant species through 1) increasing disturbance, which can encourage expansion of species adapted to disturbance; 2) removal or eradication of invasive plant species occurrences; and 3) changing physical conditions such that viability of existing occurrences and potential for establishment or expansion is affected, either positively or negatively.

While not all non-native plant species are invasive or are documented to have negative effects on native plant species communities or wildlife habitats, vegetation communities dominated by natives are considered to have more ecological integrity and be perhaps more likely to support native wildlife through providing habitat, food, and other important relationships.

4.3.2.2.2.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

Extensive ground disturbance and creation of new open areas during restoration activities could result in the colonization of the disturbed ground by kikuyu grass and other non-native species. However, prior to commencement of wetland restoration, invasive non-native species would be aggressively removed from the site. Non-native plant species would be removed on 3.1 acres of the Built Up community type. Additionally, many non-native seeds in the soil seed bank would be removed with fill. The active removal of invasive plants and seeds would greatly reduce their populations at the restoration site, allowing for increased establishment of native vegetation, an increase in native species diversity and abundance, and increased ecosystem integrity and function. Thus wetland restoration would have long-term moderate beneficial impacts as non-native species would be eradicated from areas where corrals would be removed and from much of the Built Up area that would be converted to wetlands.

Restoration activities could import noxious weed propagules on construction machinery. Heavy equipment, however, would be required to be cleaned and weed-free before entering the Project Area. Noxious weed removal would be conducted as part of restoration actions, reducing the potential for widespread invasion as a result of construction activities.

Changes in hydrologic conditions which would result in a wetter site would reduce the potential for establishment of kikuyu grass and other non-native species found in the area. It is possible that invasive species adapted to wet conditions could establish in the new wetlands; however, since such species do not yet occur at Prisoners Harbor, and Best Management Practices would be practiced so that they are not introduced to the area, it is unlikely that the new wetlands would be invaded by non-native species.

4.3.2.2.2.2 Effects of Stream Channel Restoration

Riparian restoration in Cañada del Puerto Creek would take place with a phased approach. Eucalyptus removal would begin at the most downstream reach of the creek and would proceed upstream in sectional reaches. Approximately 1737 eucalyptus trees would be removed and 20.02 acres of the Eucalyptus habitat type would be restored to native riparian vegetation types. Such widespread removal of eucalyptus trees would have major beneficial impacts on non-native vegetation.

Revegetation during the phased approach to eucalyptus removal and riparian restoration would occur either through natural recruitment from the site's seedbank, reproduction of remnant native plants on the floodplain, or active revegetation including seeding and planting. Areas restored during early phases would be susceptible to reinvasion by eucalyptus from adjacent stands that would not have yet been restored, especially if relying on natural recruitment for revegetation, which would take longer than active planting of native species. Monitoring and continued eucalyptus control would need to occur for successful restoration.

Although fill disposal is an action associated with wetland restoration, the fill areas would be located in or near the riparian corridor. Site preparation would include the removal of 122 non-historic eucalyptus trees in the designated fill disposal areas. The ecological benefit of removing the trees include opening the area for re-colonization by native plant species and restoring Southern Riparian Woodland ecological function. With the removal of eucalyptus trees and fennel in the fill disposal areas, 2.78 acres of non-native vegetation would be removed, and there would be a moderate beneficial impact.

Disturbed soil generally attracts infestation by fast-growing invasive weed species with widely dispersed propagules. Fill placement would be a target for new establishment of weedy species. Some fill hauled from the wetland restoration site would contain propagules of noxious weed species, such as Kikuyu grass. Non-native species could spread and become established on the fill in areas where such species may not already occur. Their proximity to relatively healthy vegetation communities would represent a new threat to the native habitats. If fill containing propagules of weed species would be placed at least a foot under the final grade of the area, growth of the imported propagules could be avoided. This, along with follow-up non-native plant control and revegetation to establish native plant species, would reduce impacts of disturbing ground and fill disposal to negligible to minor adverse.

Partial berm removal would result in ground disturbance and creation of new open areas during deconstruction activities that could result in colonization by non-native species. Revegetating and restoring the creek bank with native vegetation should provide competition for non-native species. Along with continued non-native plant control, the area of berm removal would provide 100 feet of restored creek bank vegetation community. Impacts on non-native species from berm removal would be minor and beneficial over the long-term, but could be negligible adverse in the short-term due to ground disturbance during deconstruction.

4.3.2.2.2.3 CUMULATIVE IMPACTS

Past activities which have impacted non-native vegetation occurred with American and Mexican settlement of Santa Cruz Island in the nineteenth century. Activities associated with settlement included the clearing and farming of certain areas on the island; the establishment of non-native species such as eucalyptus trees; and the introduction of sheep, pigs, cattle, and horses. Past grazing and human disturbance have allowed the transport of weed seeds to Santa Cruz Island and has resulted in the current weed infestation on the island. Additionally, the rapid removal of cattle and sheep are thought to have played an important role in the large fennel expansion that occurred. Introducing pigs to the island caused significant vegetation damage as pigs disturbed the soils and ate corms, bulbs, and acorns. Type conversion from native woodland and shrubland to non-native grasslands occurred during this era. At Prisoners Harbor, the entire area at the mouth of the Cañada del Puerto Creek was landscaped with grasses and trees planted in rows, a large portion of the wetland was filled, eucalyptus trees were planted, and sheep and cattle ranching occurred.

There have been past actions which have also had beneficial impacts on non-native vegetation. By 2006 all feral pigs were eradicated from the island, allowing for recovery of native vegetation. Treatment of non-native fennel has been an ongoing effort in the east portion of the Central Valley, although full control has not yet been achieved. Additionally, in 2008 the TNC treated all fennel plants growing within 10 feet of roads on their land, including within the Project Area, with herbicide. Since 2004, there has been an ongoing effort to control kikuyu grass in the corral area and among willow trees in the lower Cañada del Puerto Creek. Past actions combined have contributed moderate adverse cumulative impacts on non-native native vegetation.

Present activities which could impact non-native native vegetation consist of ongoing invasive plant control. The Park currently has a three year project to treat 10 priority weed species on the east end and the isthmus of Santa Cruz Island. Priority species include fennel, yellow star thistle, pampas grass, Harding grass, arundo, eucalyptus, Peruvian pepper tree, Italian stone pine, tamarisk, and European olive. In the Project Area, there is an ongoing effort to control kikuyu grass in the corral area and among willow trees in the lower Cañada del Puerto Creek. The Nature Conservancy has an on-going effort to control fennel along the road to the Central Valley. On the negative side, human activities continue to provide the most likely vector of transporting weeds from mainland sources to Santa Cruz Island. Present actions combined contribute minor beneficial cumulative impacts on non-native vegetation.

Future cumulative impacts to non-native plant communities would include continued restoration of the Cañada del Puerto Creek area on TNC land adjacent to and upstream of the Prisoners Harbor wetlands restoration area. TNC may propose additional removal of eucalyptus and other introduced species along the creek above the furthest upstream extent of the proposed project. While no specific plans have yet been proposed, it is foreseeable that additional riparian restoration could be implemented. Conversely, ongoing and future human activities could introduce weeds from the mainland to the island. Future actions would contribute minor beneficial cumulative impacts on native vegetation.

The additional impacts associated with Alternative B, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on non-native vegetation.

4.3.2.2.2.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative B would have negligible adverse to major beneficial effects from eradication and control of non-native vegetation in the Project Area. Long-term major beneficial effects would result from 20.02 acres of riparian restoration in which 1737 eucalyptus trees would be eradicated, as well as eucalyptus removal on fill disposal sites. Long-term moderate beneficial impacts would also result from 3.1 acres of wetland restoration by removal of all non-native species on the site.

Short-term negligible to minor adverse effects would occur with construction activities associated with wetland and riparian restoration as ground disturbance and creation of new open areas during restoration activities could result in the colonization by non-native species. However, any new colonization would be removed as restoration and revegetation efforts are completed.

The level of impact on non-native vegetation would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.2.2.2.5 MITIGATION AND MONITORING

Best Management Practices described in section 2.2.2.4.1 will be followed to prevent the transport of unwanted weedy species to the island.

The Project Area will be surveyed by NPS and TNC biologists for fennel, kikuyu grass and eucalyptus each spring. New occurrences of each species will be treated for five years following project completion.

4.3.3 Cultural Resources

4.3.3.1 Archeological Resources

Under Alternative B – 2/3 Wetland Restoration with Partial Berm Removal, the Park would restore 3.1 acres of the former wetland; remove the existing cattle corrals and relocate the scale house to its pre-1960s location; remove a portion of the berm along the Cañada del Puerto Creek; remove invasive eucalyptus trees and control other invasive plant species; construct a protective barrier around archeological site CA-SCrI-240, and construct wayside exhibits, a wetland viewing bench, or an interpretive guide at select locations within the Project Area.

4.3.3.1.1 Effects of wetlands and floodplain restoration

Removal of invasive non-native plant species from the wetland restoration area would be accomplished by hand pulling, hand- or machine-excavation, chain sawing, burning or application of herbicide. After the removal of invasive plants, sand and rock fill would be excavated from the 3.1-acre wetland restoration area using heavy equipment. After removal activities are completed, the site would be replanted with native wetland species. Archeological resources are known to be present on elevated points of land within the wetland restoration area. Removal of invasive plants could impact archaeological resources within the plant removal area. Sand and rock fill removal is unlikely to impact archeological resources because fill is not present on elevated points of land and would not, therefore, require removal. An archeologist would be present during all ground disturbing activities associated with invasive plant and fill removal to ensure that any currently unknown archaeological resources that may be encountered would receive proper treatment. If any archeological deposits are encountered, work would be stopped in the vicinity and the resource would be evaluated. If the resource is determined to be significant, mitigation measures would be implemented. Such measures could include avoidance or data recovery, in consultation with the Tribe and SHPO. Therefore, invasive plant and fill removal activities is considered to have a short-term minor adverse impact on archeological resources.

Two fill disposal sites for temporary stockpiling of the fill removed from the wetland area would be located on the east side of the Cañada del Puerto Creek, upstream and downstream from the creek crossing. These sites would also be used as construction staging areas for heavy equipment, vehicles, fuel totes, and other large material and supplies required for the project. Together these two sites encompass 2.78 acres of land. One of the two fill disposal sites overlaps a portion of archeological site CA-SCrI-240. The overlap occurs at the edge of the site where cultural materials are less dense (Pacific Legacy 2007).

To prepare the sites for fill placement, over 100 non-historic eucalyptus trees would be removed. Personnel would use chainsaws, chippers, tractor, and a stump grinder to cut trees and grind stumps to 12 inches below grade. The stockpile sites would be covered with straw or geotechnical fabric prior to placement of fill. This would serve to separate the archeological deposit from the fill and provide some protection to the deposit during filling operations. Upon completion of stockpiling, the fill would be compacted, sloped to natural contours, and seeded with native plants. An archeologist and Native American representative would be onsite to monitor eucalyptus removal and fill stockpiling to ensure that these activities have a minor impact on the archeological deposit. Although stockpiling of fill could compact any archeological deposits that may be present in the stockpile areas, it is anticipated that once the fill is in place, it would help protect and preserve that portion of the archeological site from wind and water-induced erosion and potential for unauthorized removal of cultural material. Removal and stockpiling activities would have a minor adverse impact on CA-SCrI-240 cultural deposits.

Alternative B also includes the removal of a portion of the artificial berm that runs along the west bank of Cañada del Puerto Creek. Hydraulic modeling indicates that with the berm in place, the velocity and stream power of the portion of Cañada del Puerto Creek adjacent to CA-SCrI-240 during a 100-year storm are relatively high (velocities of 10 to 12 feet per second with stream power values of 18 to 20 pounds per foot second), which causes flood-induced erosion of the archeological deposit. By comparison, removal of the berm would result in a relatively unconstricted channel and would have stream power values in the range of 2 to 3 pounds per foot second for the same flow because of the reduction of water depth (NPS 2007). It is expected that removal of the berm would increase the frequency of flooding near CA-SCrI-240, but the depths and velocities of the floodwaters are predicted to be reduced. To protect CA-ScrI-240 from continuing (although lessened) exposure to erosion, the Park would deflect potential flood waters away from the culturally dense area of the site by the placement of a small earth, log, and cobble berm around the upstream face of the archeological site or by packing earth, logs, and cobbles against the base of the archeological site and planting with compatible native plants. Eucalyptus logs removed from the wetland restoration site that have a diameter greater than 12 inches would be used to create the protective barrier. This barrier, in addition to deflecting flood waters from the site, would also reduce the potential for unauthorized collection of materials by reducing the visibility and the potential for exposure of intact deposits. However, because the effectiveness of this barrier in protecting the resource and its long-term structural integrity is not assured, construction of the barrier is considered a long-term moderate beneficial impact on the resource.

The two temporary wayside exhibits, a wetland viewing bench, or interpretive guide to educate the public about the historic uses of Prisoners Harbor and the restored wetlands would be designed and placed to avoid archeological resources. The area designated for loading/unloading equipment, vehicles, and other large materials contains no known archeological resources. These structures and facilities, therefore, would have no impact on archeological resources.

Under Alternative B, the Park would continue its current management practices to protect known archeological resources at Prisoners Harbor that contribute to the Archeological District and additional unknown archeological resources that may be present. These practices include regular maintenance of the fencing that protects archeological site CA-SCrI-240; and controlling the spread of invasive vegetation. The Park also undertakes cultural resources monitoring and/or subsurface testing within areas of potential ground-disturbance associated with proposed projects, and avoidance of any such resources if feasible, or data recovery, if necessary. Continuation of ongoing maintenance practices would have a long-term moderate beneficial impact on archeological resources.

4.3.3.1.2 Effects of stream channel restoration

Riparian restoration of the Cañada del Puerto Creek requires removal of eucalyptus trees along an approximately 0.7 mile stretch of the stream channel. The eucalyptus removal area has not been systematically surveyed for archeological resources because of the presence of dense underbrush and fallen trees. Therefore it is not known if archeological resources are present in this area. Cutting, dragging, hauling, and vehicle operation associated with eucalyptus removal could damage any archeological deposits that may be present. Therefore, cultural resources specialists would monitor these activities to ensure that any archeological deposits encountered receive proper treatment. If any archeological deposits are encountered, work would be stopped in the vicinity and the resource would be evaluated. If the resource is determined to be significant, mitigation measures would be implemented. Such measures could include avoidance or data recovery, in consultation with the SHPO and the tribe. Therefore, eucalyptus tree removal along the Cañada del Puerto is considered to have a short-term negligible to minor adverse impact on archeological resources.

4.3.3.1.3 Cumulative Impacts

Alternative B would have a short-term negligible to minor adverse impact on currently known archeological resources, and unknown archeological resources that could be encountered during vegetation and tree removal activities associated with wetlands and stream channel restoration and stockpiling of fill. These impacts would not contribute to cumulative impacts on archeological resources because the Park's ongoing management practices provide protection to archeological resources throughout the Archeological District.

Alternative B would have long-term moderate beneficial impact on archeological resources by protecting CA-ScrI-240 from stream erosion and unauthorized collection of materials, and by continuing ongoing management practices to protect known and unknown archeological resources at Prisoners Harbor and throughout the Archeological District. These activities have a long-term moderate beneficial cumulative impact on archeological resources.

4.3.3.1.4 Conclusion (including impairment)

The activities that would take place under Alternative B would have a short-term negligible to minor adverse impact and a long-term moderate beneficial impact on archeological resources.

Removal of invasive plants, including eucalyptus trees, in the wetlands restoration area, the fill disposal site, and along the Cañada del Puerto Creek could impact known and unknown archaeological resources that may be present within the removal areas. An archeologist would be present during all ground disturbing activities associated with invasive plant removal to ensure that any currently unknown archaeological resources that may be encountered would receive proper treatment. Therefore, these activities would have short-term negligible to minor adverse impacts on archeological resources.

One of the two fill disposal sites overlaps a portion of archeological site CA-SCrI-240 where cultural materials are less dense. An archeologist and Native American representative would be onsite to monitor eucalyptus tree removal and fill stockpiling to ensure that this activity has a minor impact on the archeological deposit. Although stockpiling of fill could compact any archeological deposits that may be present in the stockpile areas, it is anticipated that once the fill is in place, it would help protect and preserve that portion of the archeological site from wind and water-induced erosion and potential for unauthorized removal of cultural material. Removal and stockpiling activities would have a minor adverse impact on CA-SCrI-240 cultural deposits.

The removal of a portion of the artificial berm that runs along the west bank of Cañada del Puerto Creek would help protect CA-SCrI-240 by reducing the potential for stream flows to erode the cultural deposit. In addition, the Park would deflect potential flood waters away from the culturally dense area of the site by the placement of a small berm around the upstream face of CA-SCrI-240. This barrier would also reduce the potential for unauthorized collection of materials by reducing the potential for exposure of intact deposits. Protection of the site from ongoing erosion and reducing the potential for unauthorized removal of cultural materials is considered a long-term moderate beneficial impact.

Construction of interpretive facilities and use of a designated loading/unloading area would have no impact on archeological resources.

Eucalyptus tree removal associated with riparian restoration of a portion of Cañada del Puerto Creek could damage any currently unknown archeological features that may be present in the removal area. Cultural resources specialists would monitor tree removal to ensure that any archeological deposits encountered receive proper consideration. Tree removal is considered a short-term negligible to minor adverse impact on archaeological resources.

Under Alternative B, the Park would continue its current management practices to protect known archeological resources at Prisoners Harbor that contribute to the Archeological District and additional unknown archeological resources that may be present. In addition, the Park's maintenance activities would be expanded to include monitoring the protective barrier at CA-SCrI-240 for its effectiveness in protecting the archeological deposit and checking it for structural integrity, with repairs made if needed. These practices would have a moderate long-term beneficial impact on archeological resources.

The level of impact on archeological resources would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.3.3.1.5 Mitigation and Monitoring

The Park's maintenance activities would be expanded to include monitoring the protective barrier at CA-SCrI-240 after flood events to check for structural integrity and effectiveness in protecting the archeological deposit. Repairs or modifications to the berm would be made as needed to ensure protection of the resource.

Implementation of mitigation measure would result in a major long-term beneficial impact to the resource.

4.3.3.2 Historical Resources

Under Alternative B – 2/3 Wetland Restoration with Partial Berm Removal, the Park would restore 3.1 acres of the former wetland, requiring the removal of all the cattle corrals; relocate the scale house from its present-day location to its pre-1960s location; remove a portion of the berm along the Cañada del Puerto Creek; remove invasive eucalyptus trees and control other invasive plant species; construct protective barriers around archeological site CA-SCrI-240 and construct wayside exhibits, a wetland viewing bench, or an interpretive guide at select locations within the Project Area to educate the public about wetlands restoration and the historic uses of Prisoners Harbor.

4.3.3.2.1 Effects of wetlands and floodplain restoration

Removal of invasive non-native plant species from the 3.1-acre wetlands restoration area and removal of fill to restore the wetland would require the removal of all the cattle corrals. In addition 7 of the 8 telephone poles and all 3 water troughs in the corral area would be removed. A small area of *yerba mansa* that was planted in the corral area in the early 20th century by the island cowboys would also be removed, but would be replanted in another area. Cement from the hunt club foundation also would be removed.

The cattle corrals, water troughs, and telephone poles are contributing resources to the Ranching District. The corrals are highly visible to Prisoners Harbor visitors and are readily associated with ranching. Their location near Prisoners Harbor pier and adjacent to Navy Road, and their geographic extent, make them a dominant feature in the landscape that is important in conveying the historical use of Prisoners Harbor for ranching. These cattle corrals are the only remaining corrals at Prisoners Harbor and their removal would reduce the contribution that Prisoners Harbor makes to the Ranching District. However, their removal would not diminish the integrity of the Ranching District to the extent that the Ranching District's National Register eligibility would be jeopardized. This is because even with their loss, the many buildings, structures, small-scale features, and landscape elements throughout the island that are contributing characteristics to the Historic District would continue to reflect the ranching history of the island.

Wetland restoration under Alternative B would have a moderate adverse impact on historic resources.

No historic resources are known to be present within the 2.78 acres of land adjacent to the Cañada del Puerto Creek proposed for fill stockpiling and only non-historic eucalyptus trees would be removed. Most of the eucalyptus trees that are growing along the stream channel have spread extensively from the early plantings. The Park is analyzing historic photographs, maps, and tree measurements to determine if any of the eucalyptus or other trees along the stream channel were part of the late-19th century development. If any such plantings are identified, the Park would consult with the State Historic Preservation Office regarding the status of the plantings as contributing or non-contributing to the Ranching District, and to identify the appropriate treatment or mitigation for their removal.These activities, therefore, would have a minor adverse impact on historic resources.

Partial removal of the berm along the Cañada del Puerto Creek could impact a historic resource. Historic photos and an 1892 map of Prisoners Harbor show a rock retaining wall several hundred feet in length along the west side of the stream, presumably built to prevent flooding of the ranch area. This wall was most likely destroyed by later stream modifications, although it is possibly buried beneath the existing berm. If it were present with its integrity retained, this rock retaining wall would be a contributing resource to the Ranching District. Berm removal would be monitored by an archeologist. If remnants of the rock wall are uncovered, they would be photographed and documented. Although the potential removal of a historic rock retaining wall would slightly reduce the contribution that Prisoners Harbor makes to the Ranching District, its removal would not diminish the integrity of the Ranching District to the extent that the District's National Register eligibility would be jeopardized, because the many buildings, structures, small-scale features, and landscape elements throughout the island that are contributing characteristics to the Historic District would continue to reflect the ranching history of the island. Documentation of this feature prior to its removal would serve to retain the information it provides regarding the historic development of the ranch. Berm removal would have a potential minor adverse impact on historic resources.

Removal of the berm would increase overbank flooding in the stream reach between the road crossing and the Native American village site. The access road and the historical warehouse are located on the extreme southwestern margin of the Cañada Del Puerto greater geomorphic floodplain. Under existing conditions (berm in place) high flows are contained in the channel below the road crossing, producing a backwater effect and causing floodwaters to exit the channel at the crossing. Based on anecdotal reports, this phenomenon has resulted in flood waters traveling down the road and reaching the historic warehouse. Removal of the berm will reduce hydraulic pressure on the road crossing and result in less frequent overbank flows at that location. One dimensional hydraulic modeling (HEC-RAS) of this creek and its floodplain suggest that a sustained 100-year flood of 2590 cfs may still reach the elevation of the warehouse with the berm removed. However, given the non-confining nature of this fluvial system and the low gradient of the valley in this area, even this relatively rare event would not reach depths greater than about 1 foot over the road, nor velocities in excess of about 1-2 feet per second.

The wayside exhibits, wetland viewing bench, or interpretive guide would be small in scale and would be placed to avoid direct conflict with views of the historic features at Prisoners Harbor. Therefore, they would have a long-term negligible impact on the historic setting of Prisoners Harbor and would increase the public's awareness of the history of the area.

Under Alternative B, the Park would continue its current management practices to protect the remaining historic resources at Prisoners Harbor that contribute to the Ranching District. These practices consist of implementing an ongoing invasive plant control program that eliminates the potential damage to historic features that these plants and their root systems can cause if left unchecked; maintaining the historic appearance and condition of historic trees by periodically trimming the branches to maintain their health and historic appearance; maintaining the two historic roads within the Project Area: Navy Road and the road to the Main Ranch; and avoiding the location of the below-ground water pipe that runs from the warehouse generally along Navy Road and the remnant of the rose and agave garden adjacent to the water pipe. These management practices would have a long-term moderate beneficial impact on the historic resources at Prisoners Harbor that contribute to the significance of the Ranching District.

4.3.3.2.2 Effects of riparian restoration

Riparian restoration of the Cañada del Puerto Creek consists of the removal of eucalyptus trees along an approximately 0.7 mile stretch of the stream channel. The eucalyptus removal area has not been systematically surveyed for historic resources, such as structure foundations, because of the presence of dense underbrush and fallen trees. Therefore it is not know if such resources are present in this area. Cutting, dragging, hauling, and vehicle operation associated with eucalyptus removal could damage any such features that may be present. Cultural resources specialists would monitor these activities to ensure that any features encountered receive proper treatment. If any historic features are encountered, work would be stopped in the vicinity and the resource would be evaluated. If the resource is determined to be significant, mitigation measures would be implemented. Such measures could include avoidance, recordation, or data recovery, in consultation with the SHPO. Therefore, eucalyptus tree removal along the Cañada del Puerto is considered to have a short-term minor adverse impact on historic resources.

While it is possible that some of the eucalyptus trees to be removed may date to the historic ranching period, the majority of eucalyptus trees at Prisoners Harbor and in Cañada del Puerto Creek have spread unintentionally from early plantings. The Park is analyzing historic photographs, maps, and tree measurements to determine if any of the eucalyptus or other trees along the stream channel were part of the late-19th century development (when the island tree planting campaign took place). If any such plantings are identified, the Park would consult with the State Historic Preservation Office regarding the status of the plantings as contributing or non-contributing to the Ranching District, and to identify the appropriate treatment or mitigation for their removal. Riparian restoration of the Cañada del Puerto Creek, therefore, would have a potential short-term negligible adverse impact on historic resources.

4.3.3.2.3 Cumulative Impacts

Removal of the cattle corrals and various other small-scale features at Prisoners Harbor under Alternative B would be cumulatively considerable when added to the loss of structures and other small-scale features at Prisoners Harbor over time as described in Section 4.1, Cumulative Impacts Scenario. However, the cumulative losses at Prisoners Harbor would not diminish the integrity of the Ranching District to the extent that the District's National Register eligibility would be jeopardized. Therefore, removal of the cattle corrals and various other small-scale features at Prisoners Harbor is considered a moderate cumulative impact.

Fill stockpiling and non-historic eucalyptus tree removal are anticipated to have no impact on historic resources and therefore would not contribute to cumulative impacts.

Although a number of non-contributing features have been constructed within the Ranching District by the National Park Service and The Nature Conservancy, such as new fencelines, visitor-service facilities, and signage, the effect of the accumulation of these features has been minimal due to their placement in isolated locations, small size, and limited quantity (NPS 2004). Therefore, the placement of wayside interpretive features would make a minor contribution to any adverse cumulative impacts from non-contributing features on the Historic District.

Cultural resources specialists would monitor eucalyptus tree removal along the Cañada del Puerto Creek to ensure that any historic features encountered receive proper treatment. In addition, the Park is undertaking studies to determine if any of the eucalyptus or other trees along the stream channel were part of the late-19th century development. If any such plantings are identified, the Park would consult with the State Historic Preservation Office regarding the status of the plantings as contributing or non-contributing to the Ranching District, and to identify the appropriate treatment or mitigation for their removal. Therefore, riparian restoration of the Cañada del Puerto Creek would not contribute to cumulative loss of historic features or historic vegetation within the Ranching District.

Continuation of the Park's management practices for protecting historic resources at Prisoners Harbor and throughout the Ranching District would contribute to a long-term major beneficial cumulative impact on the historic resources within the Ranching District as a whole.

4.3.3.2.4 Conclusion (including impairment)

Removal of the cattle corrals would reduce the contribution that Prisoners Harbor makes to the Ranching District, but would not diminish the integrity of the Ranching District to the extent that the Ranching District's National Register eligibility would be jeopardized.

Fill stockpiling and non-historic eucalyptus tree removal are anticipated to have no impact on historic resources. Placement of wayside exhibits is considered a long-term negligible adverse visual impact on historic resources.

Although the potential removal of a historic rock retaining wall that may be identified during berm removal would slightly reduce the contribution that Prisoners Harbor makes to the Ranching District, its removal would not diminish the integrity of the Ranching District to the extent that its National Register eligibility would be jeopardized. Documentation of these features prior to their removal would serve to retain the information provided by this feature regarding the historic development of the ranch, including past construction practices. Therefore, berm removal would have a potential minor adverse impact on historic resources.

The Park is undertaking studies to determine if any of the eucalyptus or other trees along the stream channel were part of the late-19th century development. If any such plantings are identified, the Park would consult with the State Historic Preservation Office regarding the status of the plantings as contributing or non-contributing to the Ranching District, and to identify the appropriate treatment or mitigation for their removal. Riparian restoration of the Cañada del Puerto Creek, therefore, would have a potential short-term minor adverse impact on historic resources.

Continuation of the Park's management practices for protecting historic resources would have a long-term moderate beneficial impact on the historic resources at Prisoners Harbor that contribute to the significance of the Ranching District.

Although the project would remove the only remaining cattle corrals at Prisoners Harbor and their removal would reduce the contribution that Prisoners Harbor makes to the Ranching District, their removal would not diminish the integrity of the Ranching District to the extent that the Ranching District's National Register eligibility would be jeopardized. This is because even with their loss, the many buildings, structures, small-scale features, and landscape elements throughout the island that are contributing characteristics to the Historic District would continue to reflect the ranching history of the island.

Therefore, Alternative B would not result in impairment of historical resources because it would not result in a major, adverse impact to a resource or value whose conservation is necessary to fulfill specific purposes of the Park; key to the natural or cultural integrity of the Park; or identified as a goal in the Park's planning documents.

4.3.3.2.5 Mitigation and Monitoring

The Park intends to relocate the scale house from its present-day location within the cattle corral complex to its pre-1960s location near the historic warehouse. This would be accomplished under the supervision of Park cultural resource specialists and after consultation with the State Historic Preservation Office.

Prior to removal of the corrals and relocation of the scale house, the entire corral complex at Prisoners Harbor would be photographed and documented, including documentation of construction methods and material. This information would be archived at Park Headquarters. Documentation of these resources prior to their removal would serve to retain the information provided by the corrals and other features regarding the historic development of the ranch. Relocating the scale house to its pre-1960s location would partially compensate for the loss of the corral complex. To help interpret the historic ranching use of Prisoners Harbor, the park will build a corral structure similar to the historic sheep corrals in photos dated c. 1900 (Figure 3.8). The corrals will be situated along the row of eucalyptus trees at the base of the cliff, extending toward the pier. Design and materials will approximate the appearance of the historic sheep corrals and be determined by NPS cultural resource specialists in consultation with the State Historic Preservation Office during the design phase of the project.

4.3.4 Social Resources

4.3.4.1 Recreation and Visitor Experience

4.3.4.1.1 Effects of wetlands and floodplain restoration

Excavation and eucalyptus tree removal in the fill disposal site would require about 4 – 6 weeks. During that time, temporary fencing would be installed parallel to the access road in the Prisoners Harbor area. The fencing would direct visitors along the south side of the access road in the Prisoners Harbor area and away from the excavation site and fill disposal site. Pedestrian access to the restrooms and Prisoners-Pelican trail would remain unchanged, as would road access to the Central Valley. Truck activity and use of the fill disposal areas would effectively block access to Navy Road, but the small number of hikers destined for Del Norte would be allowed to pass Cañada del Puerto Creek with permission from the on-site supervisor. Vehicle access to the Navy site and Del Norte campground would be re-routed through the Central Valley. This re-routing would cause a minor short-term impact on Del Norte visitors and users of the Navy site, as it would approximately double the driving distance and time from about 6 miles and 0.5 hours to about 12 miles and 1 hour. Both routes require 4-wheel drive vehicles, but road conditions are slightly rougher on the alternate route.

Vehicle use of the access road in the Prisoners Harbor area would be limited to boat arrival and departure times to allow for loading and unloading gear, supplies, and equipment at the pier. This limitation in road access would produce a minor short-term inconvenience impact to campers traveling by vehicle.

Restoration activities will not impede access to embarking or disembarking tour boats.

This alternative is not expected to increase visitor use beyond the Park's limit of 100 visitors per day.

The removal of the eight historic cattle corrals would have a moderate, adverse and permanent impact on the visitor experience. The corrals are one of the first features the visitor sees when disembarking at Prisoners Harbor. While the surrounding ranching structures would still remain intact and would continue to convey some historic character of the ranching operations (see section 4.3.3.2.1), without the corrals the scope and landscape context of the Ranching District will have to be conveyed by the use of corral photographs in a new interpretive display at the Visitors Center. Additionally, moving the scale house to its pre-1960's location adjacent to the warehouse will aid visitor understanding of the relationship between these two ranching facilities. The interpretive signage onsite will describe the Ranching District features, past and present.

The addition of interpretive signage at two locations and the viewing bench, and additional interpretive material at the Visitors Center will have moderate long-term beneficial effects on the visitor experience. The bench will contribute to the visitor's appreciation for the natural and cultural features of the Harbor, and the signage will provide specific information about the ecological, cultural and historical context of the site area, and the relationship of the natural resources to the history of human activities at Prisoners Harbor. This contributes to the Park's visitor experience goals.

The visibility of restoration work and equipment within the Prisoners Harbor would produce a minor temporary visual and aural impact on the visitor experience.

4.3.4.1.2 Effects of stream channel restoration

Eucalyptus tree removal in Cañada del Puerto Creek would take place in intervals of about 6 weeks in duration. During tree removal access to the restrooms and the Prisoners-Pelican trail would remain unchanged. Access to the Central Valley would be re-routed to the Navy Road during this time. Just as blocking the Navy road doubled travel time to Del Norte and the Navy site, when the stream channel is being restored, blocking the Access Road would double travel time to the Central Valley, causing short-term minor inconvenience to visitors headed there. Access to the Navy site, the Del Norte campground, and the rest of the Isthmus would not be affected.

Stream channel restoration activities will not impede access to embarking or disembarking tour boats, and they will have no impact on access to existing historic ranching structures.

The visibility of restoration work and equipment along the riparian trail would produce a minor temporary visual impact on the visitor experience.

4.3.4.1.3 Cumulative impacts

Alternative B would contribute to moderate adverse cumulative impacts on the visitor experience. The removal of the cattle corrals means the loss of one component of the complex of features that contribute to the historical appeal of the Prisoners Harbor area. Photos and other documentation of the corrals will be included in new interpretive material at the Visitors Center. The addition of interpretive signage at two locations and the viewing bench along the wetland periphery will have moderate beneficial impacts, as described.

4.3.4.1.4 Conclusion

Wetlands restoration activities will have short-term minor adverse impacts to a small number of visitors (and residents of the Navy site) whose passage to Del Norte campground and the Navy site will be re-routed during the 4-6 weeks of actual restoration work. Access to recreational features in the interior of the Island will still be available, though inconvenienced during restoration.

Removal of the corrals will produce moderate long-term adverse impacts to the visitor experience, which will be partially mitigated by the return of the scale house to its historic location, and the additions and improvements to interpretation onsite and at the Visitors Center.

Riparian restoration will have short-term minor adverse impacts to a small number of visitors whose passage to the Central Valley will be re-routed during the 6 week segments of actual restoration, which will occur several times over the multi-year duration of this restoration.

4.4 Alternative C – 1/3 Wetland Restoration with Partial Berm Removal

4.4.1 Water Resources

Alternative C – 1/3 Wetland Restoration with Partial Berm Removal is identical to Alternative B, except that 2.1 acres of wetlands would be restored instead of the 3.1 acres restored under Alternative B, two of the historic corrals could be maintained in place, and the scalehouse would not be moved.

4.4.1.1 Hydrologic Function and Processes

The impacts associated with Alternative C on hydrologic function and processes would be similar to those impacts presented in Section 4.3.1.1 for flood elevation and frequency, hydrologic connectivity, sediment transport dynamics, and water quality. However, the reduction in restoration area compared to Alternative B can be expected to produce roughly proportional reductions in wetlands benefits (Bartoldus et al., 1994).

Flood Elevation and Frequency: Alternative C would have a minor adverse impact on flood elevation and flood frequency, and a beneficial effect of reduced flooding at the road crossing. Removal of the berm would increase the frequency that the creek overflows its banks connecting the flows to the floodplain and the recreated wetland as described for Alternative B in Section 4.3.1.1.1.

Stormwater and Floodwater Storage: Alternative C would have a beneficial effect related to the increased area for stormwater and flood storage as described for Alterative B; however the recreated wetlands would increase the existing flood storage by 2.1 acres rather than 3.1 acres. Approximately 8.6 acres of functioning wetlands would be available for floodwater storage capacity. A detailed discussion of impacts is included in Section 4.3.1.1.1.

Sediment Transport Dynamics: Alternative C would have a negligible adverse impact related to sediment transport dynamics as described in Alternative B.

The level of impact on hydrologic function would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.1.2 Wetlands and Floodplains

The impacts associated with Alternative C on changes in wetlands and floodplains is the same as those impacts presented in Section 4.3.1.2 except that the total number of acres of wetland re-creation is 2.1 acres rather than 3.1 acres. The recreated wetland would provide similar wetland functions and values, such as improved water quality, stream shading, flood attenuation, and groundwater exchange, as described for Alternative B except the areal extent of wetland would be one acre less. Alternative C would have substantial beneficial impact because implementation of the alternative would increase the areal extent of wetlands by greater than 2 acres. A number of studies in the wetlands literature suggest a positive relationship between wetlands functions and wetland size (Bartoldus, et al, 1994, Marble, 1992), but the relationships are not explored at the relatively small scale of this project, so precise prediction of the difference in functional improvements between Alternatives B & C is not possible. The same monitoring requirements would be implemented as part of the project for this alternative.

The level of impact on wetlands would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.1.3 Water Quality

The water quality impacts associated with Alternative C would be similar to those discussed in Section 4.3.1.3. A total of 2.1 acres of fill removal and wetland re-creation would have a moderate beneficial effect similar to the benefits expected from 3.1 acres discussed for Alternative B. A number of studies in the wetlands literature suggest a positive relationship between wetlands functions and wetland size (Bartoldus, et al, 1994, Marble, 1992), but the relationships are not explored at the relatively small scale of this project, so precise prediction of the difference in functional improvements between Alternatives B & C is not possible.

The level of impact on water quality would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.2 Biological Resources

Introduction

Under Alternative C, the Park would retain two of the existing cattle corrals adjacent to the access road, restore 2.1 acres of palustrine wetlands and deepwater habitat, remove eucalyptus, control invasive species, construct a protective barrier around the archeological site, and improve the visitor experience. A portion of the berm would be removed and the creek connected to its floodplain.

4.4.2.1 Wildlife

4.4.2.1.1 Birds

4.4.2.1.1.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

The effects of wetlands restoration on birds would be similar to those in Alternative B as described in Section 4.3.2.1.1.1. The main difference between alternatives is that 2.1 acres of wetlands would be restored in Alternative C, compared with 3.1 acres in Alternative B, providing one less acre of habitat; however, the availability of an additional 2.1 acres of wetlands in this alternative would still have a moderate beneficial impact on birds.

The benefits of restoring 2.1 acres of wetlands in Alternative C would not likely be as great as restoring 3.1 acres in Alternative B. A study of Ohio wetlands in 2001-2002 (Porej, No Date) found that species richness and densities of several species and groups of species, including migrating waterfowl, were associated with the size of wetlands. Study results suggested that creation of larger wetland complexes should be preferred over the creation of isolated wetlands. Additionally, the study concluded that the size of the individual wetland may be important for certain area-sensitive bird species and groups since there was a significant increase in species richness with increasing wetland area for marshes <5.5ha. (1 ha = 2.47 acres).

Generally, as a wetland's size increases, so does its habitat diversity and stability. Increased species richness with wetland size has been reported by several studies as described in Weller (1999). Increasing the size of small wetlands usually has a greater impact on increasing animal species richness than increasing the size of large areas (Marble, 1992). Thus, increased avian species richness with greater wetland size could be applicable to the small wetland areas restored by this project.

Wetland species, particularly waterfowl, are sensitive to human disturbance (Castelle et al., 1992; Burke and Gibbons, 1995; Semlitsch, 1997). A buffer between wetland habitat and human activity can reduce the negative impact of human activity on waterfowl breeding and feeding. With two corrals in place under this alternative, as opposed to removing all the corrals as in Alternative B, a small portion of the wetland would have a 100'-150' buffer from human disturbance (Figure 2.5). In this area there would be some waterfowl breeding, but with reduced populations and diversity compared with a 200' to 300' buffer from human disturbance (Table 2.2). The majority of wetland area would have a 50' to 100' buffer from human disturbance. The wetland generally would be ineffective in preserving major wetland functions and human activities would disturb breeding/feeding birds (Castelle et al., 1992). Degradation of buffer habitats over time would be more likely to occur in the area with a 50' to 100' buffer (Castelle et al., 1992).

The temporary displacement and disturbance of birds caused by construction activities for wetland restoration and human presence would occur for the several months duration of construction. However, the duration of disturbance would be shorter in this alternative than under Alternative B as the area of restoration is one acre less. Impacts to bird species would still be minor and adverse.

4.4.2.1.1.2 Effects of Stream Channel Restoration

The effects of riparian restoration on birds would be similar to those in Alternative B as described in Section 4.3.2.1.1.2.

4.4.2.1.1.3 Cumulative Impacts

Cumulative past, present, and foreseeable future impacts on birds for this alternative would be similar to those described for Alterative B in Section 4.3.2.1.1.3. The additional impacts associated with Alternative C, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on birds.

4.4.2.1.1.4 Conclusion (Including Impairment)

Alternative C would have negligible adverse to moderate beneficial effects on birds in the Project Area. Long-term moderate beneficial impacts would result from 2.1 acres of wetland restoration, which would support an increase in use by many bird species for refuge and forage. Long-term moderate beneficial impacts would also result from 20.02 acres of riparian restoration by eradication of eucalyptus trees and revegetation to re-establish native riparian plant communities. Riparian restoration would benefit riparian-associated bird species by increasing riparian value to breeding and migratory birds, as well as resulting in additional snags and cavities for cavity nesters.

Short-term negligible and minor adverse effects would occur on existing bird habitats with disturbance and destruction from construction activities associated with wetland and riparian restoration. However, these impacts would be outweighed by the availability of native habitats with improved ecological integrity once restoration is complete.

There would also be short-term negligible and minor adverse effects on birds, including special status birds, during construction activities for wetland and riparian restoration as species would be temporarily disturbed or displaced by noise and human activity. Impacts to nesting birds would be minimized as most activities would be scheduled after the spring breeding season.

This alternative would have minor beneficial impacts on two of the special status bird species in the Project Area, the Island scrub-jay and the bald eagle, with restoration of wetlands and riparian habitat which would provide additional foraging habitat for both species.

The level of impact on birds would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.2.1.1.5 MITIGATION AND MONITORING

Mitigation and monitoring activities would be the same as those for Alternative B, described in Section 4.3.2.1.1.5.

4.4.2.1.2 Mammals, reptiles, and amphibians

4.4.2.1.2.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

The effects of wetlands restoration on mammals, reptiles, and amphibians would be similar to those in Alternative B as described in Section 4.3.2.1.2.1. The main difference between alternatives is that 2.1 acres of wetlands would be restored in Alternative C, compared with 3.1 acres in Alternative B, providing one less acre of habitat; however, the availability of an additional 2.1 acres of wetlands in this alternative would still have overall moderate beneficial impacts on mammals, reptiles, and amphibians.

Babbitt (2005) found in a study on New Hampshire wetlands that species richness was related to wetland size in wetlands with short and intermediate hydroperiods, but not wetlands with long hydroperiods. The study concluded that wetland size does not appear to be a useful sole criterion for determining wetland functional value for amphibians. Thus it is not likely that the difference in wetland size between alternatives would affect the extent of beneficial impacts on amphibians.

The temporary displacement and disturbance of mammals, reptiles, and amphibians caused by construction activities for wetland restoration and human presence would occur for the several months duration of construction. However, the duration of disturbance would be shorter in this alternative than under Alternative B as the area of restoration is one acre less. Impacts to mammals, reptiles, and amphibians would still be minor and adverse.

4.4.2.1.2.2 EFFECTS OF STREAM CHANNEL RESTORATION

The effects of riparian restoration on mammals, reptiles, and amphibians would be similar to those in Alternative B as described in Section 4.3.2.1.2.2.

4.4.2.1.2.3 CUMULATIVE IMPACTS

Cumulative past, present, and foreseeable future impacts on mammals, reptiles, and amphibians for this alternative would be similar to those described for Alterative B in Section 4.3.2.1.2.3. The additional impacts associated with Alternative C, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on mammals, reptiles, and amphibians.

4.4.2.1.2.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative C would have negligible adverse to moderate beneficial effects on mammals, reptiles, and amphibians in the Project Area. Long-term moderate beneficial impacts would result from 2.1 acres of wetland restoration, which would support an increase in use by wildlife for breeding, refuge and forage. Long-term moderate beneficial impacts would also result from 20.02 acres of riparian restoration by eradication of eucalyptus trees and revegetation to re-establish native riparian plant communities. Riparian restoration would benefit wildlife species by increasing riparian value as the habitat matures and an increase in the areal extent of fully functioning riparian communities.

Short-term negligible and minor adverse effects would occur on existing wildlife habitats with disturbance and destruction from construction activities associated with wetland and riparian restoration. However, these impacts would be outweighed by the availability of native habitats with improved ecological integrity once restoration is complete.

There would also be short-term negligible and minor adverse effects on mammals, reptiles, and amphibians, including special status species, during construction activities for wetland and riparian restoration as species would be temporarily disturbed or displaced by noise and human activity or could be crushed and killed during ground disturbing activities. Restoration actions also have the potential to disrupt breeding cycles as some work would coincides with lizard and snake egg laying periods.

Specials status species would benefit from wetland or riparian restoration or both. Wetland restoration would provide additional habitat for bats, island fox, deer mouse, harvest mouse, and slender salamander. Riparian restoration would provide additional habitat for bats, island fox, slender salamander, island fence lizard, and gopher snake.

The level of impact on mammals, reptiles, and amphibians would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.2.1.2.5 MITIGATION AND MONITORING

Mitigation and monitoring activities would be the same as those for Alternative B, described in Section 4.3.2.1.2.5.

4.4.2.1.3 Aquatic Invertebrates and Fish

4.4.2.1.3.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

The effects of wetlands restoration on aquatic invertebrates and fish would be similar to those in Alternative B as described in Section 4.3.2.1.3.1. The main difference between alternatives is that 2.1 acres of wetlands would be restored in Alternative C, compared with 3.1 acres in Alternative B, providing one less acre of habitat; however, the availability of an additional 2.1 acres of wetlands in this alternative would still have overall minor beneficial impacts on aquatic invertebrates and fish.

4.4.2.1.3.2 EFFECTS OF STREAM CHANNEL RESTORATION

The effects of riparian restoration on aquatic invertebrates and fish would be similar to those in Alternative B as described in Section 4.3.2.1.3.2.

4.4.2.1.3.3 CUMULATIVE IMPACTS

Cumulative past, present, and foreseeable future impacts on aquatic invertebrates and fish for this alternative would be similar to those described for Alternative B in Section 4.3.2.1.3.3.

The additional impacts associated with Alternative C, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute minor beneficial cumulative impacts on aquatic invertebrates. As there are no known permanent fish species in Cañada del Puerto Creek, there would not be any associated cumulative impacts on fish.

4.4.2.1.3.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative C would have negligible adverse and negligible to minor beneficial effects on aquatic invertebrates in the Project Area. Long-term minor beneficial impacts would result from 2.1 acres of wetland restoration, which would support an increase in use by aquatic invertebrates. Long-term negligible beneficial impacts would also result from 20.02 acres of riparian restoration which would benefit aquatic invertebrates by reconnecting hydrologic function between Cañada del Puerto Creek and its floodplain.

There would also be short-term negligible adverse effects on aquatic organisms during construction activities for wetland and riparian restoration as there is the potential for mortality of some individual insects while they are in their terrestrial life stages to be crushed by construction equipment or excavated from burrows during ground disturbing activities.

Restoration activities could have negligible adverse impacts on aquatic habitat from sediment release during construction or during the first few years after each phase of restoration until riparian vegetation becomes established. Negligible adverse impacts can also be cause by fuel and oil spills from construction equipment that could reach surface or groundwater.

As there are no known permanent fish species in Cañada del Puerto Creek or the remnant wetland, there would not be any adverse or beneficial impacts on fish from riparian or wetland restoration.

The level of impact on aquatic invertebrates and fish would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.2.1.3.5 MITIGATION AND MONITORING

Mitigation and monitoring activities would be the same as those for Alternative B, described in Section 4.3.2.1.3.5.

4.4.2.2 Vegetation

4.4.2.2.1 Native Vegetation Communities

4.4.2.2.1.1 EFFECTS OF WETLANDS FLOODPLAIN RESTORATION

The effects of wetlands restoration on native vegetation communities would be similar to those in Alternative B as described in Section 4.3.2.2.1.1. The main difference between alternatives is that 2.1 acres of wetlands would be restored in Alternative C, compared with 3.1 acres in Alternative B, providing one less acre of native vegetation. Under this alternative, wetland restoration with partial berm removal would have major beneficial impacts on native vegetation communities. However, the major beneficial impacts in Alternative C would benefit native vegetation to a lesser extent than Alternative B as fewer acres of wetlands would be restored. In a study of wetlands in Ontario, Canada Houlahan et al. (2006) found that wetland size is the most important predictor of plant species richness, which was positively correlated with wetland area. Thus it is possible that the one acre difference between alternatives would be enough to result in lower plant species richness under Alternative C than Alternative B.

4.4.2.2.1.2 EFFECTS OF STREAM CHANNEL RESTORATION

The effects of riparian restoration on native vegetation communities would be similar to those in Alternative B as described in Section 4.3.2.2.1.2.

4.4.2.2.1.3 CUMULATIVE IMPACTS

Cumulative past, present, and foreseeable future impacts on native vegetation communities for this alternative would be similar to those described for Alterative B in Section 4.3.2.2.1.3. The additional impacts associated with Alternative C, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on native vegetation communities.

4.4.2.2.1.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative C would have negligible adverse to major beneficial effects on native vegetation communities in the Project Area. Long-term major beneficial impacts would result from 2.1 acres of wetland restoration, which would improve functioning and ecological value of native vegetation communities in the Project Area. Long-term major beneficial impacts would also result from 20.02 acres of riparian restoration by eradication of eucalyptus trees and revegetation of native plants to restore native riparian vegetation communities. With berm removal, the hydrological connectivity of the system between Cañada del Puerto Creek and the new wetlands and riparian areas would be restored. Restored hydrological connectivity would allow native plant communities to function naturally and sustainably over the long-term and fully meet project objectives.

Short-term negligible and minor adverse effects would occur with construction activities associated with wetland and riparian restoration and non-native plant control which would disturb or destroy existing vegetation. However, these adverse effects would be balanced or outweighed by the beneficial effects of the restoration efforts.

There would be no impacts to the Santa Cruz Island silver lotus or other special status plant species. Restoration activities would take place in the area where silver lotus plants occur but care would be taken not to impact them, and no new habitat would be created in which any of the special status plants on Santa Cruz Island can re-establish.

The level of impact on native vegetation would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.2.2.1.5 MITIGATION AND MONITORING

Mitigation and monitoring activities would be the same as those for Alternative B, described in Section 4.3.2.2.1.5.

4.4.2.2.2 Non-Native Vegetation

Proposed actions in Alternative C would affect the extent of invasive plant species through 1) increasing disturbance, which can encourage expansion of species adapted to disturbance; 2) removal or eradication of invasive plant species occurrences; and 3) changing physical conditions such that viability of existing occurrences and potential for establishment or expansion is affected, either positively or negatively.

While not all non-native plant species are invasive or are documented to have negative effects on native plant species communities or wildlife habitats, vegetation communities dominated by natives are considered to have more ecological integrity and be perhaps more likely to support native wildlife through providing habitat, food, and other important relationships.

4.4.2.2.2.1 EFFECTS OF WETLANDS AND FLOODPLAIN RESTORATION

The effects of wetlands restoration on non-native vegetation would be similar to those in Alternative B as described in Section 4.3.2.2.2.1. The main difference between alternatives is that 2.1 acres of wetlands would be restored in Alternative C, compared with 3.1 acres in Alternative B, removing one less acre of non-native vegetation. Under this alternative, wetland restoration would have long-term beneficial impacts in control of non-native vegetation; these effects would be minor as some of the same non-native species would still remain in the two corrals and other parts of the Built Up area that are not being converted to wetlands.

4.4.2.2.2.2 EFFECTS OF STREAM CHANNEL RESTORATION

The effects of riparian restoration on native vegetation communities would be similar to those in Alternative B as described in Section 4.3.2.2.2.2.

4.4.2.2.2.3 CUMULATIVE IMPACTS

Cumulative past, present, and foreseeable future impacts on non-native vegetation for this alternative would be similar to those described for Alterative

B in Section 4.3.2.2.2.3. The additional impacts associated with Alternative C, as described above and as compared to past, present, and foreseeable future cumulative impacts, would contribute moderate beneficial cumulative impacts on non-native vegetation.

4.4.2.2.2.4 CONCLUSION (INCLUDING IMPAIRMENT)

Alternative C would have negligible adverse to major beneficial effects from eradication and control of non-native vegetation in the Project Area. Long-term major beneficial effects would result from 20.02 acres of riparian restoration in which 1737 eucalyptus trees would be eradicated, as well as eucalyptus removal on fill disposal sites. Long-term minor beneficial impacts would also result from 2.1 acres of wetland restoration during which there would be removal of all non-native species on the site, but non-native species would remain in adjacent corral and other Built Up areas.

Short-term negligible to minor adverse effects would occur with construction activities associated with wetland and riparian restoration as ground disturbance and creation of new open areas during restoration activities could result in the colonization by non-native species. However, any new colonization would be removed as restoration and revegetation efforts are completed.

The level of impact on non-native vegetation would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.2.2.2.5 MITIGATION AND MONITORING

Mitigation and monitoring activities would be the same as those for Alternative B, described in Section 4.3.2.2.2.5.

4.4.3 Cultural Resources

4.4.3.1 Archeological Resources

Alternative C – 1/3 Wetland Restoration with Partial Berm Removal is identical to Alternative C except that 2.1 acres of wetlands would be restored instead of the 3.1 acres restored under Alternative B, requiring the removal six of the eight cattle corrals.

4.4.3.1.1 Effects of wetlands and floodplain restoration

Removal of invasive non-native species from the 2.1-acre wetlands restoration area would have a slightly less potential to impact archeological resources because of the smaller area of land disturbance that would occur under Alternative C compared to Alternative B. An archeologist would be present during all ground disturbing activities associated with invasive plant and fill removal to ensure that archaeological resources that may be encountered would receive proper consideration. Therefore, similar to Alternative B, these activities would have a short-term negligible adverse impact on archeological resources.

Two fill disposal sites for temporary stockpiling of the fill removed from the wetlands area would be located at the same location as under Alternative B and would also encompass 2.78-acres of land but would be slightly lower in height. As under Alternative B, an archeologist would be onsite to monitor eucalyptus removal and fill stockpiling to ensure that these activities have a minimal impact on the archeological deposit. Therefore, removal and stockpiling activities would have, at most, a short-term minor adverse impact on CA-SCrI-240 cultural deposits. It is anticipated that once the fill is in place, it would help protect and preserve that portion of the archeological site from wind and water-induced erosion and the potential for unauthorized removal of cultural material. This is considered a long-term moderate beneficial impact.

Under Alternative C, to protect CA-SCrI-240 from continuing (although lessened) exposure to erosion, the Park would deflect potential flood waters away from the culturally dense area of the site by the placement of a berm around the upstream face of the archeological site. This barrier, in addition to deflecting flood waters from the site, would also reduce the potential for unauthorized collection of materials by reducing the visibility and the potential for exposure of intact deposits. However, because the effectiveness of this barrier in protecting the resource and its long-term structural integrity is not assured, construction of the barrier is considered a long-term moderate beneficial impact on the resource.

Under Alternative C, the Park would continue its current management practices to protect known archeological resources at Prisoners Harbor that contribute to the Archeological District and additional unknown archeological resources that may be present. These practices include regular maintenance of the fencing that protects archeological site CA-SCrI-240 through periodic inspection and repair of the posts, wire, and hardware; and controlling the spread of invasive vegetation, including kikuyu grass, fennel, and young eucalyptus recruits, that otherwise would spread and potentially disturb the integrity of any currently unknown archeological resources. Control methods include herbicide spraying and hand cutting, which have minimal or no affect on archeological resources. The Park also undertakes cultural resources monitoring and/or subsurface testing within areas of potential ground-disturbance associated with proposed projects, and avoidance of any such resources, if feasible, or data recovery, if necessary. Continuation of the Park's ongoing archeological resource protection measures would have a moderate beneficial long-term impact on archeological resources.

Because all other activities under Alternative C would be the same as those described for Alternative B, potential impacts to archeological resources would also be the same.

4.4.3.1.2 Cumulative Impacts

Alternative C would have the same cumulative impacts on archeological resources as described in Section 4.3.3.1.3 for Alternative B.

4.4.3.1.3 Conclusion (including impairment)

Alternative C would have the same impacts on archeological resources as those described above in Section 4.3.4.1 for Alternative B. The only difference would be a slighter less potential for removal of invasive non-native species from the wetlands restoration area to impact archeological resources because of the smaller area of land disturbance. An archeologist would be present during all ground disturbing activities associated with invasive plant and fill removal to ensure that any currently unknown archaeological resources that may be encountered would receive proper consideration. Therefore, similar to Alternative B, these activities would have a minor short-term adverse impact on archeological resources.

Once the berm is removed and the fill site is constructed, it would help protect and preserve that portion of the archeological site from wind and water-induced erosion and the potential for unauthorized removal of cultural material. This is considered a long-term moderate beneficial impact.

The level of impact archeological resources from Alternative C would not result in impairment of park resources that fulfill the specific purposes identified in the enabling legislation or that are essential to the natural or cultural integrity of the park.

4.4.3.1.4 Mitigation and Monitoring

The Park's maintenance activities would be expanded to included monitoring the protective barrier at CA-SCrI-240 after flood events to check for structural integrity and effectiveness in protecting the archeological deposit. Repairs or modifications to the berm would be made as needed to ensure protection of the resource.

Implementation of mitigation measure would result in a major long-term beneficial impact to the resource.

4.4.3.2 Historical Resources

Alternative C – 1/3 Wetland Restoration with Partial Berm Removal is identical to Alternative B except that 2.1 acres of wetland would be restored instead of the 3.1 acres restored under Alternative B, requiring the removal of 6 of the 8 cattle corrals, 6 of the 8 telephone poles and 2 of the 3 water troughs. Prior to commencement of invasive plant removal and other earthmoving activities in this area, the entire corral complex would be photographed and documented, including documentation of construction methods and materials. This information would be archived at Park Headquarters.

4.4.3.2.1 Effects of wetlands and floodplain restoration

Retaining two of the eight cattle corrals, including the scale house, would help to convey to visitors the historic use of Prisoners Harbor for cattle ranching and would be immediately visible to visitors accessing the island from Prisoners Harbor pier. However, the loss of six of the eight cattle corrals would diminish the historic design and feeling of the corral complex as it existed during the period of historic significance to the extent that it would no longer be considered as contributing to the Ranching District. Their removal, however, would not diminish the integrity of the Ranching District to the extent that the Ranching District's National Register eligibility would be jeopardized.

Wetland restoration under Alternative C would have a moderate adverse impact on historic resources.

The hunt club cement foundation post-dates the period of significance and does not contribute to the Ranching District. Therefore, its removal would have no impact on contributing historic resources.

The designated loading/unloading area for equipment, vehicles, and other large materials and supplies would be located adjacent to a portion of the cattle corrals and would introduce a visual element that is out of character with the historic setting in this area. However, because its use would be short-term it is considered to be a short-term minor adverse impact on historic resources.

Under Alternative C, the Park would continue its management practices to protect historic resources at Prisoners Harbor that contribute to the Ranching District. These practices consist of maintaining the appearance of the remaining cattle corrals and scale house through painting, gate repair, and replacement of degraded boards and hardware; and periodic mowing of the plants inside the corrals; implementing an ongoing invasive plant control program that eliminates the potential damage to historic features that these plants and their root systems can cause if left unchecked; maintaining the historic appearance and condition of historic trees by periodically trimming the branches to maintain their health and historic appearance; maintaining the two historic roads within the Project Area: Navy Road and the road to the Main Ranch; and avoiding the location of the below-ground water pipe that runs from the warehouse generally along Navy Road and the remnant of the rose and agave garden adjacent to the water pipe. These management practices would have a long-term moderate beneficial impact on the historic resources at Prisoners Harbor that contribute to the significance of the Ranching District.

4.4.3.2.2 Cumulative Impacts

Removal of a portion of the cattle corrrals, telephone poles, and water troughs in the wetland restoration area and the removal of the historic rock retaining wall that could be present beneath the berm would reduce the contribution that small-scale features at Prisoners Harbor make to the Ranching District. However, because many such featues remain throughout the Ranching District, and the remaining historic resources at Prisoners Harbor would continue to convey the historic use of Prisoners Harbor for cattle ranching, their loss would make a minor contribution to cumulative adverse impacts on the Historic District as a whole.

4.4.3.2.3 Conclusion (including impairment)

Alternative C would have the same impacts on historic resources as Alternative B except that retaining a portion of the cattle corrals, telephone poles, and troughs would help convey to visitors the historical use of Prisoners Harbor for cattle ranching. The removal of six of the eight cattle corrals would diminish the historic design and feeling of the corral complex as it existed during the period of historic significance to the extent that it would no longer be considered a small-scale landscape feature and a contributing element to the cultural landscape Therefore, vegetation and fill removal from the 2.1-acre wetland restoration area is considered a long-term moderate adverse impact on historic resources. Use of a designated loading/unloading area is considered a short-term minor adverse visual impact on historic resources.

Although the project would remove a substantial portion of the remaining cattle corrals at Prisoners Harbor and their removal would reduce the contribution that Prisoners Harbor makes to the Ranching District, their removal would not diminish the integrity of the Ranching District to the extent that the Ranching District's National Register eligibility would be jeopardized. This is because even with their loss, the many buildings, structures, small-scale features, and landscape elements throughout the island that are contributing characteristics to the Historic District would continue to reflect the ranching history of the island. Therefore, Alternative C would not result in impairment of historical resources because it would not result in a major, adverse impact to a resource or value whose conservation is necessary to fulfill specific purposes of the Park; key to the natural or cultural integrity of the Park; or identified as a goal in the Park's planning documents.

4.4.3.2.4 Mitigation and Monitoring

Prior to commencement of invasive plant removal and other earthmoving activities in the corral complex area, the entire corral complex should be photographed and documented, including documentation of construction methods and materials. This information would be archived at Park Headquarters.

Documentation of these resources prior to their removal would serve to retain the information provided by the corrals and other features regarding the historic development of the ranch. However this measure would not fully mitigate the loss of the corral complex and other small-scale features. No additional feasible mitigation measures have been identified to further reduce the impact. Therefore it remains a moderate adverse impact.

4.4.4 Social Resources

4.4.4.1 Recreation and Visitor Experience

4.4.4.1.1 Effects of wetlands and floodplain restoration

As they relate to the visitor experience, the activities of wetlands and floodplain restoration are same as Alternative B; therefore the effects are the same as described in Section 4.3.4.1.1, with the exception of the removal of corrals and relocation of the scale house.

The removal of six of the eight historic cattle corrals would have a minor adverse and permanent impact on the visitor experience. With two of the corrals as well as the surrounding ranching structures remaining intact, the historic contribution of the corrals to ranching operations (see Section 4.3.3.2.1 would be impacted but not destroyed. The scope and landscape context of the Ranching District would, however, be more fully conveyed by the use of corral photographs in a new interpretive display at the Visitors

Center. Additionally, the interpretive signage onsite will describe the Ranching District features, past and present.

The addition of interpretive signage at two locations and the viewing bench, and additional interpretive material at the Visitors Center will have moderate long-term beneficial effects on the visitor experience. The bench will contribute to the visitors' appreciation for the natural and cultural features of the Harbor, and the signage will provide specific information about the ecological, cultural and historical context of the site area, and the relationship of the natural resources to the history of human activities at Prisoners Harbor. This contributes to the Park's visitor experience goals.

The visibility of restoration work and equipment within the Prisoners Harbor would produce a minor temporary visual and aural impact on the visitor experience.

4.4.4.1.2 Effects of stream channel restoration

The effects of Alternative C are identical to those in Alternative B, as described in Section 4.3.4.1.2.

4.4.4.1.3 Cumulative impacts

Alternative C would contribute to moderate adverse cumulative impacts on the visitor experience. The removal of all but two of the cattle corrals impacts the overall historic impact of viewing the site. Photos and descriptions of the corrals will be included in new interpretive material at the Visitors Center. The addition of interpretive signage at two locations and the viewing bench along the wetland periphery will have moderate beneficial impacts, as described.

4.4.4.1.4 Conclusion

Wetlands restoration activities will have short-term minor adverse impacts to a small number of visitors (and residents of the Navy site) whose passage to Del Norte campground and the Navy site will be re-routed during the 4-6 weeks of actual restoration work. Access to recreational features in the interior of the Island will still be available, though inconvenienced during restoration.

Removal of the corrals will produce moderate long-term adverse impacts to the visitor experience. The remaining corrals can convey only a portion of the historic context of the ranching period, which will be partially mitigated by the additions and improvements to interpretation onsite and at the Visitors Center.

Riparian restoration will have short-term minor adverse impacts to a small number of visitors whose passage to the Central Valley will be re-routed during the 6 week segments of actual restoration, which will occur several times over the multi-year duration of this restoration.

4.5 Sustainability and Long-Term Management

This section of the analysis will focus in on the relationship between local short-term uses of the environment and the maintenance and enhancement of long term productivity, irreversible and irretrievable commitments of resources, and unavoidable adverse impacts.

4.5.1 Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

For any of the alternatives considered, no long-term management possibilities or Park productivity of resources are being sacrificed for the immediate use of NPS-owned land. The actions of restoring the wetlands, reconnecting the creek to its natural floodplain, protecting the known archeological site, and restoring the riparian corridor along Cañada del Puerto Creek meet the long-term goals of protecting the significant natural, ecological, and cultural values of the Park. If the Park chooses the Preferred Alternative, in which the ranch corrals are entirely removed as part of the wider wetlands restoration and removal of the berm, the remaining Prisoners Harbor area ranching structures will still contribute to the eligibility of the Santa Cruz Island Ranching District to the NRHP, and overall Park historic and archeological resources will be preserved in a manner consistent with its goals and management policies.

4.5.2 Irreversible and Irretrievable Commitments of Resources

If the Park chooses the Preferred Alternative, the removal of all the historic ranching corrals would constitute an irreversible commitment of resources, because the demolition of historic structures cannot be reversed. This loss would be partially mitigated by moving the scale house to its 1960's location and by including the photographic and historic documentation of the corrals in interpretive treatments onsite and at the Visitors Center, but the loss would not be fully mitigated. The Ranching District overall would still be eligible for listing on the National Register.

4.5.3 Significant and Unavoidable Adverse Impacts

Impacts to one contributing feature of the Santa Cruz Island Ranching District, eligible for listing in the National Register of Historic Places, are moderate, unavoidable, and adverse, in both alternatives. In Alternative B, the impact is more severe because all the corrals are removed; in Alternative C, the remaining presence of two corrals would still convey some of their historic role of the Ranching District to the Park visitor, but removal of contributing features still would constitute a moderate adverse impact. In both alternatives, the Ranching District overall would still retain sufficient historic integrity to maintain its eligibility for listing.

The No Action alternative would leave the Native American village site at risk of erosion from a major flood event, as well as from the threat from illegal collection of archeological remains. Alternatives B & C reduce this threat by reconnecting the creek to its floodplain.

4.6 Growth-Inducing Impacts

There are no activities within the Proposed Action that would induce residential or commercial growth within the Park or its surrounding areas.

4.7 Summary Comparison of Impacts by Alternative

	Alternative A—No Action	Alternative B—2/3 Restoration, all corrals removed	Alternative C—1/3 Restoration, 2 corrals remain
Native Plant communities	The No Action Alternative would have moderate adverse effects on native plant communities due to continued spread of eucalyptus, loss in areal extent of native plant communities, and continued degraded conditions without wetland or riparian restoration.	Alternative B would have long-term major beneficial impacts on native plants from wetland and riparian restoration, which would improve functioning and ecological value of native vegetation communities. There would be an additional 3.1 acres of native wetland communities and 20.04 acres of native riparian communities. Short-term negligible and minor adverse effects would occur with construction activities associated with wetland and riparian restoration and non-native plant control which would disturb or destroy existing vegetation.	Impacts of Alternative C would be similar to Alternative B; however, there would be 2.1 acres of wetlands restored and the major beneficial impacts in Alternative C would benefit native vegetation to a lesser extent than Alternative B as fewer acres of wetlands would be restored.
T&E Plant Species	The Santa Cruz Island silver lotus would not be affected by the No Action Alternative as no actions would occur to disturb habitat or individuals.	Riparian and wetland restoration would not provide any new habitat for re-establishment of special status plant species in the Project Area. There would not be any impacts on the Santa Cruz Island silver lotus as there would be no activity in the creek bed where they occur.	Impacts of Alternative C would be the same as Alternative B.

Non-Native Plants	The No Action Alternative would have minor adverse impact on non-native plants themselves, with continued control of invasive species producing minor beneficial impacts on native vegetation.	Alternative B would have long-term major beneficial effects from eradication and control of non-native plants with the removal of 1737 eucalyptus trees on 20.02 acres of restored riparian habitat, and removal of non-native plants on 3.1 acres of restored wetlands. Short-term negligible to minor adverse effects would occur with construction activities associated with wetland and riparian restoration as ground disturbance and creation of new open areas during restoration activities could result in the colonization by non-native species.	Impacts of Alternative C would be similar to Alternative B; however, one less acre of non-native plants would be removed during wetland restoration.
Wildlife	Current management practices that would continue under the No Action Alternative would not alter wetland, riparian or other wildlife habitat. Thus there would not likely be any changes to habitat or abundance of wildlife under this alternative.	Alternative B would have long-term moderate beneficial effects on wildlife from 3.1 acres of wetland and 20.04 acres of riparian restoration that would provide high quality habitat. Short-term negligible and minor adverse effects would occur from disturbance and destruction of habitat and disturbance and displacement of species during construction activities.	Impacts of Alternative C would be similar to Alternative B; however, there would be one less acre of wetlands restoration for wildlife habitat, so the reduced buffer from human activities would limit waterfowl breeding and feeding. In addition, the smaller restoration area would likely limit benefits to species richness compared to Alternative B.

T&E Wildlife	The No Action Alternative would have negligible to minor adverse impacts on the Island scrub-jay, and no impacts on any of the other special status species.	Alternative B would have minor beneficial impacts on the Island scrub-jay and the bald eagle with restoration of wetlands and riparian habitat. Wetland restoration would have minor to moderate beneficial impacts on bats, island fox, deer mouse, harvest mouse, and slender salamander by providing additional habitat. Riparian restoration would have negligible to moderate beneficial impacts on bats, island fox, slender salamander, island fence lizard, and gopher snake by providing additional habitat. There would be short-term negligible to minor adverse impacts due to disturbance and displacement during construction activities.	Impacts of Alternative C would be similar to Alternative B; however, there would be one less acre of wetlands restoration for wildlife habitat.
Hydrologic processes	No Impact – flood elevations and frequency would remain. There would be no increase in stormwater or flood storage and existing stream velocities and power would continue.	Negligible to Moderate Adverse impacts and Major Beneficial impacts on hydrologic processes. Removal of the berm would increase connectivity of the channel to its floodplain. Removal of the berm would increase flood frequency, but decrease flood water velocity and power. Building protective berm around arch site would further reduce risk.	Same as Alternative B

Wetlands	No Impact – no new wetlands or increased hydrologic connectivity between Cañada Del Puerto Creek and the floodplain would occur.	Major Beneficial Impact to hydrologic and ecological function from creation of 3.1 acres of wetland.	Major Beneficial Impact from creation of 2.1 acres of wetland, although functional benefits would likely not be as great as from Alt B.
Water Quality	No Impact – water quality conditions would not change.	Moderate Beneficial impacts from removal of the berm and reconnection of the channel to the floodplain. Re-creation of 3.1 acres of wetlands increases floodplain capacity. Negligible Adverse effects from removal of non-native eucalyptus.	Similar to Alternative B except that there would be only 2.1 acres of additional wetlands added to the floodplain, so beneficial impacts would likely be reduced.
Archeological Resources	No adverse impacts; moderate beneficial impact from continued maintenance and protection	Short-term negligible to minor adverse impact on arch resources from removal of eucalyptus and creation and use of fill disposal site. Long-term moderate to major beneficial impact to site 240 from reduced risk of erosion from flooding after berm removal and arch site berm construction.	Similar to B except slightly reduced adverse impact from less disturbance.
Historical Resources	Minor adverse impacts from natural degradation of features; moderate beneficial impact from continued maintenance and protection	Moderate long-term adverse impact on contributing features from removing corrals; Minor adverse impact from removal of historic rock retaining wall	Reduced but still moderate long-term adverse impact on contributing features from removing corrals.

Visitor Experience	No adverse impacts; moderate beneficial impact from potential facilities improvements in GMP	Short-term minor impacts from inconvenience; Moderate long-term adverse impact from corral removal. Minor improvements from bench and new signage	Same as Alternative B, except long-term adverse impact from corral removal is minor.

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

CHAPTER FIVE

CONSULTATION AND COORDINATION

5.0 Consultation and Coordination

This chapter includes a summary of efforts to involve federal, state, and local agencies, organizations, and the public, including local community members in the planning process for the proposed project beginning with a preliminary public scoping meeting in April 2006.

5.1 Consultation

Agency scoping was conducted throughout the planning process to ensure that agencies were familiar with the project and had ample opportunity to provide input while it was easy to incorporate suggestions into planning documents.

Agencies consulted with during the planning process include the U.S. Fish and Wildlife Service, California State Historical Preservation Office, U.S. Army Corps of Engineers, California Coastal Commission, California Department of Fish and Game.

5.1.1 California State Historic Preservation Office

The State Historic Preservation Office was contacted regarding the potential effects on the cattle corrals in the project area. A letter providing information and seeking concurrence with the Area of Potential Effect and the park's determination of effects on properties listed on and eligible for the National Register of Historic Places was sent October 18, 2008. Following a site visit with staff from the Office of Historic Preservation (OHP) and representatives from the tribe to the Prisoners Harbor project area on February 24, 2009, the park evaluated suggestions made by the OHP staff and consulted with the Tribe regarding treatment of the east side of the drainage. A letter from the Tribe was received on September 4, 2009 and a concurrence letter from OHP was received on January 22, 2010. This correspondence is contained in Appendix G.

5.1.2 U.S. Fish and Wildlife Service

Under Section 7(c) of the Endangered Species Act, the park reviewed the proposed activities and determined whether any listed federally listed species may be affected. A species list was prepared for the US Fish and Wildlife service in a letter dated August 1, 2008. In a letter dated September 11, 2008 (Appendix H), the FWS believed that there were no federally listed plant species in the project area and the proposed project could support the only listed animal species, the island fox (*Urocyon littoralis cruzae*). Proposed avoidance measures during project implementation for the island fox are described in Chapter 4.

5.1.3 U.S. Army Corps of Engineers

A Cowardin Wetlands Delineation was completed during 2008 by the NPS Water Resources Division. It is contained in Appendix D. The U.S. Army Corps of Engineers was contacted regarding the need for a Clean Water Act Section 404 Wetlands Permit and/or a Rivers and Harbors Act section 10 or 13. An application for A Clean Water Act Section 404 permit will be submitted by the park.

5.1.4 California Regional Water Quality Control Board

The California Regional Water Quality Control Board will be contacted regarding the need for a Clean Water Act Section 401 Water Quality Certification.

5.1.5 California Department of Fish and Game

The California Department of Fish and Game has been contacted regarding a Streambed Alteration Agreement and incidental take permit. This project will not require a Stream Alteration or Incidental Take Permit.

5.1.6 Coastal Commission

The Coastal Commission was contacted regarding a Consistency Determination. The park has determined that the restoration of the coastal wetland and riparian corridor would not affect public access, recreation, the marine environment, or the coastal zone, and therefore, does not require a consistency determination. A copy of the negative declaration is included in Appendix I.

5.2 Public Involvement Process

5.2.1 Internal Scoping

In 2003 Channel Islands National Park received Technical Assistance from the NPS Water Resources Division to evaluate the feasibility of wetland restoration at Prisoners Harbor on Santa Cruz Island.

5.2.2 External Scoping

The National Park Service sought input on a range of concerns and environmental issues and suggestions for alternative methods for implementing the proposed project. This summary informs the public on the extent and nature of the comments received by the NPS during public scoping.

5.2.2.1 Public Scoping

A preliminary public input meeting was conducted at Prisoners Harbor on Santa Cruz Island on April 5, 2007. Thirty-three interested individuals, experts, and partners were invited. Twenty-one non-NPS individuals attended. The agenda for the meeting included introductions, site orientation with an informal walking tour of the site, followed by a round-robin discussion with opportunity to ask questions and express concerns (Table 5.1, Table 5.2).

Table 5.1 Informal walking tour included NPS experts stationed at specific locations to answer questions.

LOCATION	TOPIC	DISCUSSION	EXPERT
A. Road to Archeological site	Hydrology	Removing levee, changes in hydrology	Mike Martin
B. Eastern edge of corrals	Wetland Restoration	Restoration method, removing and relocating fill, revegetation	Joel Wagner
C. Warehouse	Historic District	Cattle/sheep corrals	Ann Huston
D. Archeological site	Archeological site	Location and extent of Archeological site	Kelly Minas
E. Seating area	Environmental Compliance	Public Input to the NEPA process	Marie Denn
F. Beach	Natural Resource Values	Backbarrier wetland, history, ecological benefits	Kate Faulkner,

Table 5.2 Major issues and concerns expressed during the on-island site visit.

MAJOR ISSUE	CONCERN	NAME
Visitor Experience	Control visitor impacts (mischief, vandalism) using boardwalks, viewing platforms	Island Packers
	Control and educate the public so no damage is done to arch site	Santa Ynez band of Chumash Indians
	Educate visitors to reduce potential for disturbance or desecration of arch site	Descendant, Santa Cruz Island Chumash
Historic Resources	Reduce size of corrals to 55’, this creates buffer, reduces potential visitor impacts, and preserves part of corral	Santa Cruz Island Foundation
Natural Resources	Don’t extirpate harvest mouse during construction Plan for desirable wetland species Do not lose human history Plan for veg. management in corrals Control Kikuyu grass	Santa Barbara Museum of Natural History

	Campground near wetland will affect wetland re:buffer	
	Potential for increased sedimentation and/or decreased run-off should be included in the model	University of California Natural Reserve System
	Eucalyptus are a recent occurrence and disrupt water budget	The Nature Conservancy
	Avoid extirpation of harvest mouse during construction	Interested individual
Archeological Resources	Preserve arch site, preserve levee adjacent to arch site, add berm to south side of arch site	Subject Matter Expert
	Removing levee may impact arch site	Santa Ynez band o Chumash Indians
Park Planning	Should not proceed without GMP	Santa Cruz Island Foundation
Maintenance	Potential long-term maintenance needs Earth moving concerns, deposition of fill Potential for water impacts to road and arch site	Interested individual

A Notice of Intent (NOI) to prepare an EIS and conduct public scoping was published in the Federal Register on June 11, 2008. On June 12, 2008, a press release announcing public scoping was distributed to the Ventura County Star and the Santa Barbara News-Press, as well as 73 other media outlets, including newspaper, radio stations, and television stations. The press release explained the public scoping process, announced two public open houses, and provided the web address for Channel Islands National Park and NPS park planning. The NOI and press release were posted on the park website. A notice of the public scoping open houses was printed in the Ventura County Star on June 23, 2008 and in the Santa Barbara News-Press on June 23, 2008.

The NPS mailed approximately 240 public scoping announcements with the time, date, and location of the public open houses.

Approximately nine members of the public attended the public open house at Channel Islands National Park Headquarters and approximately 13 members of the public attended the public open house at the Santa Barbara Public Library.

The 45-day public scoping period closed July 27, 2008.

5.2.2.2 Public Response to Scoping

Five individuals or private organizations hand delivered or emailed comments regarding the Prisoners Harbor Coastal Wetland Restoration Plan. Commenting organizations included The Nature Conservancy and the Santa Cruz Island Foundation. No comments were received from federal or state agencies. Four letters supported wetland restoration, one letter expressed concern about park planning and the impacts of levee removal, another letter wanted to see support for the project from the Chumash.

The following table consolidates scoping comments under major issue topics.

Table 5.3 Scoping Comments by Major Issue Topic

ISSUE TOPIC	COMMENT	
Park Planning	Enabling legislation does not mandate restoration of island conditions to pre-European times	Santa Cruz Island Foundation
	Park should not undertake Prisoners Harbor Coastal Wetland Restoration without a current General Management Plan	Santa Cruz Island Foundation
Historic Resources	Support for relocating the scalehouse and removing the corrals	Interested Individual
	Concern that removing the levee will cause irreparable harm to archeological site, historic warehouse, and corral system	Santa Cruz Island Foundation
	Supports designing the wetland to prevent damage to road and warehouse during flooding	Interested Individual
Archeological Resources	Support for making the archeological site visible with signage	Interested Individual
	Chumash tribe should support the project	Journalist
Wetland Restoration	General support for restoring wetland and riparian ecosystems	The Nature Conservancy, Interested Individual, journalist
Eucalyptus removal	Supports removing eucalyptus	Interested individual

Visitor experience	Would support a "nature" trail with signage describing wildlife, Chumash and ranching history along the perimeter of the wetland	Interested individual

5.3 Notification and Distribution of Draft EIS

The park widely distributed the draft EIS for comment. Methods the park used to notify the general public, organizations, and agencies that the draft EIS was available for review and comment included:

Federal Register
A Notice of Availability for the draft EIS was published in the Federal Register on May 15, 2009.

Press Release
The park issued a Press Release on May 26, 2009 announcing the availability of the draft EIS for comment, the length of the comment period, and the time, date, and location of the Public Open House.

Public Open House
One Public Open House was held on June 23, 2009 from 5 pm to 7 pm at Channel Islands National Park Robert J, Largomarsino Visitor Center. Four interested individuals attended.

Website
The park posted the draft EIS on the Channel Islands National Park website and the NPS Park Planning website on May 15, 2009. The park invited comment on the draft EIS through both websites.

List of Recipients of Announcement of Availability of Draft EIS
The park mailed an announcement of the availability the draft EIS in electronic formate on the Channel Islands National Park website, the NPS Park Planning website, and the availability of paper copies of the draft EIS in four public libraries to government agencies, organizations, libraries, businesses, and individuals for a total of 247 announcements.

5.3.1 Draft EIS List of Recipients

Government
Army Corps of Engineers
California Coastal Commission
California Coastal National Monument
California Department of Fish and Game
California Department of Parks and Recreation
California Office of Historic Preservation
California Resources Agency, CERES
California State Clearing House
California State Lands Commission
California State Parks
Central Coast Regional Water Quality Control Board
Channel Islands National Marine Sanctuary
City of Oxnard
City of Santa Barbara
City of Ventura
County of Santa Barbara
Honorable Barbara Boxer
Honorable Dianne Feinstein
Honorable Lois Capps
Honorable Elton Gallegly
Honorable Brad Sherman
Honorable James Hansen
Los Padres National Forest
Minerals Management Service
National Marine Fisheries Service

Naval Warfare Center
Santa Monica Mountains National Recreation Area
United States Environmental Protection Agency
United States Fish and Wildlife Service
United States Geological Service
Vandenberg Airforce Base
Ventura County Air Pollution Control District

Libraries, Organizations, and Businesses
Alpine Training Center
Aspen Helicopters
Bararene Chumash Council
Barbareno/Ventureno Band of Chumash Indians
Boojum Institute
California Preservation Foundation
California State Coastal Conservancy
Channel Islands Aviation
Channel Islands Kayak Center
Chumash Maritime Association
Environmental Management and Planning Solutions
Gabrieleno-Tongva Tribal Council
Growing Solutions
Guided Discoveries
Island Packers
Los Angeles Maritime Institute
Los Angeles Public Library
Middleburg College
Montrose Settlements Restoration Program
National Parks Conservation Association
National Trust for Historic Preservation
NOAA Restoration Center
Northern Chumash Tribal Council
Northwestern University
Orange Coast College
Owl Clan
Oxnard Public Library
Paddle Sports
Restoration Resources
Salinan-Chumash Nation
San Buenaventura American Indian Council
San Fernando Mission Indians
San Luis Obispo County Chumash Council
Santa Barbara Audubon Society
Santa Barbara Botanic Garden
Santa Barbara Museum of Natural History
Santa Catalina Island Conservancy
Santa Cruz Island Foundation
Santa Ynez Band of Mission Indians
Smithsonian Institute
Southwind Kayak Center
Success Oriented Achievement Realized (SOAR)
Terra Marine
The Dunn School
The Nature Conservancy
Thousand Oaks Library
Tribal Elders Council Santa Ynez Band of Mission Indians
Truth Aquatics
University of California, Santa Barbara
Ventura Audubon Society

Individuals
Larry Agenbroad
Scott Anderson
David Anderson
Eleanor Arellanes
Vincent Armenta
Jeanne Arnold
Ellen Aronson
Frank Arredondo
Adolfo Bailon
Greg Baker
Joy Bannerman
Brian Barnwell
Starleen Bellone
Fred Benko
Steve Bennett
Mary Bergen
Shauna Bingham
James Birchler
Marty Blum

Jennifer Boyce
Leannah Bradley
Todd Braje
Peter Brand
Jean Braudaff-Kerr
Brian Brennan
Julia Brownley
Roger Briggs
Alex Brodie
Johnny Brown
Tony Brown
Salud Carabajal
Harry Carter
David Castanon
Henry Chaney
David Chang
Darlene Chirman
Michael Cohen
Fred Collins
Paul Collins
Kirk Connally
Mark Connally
Brian Connor
Roberta Cordero
Coleen Cory
Natalie Cosentino
Rachel Couch
Diane Cross
Marla Daily
Nan Deal
Mark Delaplane
Robert DeLong
Diane Devine
Deanne DiPietro
Wayne Donaldson
Milford Donaldson
Richard Doutt
Terry Dressler
Charles Drost
Rachel Duarte
Sam Dunlap
Bill Ehorn
Krista Fahy
Iya Falcone
Bob Feron
Ed Fess
Brooks Firestone
Karen Flagg
John Flynn
Timothy Flynn
Paul Friesema
Glen Fritzler
Bill Fulton
Richard Garcia
Elena Gherini
Denny Gherini
John Gherini
Pete Gherini
Andrea Gherini
Jim Gladson
Warren Glaser
Michael Glassow
Phylicia Gomes
Cathy Good
Suzanne Goode
Inez Goodwin
Paul Grossgold
Lois Grunwald
Darcee Guttilla
James Haas
Rick Hanks
Donald Hartley
Ruth Hartman
Sean Hastings
Brain Hatfield
Laird Henkel
Andres Herrera
Thomas Holden
Grant House
Jeff Howarth
Alissa Hummer
Karl Hutterer
Mark Hyatt
Deb Jensen
John Johnson
Kori Johnson
Ann Jones
Randy Judycki
Steven Junak
Tom Kiernan
John King
Mick Kronman

John Kuizenga
Calvin Lamb
Mike Lamm
Lyndal Laughrin
Meredith Laws
Carmelita Lemos
Robin Lemos
Frank Lemos
Joan Lentz
Betsy Lester Robert
Tommy Liddell
Eric Little
Annie Little
Peter Lopez
Teresa Lopez
Kote Lotah
Jennifer Lucchesi
Drew Madrigal
Lisa Mangione
Beatrice Marcoe
Kris Mashburn
Drew Mashburn
Dean Maulhardt
David Mazurkiewicz
Gerry McChesney
Travis McDaniel
Kathryn McEachern
Genie McGaugh
Charlie McLaughlin
Robert Median
John Menke
Don Mills
James Monahan
Carl Morehouse
Scott Morrison
Sean Morton
Vivian Murai
Barbara Murray
Pedro Nava
Terri Nevins
Diane Noda
Mark Oberman
Jack O'Connell
Justin Olenik
Mike Ong
Ruby Ortega
Jaret Owens
Gary Pace
Rosa Pace
Rachel Pace
Christine Palmer
Greg Pelka
Luis Perez
Juanita Perez Garcia
Darryl Perlin
David Peterson
Karen Prioleau
Carol Pulido
Theresa Raitt
James Raives
Tina Reed
Michael Rees
Virginia Reyes
Torben Rick
Freddie Romero
Sarah Romero
George Runner
Dwight Sanders
M.A. Sanjayan
Heane Schneider
Ed Schreiner
Richard Schubel
Steven Schwartz
Nancy Settle
Betty Silva
Larry Simon
Marianne Slaughter
Mary Small
David Smith
Sam Spaulding
Alex Stone
Ed Summers
Jenny Theodoro
Bob Thiel
Tim Thomas
Robert Treanor
Steve Treanor
Elise Tripp
Leo Tumamait
Patrick Tumamait
Poss Turner
Carol Tyson

Amber Tyson
Patty Velez
Lotus Vermeer
Mark Vigil
Mark Vigil, Sr.
Julie Ward
Christy Weir
Mark White
Dieter Wilken
Das Williams
Robin Wills
John Wilson
Joe Winkelmaier
David Witting
Rachel Wolstenholm
William Wyatt
Debra Yang
Arthur Zapf
Donald Zapf
John Zaragoza

5.4 List of Preparers

Individuals who participated in the preparation of this Environmental Impact Statement are listed below:

National Park Service

Marie Denn, MESM Master in Environmental Science and Management, Aquatic Ecologist with the Pacific West Region.

Ann Huston, MA in Historic Preservation, Chief of Cultural Resources Division for Channel Islands National Park.

Derek Lohuis, BA in History, Park Ranger at Channel Islands National Park.

Mike Martin, MS in Watershed Science, Hydrologist with NPS Water Resources Division in Ft. Collins, CO.

Kelly Minas, BA in Anthropology, Archeologist at Channel Islands National Park.

Kevin Noon, PhD in Wetlands Ecology, Certified Professional Wetland Scientist with the NPS Water Resources Division in Lakewood, CO.

Paula Power, MS in Plant Ecology, Vegetation Ecologist at Channel Islands National Park.

Joel Wagner, MS in Environmental Science, Certified Professional Wetland Scientist with the NPS Water Resources Division in Lakewood, CO.

Mangi Environmental Group

Mark Blevins, MS Geography, GIS Specialist
Bruce Kaplan, Master of Studies in Environmental Law, Project Manager
Anna Lundin, M.S., Environmental Engineering, Wetlands
Jim Mangi, Ph.D., Ecology, Project Oversight
Eveline Martin, MS Forestry, Senior Biologist
Ian Martin, MS Forestry, Biologist
Pam Sarlouis, Document Manager
Philip Sczerzenie, Ph.D Wildlife Biology, Consulting Biologist

Winzler & Kelly

Brian Bacciarini - B.S. Environmental Studies, Hydrology

Pat Collins - M.S. Environmental Health Sciences, Technical Review
David Demko - M.S. Ocean Engineering, Hydrology, Coastal Processes
Carol Kielusiak, MA Anthropology, Cultural Resources
Carrie Lukacic, BS Natural Resources Planning & Interpretation, Wetlands and Water Quality, W&K Project Manager
Tony Williams - B.S. Civil Engineering, US Navy Civil Engineer Corps Officer School, Hydrology, Coastal Processes

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

CHAPTER SIX

RESPONSE TO COMMENTS

6.0 Response to Comments

Introduction

The purpose of this chapter is to analyze the comments given to the Park by the public. The Final EIS is to be an accurate analysis of impacts of the proposed action and the alternatives. Public and agency review of the draft helps to ensure this accuracy. Analysis of comments allows the Park to identify the public's opinion on the project, and to garner new information on resources, alternatives, and environmental issues. The Park uses public comments to modify alternatives; supplement, improve, or modify our analysis; make factual corrections; or clarify information in the draft version.

The four sections in this chapter are:

- Introduction
- Commentator Summary
- Copy of Commentator Letters and E-mails
- NPS Response to Comments

In total, 11 letters or email correspondences were provided to the Park during the 60-day comment period for the Draft EIS. From this correspondence, the Park identified 11 substantive comments. Substantive comments are those that are not simple statements for or against the proposal, but rather those comments requiring additional explanation or analysis of data and those that questioned facts or conclusions contained in the Draft EIS. Letters of support, labeled NA, were included in this chapter. Substantive comments were divided into 9 categories.

Commentator Summary

Commentator Name	*Comment Category*	*Comment Number*
NOAA (National Marine Sanctuary)	Mitigation/Avoidance	1
	Comments Noted	NA
California Coastal Commission	Legal/Regulatory	2
U.S. Environmental Protection Agency Region IX	Best Management Practices	3
Santa Barbara Channel Keepers	Eelgrass impacts	4
	Grunion impacts	5
	Comments Noted	NA
The Nature Conservancy	Comments Noted	NA
The Ventura Audubon Society, Inc.	Comments Noted	NA
Interested Individual	Visitor Experience	6
	Historic Resources	7
	Comment noted	8
	Flood flows	9
Interested Individual	Visitor Experience	see comment #6
	Historic Resources	10
Interested Individual	Removal of non-native vegetation	11
Interested Individual	Comments Noted	NA
Interested Individual	Comments Noted	NA

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Channel Islands National Marine Sanctuary
113 Harbor Way
Santa Barbara, CA 93109

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July 10, 2009

Channel Islands N.P.
Supt. FILE
Admin.
Cult. RM ACTION
Interp.
Maint. FYI
Nat. RM
Protection RESPOND
Transp.
Marine Sci.
NBS - Terr.
NBS - Mar.
cc Paula

Russell Galipeau, Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

Re: Prisoners Harbor Coastal Wetland Restoration Draft Environmental Impact Statement

Dear ~~Mr. Galipeau:~~ Russell

Thank you for the opportunity to provide comments on the Prisoners Harbor Coastal Wetland and Stream Corridor Restoration Project Draft Environmental Impact Statement (DEIS). We are interested in the project because of the connection between the wetland and stream corridor and the nearshore island coastal environment, and our joint management responsibilities to protect these habitats. In general, we support the restoration of native habitat and protection of cultural resources on and around the Channel Islands. We have a few outstanding concerns regarding the possible impacts of the restoration project on the Sanctuary's marine resources that appear to not have been adequately addressed in the DEIS.

In particular, we are concerned about the possible impacts to sanctuary waters and resources during the construction, grading and related project operations. Specifically, we would appreciate additional detail on the potential environmental impacts and proposed mitigation to address: 1

Runoff and siltation in adjacent marine waters. In particular, how the use of herbicides for non-native species removal will not be discharged into Sanctuary marine waters.

Noise and light disturbance to marine mammals and seabirds.

Protection of marine archeological artifacts.

Sanctuary regulations prohibit disturbance to cultural resources, discharge of matter or material and alteration of the seabed [15 CFR part 922]. If disturbance to cultural artifacts, discharge or deposit of materials or alteration of the seabed is projected, the National Park Service will need to consult with the Sanctuary and may need to request a Letter of Authorization from the Sanctuary Superintendent.

We look forward to the responses to these comments and will work with you to explore ways to minimize possible impacts to the sanctuary and park ocean waters. If you have any questions, please contact the Sanctuary's Resource Protection Coordinator, Sean Hastings, at Sean.Hastings@noaa.gov or (805) 884-1472.

Sincerely,

Mike Murray
for
Christopher Mobley
Sanctuary Superintendent

18069	Protect and enhance resources at Prisoners Harbor	27516	4	The California Coastal Commission notes that Section 5.1.6 of the DEIS states that the Commission will be contacted regarding a consistency determination. A consistency determination (CD) will need to be prepared by the NPS and submitted to the Coastal Commission for the proposed project prior to implementation of the project. The CD should include an analysis of the project's consistency with the applicable policies of Chapter 3 of the Coastal Act, including policies addressing public access and recreation, marine resources and water quality, environmentally sensitive habitats, cultural resources, and visual resources.	2	07/13/2009	No (4)	Unaffiliated Individual	California Coastal Commission	Simon, Larry . 45 Fremont Street, Suite 2000, San Francisco, CA 94105 San Francisco, CA 94105 USA lsimon@coastal.ca.gov	No

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

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7/6/2009

Russell E. Galipeau
Superintendent,
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

Subject: Draft Environmental Impact Statement (DEIS) for the Prisoners Harbor Coastal Wetlands Restoration Project, Channel Islands National Park, California (CEQ #20090151)

Dear Mr. Galipeau:

The Environmental Protection Agency (EPA) has reviewed the above referenced document pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

EPA supports the Project's purpose and goals. We concur that the more extensive efforts to restore habitat in the preferred alternative will be most beneficial to those species that depend upon it. We have rated this Draft Environmental Impact Statement (DEIS) as LO (Lack of Objections). Please see the enclosed Summary of EPA Rating Definitions for further explanation of our rating system. While we support the preferred alternative, we offer the following recommendations below for the control of non-native species and the protection of human health.

Control of Non-Native Species

The DEIS includes a significant discussion of invasive plant species, but contractor equipment inspection is the primary method proposed to avoid the transport of unwanted weeds. Similarly, the DEIS only mentions rodent control for landing craft, as a means to ensure that rodents are not transported to the park. In addition to the DEIS, the National Park Service (NPS) provided EPA a copy of its Draft Non-Native Species Prevention Plan for the Channel Islands National Park, California (undated). We recommend that appropriate prevention activities mentioned in this plan be incorporated into the DEIS as mitigation measures or best management practices, including:

- Construction equipment will be taken apart and (or) washed prior to transportation to the island, if it has openings and crevices for weeds, soil, invertebrates, and vertebrates to hide. 3
- An NPS representative will educate construction personnel on the importance of controlling non-native species.

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- Organic erosion control material, such as hay bales, will be prohibited.
- The last location the equipment was used will dictate more stringent control measures (e.g. if the area is know to have sudden oak death or red imported fire ants).

Air Quality

In light of the serious human health impacts associated with particulate matter, EPA typically recommends incorporation of best available control measures into a Final EIS. Because of the relative small scale of this project, we offer these fugitive dust control measures as suggestions for your consideration.

- NPS should water dry soil in excavation and fill areas to minimize dust migration during windy conditions, and install wind fencing.
- When hauling material and operating non-earthmoving equipment, NPS should prevent spillage and limit speeds to 15 miles per hour (mph). NPS should also limit speed of earth-moving equipment to 10 mph.

We appreciate this opportunity to review the DEIS. When the Final EIS is released for public review, please send one copy to the address above (mail code: CED-2). If you have questions, please contact me at (415) 972-3521, or contact Tom Kelly, the lead reviewer for this project. Tom can be reached at 415-972-3856 or kelly.thomasp@epa.gov.

Sincerely,

Kathleen M. Goforth

Kathleen M. Goforth, Manager
Environmental Review Office (CED-2)

Enclosure: Summary of EPA Rating Definitions

cc: Matthew Vandersande, U.S. Army Corps of Engineers

2

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

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July 14 2009

Channel Islands N.P.
Supt. FILE
Admin.
Cult. RM ACTION
Interp.
Maint. FYI
Nat. RM
Protection RESPOND
Transp.
Marine Sci.
NBS - Terr.
NBS - Mar.
cc Paula

Mr. Russell Galipeau
Superintendent, Channel Islands National Park
1901 Spinnaker Drive
Ventura CA 93001

Re: Requests for comments on Draft Environmental Impact Statement, Prisoners Harbor Coastal Wetland Restoration Plan

Dear Mr. Galipeau,

This letter is submitted by Santa Barbara Channelkeeper (SBCK) in Channel Islands National Park (CINP)'s request for comments on the *Draft Environmental Impact Statement, Prisoners Harbor Coastal Wetland Restoration Plan.* SBCK is a local non-profit 501(c)3 organization whose mission is to protect and restore the Santa Barbara Channel and its watersheds through citizen action, education and enforcement. To carry out this mission, SBCK has established five essential goals for the organization: 1) Eliminate industrial and other pollution to the Channel; 2) Eliminate beach closures; 3) Protect local wetlands; 4) Monitor water quality; and 5) Monitor and restore aquatic ecosystems.

We welcome this opportunity to comment upon the proposed Restoration Plan, and specifically in regards to any effects that implementation of this Plan might have on 1) the eelgrass (*Zostera pacifica*) bed that grows immediately offshore of Prisoners Harbor and the mouth of Cañada del Puerto, and 2) the use of Prisoners Harbor beach as spawning grounds for the California Grunion (*Leuresthes tenuis*).

1. Potential effects on eelgrass (*Zostera pacifica*) beds not mentioned or analyzed in DEIS

Eelgrasses are seagrasses, marine flowering plants that form underwater patches or meadows much like wild grasses do on land. Seagrass meadows are among the most productive communities on earth. They are ecologically important for increasing primary production, supporting complex food webs, recycling nutrients, and stabilizing sediments. Many studies have documented that seagrasses provide habitat complexity, shelter, and food for numerous fishes and invertebrate species. Eelgrass beds, which are recognized by state and federal statutes as highly valuable, yet sensitive habitats, have also been designated Essential Fish Habitat (EFH) for various fish species managed by the Magnuson-Stevens Fishery Conservation Management Act. More recently, it has been listed as a Habitat Area of Particular Concern, identifying it as rare, especially vulnerable to human impacts, particularly important ecologically, and/or located in environmentally stressed areas. Please refer to the SOUTHERN CALIFORNIA EELGRASS MITIGATION POLICY (Adopted July 31, 1991) for more information.

Researchers around the world agree that the greatest overall challenge facing seagrass ecosystems is the need for increased public awareness about the values they provide and the importance of their protection. The ecosystem services provided by seagrass habitats are ecologically and economically significant, yet seagrass beds continue to decline worldwide due to both natural and anthropogenic threats. SBCK has been working hard over the past seven years to educate the public about the value of this resource found at only three of the islands within CINP.

Eelgrass forms valuable habitat for a diverse group of fishes and invertebrates. For instance, a minimum of 53 species of fishes (including adult and young-of-the-year) have been documented in beds around Santa Cruz and Santa Rosa islands, including grass, and brown rockfish and California scorpionfish (included on the DFG list of 19 species of finfish proposed for management under the Nearshore Fishery Management Plan), kelp bass, juvenile of the overfished boccacio, many species of surfperches, and such harvested invertebrates as lobster, rock and sheep crabs, and geoduck clams. The value of eelgrass beds for these and many other species could be quite large; surveys by Dr. Jack Engle in the mid 1990's found species diversity in eelgrass beds at Santa Cruz and Santa Rosa to be nearly twice as high (~150 species) as on nearby sandy intertidal and subtidal habitats.

As you might be aware, SBCK has been deeply involved in restoration of eelgrass (*Zostera pacifica)* to Anacapa Island. Surveys just this past month have found that seven years after initial planting began, our restored grass bed has spread more than 2 km eastward from Frenchy's Cove and is teeming with life. In addition to this work, SBCK has been working with NPS biologists and with Channel Islands National Marine Sanctuary staff to fully locate and map eelgrass beds around Santa Cruz and Santa Rosa islands. Eelgrass beds only occur in a few locations around each island. At Santa Cruz, the main beds are at Smugglers, Scorpion, and in the shallow near-shore waters of Prisoners Harbor. Since 2008, we have been sending GPS track information to GIS technicians at CINP who have created preliminary maps of eelgrass resources. Our goal is to have these maps available to the public by Fall 2009. Please see attached *draft* map of Prisoners Harbor that denotes the boundaries of the eelgrass bed near Cañada del Puerto.

The DEIS does not mention that this extensive eelgrass habitat exists just offshore of the beach and wetlands in 15' water depth. As a photosynthesizing plant, eelgrass is extremely vulnerable to sedimentation and changes in water clarity. On Page 66, the Plan 4 states "One water quality parameter that could be affected by the project is sediment concentration." SBCK is concerned that any project that alters the flow of the Cañada del Puerto may have effects on this habitat. However, these effects may not all be negative, as our surveys have shown that there is a scoured area of the seafloor just offshore of the mouth of Cañada del Puerto, probably resulting from episodic flood events. The eelgrass bed is narrow in this area but wide on either side. There is also Giant Kelp (*Macrocystis pyrifera*) growing seasonally on cobbles in shallow water in this area as well. An analysis of the proposed *Draft Environmental Impact Statement, Prisoners Harbor Coastal Wetland Restoration Plan* is incomplete without consideration and analysis of any potential effects on this adjacent subtidal habitat.

We ask that you include a description of this habitat in the EIS along with an analysis of sediment loads and grain size carried by Cañada del Puerto for each of the various restoration alternatives and an analysis of how that might affect the nearshore environment. We also ask that there be included in the plan pre-, during- and post-construction subtidal monitoring of the area surrounding the mouth of Cañada del Puerto with reference sites located up and down coast.

2. Historic use of Prisoners Harbor beaches by the California Grunion

California grunion are a species of marine fish found only along the coast of southern California and northern Baja California. Grunion spawn completely out of the water and lay their eggs on sandy beaches. The eggs remain buried in the sand throughout incubation, fully out of water for approximately 2 weeks. The larvae hatch when the eggs wash out by high waves during tides before the new and full moons. The spawning season extends from late February or early March to August or early September. Grunion and their eggs are extremely vulnerable to disturbance and thus sandy beaches are considered Essential Fish Habitat according to the US Fish and Wildlife Service during the spawning season.

Although for much of the year the beach around the high tide line at Prisoners Harbor is mostly cobble, in the calm summer months sand accumulates and grunion have been documented spawning between the pier and the mouth of Cañada del Puerto. In fact, 5
during surveys for UCSB and the California Coastal Commission on this beach in 1996 and 1997, I have personally witnessed grunion spawning. Moreover, feral pigs were observed digging up the sand to find and eat the eggs during one evening's grunion spawning event (see "Feral Pigs Grunt for Grunion", Alolkoy, Spring 1998 –attached).

There is no mention of grunion within the DEIS, and we believe that there is a possibility that the Plan could effect (either negatively or positively) the narrow beach at either side of the mouth of Cañada del Puerto. We ask that you include a description of this grunion habitat in the EIS along with an analysis of sediment loads and grain size carried by Cañada del Puerto for each of the various restoration alternatives and an analysis of how that sediment might affect the beach environment. Sand accretion or erosion of the beach area either side of the mouth of Cañada del Puerto should addressed.

We also ask that there be included in the plan pre-, during- and post-construction monitoring of the beach area surrounding the mouth of Cañada del Puerto with reference sites located up and down coast. Finally, any construction activities that might disturb grunion spawning, including lights near the beach at night, should be postponed until after predicted grunion runs are over.

Finally, I would like to offer comments on the follow specific passage of text. On page 81, Section *3.2.1.2 Wetlands,* 3.2.1.2.1 Types of wetlands in the Project Area, the Plan states:

"Along the beach within the Project Area, the boulder bar consists of Marine Intertidal Rocky Shore habitat."

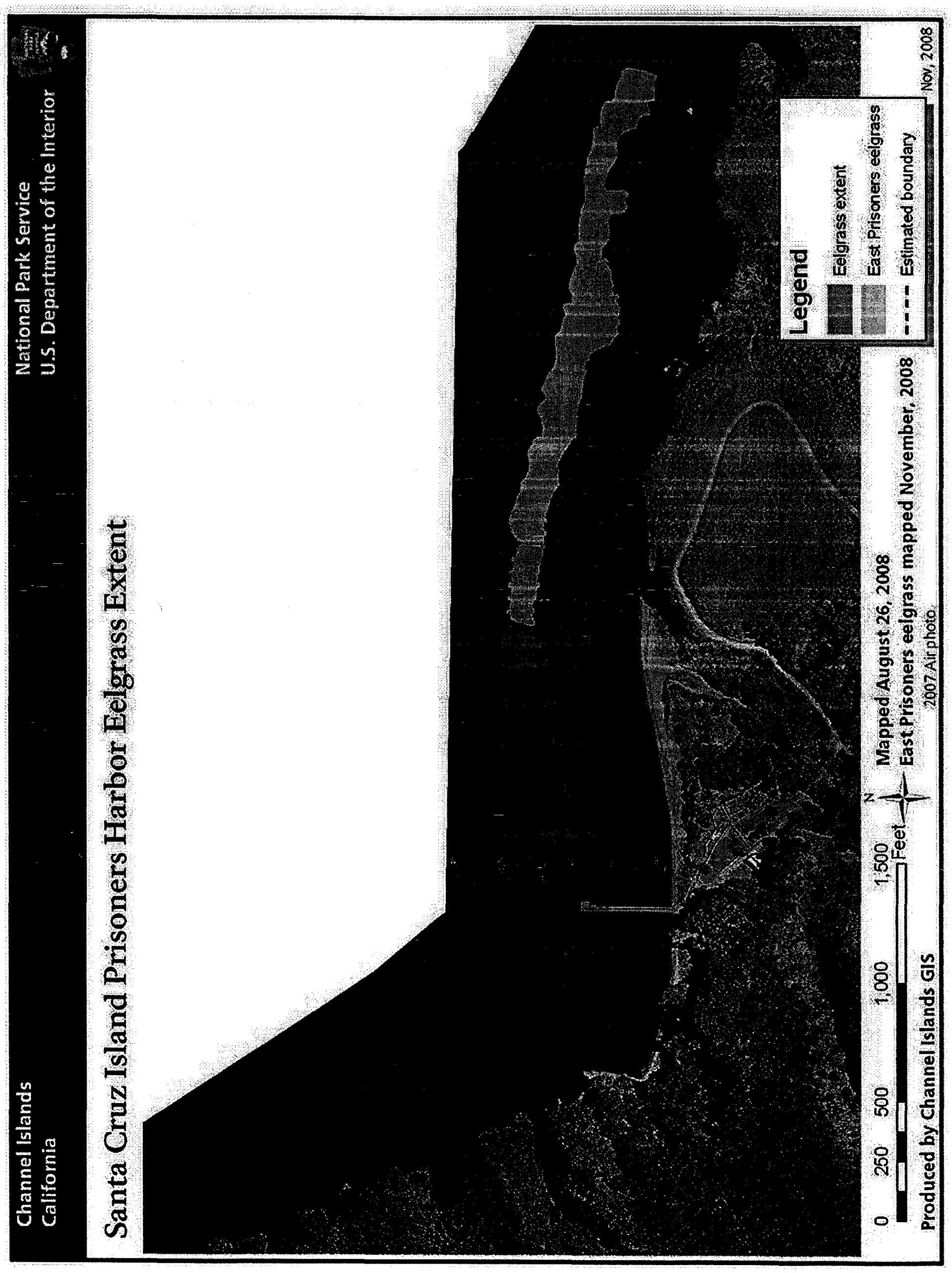
From my considerable experience within the Prisoners Harbor area, the true rocky habitat is to the west of the pier up against the cliffs. Indeed, this western area is where the MARINe (CINPS/PISCO) long-term monitoring site is located (I helped set up this site in the 1990s). There is no bedrock rocky habitat between the pier and the mouth of Cañada del Puerto. Rather, the upper part of the beach in the Project Area is cobble, boulder and/or sand, depending on the season.

In conclusion, we feel that the *Draft Environmental Impact Statement, Prisoners Harbor Coastal Wetland Restoration Plan* could greatly benefit the beach and nearshore subtidal habitats, but that the Plan is incomplete without a thorough discussion and analysis of the potential impacts.

Thank you for this opportunity to comment and we can provide references upon request.

Sincerely,
Jessie

Jessica Altstatt
Science Director


Channel Islands
California
National Park Service
U.S. Department of the Interior
Santa Cruz Island Prisoners Harbor Eelgrass Extent
Legend
Eelgrass extent
East Prisoners eelgrass
Estimated boundary
0 250 500 1,000 1,500
Feet
N
Mapped August 26, 2008
East Prisoners eelgrass mapped November, 2008
2007 Air photo
Produced by Channel Islands GIS
Nov, 2008

Research Page

Feral Pigs Grunt for Grunion

By Dan Martin, Jessie Altstatt and Jack Engle

Many Southern Californians know about the amazing fish called grunion which willingly leave the sea to bury and fertilize their eggs under several inches of sand high up on the beach. For many coastal natives, the phrase *grunion run* evokes memories of balmy summer nights chasing slippery fish across a moonlit beach. Who could forget the thrill of grabbing a grunion and feeling it wriggle in your bare hands?

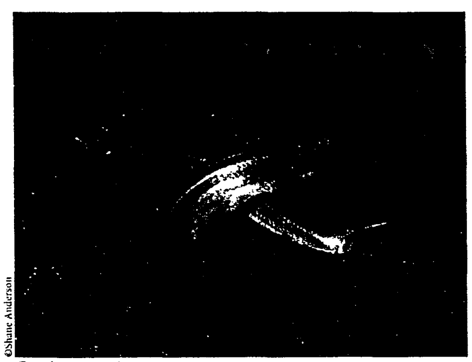
But humans, apparently, are not the only mammals which seek out these extraordinary creatures. As we discovered during a survey of Sanctuary beaches a few years ago, the feisty pigs of Santa Cruz Island also like to hunt them.

In 1994, UCSB's Marine Science Institute began a project to create a baseline inventory of coastal marine resources on and around the Northern Channel Islands. (The study was funded by the California Coastal Commission, with logistical support provided by the Channel Islands National Marine Sanctuary.) The data will provide baseline information on marine resources so that a more accurate damage assessment may be made in case of an oil spill. We targeted Santa Cruz Island for much of the survey work in part because oil dispersion models indicate that it is especially vulnerable to potential oil spills in the channel.

Feral pigs on Santa Cruz Island. ©A. Wenner

In June of 1996 and 1997, we found grunion eggs on four of 13 Santa Cruz Island beaches: Christy, Smuggler's, Pozo and Prisoners'. During our 1996 trip, we discovered evidence suggesting that oil spills—which leave residues in beach sediments that may harm grunion embryos—may not be the only threat to grunion nursery grounds. At Prisoners' beach, we found fresh pig tracks and extensive rooting of the sand in the very zone where grunion had laid their eggs the night before.

Returning to the island a year later, we witnessed first-hand the pigs' destructive foraging behavior. Poised quietly behind a driftwood log at the edge of the beach, we waited and watched. After several hours, the grunion appeared and began to spawn. Fifteen minutes later, a pair of large swine waddled down the beach, their snouts eagerly snapping in the surf and sand. Before the spawning run ended, the pigs had made several passes up and down the area where grunion had deposited eggs. Then the pigs trotted off into the darkness. An hour after the tide receded, the pigs returned to the same spot and began rooting through the sand, apparently gobbling up fresh grunion roe with great relish.



©Shane Anderson

Grunion spawning.

No one is certain how pigs got to Santa Cruz Island. Local historians believe a squatter living at Prisoners' Harbor may have introduced swine there around 1852. Despite efforts to control their populations, the elusive pigs now roam freely and have become quite numerous (their numbers on the island appear to fluctuate between 1,000 and 5,000.)

Now we also have evidence that the feral pigs pose a threat to grunion reproductive efforts. Like some humans on the coastal mainland, the pigs of Santa Cruz Island apparently patrol the surf line continuously during peak spawning hours. As a result, grunion may get spooked and flee back to the safety of the waves, hampering their spawning efforts.

Oil spills remain a potential threat to grunion in the Santa Barbara Channel. But feral pigs are a fully realized one. *Run, grunion!*

Dan Martin, Jessie Altstatt and Jack Engle are biologists at the Marine Science Institute of the University of California, Santa Barbara. Jack also coordinates the Tatman Foundation's Channel Islands Research Program.

The Nature Conservancy
Protecting nature. Preserving life.

Santa Cruz Island Preserve Project
Ventura Field Office
3639 Harbor Blvd., Suite 201
Ventura, CA 93001

tel [805] 642-0345
fax [805] 642-0342
nature.org
nature.org/california

Rec'd 07/17/09 JB

Channel Islands N.P.

✓	Supt.	FILE
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	Marine Sci.	
	NBS - Terr.	
	NBS - Mar.	

cc Paula JB

Channel Islands National Park
1901 Spinnaker Dr.
Ventura, CA 93001

July 15, 2009

Comments on Draft EIS for Prisoners Harbor Coastal Wetlands Restoration on Santa Cruz Island, CA

The proposed restoration of the back-barrier wetlands at Prisoners' Harbor, Santa Cruz Island is a challenging but highly valuable endeavor. Wetlands restoration will expand habitat for the endangered Santa Cruz Island fox as well as native birds, herpetofauna, invertebrates, and plants. A restored wetlands will enhance the visitor experience at Prisoners' Harbor and provide a venue for educating the public about island ecology and the Chumash peoples who once occupied the island.

The Nature Conservancy, on whose land a portion of the restoration will take place, supports Alternative "B" in the April 2009 Draft EIS for the Prisoners Harbor Coastal Wetland Restoration Plan. TNC staff will continue to provide input, as needed, and cooperate with NPS staff to facilitate successful project implementation.

Lotus A Vermeer

The Nature Conservancy's Santa Cruz Island Project Staff
Lotus Vermeer, Ph.D., Director

1

PS
Kate I
Paula I

The Ventura Audubon Society, Inc.

P.O. Box 24198, Ventura, CA 93003 www.venturaaudubon.org

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2009 JUN 24 PM 12: 37

June 19, 2009

Prisoners Harbor Coastal Wetland
Restoration Project
ATTN: Russell Galipeau, Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

Dear Mr. Galipeau,

The Ventura Audubon Society has reviewed the Draft Environmental Impact Statement (DEIS) for the Prisoners Harbor Coastal Wetland Restoration Project. Ventura Audubon Society, and its 650 member families, fully support Alternative B of the DEIS. We see the following benefits.

1. Removal of 20 acres of Eucalyptus trees. Eucalyptus trees are an introduced, invasive species. Their presence has a significant adverse impact on native bird species. Their acrid, aromatic leaf litter precludes an understory of other kinds of vegetation that provide nesting and foraging habitat for many species of birds. Eucalyptus' high level of water use can dry up shallow stream flows. The flowers of Eucalyptus have deep nectar cups with the entrance to them having a tar like substance on it. When native birds probe the flowers to get nectar and insects this tar coats the feathers at the base of the bill and may clog the bird's nostrils. (In New Zealand and Australia where eucalyptus trees are native the birds have evolved longer bills and so do suffer from this problem.) Clogging of nostrils has resulted in the death of individuals of the following bird species from you bird list: Allen's Hummingbird, Anna's Hummingbird, Bewick's Wren, Bushtit, Hutton's Vireo, Orange-crowned Warbler, Pacific-slope Flycatcher and Yellow-rumped Warbler. We believe removal of Eucalyptus trees to allow native vegetation to use the area should be done whenever possible.

2. Removal of the corrals, scale house and fill material from the historic wetlands is an important step in restoration of this valuable habitat. Many species of birds have had their populations reduced by human use of wetland areas, resulting in a 90% reduction of this type of habitat in California. Your efforts will help offset this loss.

3. Vital to reestablishing coastal wetlands is restoration of the hydrologic connection of those wetlands with coastal streams. We support removal of the current berm that severs that connection.

4. We feel that any restoration of natural habitats significantly improves the visitor experience to the Channel Islands National park.

Thank you for the opportunity to comment on the DEIS. Please contact me if you have any question concerning our comments at (805)652-0706.

The Ventura Audubon Society supports your projects that protect native plants and animals and seek to restore their habitats that have been degraded by using the Channel Islands as private ranches.

Reed V. Smith, Science Chair
Ventura Audubon Society

Prisoners Harbor Coastal Wetland Restoration Plan
Draft Environmental Impact Statement

Public Comment Form

Please complete this form with your comments on Channel Islands National Park's Prisoners Harbor Coastal Wetland Restoration Plan Environmental Impact Statement. Completed forms may be turned in at the agency public open house for this project or mailed to the address provided on the back of this form. You may include additional pages, if needed.

Please note that names and addresses of people who comment become part of the public record. If you wish to withhold your name and or address form the public record for this project, you must state your request prominently at the beginning of your comments and NPS will honor your request to the extent allowable by law. We will make all submissions from organizations, businesses and individuals who identify themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

1. Alt B&C should include more interpretive facilities (Draft EIS shows only one bench and 2 interpretive signs) There are many more opportunities for improved visitor experience, ie ⓐ Bird viewing blends or platforms at several locations with different habitats ⓑ Plant communities in and around wet lands; ⓒ ranching & corral history ⓓ stream outlet/ocean interface. These various areas should be connected by a "nature" trail surrounding entire project area 6

2. More historical corrals should be retained. Perhaps restoration on south side of road & west of magazine building. 7

3. Alt. B plan should be more specific about berm removal. Legend is not clear. Identify all of existing berm and part to be removed. 8

4. I have concern that when major flood flows are allowed into wet land areas, ~~that~~ a new outlet to ocean will ~~be~~ occur somewhere on the beach berm. To protect the pier abutment the land area should be raised to an elevation above the normal or typical natural berm elevation so the new channel is not cut near the pier. 9

Comments by
Donald F. Mills
3418 Fairmont Drive
Ventura CA. 93003

18069	Protect and enhance resources at Prisoners Harbor	2365 7	1	Thank-you for hosting the informative public information on July 1st at the CINP Visitor's Center. It was a pleasure meeting and talking with Russell, Kate, Paula and Ann. As a Channel Islands Naturalist Corp volunteer, I appreciate the opportunity to learn more about the history and geology of our Channel Islands. I am very much in favor of restoring the wetlands at Prisoners Harbor. Anytime natural habitat we have altered or destroyed can be returned to what it once was is a big win for the plants and animals that once utililzed the habitat. The proposals you have strike a good balance between retaining the important cultural resources - both the midden site and the ranch buildings and corrals - and recovering the lost habitat. Here are several items that are important to me: 1. Enhancing the visitor experience: Providing visitors with views and information about this restored habitat. I would like to see a "nature" trail along the perimeter of the wetlands with occasional signage describing not only the wildlife present but also information about the Chumash and ranching history. 2. Protecting cultural resources: Ensuring that the recovered wetland area is set back far enough to prevent damage to the road and buildings even in a worse-case flooding scenario. 10 3. Don't bury the midden archeology site. I'm no archeologist, but it seems wrong try to hide it from view. I'd rather you make it visible and even point it out on a sign while finding other ways to protect it. 4. I have no problem with the relocating of the scale house and some of the corrals. Nor do I have a problem with removal of the Eucalyptis trees. 5. One obvious concern is what you will do with the excavated dirt and the cut-down trees. I know you haven't got to that part of the planning process yet, but I'll be interested in the ideas you have when you get to that phase. Thanks again for the opportunity to participate in this project proposal. Joel Justin...

18069	Protect and enhance resources at Prisoners Harbor	27516	5	STOP demonizing non-native species..eucalyptus are beautiful trees and home to many species..bionativism is a psychological problem, not an ecological problem..stop killing and destroying in the name of species cleansing..this restoration is a SCAM!! non-natives always grow back as nature intends in spite of the time and money you waste trying to get rid of them!	07/13/2009	No (5)	11	Unaffiliated Individual		Kept Private Kept Private Carpinteria, CA 93013 USA Kept Private	Yes
18069	Protect and enhance resources at Prisoners Harbor	27516	1	I have been involved as a volunteer interpreter for Channel Islands National Park and Channel Islands National Marine Sanctuary for over 15 years and am very familiar with the islands in general, and with Prisoner's Harbor/Santa Cruz Island in particular. This includes a knowledge base of a wide variety of factors and issues regarding the overall environment of the area as well as the cultural history. I have reviewed the wetlands restoration project eir, and have attended talks and public forums regarding the project. I have also discussed it first-hand with the planners and I fully support the project. It is my feeling that once completed, the restoration of the wetlands and this area of Prisoner's Harbor will lead to better balance in the natural environment, while protecting and even enhancing the cultural resources of the area. The plan is well thought out and comprehensive and should go forward. David Begun	05/29/2009	No (1)		Unaffiliated Individual	Channel Islands Naturalist Corp	Kept Private Kept Private Westlake Village, CA 91361 USA Kept Private	Yes

18069	Protect and enhance resources at Prisoners Harbor	27516	3	I have reviewed the project descripton for the NPS Alternative B - preferred alternative. I am in support of this alternative and urge this as the best environmental option. If funding is an issue for this alternative, I am willing to volunteer for th	7/3/2009	No	ffiliated Individual

NPS Response to Comments

1) Project activities are focused on restoring ecosystem function of wetland and riparian communities. No project activities will take place in the intertidal zone or on the seabed. On p. 25 section 2.2.2.4.1, the EIS states: Implementation of a Storm Water Pollution Control Plan would be required of the contractor to reduce erosion of the fill disposal site and siltation in the creek and marine resources in the unlikely event of rain during the dry season.

   The use of herbicides is discussed on p.23, section 2.2.2.2. The EIS states: "Any herbicides which may be considered are all equally subject to strict advance approvals through the service-wide Integrated Pest Management Program, which only allows for use of least-toxic chemicals and substances including surfactants which are appropriate for use in or near watersheds and marine waters."

   Activities will only occur during daylight hours and will not require supplemental lighting.

2) In accordance with the Federal coastal Zone Management Act of 1972 as amended, Section 307c(1), the park has determined that the restoration of the Prisoners Harbor coastal wetland and associated riparian corridor on Santa Cruz Island would have no effect upon coastal uses or resources; and therefore, does not require a consistency determination with the California Coastal Management Program. A negative determination has been prepared by the park and mailed to the California Coastal Commission.

3) On p.23, section 2.2.2.2, the EIS states: "Any herbicides which may be considered are all equally subject to strict advance approvals through the service-wide Integrated Pest Management Program, which only allows for use of least-toxic chemicals and substances including surfactants which are appropriate for use in or near watersheds and marine waters." Furthermore, when herbicides are used on park property, signs are posted informing the public of the product being used, the location, the date and time of application, the purpose of the application, and park contact information.

   Mitigation measures will be incorporated into the project Implementation Plan to prevent the unintended transport of non-native species to the island. On p. 26, section 2.2.2.4, the EIS states, "Best Management Practices would be used by the construction contractor during construction to minimize the transport of unwanted weeds to the island including inspection of all equipment and clothing for weedy species prior to transport to the island.

   Mitigation measures will include educating all contracted personnel on the prevention and control of unwanted hitchhikers and the spread of non-native species. Material used in erosion control will be free of weeds and/or weed seeds, chemical additives, and non-biodegradable mesh.

Mitigation measures will be identified that protect air quality, including watering dry soil in excavation and fill areas and limiting the speed of vehicles on dirt roads.

4) The Cañada del Puerto creek is seasonal, flowing during the rainy season and forming a pool at the marine boulder bar. For most of the year, the marine boulder bar acts as a filter, removing sediments as the creek drains through the marine boulder bar to the ocean. The marine boulder bar typically opens briefly during the winter months when tides are high and storms are more common. Then quickly reforms. During winter storms Cañada del Puerto creek is carrying sediments from the entire 13 square mile watershed including the Central Valley.

   The EIS addresses concerns about erosion and siltation during excavation and tree removal. Excavation of fill would take place during the dry season to reduce the chance of sediment transport to the creek. On p. 26, section 2.2.2.4.1 the EIS states, "Implementation of a Storm Water Pollution Control Plan would be required of the contractor to reduce erosion of the fill disposal site and siltation in the creek and marine resources in the unlikely event of rain during the dry season." On p. 35, section 2.2.2.6, the EIS states, "Best Management Practices used during tree removal would include installation of silt fencing along the side of the creek where tree removal is taking place."

5) The project area is separated from the beach by a remnant wetland. Construction activities will take place between the access road and the remnant wetland and will noat involve the marine boulder bar or beach area. Equipment will be staged in The Nature Conservancy parking area. Restoration activities will not occur during night hours therefore no additional lighting would be required.

6) On page 35, section 2.2.2.8, the EIS states: "The park will prepare a Comprehensive Interpretive Plan for long-term interpretation of the natural and cultural resource in the Prisoners area, with the goal of providing a range of interpretation media and opportunities without jeopardizing the resources themselves." Prior to the completion of this plan, the resources will be interpreted through temporary wayside exhibits, site bulletins, and an interpretive guide.

7) On page 185, section 4.3.3.2.5, the EIS states: "To help interpret the historic ranching use of Prisoners Harbor, the park will build a corral structure similar to the historic sheep corrals in photos dated c. 1900 (Figure 3.8). The corrals will be situated along the row of eucalyptus trees at the base of the cliff, extending toward the pier. Design and materials will approximate the appearance of the historic sheep corrals and be determined by NPS cultural resource specialists in consultation with the State Historic Preservation Office during the design phase of the project.

8) Thank-you for your comment. The legends of Figures 2.1 and 2.7 have been edited to clarify that the displayed berm (cross-hatching symbol) represents the portion of the berm that will remain after partial removal.

9) According to elevation data collected in the project area between 2004 and 2007, the marine boulder bar varies from about 7 to 12 feet above mean sea level with the higher elevations in the direction of the pier, suggesting a land surface gradient away from the pier toward the channel outlet. Previous out-of-bank flows demonstrated no tendency to threaten the pier or breach the marine boulder bar in any other location.

10) On page 181, section 4.3.3.2.1, the EIS states: “Removal of the berm would increase overbank flooding in the stream reach between the road crossing and the Native American village site. The access road and the historical warehouse are located on the extreme southwestern margin of the Canada del Puerto greater geomorphic floodplain. Under existing conditions (berm in place) high flows are contained in the channel below the road crossing, producing a backwater effect and causing floodwaters to exit the channel at the crossing. Based on anecdotal reports, this phenomenon has resulted in flood waters traveling down the road and reaching the historic warehouse. Removal of the berm will reduce hydraulic pressure on the road crossing and result in less frequent overbank flows at that location. One deimensional hydraulic modeling (HEC-RES) of this creek and its floodplain suggest that a sustained 100-year flood of 2590 cfs may still reach the elevation of the warehouse with the berm removed. However, given the non-confining nature of this fluvial system and the low gradient of the valley in this area, even this relatively rare event would not reach depths greater than about 1 foot over the road, nor velocitites in excess of about 1-2 feet per second.” Therefore, based on our analysis, a 100-year flood would not be likely to cause significant damage to the historic buildings.

11) On page 79, section 3.3.2.1.1, the EIS states: “The genus Eucalyptus includes about 450 species and is native to Australia. During the late 19th century, it was widely planted throughout California, including four species on Santa Cruz Island (Junak, et al. 1995) where they were planted for ornamental and utilitarian purposes such as windbreaks and future pier pilings. Some trees planted during the ranching era are now considered contributing elements to the historic landscape (NPS Cultural Landscape Inventory, 2004). Most eucalyptus trees on the island, however, are feral offspring of historic trees.

Their presence creates an adverse environment for many native species, including passerine birds. Native plant understory used by birds for foraging and nesting is greatly reduced beneath eucalyptus trees. According to the Audubon Society, the flowers of eucalyptus trees have deep nectar cups, with a tar-like substance at the entrance of the cup. When native birds probe the flowers to get nectar and insects, this substance coats the feathers at the base of the bill and may clog the bird’s nostrils. Additionally, eucalyptus leaf litter is highly flammable creating a fire hazard which poses a threat to historic buildings on Santa Cruz Island."

One goal of the project is to replace eucalyptus trees with native plant species appropriate to the site. Native plants provide improved habitat for native birds and other fauna and reduce hazardous fuels buildup.

PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

CHAPTER SEVEN

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PRISONERS HARBOR COASTAL WETLAND RESTORATION PLAN

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APPENDIX A—NOTICE OF INTENT

Federal Register / Vol. 73, No. 113 / Wednesday, June 11, 2008 / Notices 33109

ACTION: Notice of Proposed Reinstatement of Terminated Oil and Gas Lease.

SUMMARY: Under the provisions of 30 U.S.C. 188(d) and (e), and 43 CFR 3108.2–3(a) and (b)(1), the Bureau of Land Management (BLM) received a petition for reinstatement of oil and gas lease COC68788 from Gunnison Energy Corp., and SG Interests VII, LTD, for lands in Gunnison County, Colorado. The petition was filed on time and was accompanied by all the rentals due since the date the lease terminated under the law.

FOR FURTHER INFORMATION CONTACT: Bureau of Land Management, Milada Krasilinec, Land Law Examiner, Branch of Fluid Minerals Adjudication, at 303.239.3767.

SUPPLEMENTARY INFORMATION: The lessee has agreed to the amended lease terms for rentals and royalties at rates of $10.00 per acre or fraction thereof, per year and 16 ⅔ percent, respectively. The lessee has paid the required $500 administrative fee and $163 to reimburse the Department for the cost of this **Federal Register** notice. The lessees have met all the requirements for reinstatement of the lease as set out in Section 31(d) and (e) of the Mineral Lands Leasing Act of 1920 (30 U.S.C. 188), and the Bureau of Land Management is proposing to reinstate lease COC68788 effective February 1, 2008, under the original terms and conditions of the lease and the increased rental and royalty rates cited above.

Dated: June 6, 2008.

Milada Krasilinec,
Land Law Examiner.

[FR Doc. E8–13124 Filed 6–10–08; 8:45 am]

BILLING CODE 4310–JB–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[ID–410–1232–IA–ID27–241A, DEG080003]

Notice of Restriction Order No. ID–410–03, Wallace Forest Conservation Area; Idaho

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of Restriction.

SUMMARY: This restriction order prohibits overnight camping by any person or groups of persons within the Wallace Forest Conservation Area described as all public lands administered by the Bureau of Land Management (BLM) located in Boise Meridian.

T.50 N., R. 2 W.,
Sec. 31, lots 5, 6, 7, 8, E½NE¼SW¼.
T. 50 N., R. 3 W.,
Sec. 26, portion of SW lying S & W of Sunnyside Road;
Sec. 35, portion of lots 1, 2, 7, lots 4, 5, 6, N½NW¼, W½NE¼.
T. 49 N., R. 2 W.,
Sec. 6, lot 4.
T. 49 N., R. 3 W.,
Sec. 1, portion of lots 1, 2, 5, 6.

All are contiguous lands in Kootenai County, Idaho.

The area described above is hereby closed to public occupancy and use daily, beginning one hour after sunset and continuing until one hour before sunrise. A map depicting the restricted area is available for public inspection at the Bureau of Land Management, Coeur d'Alene Field Office, 3815 Schreiber Way, Coeur d'Alene, Idaho. These restrictions become effective immediately and shall remain in effect until revoked or replaced with supplemental rules, or both.

FOR FURTHER INFORMATION CONTACT: Brian White at the BLM Coeur d'Alene Field Office, 3815 Schreiber Way, Coeur d'Alene, ID 83815 or call (208) 769–5031 or via e-mail at *brian_white@blm.gov.*

SUPPLEMENTARY INFORMATION: The authority for establishing these restrictions is 43 CFR 8364.1.

The 2007 Coeur d'Alene Resource Management Plan (Action RC–1.2.6, p. 47) calls for "establishing additional rules as needed in response to changing situations" under Objective RC–1.2. This objective applies specifically to recreation sites within the Coeur d'Alene Lake Special Recreation Management Area (SRMA). The subject public lands are entirely within this SRMA.

The BLM initiated a public participation process last year to get ideas and comments from the public about future management of this area. Three public workshops were held, including one on-site, which generated significant public interest. Area residents complained of loud parties, bonfires, and lewd activities visible from their homes. Other participants and the vast majority of public comments did not support overnight use or camping within the area.

Supplementary rules will be published according to decisions made within the Environmental Assessment and Recreation Project Plan for the Wallace Forest Conservation Area, which are expected to be completed in 2008.

The camping restriction is necessary to:

(1) Protect public health and safety;
(2) Protect persons, property, public land and resources from vandalism and other damage;
(3) Protect water quality from improper disposal of human waste;
(4) Prevent proliferation of illegal campfires; and
(5) Prevent other activities which are illegal under state or Federal regulations, or both.

These restrictions do not apply to:

(1) Any Federal, state or local government officer or member of an organized rescue or fire fighting force while in the performance of an official duty;
(2) Any Bureau of Land Management employee, agent, contractor, or cooperator while in the performance of an official duty; and
(3) Any person or group expressly authorized by the BLM to use the subject public land.

Penalties. Any person failing to comply with the closure orders may be subject to imprisonment for not more than 12 months, or a fine in accordance with the applicable provisions of 18 U.S.C. 3571, or both.

Dated: April 23, 2008.

Eric R. Thomson,
Coeur d'Alene Field Manager.

[FR Doc. E8–13106 Filed 6–10–08; 8:45 am]

BILLING CODE 4310–GG–P

DEPARTMENT OF THE INTERIOR

National Park Service

Coastal Wetlands Restoration at Prisoners Harbor, Santa Cruz Island, Channel Islands National Park, Santa Barbara County, CA; Notice of Intent to Prepare an Environmental Impact Statement

Summary: The National Park Service, in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), will prepare an Environmental Impact Statement (EIS) to consider suitable means for restoration of a wetland and stream corridor at Prisoners Harbor and lower Canada del Puerto drainage on Santa Cruz Island, Santa Barbara County, California. The Prisoners Harbor area is part of Channel Islands National Park managed by the National Park Service (NPS). The EIS will analyze alternatives for ecological restoration of the wetland and lower stream corridor, ensuring public access, and protecting cultural and historical resources.

Background: Channel Islands National Park is headquartered in

Ventura, California. Congress established the park "[i]n order to protect the nationally significant natural, scenic, wildlife, marine, ecological, archeological, cultural, and scientific values of the Channel Islands" (Pub. L. 96–199). The park proposes to restore a functional, self-sustaining ecosystem at a former 9-acre backbarrier coastal wetland site known as Prisoners Harbor and an associated 40-acre stream corridor in the lower Canada del Puerto watershed on Santa Cruz Island. The proposed wetland restoration site includes what was once the largest backbarrier coastal wetland on the Channel Islands. The wetland and stream corridor have been extensively modified over the past 150 years by filling of wetlands, intentional planting and accidental introduction of non-native vegetation such as stone pines, eucalyptus, and kikuyu grass in the area, and construction of a levee, buildings, corral, and unsurfaced roads. These modifications to the creek and floodplain have altered channel hydraulics, resulting in reduced ecosystem function, and contributed to the estimated 95% decline of California's wetlands statewide.

The loss of natural wetland and riparian ecosystems in the Prisoners Harbor area has resulted in locally diminished habitat for federally listed Santa Cruz Island barberry, Santa Cruz Island silver lotus, Santa Cruz Island gooseberry, endemic Santa Cruz Island scrub jay, Santa Cruz Island deer mouse, the rare Channel Islands slender salamander, western harvest mouse, loggerhead shrike, other passerine birds, and migratory waterfowl. Proliferation of non-native eucalyptus trees in the riparian corridor has severely reduced plant and wildlife-diversity and negatively affected habitat for species of special concern and passerine birds.

Preliminary Alternatives and Environmental Issues: The park proposes to restore wetland and riparian ecosystem function by removing fill from the historic wetland, reconnecting the Canada del Puerto stream with its floodplain, removing non-native eucalyptus and other vegetation in the lower drainage, and recreating habitat for special status species (both flora and fauna), passerine birds, and migratory waterfowl. Additionally the project proposes to protect significant cultural resources, and provide for an enhanced visitor experience. A successful project would meet the following goals:

- Restore functional wetland and riparian ecosystems and reduce the impact of non-native species on local biological diversity.
- Consistent with restoring functional ecosystems, recreate and maintain habitat adequate to support populations of special status species, passerine birds, and migratory waterfowl.
- Develop a restoration design that identifies and, to the extent possible, mitigates factors that reduce the site's full restoration potential.
- Protect archaeological resources from erosion during both normal and flood conditions.
- Provide access to the Central Valley inland from the affected area, NPS property east of Prisoners Harbor, and Nature Conservancy inholdings on NPS property upstream from the area of potential effect.
- Reduce risk of exposure to flooding that could damage the roadway and historic buildings.
- Provide visitor access and resource interpretation that are compatible with protection of resources.
- Enhance visitor knowledge and understanding of the prehistory, recent human history, and natural history of the Prisoners Harbor area.

Channel Islands National Park seeks public input to assist with identifying issues and developing a suitable range of alternatives for restoration of the lower Canada del Puerto watershed and Prisoners Harbor wetlands area. Restoration methods could include topographic alterations aimed at recovering natural hydrologic and ecological processes. These potential alterations could change the current hydrologic regime within the proposed project area, leading to either resumption of seasonal flooding of a fully restored wetland/floodplain or limited flooding of a partially restored wetland/floodplain. A "no-action" alternative, entailing no changes in current hydrologic regime, will also be assessed. An archeological site and some historic structures are located within the area of potential effect. Any restoration actions undertaken would be designed to ensure flood risks to the archeological site and historic resources will not be aggravated beyond current conditions and that influence of non-native species, including eucalyptus, on a restored ecosystem dominated by native species is reduced. As part of the effort to develop preliminary alternatives, the NPS will explore options for improved public access and enhacing educational opportunities consistent with ecosystem restoration.

Preliminary public outreach was initiated by the park in 2007. Concern was expressed about the possibility of removing cattle corrals constructed on filled coastal wetland. The corrals were built in the 1950's as part of rancher Carrie Stanton's conversion to a cattle operation. The corrals are considered a "small scale feature" in the 2004 Cultural Landscape Inventory and deemed to be a contributing element to the eligibility of the Santa Cruz Island Ranching District to the National Register of Historic Places. The park has acknowledged this concern and will work with the State Historic Preservation Office in developing mitigation measures common to all alternatives or safeguards specific to a particular alternative if necessary. Other issues or concerns known at this time include potential effects upon: Threatened and endangered species protected under the federal and state Endangered Species Acts, floodplain and stream corridor, native flora and fauna; historic and archeological resources, land use, and opportunities for and constraints on public use.

Public Scoping and Comment Process: Notice is hereby given that the final public scoping phase is underway, with the express purpose of eliciting additional public comment regarding a suitable range of alternatives, the nature and extent of potential environmental impacts and benefits, and appropriate mitigation strategies that should be addressed in the forthcoming conservation planning and environmental impact analysis process. For those who have commented previously, it is not necessary to re-submit comments. Federal, state, and local agencies, Tribes, and interested organizations are also encouraged to participate in the scoping process. Whether California state or local involvement in the environmental impact analysis process is necessary is yet to be determined. If an environmental clearance document is required under the California Environmental Quality Act (CEQA), the NPS will coordinate the NEPA/CEQA process with the designated state agency (or agencies).

A timely opportunity to learn more about the proposed restoration and provide information is a public meeting to be held during summer 2008. Information expected to be provided at the public meeting includes the history of the Prisoners Harbor/Canada del Puerto area, purpose and need for the proposed restoration, opportunities and constraints in developing the restoration design, potential alternative courses of action with regards to restoration, potential effects of these courses of action, and appropriate strategies for mitigation and monitoring. All interested individuals, organizations, and agencies are encouraged to provide comments or suggestions. For those persons unable to attend the meeting, information about the project will be available at *http://parkplanning.nps.gov* or by contacting the park as noted below.

All written scoping comments must be postmarked or transmitted not later than 45 days following publication of this notice in the **Federal Register** (immediately upon publication of this notice, the confirmed deadline for comments to be submitted will be posted on the park Web site). Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. To provide comments or information pertinent to the proposal, inquire about the public meeting, or to request a printed copy of the scoping document, please contact Paula Power, Channel Islands National Park, Attn: Prisoners Harbor Coastal Wetland Restoration Project, 1901 Spinnaker Drive, Ventura, CA 93001, telephone (805) 658–5784; FAX (805) 658–5799; e-mail *paulapower@nps.gov*). Duplicate informational updates will be regularly posted on the park Web site *http://www.nps.gov/chis/home_mngmntdocs.htm* and also at *http://parkplanning.nps.gov*.

Decision Process: At this time, the draft EIS is expected to be available for public review in early 2009; following due consideration of all public and agency comments, it is expected that the final environmental document will be completed in late 2009. As a delegated EIS, the official responsible for the final decision is the Regional Director, Pacific West Region. Subsequently the Superintendent, Channel Islands National Park, would be responsible for implementing the approved restoration and management actions.

Dated: April 28, 2008.

Patricia L. Neubacher,

Acting Regional Director, Pacific West Region.

[FR Doc. E8–12965 Filed 6–10–08; 8:45 am]

BILLING CODE 4310–F6–M

DEPARTMENT OF THE INTERIOR

National Park Service

Off-Road Vehicle Management Plan (ORV Management Plan), Environmental Impact Statement (EIS), Lake Meredith National Recreation Area, Texas

AGENCY: National Park Service, Department of the Interior.

ACTION: Notice of Intent To Prepare an Environmental Impact Statement (EIS) for an Off-Road Vehicle Management Plan (ORV Management Plan) for Lake Meredith National Recreation Area, Texas.

SUMMARY: Pursuant to the National Environmental Act of 1969, 42 U.S.C. 4332(2)(C), the National Park Service is preparing an Environmental Impact Statement for an Off-Road Vehicle Management Plan (ORV Management Plan) for Lake Meredith National Recreation Area, Texas. This effort will result in an ORV Management Plan/EIS that will be used to guide the management and control of ORVs at the Recreation Area for approximately the next 15 to 20 years. It will also form the basis for a special regulation that will regulate ORV use at the Recreation Area. The ORV Management Plan/EIS will assess potential environmental impacts associated with a range of reasonable alternatives for managing ORV impacts on park resources such as soils, wetlands, wildlife, cultural resources, visitor experience, and public safety.

Lake Meredith Recreation Area was established in 1964 for the administration of public recreational facilities at the Sanford Reservoir area, Canadian River project, Texas. In 1990 Congress designated Lake Meredith a National Recreation Area to "provide for public outdoor recreation use and enjoyment of the lands and waters associated with Lake Meredith in the State of Texas, and to protect the scenic, scientific, cultural, and other values contributing to the public enjoyment of such lands and waters," (Pub. L. 101–628, 16 U.S.C. 46Oeee, November 28, 1990). Lake Meredith offers many recreational uses including boating, swimming, fishing, hunting and ORV use. Lake Meredith currently has two areas designated as ORV areas, Rosita (~1,740 acres) and Blue Creek (~275 acres). These areas were designated by special regulation, 36 CFR 7.57. Both areas were utilized by the local community for recreational use prior to the establishment of the Sanford Reservoir Project in 1965.

Executive Order 11644, issued in 1972 and amended by Executive Order 11989 in 1977, states that Federal agencies allowing ORV use must designate the specific areas and trails on public lands on which the use of ORVs may be permitted, and areas in which the use of ORVs may not be permitted. Agency regulations to authorize ORV use provide that designation of such areas and trails will be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands, and minimization of conflicts among the various uses of those lands. Executive Order 11644 was issued in response to the widespread and rapidly increasing use of ORVs on the public lands—"often for legitimate purposes but also in frequent conflict with wise land and resource management practices, environmental values, and other types of recreational activity." Code of Federal Regulations (CFR) 36 § 4.10 requires that "Routes and areas designated for off-road motor vehicle use shall be promulgated as special regulations." "In addition, such routes and areas may only be designated in national recreation areas, national seashores, national lakeshores and national preserves." Therefore, in accordance with the Executive Order, the purpose of this plan/EIS is to manage ORV use in compliance with the Recreation Area's enabling legislation, NPS management policies, and other laws and regulations to ensure protection of the natural, cultural, and recreational values of the Recreation Area's environment for present and future generations.

An ORV Management Plan is needed to address the inconsistent management of ORV use over time, address the impacts to both cultural and natural resources, and address ORV use outside of the authorized areas. Specifically, an ORV Management Plan is needed to: (1) Comply with Executive Orders 11644 and 11989 respecting ORV use, and with NPS laws, regulations (36 CFR 4.10), and policies to minimize impacts to Recreation Area resources and values; (2) Provide for sustainable recreational ORV use areas; (3) Address the lack of an approved plan, which has led to ORV use outside of authorized areas; (4) Address resource impacts resulting from ORV use; and (5) Address the change in numbers, power, range and capabilities of ORVs. The ORV Management Plan/DEIS will cover all lands administered by the NPS at the Recreation Area.

Through internal scoping efforts, several draft objectives were outlined for the EIS:

Visitor Use and Safety: Manage ORV use to minimize conflicts among different ORV users; promote safe

APPENDIX B—SUMMARY OF SCOPING COMMENTS

Summary of Scoping Comments
Prisoners Harbor Coastal Wetland Restoration

National Park Service
Channel Islands National Park

Introduction

The National Park Service (NPS), in accordance with provisions in the National Environmental Policy Act (NEPA), conducted public scoping for the Prisoners Harbor Coastal Wetland Restoration Plan Environmental Impact Statement (EIS). Public scoping is held early in the NEPA process to seek public input on the range of concerns, issues and alternatives that should be addressed in the EIS. This summary informs the public on the extent and nature of the comments received by the NPS during public scoping.

Background on Public Scoping

A preliminary public input meeting was conducted at Prisoners Harbor on Santa Cruz Island on April 5, 2007. Thirty-three interested individuals, experts, and partners were invited. Twenty-one non-NPS individuals attended. The agenda for the meeting included introductions, site orientation with an informal walking tour of the site, followed by a round-robin discussion with opportunity to ask questions and express concerns (Table 1, Table 2).

Table 1. Informal walking tour included NPS experts stationed at specific locations to answer questions.

LOCATION	TOPIC	DISCUSSION	EXPERT
A. Road to Archeological site	Hydrology	Removing levee, changes in hydrology	Mike Martin
B. Eastern edge of corrals	Wetland Restoration	Restoration method, removing and relocating fill, revegetation	Joel Wagner
C. Warehouse	Historic District	Cattle/sheep corrals	Ann Huston
D. Archeological site	Archeological site	Location and extent of Archeological site	Kelly Minas
E. Seating area	Environmental Compliance	Public Input to the NEPA process	Marie Denn
F. Beach	Natural Resource Values	Backbarrier wetland, history, ecological benefits	Kate Faulkner,

Table 2. Major issues and concerns expressed during the on-island site visit.

MAJOR ISSUE	CONCERN	NAME
Visitor Experience	Control visitor impacts (mischief, vandalism) using boardwalks, viewing platforms	Island Packers
	Control and educate the public so no damage is done to arch site	Santa Ynez Band of Chumash Indians
	Educate visitors to reduce potential for disturbance or desecration of arch site	Santa Cruz Island Descendent
Historic Resources	Reduce size of corrals to 55', this creates buffer, reduces potential visitor impacts, and preserves part of corral	Santa Cruz Island Foundation
Natural Resources	Don't extirpate harvest mouse during construction Plan for desirable wetland species Do not lose human history Plan for veg. management in corrals Control Kikuyu grass Campground near wetland will affect wetland re:buffer	Santa Barbara Museum of Natural History
	Potential for increased sedimentation and/or decreased run-off should be included in the model	University of California Natural Reserve System
	Eucalyptus are a recent occurrence and disrupt water budget	The Nature Conservancy
	Avoid extirpation of harvest mouse during construction	Interested Individual
Archeological Resources	Preserve arch site, preserve levee adjacent to arch site, add berm to south side of arch site	Interested Individual
	Removing levee may impact arch site	Santa Ynez Band of Chumash Indians
Park Planning	Should not proceed without GMP	Santa Cruz Island Foundation
Maintenance	Potential long-term maintenance needs Earth moving concerns, deposition of fill Potential for water impacts to road and arch site	Interested Individual

A Notice of Intent (NOI) to prepare an EIS and conduct public scoping was published in the Federal Register on June 11, 2008. On June 12, 2008, a press release announcing public scoping was distributed to the Ventura County Star and the Santa Barbara News-Press, as well as 73 other media outlets, including newspaper, radio stations, and television stations. The press release explained the public scoping process, announced two public open houses, and provided the web address for Channel Islands National Park and NPS park planning. The NOI and press release were posted on the park website. A notice of the public scoping open houses was printed in the Ventura County Star on June 23, 2008 and in the Santa Barbara News-Press on June 23, 2008.

The NPS mailed approximately 240 public scoping announcements with the time, date, and location of the public open houses.

Approximately nine members of the public attended the public open house at Channel Islands National Park Headquarters and approximately 13 members of the public attended the public open house at the Santa Barbara Public Library.

The 45-day public scoping period closed July 27, 2008.

Public Response to Scoping

Five individuals or private organizations hand delivered or emailed comments regarding the Prisoners Harbor Coastal Wetland Restoration Plan. Commenting organizations included The Nature Conservancy and the Santa Cruz Island Foundation. No comments were received from federal or state agencies. Four letters supported wetland restoration, one letter expressed concern about park planning and the impacts of levee removal, another letter wanted to see support for the project from the Chumash.

The following table consolidates scoping comments under major issue topics.

ISSUE TOPIC	COMMENT	
Park Planning	Enabling legislation does not mandate restoration of island conditions to pre-European times	Santa Cruz Island Foundation
	Park should not undertake Prisoners Harbor Coastal Wetland Restoration without a current General Management Plan	Santa Cruz Island Foundation
Historic Resources	Support for relocating the scalehouse and removing the corrals	Interested Individual
	Concern that removing the levee will cause irreparable harm to archeological site, historic warehouse, and corral system	Santa Cruz Island Foundation
	Supports designing the wetland to prevent damage to road and warehouse during flooding	Interested Individual

Archeological Resources	Support for making the archeological site visible with signage	Interested Individual
	Chumash tribe should support the project	Journalist
Wetland Restoration	General support for restoring wetland and riparian ecosystems	The Nature Conservancy, Interested Individual, Journalist
Eucalyptus removal	Supports removing eucalyptus	Interested Individual
Visitor experience	Would support a “nature” trail with signage describing wildlife, Chumash and ranching history along the perimeter of the wetland	Interested Individual

Written comments received by the NPS are available for review at Channel Islands National Park. Notes from the April 5, 2007 site visit are available for review at the NPS park planning website at http//:parkplanning.nps.gov.

APPENDIX C—GIS ANALYSIS OF REVEGETATION PLANS

Using GIS to Develop Revegetation Plans

Melissa Hayashida
Channel Islands National Park Intern
Channel Islands National Park, Ventura, CA
November 2009

With its ability to manage and analyze spatial data, GIS (geographic information systems) is a powerful resource management tool. GIS analysis helps solve problems by identifying geographic patterns and relationships. Because of its ability to organize geographic data and combine a variety of datasets into an interactive map (Essays on Geography and GIS 2008), GIS was chosen to help form a basis for a revegetation plan on Santa Cruz Island, the largest island in Channel Islands National Park. Specifically, Channel Islands National Park used GIS to identify suitable vegetation for a fill disposal site on Prisoners Harbor. The fill disposal site is part of its Prisoners Harbor Coastal Wetland Restoration Plan.

Through its Prisoners Harbor Coastal Wetland Restoration Plan, the Park seeks to restore the 9-acre Prisoners Harbor coastal wetland site and its 40-acre associated stream corridor in the lower Ca***ñ***ada del Puerto Creek on Santa Cruz Island (Figure 1). Prisoners Harbor wetland was the largest wetland complex on Santa Cruz Island. Before the early 1800's, the wetland site supported about 12 acres of coastal marsh and riparian forest. A mixed live oak savannah was likely supported in lower Ca***ñ***ada del Puerto on the floodplain terraces immediately upstream from Prisoners Harbor. The wetland was filled in by agriculturalists in the 19th and 20th centuries to support sheep and cattle operations. The loss of important wetland functions and ecosystem services was further amplified by the channelizing of the Ca***ñ***ada del Puerto stream and the introduction of invasive species. With the Prisoners Harbor Coastal Wetland Restoration Plan, the Park will reconnect the Ca***ñ***ada del Puerto stream with its floodplain, remove non-native vegetation, enhance the visitor experience, and protect cultural and historic resources.

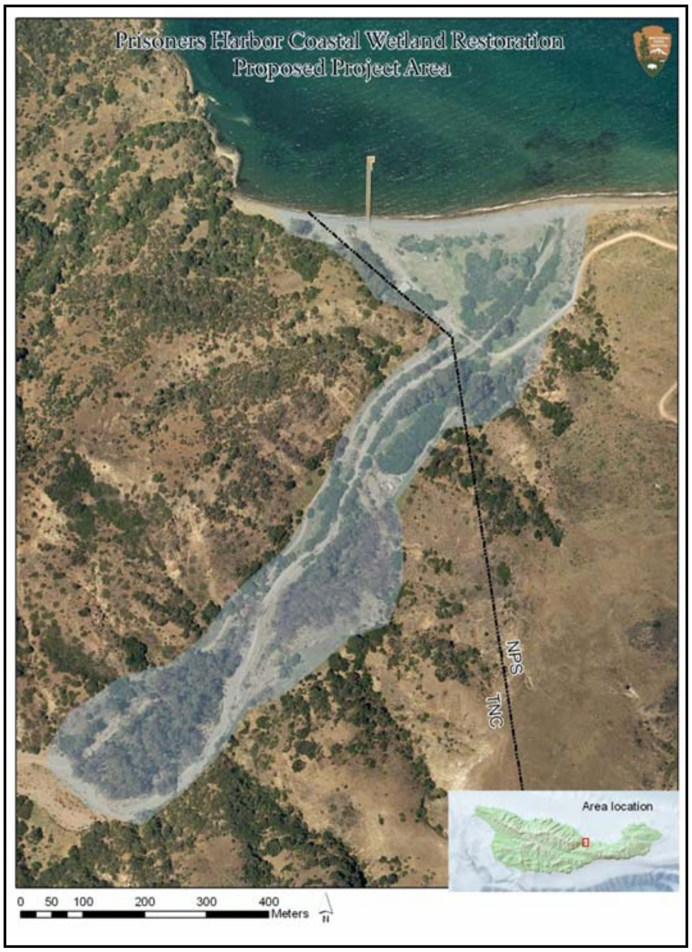


Figure 1. Prisoners Harbor Wetland Restoration Project Area

Approximately 13,000 +/- 20% cubic yards of fill material will be removed from atop the buried wetland surfaces to restore 2/3 of the buried wetlands. This fill will be placed at one or two nearby fill disposal sites, compacted and sloped to natural contours, and seeded with native plants (NPS Prisoners Harbor Coastal Wetland Restoration Plan Draft EIS 2009). The Park decided to use ESRI's ArcGIS to help choose which native plants should be planted in the fill disposal site/s. GIS was used to search for places on the island that are similar to the fill disposal site and identify the vegetation types growing in those places.

Methods

Data Sources

Our GIS analysis relied on a variety of datasets. An elevation dataset was used to determine elevation, aspect, and slope for the entire island. The elevation data used was Southern California Interferometric Synthetic Aperture Radar (IfSAR) data, which was collected for Santa Cruz Island in the winter of 2002/2003. The IfSAR data *has three meter point spacing and approximately one-meter vertical accuracy in non-vegetated areas* (NOAA NOS and CSC 2004).

Using the slope and aspect tools (par t of ArcGIS's Spatial Analyst extension), slope and aspect were derived from the IfSAR data. The slope tool *calculates the maximum rate of change between each cell and its neighbors* and the aspect tool *identifies the downslope direction of the maximum rate of change in value from each cell to its neighbor* (ESRI 2007).

The Nature Conservancy (TNC) contracted Aerial Information Systems, Inc. to create a vegetation map of Santa Cruz Island. We used this vegetation map to identify vegetation classes and vegetation types (vegetation alliances and sub-alliances) throughout the island. Aerial Information Systems, Inc. used base imagery (IKONOS one-meter natural color and color-infrared imagery 2005; Air Photo USA one-meter natural color photography 2002; I.K. Curtis 1:12000 natural color photography 2005), aerial photographs, field plots, field reconnaissance, and other source material to identify vegetation on the island. Further details regarding the map can be found in the Santa Cruz Island Photo Interpretation and Mapping Classification Report (Aerial Information Systems, Inc. 2007).

To determine soil types throughout the island, the Natural Resources Conservation Service Soil Survey of Channel Islands National Park was consulted (USDA NRCS 2007).

Shoreline data from 1994 USGS Digital Orthophoto Quarter Quads (Schwemm 1998) supplied provided a fairly accurate representation of Santa Cruz Island's shoreline.

Geoprocessing Steps

1. **Relevant factors for vegetation success were chosen**

Elevation, slope, aspect, soil type, and proximity to the coast were identified as important, defining characteristics of a vegetation's habitat.

2. **The slope, aspect, elevation, and proximity to the coast of the fill disposal site were determined**

In order to determine the elevation, slope, aspect, soil type, and proximity to the coast of the fill disposal site, it was necessary to identify the location of the fill disposal site on an aerial photograph (a secondary disposal site, not shown below, was chosen in case the amount of fill exceeds the capacity of the first fill site; see Appendix A). Within ArcMap, a polygon was digitized to define the area enclosed by the disposal site (Figure 2).

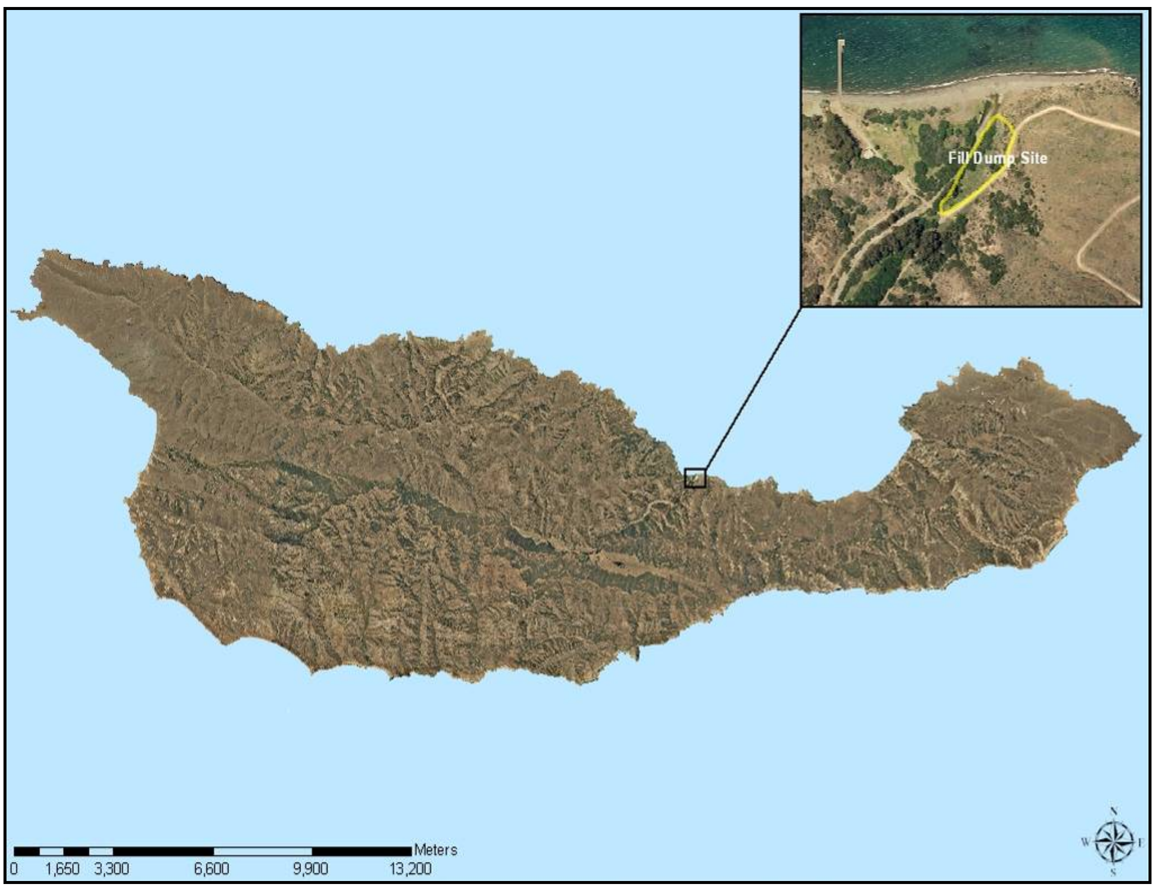


Figure 2. Prisoners Harbor Wetland Restoration Fill Disposal Site

Using the elevation, slope, aspect, soil, and shoreline datasets, the elevation, slope, aspect, soil type, and proximity to the coast of the fill disposal site were determined. The zonal statistics tool (part of the Spatial Analyst extension), which *calculates statistics on values of a raster within the zones of another dataset* (ESRI 2008), was used to find out the range of elevation and the range of slope within the fill disposal site. The aspect of the fill disposal site was determined by simply overlaying the aspect layer on top of the fill disposal site and then visually inspecting the disposal site area. This same method could be used to figure out which soil types fall within the fill disposal sites; however, it's also possible to use the "Select by Location" feature (simply select for soil types that fall within the fill disposal site polygon). Finally, the "measure" tool was used to obtain the disposal site's proximity to the coast.

Using these methods, the following characteristics of the disposal site were determined:

	Elevation	***Slope***	***Aspect***	***Soil Type***	***Proximity to coast***
Fill Disposal Site Characteristics	*6.74-42.81m*	*0.15-45.27%*	*Northwest and West*	*Starboard-Fantail-Halyard; Typic Xerofluvents Riverwash*	*~50 meters from the coast*

Table 1. Characteristics of the fill disposal site

It would be too restricting to search for places on the island with *exactly* the same characteristics as the fill disposal sites. Because of this, the criteria used to search for places on the island with similar characteristics as the fill disposal sites were based on the figures in Table 2. The search criteria differ slightly from the actual fill disposal characteristics in order to search for places on the island that may be very similar to, but perhaps not exactly alike, the fill disposal site. The search criteria also take into account the fact that some characteristics of the fill site will change with the addition and contouring of the fill material.

	Elevation	***Slope***	***Aspect***	***Soil Type***	***Proximity to coast***
Search Criteria	*0-150m*	*0-32%*	*Northwest and West*	*Starboard-Fantail-Halyard; Typic Xerofluvents Riverwash*	*Within 1 mi*

Table 2. Search Criteria

3. GIS was used to locate areas on the island that are similar (in elevation, slope, aspect, soil type, and proximity to the coast) to the fill disposal site

Once the search criteria were defined, the raster calculator was used to produce new elevation, aspect, and slope rasters from the original elevation, aspect, and slope rasters. These new rasters only included the range of values specified in our search criteria. A new elevation raster was created that showed only those places on the island with an elevation between 0 and 150m, a new slope raster was created that showed only those places with slopes between 0 and

32%, and a new aspect raster was created that showed only those places with Northwest and West aspects.

Next, the raster calculator was used again (see Geoprocessing Details for explanation) to produce a single raster that shows only those places on the island where the new elevation, slope, and aspect rasters overlap. This single raster shows only those places on the island where the elevation is between 0 and 150m AND where the slope is between 0 and 32% AND where there are Northwest and West-facing slopes.

Geoprocessing Details

- The new elevation, slope, and aspect rasters each contain two grid values:
  0 (not part of specified range of values) and 1 (part of specified range of values)
- The raster calculator is used to find all areas where:
  elevation raster + slope raster + aspect raster = 3 (where the specified ranges of all three rasters overlap)
- This produces a new raster, again with two grid values:
  0 (areas where all three rasters did NOT overlap) and 1 (the overlapping areas of all three rasters)

Then, this single raster was converted to a polygon/vector feature to enable future manageability with other polygon/vector features. (After converting the new raster to a polygon, a definition query was used to select only those areas where the grid value = 1).

The next step involves narrowing our result to only those areas in certain soil types and within a certain distance from the coast (the polygon just created is not restrictive in regard to soil type and distance from the coast). So, the polygon was clipped by only the areas on the island with Starboard-Fantail-Halyard or Typic Xerofluvents Riverwash soils. It was also clipped by only the areas on the island within 1 mile from the coast.

4. Using the vegetation map, the vegetation known to exist in these areas was determined

The resulting polygon included only the areas on the island whose elevation, slope, aspect, soil type, and proximity to the coast match the search criteria values (Figure 3). This polygon feature had no information regarding vegetation type, so the vegetation map was added to the ArcMap workspace. This vegetation map was then clipped by our polygon in order to eliminate all areas on the vegetation map that do not fall within the specified elevation, aspect, and slope ranges, are not within the soil types of interest, and that are not within one mile from the coast.

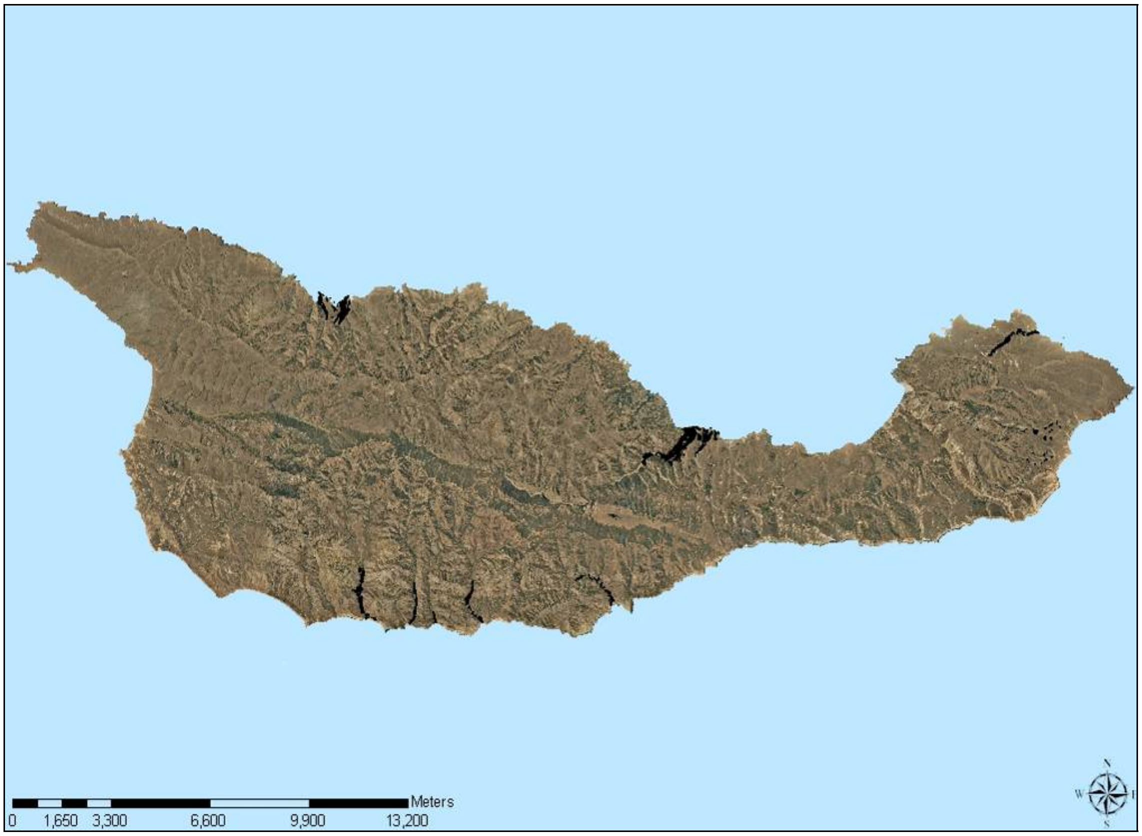


Figure 3. The black polygons represent areas on the island with a similar elevation, slope, aspect, soil type, and proximity to the coast as the fill disposal site

The result of this clip included information on the vegetation classes and the vegetation types within the areas on the island that are similar (in regard to our criteria) to the fill disposal site (Figure 4). Now, it was possible to determine which vegetation classes/types cover what percentage of these areas. First, the "calculate geometry" feature was used to update the area calculations in the vegetation layer's attribute table. Next, the "summary" feature (located within the vegetation map's attribute table) was used to sum the area for each vegetation class/type. In doing this, the dominant vegetation classes/types located in areas similar to the fill site were determined.

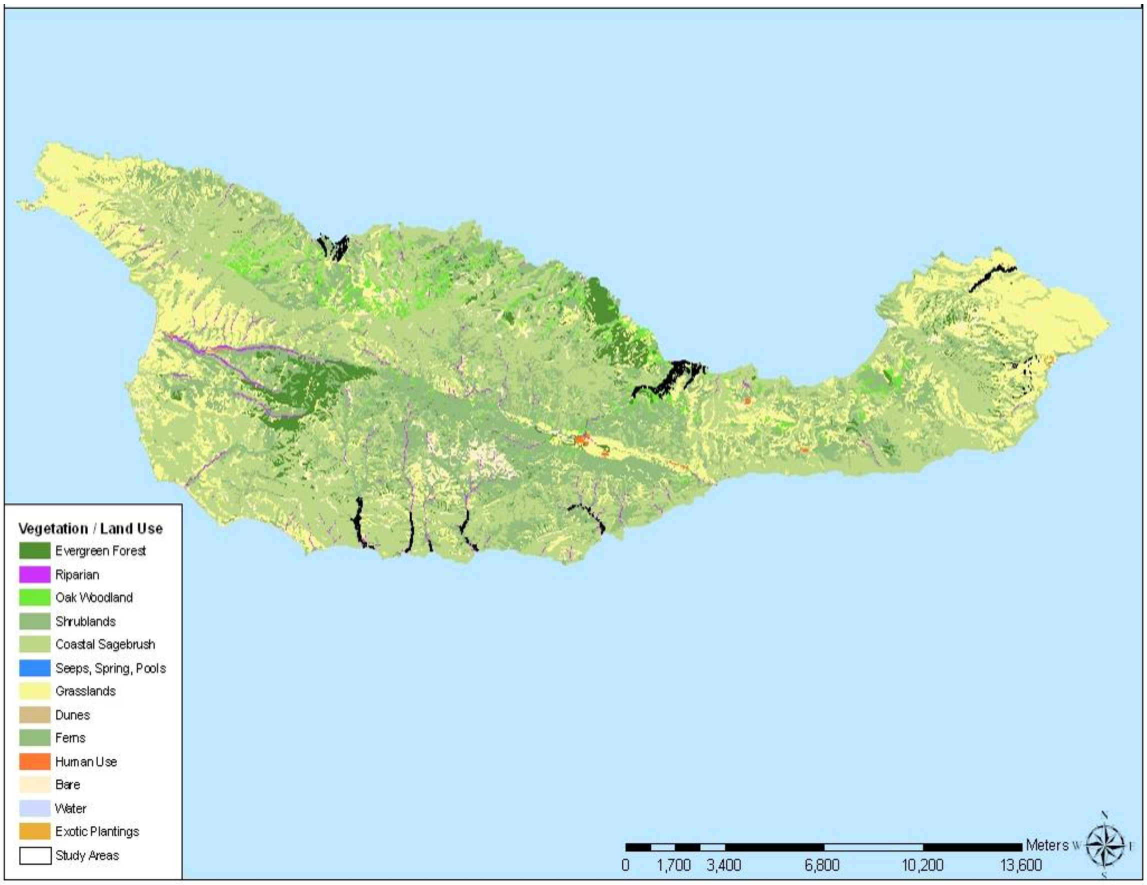


Figure 4. The black polygons (which represent areas on the island with a similar elevation, slope, aspect, soil type, and proximity to the coast as the fill disposal site) are overlaid upon the vegetation map

Results

The dominant vegetation classes/types in the areas were determined in regards to soil type. In other words, the dominant vegetation classes/types were determined for those areas in Starboard-Fantail-Halyard soils (Figure 5, Table 3) and the dominant vegetation classes/types were determined for those areas in Typic Xerofluvents Riverwash soils (Figure 6, Table 3). In Starboard soils, the dominant vegetation classes included Coastal Sagebrush, Grasslands, Shrublands, and Oak Woodland. In Riverwash soils, the dominant vegetation classes included Shrublands, Riparian, Bare, Grasslands, Evergreen Forest, Oak Woodland, Coastal Sagebrush, and Human Use.

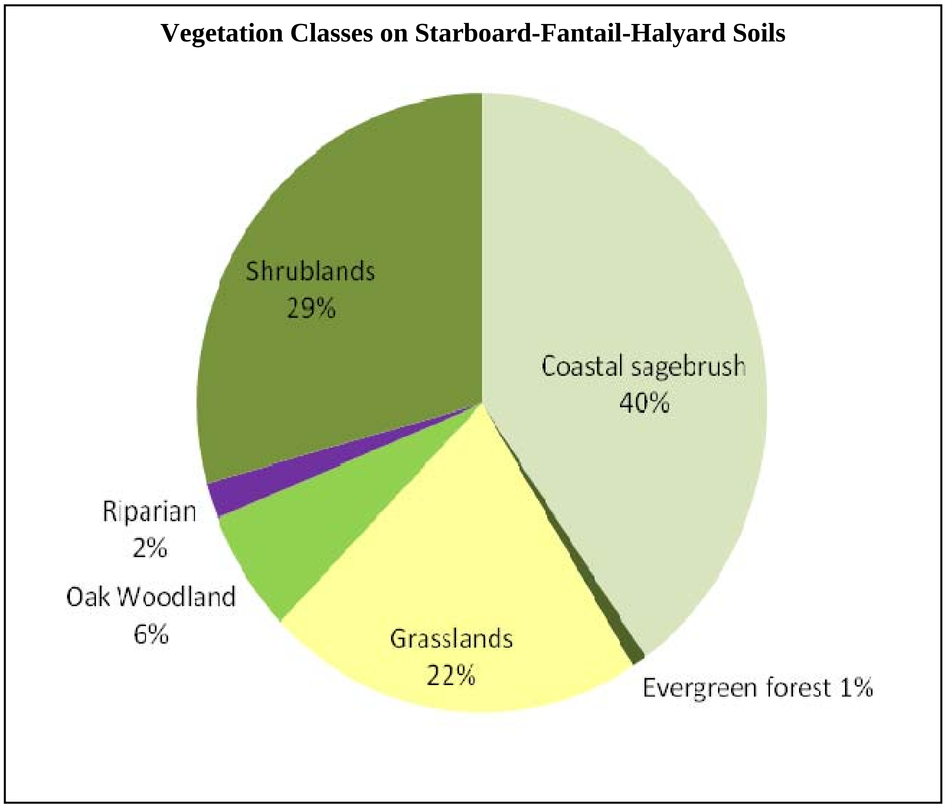


Figure 5. Shows **vegetation classes** for areas on the island with **Starboard soils** and a similar elevation, slope, aspect, and proximity to the coast as the fill disposal site

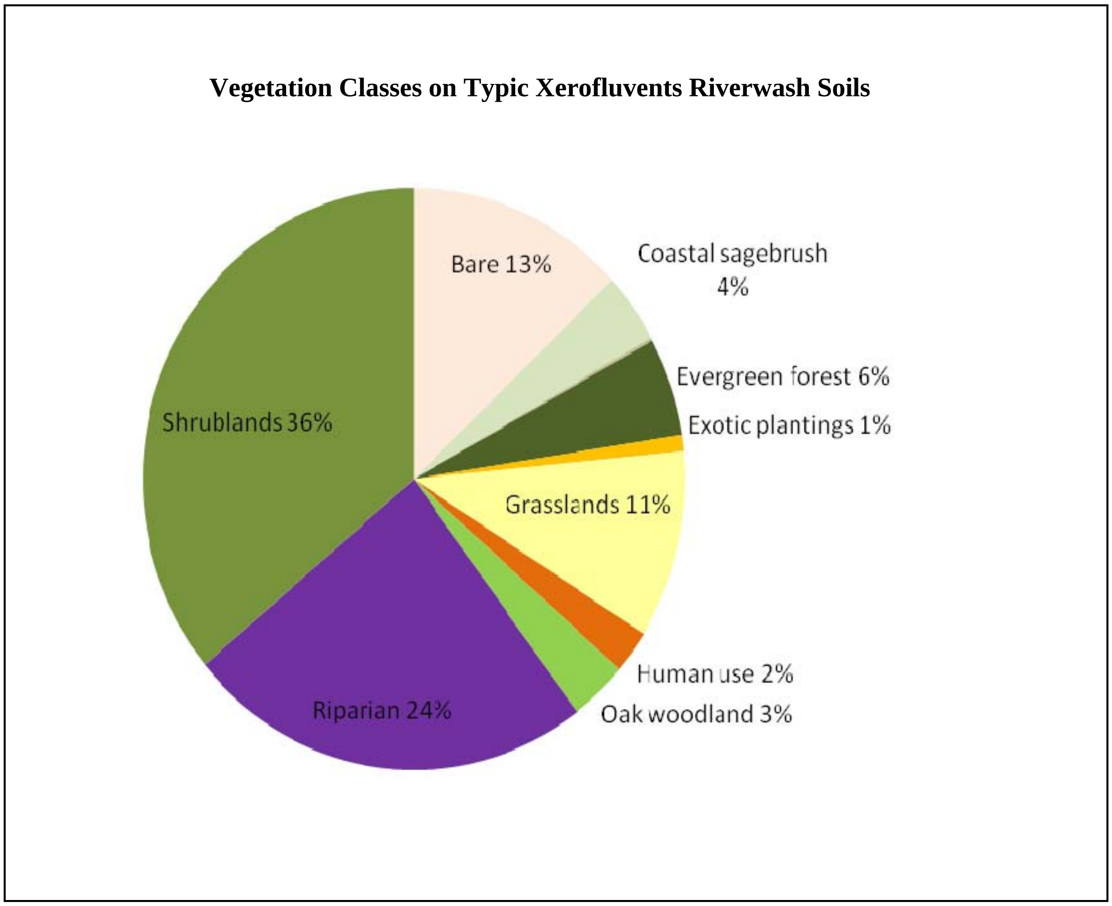


Figure 6. Shows **vegetation classes** for areas on the island with **Riverwash soils** and a similar elevation, slope, aspect, and proximity to the coast as the fill disposal site

Top Vegetation Types (see descriptions Appendix B)	
Starboard-Fantail-Halyard Soils	Typic Xerofluvents Riverwash soils
California Sagebrush – Lemonadeberry 15.78%	Mulefat Alliance 20.22%
California Annual Grasslands Alliance 14.63%	Mixed Arroyo Willow- Mule Fat Mapping Unit 18.41%
Coast Live Oak Alliance 10.51%	Stream Beds and Flats 11.79%
Island Scrub Oak- Coastal Sage Scrub Transition 9.27%	Eucalyptus Stands Mapping Unit 7.60%
Coyote Brush Alliance 7.56%	Coyote Brush Alliance 7.34%
Coastal Bluff Scrub Habitat 7.50%	Tall Temperate Annual Graminoids 5.73%
California Sagebrush Alliance 7.00%	Live Oak Alliance 4.45%
Island Scrub Oak – Island Ceanothus 4.67%	Arroyo Willow Alliance 4.00%
Fennel Mapping Unit 4.39%	Fennel Mapping Unit 2.48%
Santa Cruz Island Buckwheat Alliance 2.81%	Built-up 2.21%

Table 3

Discussion

It is important to recognize the limitations involved with using the preceding methods to determine which vegetation may be appropriate for the fill site. The datasets upon which the analysis was conducted (the elevation, slope, and aspect datasets; and the vegetation and soil maps) have to be accurate, of an appropriate spatial resolution, up-to-date, etc., if the analysis results are to be of any use. Also, it may be difficult to determine all of the factors that influence vegetation success. For our analysis, we chose elevation, slope, aspect, soil type, and proximity to the coast as important factors. These may or may not be the only useful or most useful factors for determining vegetation suitability. Furthermore, when looking for vegetation that's suitable for the fill site, we chose a range of values for elevation, slope, aspect, and proximity to the coast that we thought would represent the places on the island that are similar to the fill site. These were somewhat arbitrary choices. For example, if we expanded our elevation range to include just slightly steeper slopes, the analysis output may have included different types of vegetation.

While our GIS analysis contains various shortcomings, there are some methods that, with more expertise and time, could be used to increase accuracy, efficiency, and repeatability. In our analysis, equal value was assigned to each fill site characteristic. Elevation, slope, aspect, soil type, and proximity to the coast were all equally important in finding areas similar to the fill site. In reality, it may be more important to emphasize one or some characteristic/s over others. Using the Weighted Overlay tool, it is possible to give certain characteristics more or less weight. With the Weighted Overlay tool, such parameters can be easily changed to test many different scenarios (ESRI 2008).

ModelBuilder, an application within ArcGIS, could help document the steps used in the analysis. Within ModelBuilder, a model links geoprocessing tools together, feeding the output of each tool into the input of the next (ESRI Developer Network). The geoprocessing tools and the datasets used by those tools are saved within the model (see Figure 7). The model can be exported to script and passed on for use by others. In this way, other users can easily run the same analysis (using different datasets if desired).

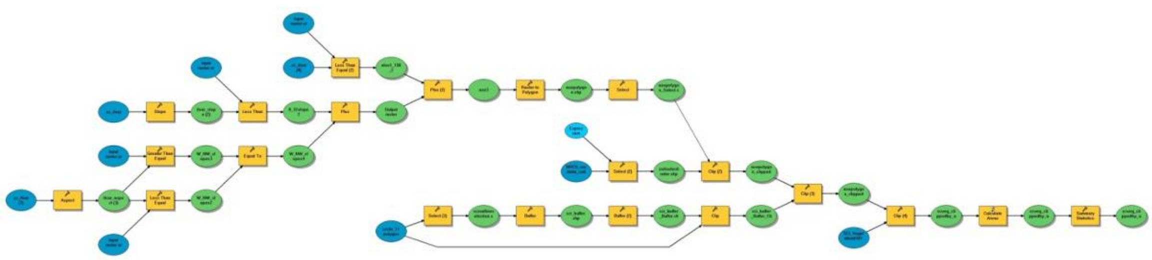


Figure 7: ModelBuilder Model

Although our GIS analysis contains limitations, it does provide a *basis* for determining which vegetation types should be used to revegetate the disposal site. Once again, the disposal site will contain fill material (which may be a mixture of Riverwash soil, Starboard soil, and other soil types) and it will be contoured such that it slopes downward toward the west (toward the stream). Using the output of our GIS analysis, it seems sensible to plant riparian vegetation along the fill site's wetter western border. As the site slopes upward toward the east and becomes drier, a transition from riparian vegetation to sagebrush/grasslands should take place (Figure 8).

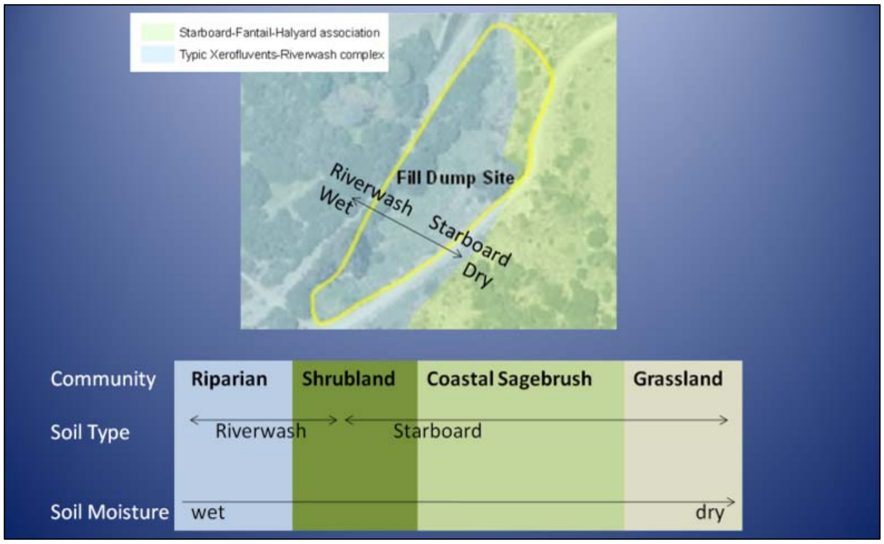


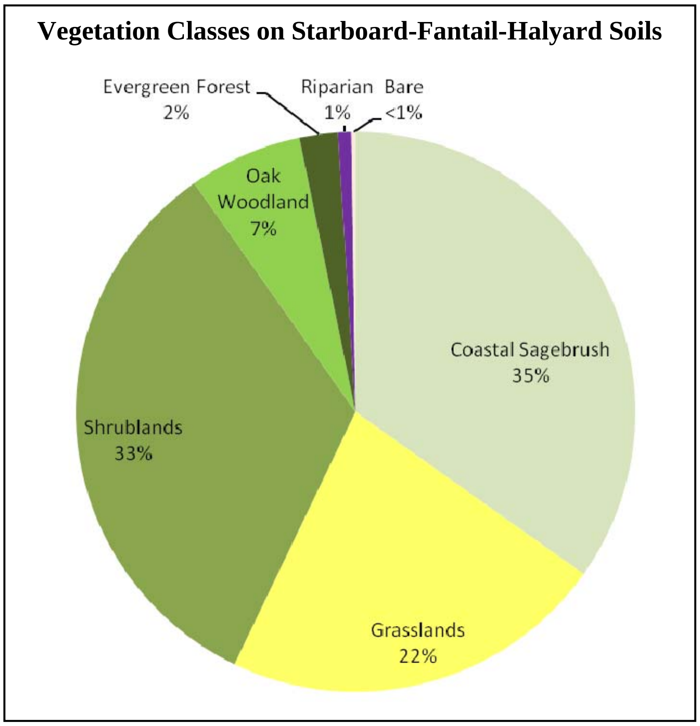
Figure 8: Outlines a possible revegetation plan

This represents a basis for a revegetation plan and must be altered or added to with the knowledge of plant and island specialists before devising a final, more detailed plan. However, GIS- with its ability to overlay a variety of data layers, search for and select certain criteria, and summarize results- serves as a valuable tool in the establishment of a revegetation strategy.

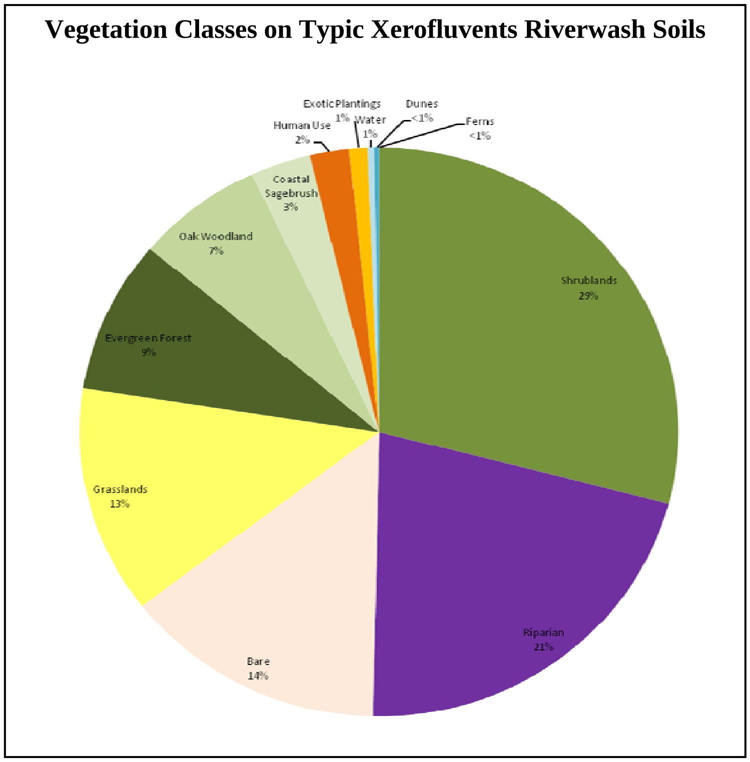
Appendix A
Fill Disposal Site #2

The secondary, potential fill site is located within a fennel infestation along Ca***ñ***ada del Puerto (see below). If necessary, it's possible to use the same steps described for the main fill site to determine potential vegetation types to plant in this fill site. Most of those steps have already been done below.

	Elevation	***Slope***	***Aspect***	***Soil Type***	***Proximity to coast***
Fill Disposal Site 2 Characteristics	*12-46m*	*0.86-51.59%*	*North, Northwest, and West*	*Starboard-Fantail-Halyard; Typic Xerofluvents Riverwash*	*Within 1 mi*
Search Criteria	*0-150m*	*0-52%*	*North, Northwest, and West*	*Starboard-Fantail-Halyard; Typic Xerofluvents Riverwash*	*Within 1 mi*



Shows **vegetation classes** for areas on the island with **Starboard soils** and a similar elevation, slope, aspect, and proximity to the coast as fill disposal site #2



Shows **vegetation classes** for areas on the island with **Riverwash soils** and a similar elevation, slope, aspect, and proximity to the coast as fill disposal site #2

Appendix B
Vegetation Type Descriptions
(summarized from Aerial Informations Systems, Inc. 2007)

Top Vegetation Types on Starboard-Fantail-Halyard Soils

California Sagebrush – Lemonadeberry 15.78% (Mapped where *Artemisia californica* dominates or co-dominates the shrub layer with *Rhus integrifolia* generally in dense settings. *Rhus integrifolia* can locally dominate over small areas. Mapped in a wide variety of slope related settings from gentle to steep, usually trending southerly in fairly exposed, xeric environments. Most polygons mapped fairly close to the shoreline extending inland along Canada Christy and Canada Medio. Stands mapped in the south and above mentioned canyons often transition into a mix of *Quercus Pacifica, Artemisia californica,* and *Rhus integrifolia.* This type is commonly mapped on the western side of the island)
California Annual Grasslands Alliance 14.63% (Mapped in generally dense cover where species from the genera *Avena, Bromus, Hordeum, or Lolium* usually dominate. Forbs and other species of annual grass can dominate over smaller areas. Ridgelines, spurs and rockier areas generally have a significant native component of *Nasella*. Woody vegetation is generally well below 10% cover and often includes species such as *Baccharis salicifolia* and *Artemisia californica.* Mapped extensively on deep poorly drained soils in valleys and ridgelines throughout the island in a variety of slope positions. Much more extensively mapped on the eastern third of the island but common throughout except on rocky slopes and ridges)
Coast Live Oak Alliance 10.51% (Quercus agrifolia Alliance; mapped only to the alliance lvel where Quercus agrifolia dominates the tree layer; conditions vary from riparian to gently sloping ridgelines and spurs, rarely noted on south trending slopes, but found occasionally on steep concave to neutral north facing slopes)
Island Scrub Oak- Coastal Sage Scrub Transition 9.27% (Mapped where *Quercus pacifica* generally dominates the chaparral canopy, usually with a minor component of *Rhus integrifolia.* Coastal sage scrub species (CSS) usually are an important component to this type as an open to dense understory, with *Artemisia californica* the most common species in the CSS layer. Other CSS species such as *Eriogonium arborescens* can be a sparse component to the stand. Annual grasses can be an important component to this type; mapped in the most xeric settings for this alliance, often interfacing with dry CSS or inland bluff scrub communities, common on steep south, east and west trending slopes not too far inland from coast; Good representative stands occur on the southern canyons near the coast and on south facing slopes in the eastern portion of the Central Valley. Most stands are within about ½ mile from the coast)
Coyote Brush Alliance 7.56% (Generally mapped in open grassy settings where *Baccharis pilularis* dominates the shrub layer in sparse to moderate cover. Stands can occasionally have a dense cover of over 60% especially on gentle north trending slopes in the isthmus region. *Rhus integrifolia* and or *Artemisia californica* can be minor components to the stand in coastal areas. Sparse stands of *Baccharis pilularis* below 5-10% cover in grassy settings are common and are noted as a shrub component in the density cover layer; Mapped on gentle to moderately sloping environments of deep soil on a variety of aspects and slope positions. Also noted on drier riparian fringes of major washes and on old stream terraces just upslope from the active channel.Commonly found on most portions of the island with the exception of the highest and most inland slopes. Good representative stands are found on gentle slopes on the northern third of the island and northern portions of the isthmus and in the vicinity of Campo Del Norte)
Coastal Bluff Scrub Habitat 7.50% (Mapped based primarily on location where bluff and steep cliffs extend no further than several hundred meters from the shoreline. Vegetation is usually sparse; often in a rocky setting with a sparse herbaceous layer, but overall cover is at least 2-5%. Species dominating or sharing dominance on the bluff may include the following, but is not limited to: *Artemisia californica, Dudleya, Coreopsis gigantean, Encelia californica, Eriophyllum staechadifolium, Leymus condensatus, Rhus integrifolia,* and *Opuntia littoralis*. Further analysis of the plot data may categorize the mapped polygons into floristic types that will be too fine scale to distinguish on the aerial photography. Subsequent modeling efforts based on geologic substrate or slope related characteristics may aid in refining the

mapped polygons into a floristic type. Several patches on the bluff itself are mapped to floristic alliances including (*Rhus integrifolia* or *Artemisia californica)* where visible on the imagery. Moderately steep to vertical cliff faces that are generally rocky with minimal soil development characterize most of the coastal bluffs along Santa Cruz Island. Over 90% of the island's coastal fringe end in a steep bluff edge; bluff faces are interrupted generally where larger streams form small sandy beaches at their mouth)
California Sagebrush Alliance 7.00% (Mapped where *Artemisia californica* dominates the stand in a wide variety of settings from an open sparse shrub layer to a dense cover. Mapped to the alliance level where photo interpreters cannot distinguish at finer levels in the classification or in extremely small patches below approximately one hectare. Most stands mapped within a mile of the coast extending inland into the western portions of the Central Valley and well into Canada Christy. It is less common on well-drained, coarser, grained soils. Several stands, especially in the southern portion of the island west of the isthmus have a significant component of *Salvia mellifera*, however, no signature correlate has been developed for this species off the aerial photography)
Island Scrub Oak – Island Ceanothus 4.67% (mapped where Quercus pacifica dominates or co-dominate the stand with Ceanothus arborus, both generally as tall shrubs; mesic scrub oak type found on north trending canyons and upper coves on neutral to concave settings in a variety of positions from lower to upper slopes)
Fennel Mapping Unit 4.39% (Mapped where *Foeniculum vulgare* dominates the herbaceous layer. Annual grasses including *Avena spp, Bromus spp.* and *Hordeum spp.* can dominate in portions of the mapped polygon. Shrubs, especially *Baccharis pilularis* are often a common overstory component and may be increasing in cover during the past decade. Common invasive plant in a variety of sparse shrub and grassy areas, which is potentially limited only by very steep, rocky environments. *Foeniculum vulgare* often grows in dense stands on gentle slopes in grasslands adjacent to major stream channels. The most extensive fennel stands occur on the isthmus along Navy Road west of Mount Pleasant. Other areas of dense fennel are located west of the UC Field Station, Christy Ranch, Main Ranch Airfield and the hills south of Smugglers' Cove. Dense fennel is occasionally mapped in narrow channels downstream from large ridge top stands; these channels may act as a conduit for further spreading of this invasive weed to grassy areas in the extreme southern portions of the island. Note plot data along San Justiniano Road northeast of Willows Anchorage depicting this species in the southern portion of the island.
Santa Cruz Island Buckwheat Alliance 2.81% (Mapped where *Eriogonum arboresens* dominates the stand as extremely sparse to sparse cover over a rocky or herbaceous understory. Other species common to inland bluff scrub environments may be a component to the stand. Occasionally, shrub cover becomes dense over very small areas in locally favorable settings, which aren't quite as steep or rocky.Generally found on steep to very steep mid to upper south trending slopes, which are usually rocky but not as severe as inland bluff scrub conditions. Often found just upslope from the California Sagebrush – Santa Cruz Island Buckwheat type (type 3312) and adjacent to inland bluff scrub which is normally found in harsher settings. Mapped extensively, especially on the western half of the island in areas near the coast to well inland.

Top Vegetation Types on Typic Xerofluvents Riverwash Soils

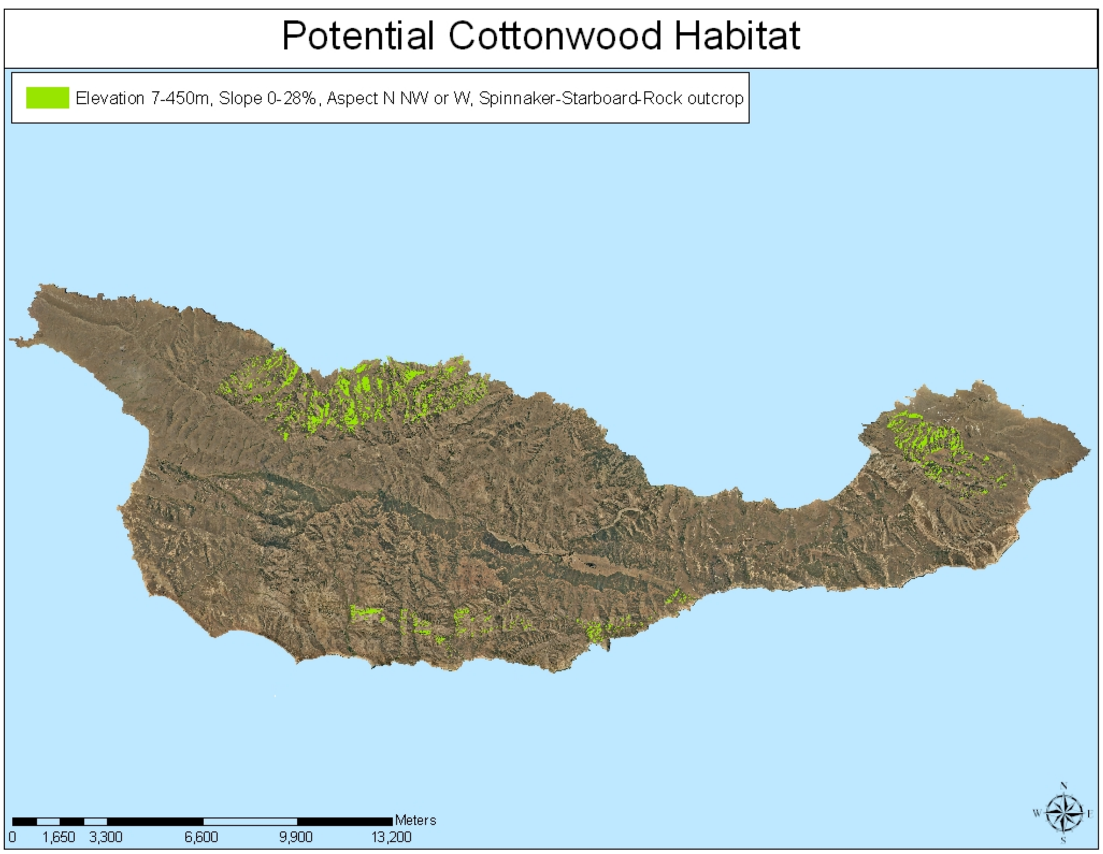
Mulefat Alliance 20.22% (Mapped where *Baccharis salicifolia* dominates the stand or co-dominates the stand with *Baccharis pilularis.* Willow species, especially *Salix lasiolepis* can be a minor component to wetter stands. Understory herbaceous layer varies considerably. Noted in active sandy or gravelly well-drained flat channels in environments wetter than *Baccharis pilularis* but drier than *Salix* lasiolepis. Fairly common in most major stream channels that are not too narrow. The most extensive stands occur on the west side of the island in the larger south trending drainages from Playa Larga to White Rock.)
Mixed Arroyo Willow- Mule Fat Mapping Unit 18.41% (Mapped where *Baccharis salicifolia* or *Salix lasiolepis* either dominates or co-dominates riparian stands of vegetation in moderately dense to dense cover. Drier fringes contain less *Salix lasiolepis* with a minor component of *Baccharis pilularis*. Wetter locations tend to have more *Salix lasiolepis*, possibly with other *Salix* or *Populus* individuals as a minor component to the stand. Found in riparian and riparian fringe areas in streams with a large watershed, allowing for seasonal to perennial flow during most years. Stream channel width varies considerably.

Wider systems may contain a zone of pure willow in the wettest portions that transition to coyote brush dominant areas on the higher terraces with *Baccharis salicifolia* occupying intermediate locations. Common in streams, especially streams that drain south of Ridge Road south of the Central Valley. Major watersheds where this type is extensively mapped include: Canada Christy, Laguna Canyon, Willows Canyon and Canada del Puerto. Much more extensively mapped west of the isthmus)
Stream Beds and Flats 11.79% no description
Eucalyptus Stands Mapping Unit 7.60% (mapped as pure stands where *Eucalyptus spp.* (primarily E. globules) is the sole component of the canopy layer. Noted primarily in association with land use related features. Several stands notes, primarily in the Central Valley. Largest stands noted west of the UC research headquarters on the western side of the island and adjacent to the NPS headquarters on the eastern portion of the island.)
Coyote Brush Alliance 7.34% (see above)
Tall Temperate Annual Graminoids 5.73% no description
Live Oak Alliance 4.45% (see above)
Arroyo Willow Alliance 4.00% (Mapped where *Salix lasiolepis* is the sole dominant to the tall shrub or small tree canopy,usually in dense stands. Other willow species in addition to *Populus fremontii* or *P. balsamifera* can form a minor emergent tree layer to the canopy. Found extending several hundred meters below small springs in upper drainages or in streams where water flows most of the year. Stands are rarely found beyond the active flood channel except in saturated conditions. Not as common as the mixed arroyo willow - mule fat type (type 3401), but found in most of the drainages mentioned in that community. Stands are also not as extensive and often form very narrow linear polygons in narrow canyons with large watersheds.)
Fennel Mapping Unit 2.48% (see above)
Built-up 2.21% no description

Appendix C
Reverse Analysis

In our analysis, a search was conducted for vegetation that grows in areas similar to the fill site. Our planting site was already known, but the vegetation with which to plant in the site had yet to be identified. Instead, what happens if a vegetation type is known and suitable planting sites for that vegetation type need to be located? In this case, suitability or site selection modeling can be performed using GIS. First, existing occurrences of the vegetation type of interest are located. The dominant characteristics of these locations are then used to discover other potential habitats for that vegetation type. An example is shown below using Fremont Cottonwoods.

	Elevation	*Slope*	*Aspect*	*Soil Type*
Characteristics of areas on the island where cottonwoods are found	*7-450 meters*	*0-28%*	*Mostly North, Northwest, and West*	*Mostly Spinnaker-Starboard-Rock outcrop complex*



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APPENDIX D—COWARDIN WETLANDS DELINEATION

United States Department of the Interior
NATIONAL PARK SERVICE
Natural Resource Program Center
Water Resources Division
1201 Oakridge Drive, Suite 250
Fort Collins, Colorado 80525

September 5, 2008

L54 (2380)

PWR/CHIS

Memorandum

To: Russell Galipeau, Superintendent, Channel Islands National Park

Through: Joel Wagner, NPS Wetlands Program Lead, NPS Water Resources Division; Kevin Noon, Wetlands Ecologist, NPS Water Resources Division

From: Marie Denn, Aquatic Ecologist, NPS Pacific West Region and NPS Water Resources Division

Copy: Kate Faulkner, Chief of Natural Resources, Channel Islands National Park; Paula Power, Ecologist, Channel Islands National Park; Dirk Rodriguez, Botanist, Channel Islands National Park; Clark Cowan, Natural Resource Management Technician, Channel Islands National Park; Rocky Rudolph, GIS Specialist, Channel Islands National Park

Subject: Results of Wetlands Mapping at Prisoners Harbor, Santa Cruz Island, July 3 - 5, 2008

Summary

This Memorandum presents a map of wetlands surveyed at Prisoners Harbor and lower Cañada del Puerto on Santa Cruz Island in July 2008. The Memorandum also reproduces a 2007 Natural Resource Conservation Service soil map for the area, a 2007 vegetation map for the area, and a 2008 inventory of vascular plants observed at Prisoners Harbor. These data are for use in the Channel Islands National Park planning effort to enhance wetland resources at Prisoners Harbor. Depending on the extent of the proposed actions at Prisoners Harbor, additional wetlands mapping work may be needed to complete the evaluation of potential environmental impacts from the proposed project.

Purpose and Need

Channel Islands National Park (CHIS) and the National Park Service Water Resources Division (WRD) are preparing an Environmental Impact Statement and Environmental Impact Report to consider alternatives for restoring coastal wetlands at Prisoners Harbor on Santa Cruz Island, California. As a part of the evaluation of potential impacts of project alternatives, the National Park Service (NPS) and its partners will examine effects that the project may have on wetlands within the Project Area.

National Park Service policy for wetlands (Director's Order 77-1, or DO 77-1) requires park staff to evaluate impacts from any management activity that could adversely impact wetland habitat and to follow procedures for protecting and restoring wetlands. DO 77-1 defines "wetlands" as those areas that are classified as wetlands in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al.* 1979).

In addition to complying with DO 77-1 at Prisoners Harbor, park managers must comply with section 404 of the federal Clean Water Act (CWA), which regulates discharge of dredged or fill material into "waters of the United States," including many wetlands. The US Army Corps of Engineers (USACOE or "Corps") administers section 404 of the CWA. The Corps defines "wetlands" as those areas that exhibit hydric soils, hydrophytic vegetation, and wetland hydrology, as described in the Corps' 1987 Manual for Wetland Delineation and the 2006 Arid West Supplement to the Manual. The Corps may decline to take jurisdiction over isolated wetlands that do not have a "significant nexus" to Traditionally Navigable Waters, as defined by recent US Supreme Court Decisions (see http://www.usace.army.mil/cw/cecwo/reg/index.html for up-to-date information on this evolving issue).

For purposes of environmental impact assessment, this memorandum provides a map of wetlands and deepwater habitats (as defined by Cowardin *et al.* 1979) that may be affected by activities within the Project Area. Subsequent compliance with DO 77-1 and Section 404 of the Clean Water Act would require a more formal wetland delineation as described in Section 4.1.2 of NPS Procedural Manual 77-1: Wetland Protection.

In addition to presenting a map of Cowardin wetlands protected under DO 77-1, this Memorandum provides a map of riparian areas, as defined by the USFWS in *A System for Mapping Riparian Areas in the Western United States* (USFWS 1997). In USFWS riparian areas the plant communities are "contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic and lentic water bodies" (USFWS 1997); however these areas typically do not exhibit hydric soils or wetland hydrology, and may not support a preponderance of wetland vegetation.

The "Project Area" delineated on maps in this Memorandum is based on initial discussions between CHIS and WRD regarding the potential boundary of project actions and their impacts; this boundary is subject to revision. Any expansion of the boundary will create a need for additional field-based wetland mapping.

Soils at Prisoners Harbor and Lower Cañada del Puerto

Hydric soils are one of the three primary characteristics of wetland habitats. The 1987 Manual for Wetlands Delineation (Environmental Laboratory 1987) suggests evaluating existing soil maps before conducting in-field hydric soil investigations. For the Prisoners Harbor area, the most recent and complete soil map was created by the Natural Resources Conservation Service (NRCS), in cooperation with the Regents of the University of California and the National Park Service in 2007 (NRCS 2007). The soil map is at a broad landscape scale, and delineates only two types of soils - identified as Soil Type 160 and Soil Type 190 - within the Project Area (Figure 1).

Soil Type 160:

The report characterizes the shoreline at Prisoners Harbor as "Beaches - abaft complex 0 to 5 percent slope." This soil type is loamy sand in dunes, excessively drained, with a depth to impermeable layer of greater than 80 feet and a parent material of sandy alluvium from sandstone.

Soil Type 190:

"Typic xerofluvent - riverwash complex 0 to 8 percent slopes" found within the stream channel and its floodplain. This soil is somewhat excessively drained, also with depth to impermeable layer of greater than 80 feet, and a parent material of "extremely stony alluvium derived from volcanic and sedimentary rock." This soil type can exhibit a fine surface layer up to 2 inches deep of decomposing plant material, a coarser subsurface layer of 2-24 inches deep of sandy loam, and underlying horizons of extremely gravely sand (to 39 inches) and extremely cobbly sand (to 72 inches below the surface).

Because the 2007 NRCS soil map is at a broad scale, it does not identify small areas of wetland soil present within the Soil Type 190 mapping unit. WRD and park staff observed these soils during site characterization efforts in 2005 and 2008 at Prisoners Harbor and in lower Cañada del Puerto. These soils exhibit hydric characteristics such as accumulation of organic matter on the soil surface and mucky texture typical of hemic organic soils. These soils would probably also exhibit other indications of hydric conditions, such as redox concentrations, discolorations due to redox depletions, and gley coloration.

Soils mapped on the borders of the Project Area are all moderately-to-steeply sloped well-drained and rocky upland soils, including

- *Soil Type 262:* Halyard-Fantail association on 30 to 85 percent slopes,
- *Soil Type 263:* Starboard-Pachic Argixerolls Rock outcrop complex on 30 to
- 75 percent slopes,
- *Soil Type 272:* Topdeck-Starboard-Rock outcrop complex on 15 to 75 percent slopes, and
- *Soil Type 290:* Rock outcrop-Topdeck-Starboard complex, 30 to 80 percent slopes

Full descriptions of these soil mapping units can be found in the soil map for the Channel Islands (NRCS 2007).

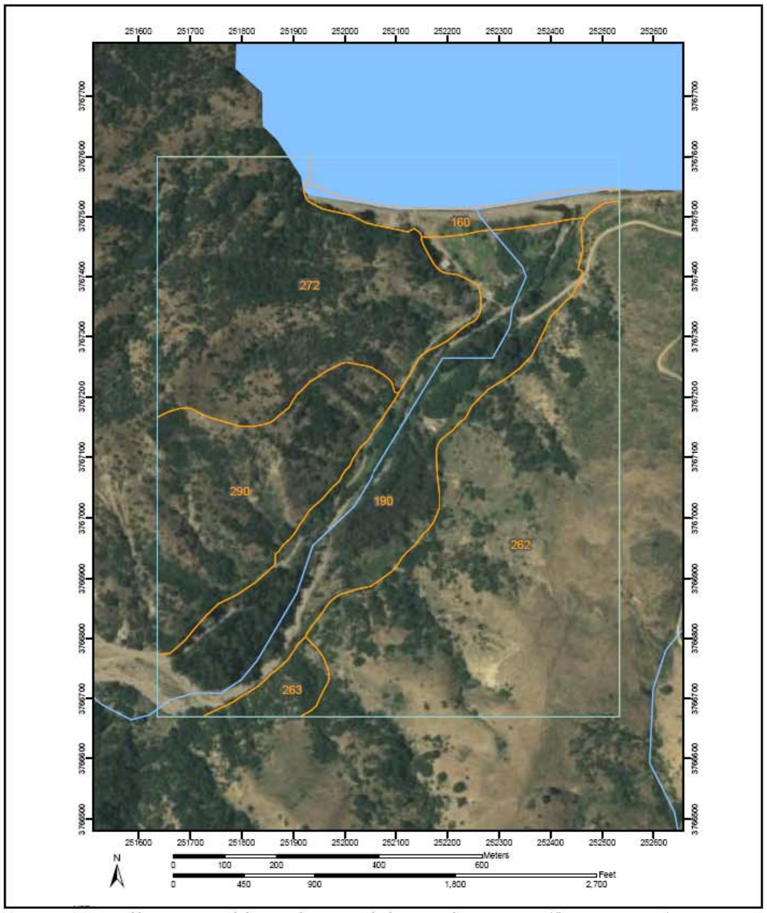

Figure 1: Soils Mapped in and around the Project Area (from NRCS)

Vegetation at Prisoners Harbor and Lower Cañada del Puerto

Another primary characteristic of wetland habitats is a preponderance of wetland - or "hydrophytic" - plants. The 1987 USACOE Wetlands Delineation Manual (Environmental Laboratory 1987) suggests evaluating existing vegetation maps of project areas before conducting in-field wetland delineations. The most recent and complete vegetation map of the Project Area was created for The Nature Conservancy in 2007

(Aerial Information Systems, Inc. 2007). This map identified eight dominant vegetation communities within the Project Area (Figure 2). These are:

Eucalyptus Stands (Mapping Unit 1120)

This mapping unit is used for areas where *Eucalyptus* species are the sole component of the canopy. The Project Area supports stands of blue gum (*Eucalyptus globules)* and river red gum *(Eucalyptus camaldulensis)*.

Coast Live Oak Alliance (Mapping Unit 2110)

In this mapping unit coast live oak (*Quercus agrifolia*) dominates the tree canopy, with 25% to 60% of the total tree cover. Within the Project Area this vegetation community occurs in a mesic riparian setting, with an understory of shrub species including coyote brush, sagebrush, mugwort, toyon, and young eucalyptus.

Lemonade Berry Alliance (Mapping Unit 3150)

This plant community appears in very limited extent in the northeast corner of the Project Area, on the slope above the Cañada del Puerto lagoon. The evergreen shrub lemonade berry (*Rhus integrefolia*) dominates the stand with a sparse canopy. Sagebrush provides a minor component to the canopy.

Mixed Arroyo Willow - Mule Fat (Mapping Unit 3401)

This unit was mapped in areas that support a mix of Arroyo willow (*Salix lasiolepis*) and mule fat (*Baccharis salicifolia*) in the top-most vegetation canopy. Within the Project Area the single polygon mapped as unit 3401 is very sparsely vegetated with mostly herbaceous and young woody plants. This unit appears to be frequently disturbed by scour from winter flows in Cañada del Puerto.

Arroyo Willow (Mapping Unit 3410)

This is the dominant native wetland and riparian plant community in the Project Area. Within the Project Area this community type is dominated by a moderate to dense canopy of arroyo willow (*Salix lasiolepis*), and in some areas the tree grows so densely to be virtually impenetrable. Arroyo willow can tolerate seasonally-saturated soils, but can also access deep groundwater during droughts. The herbaceous component under the tree/shrub canopy may fluctuate over time with changing groundwater availability – becoming more characterized by hydrophytic plants such as bulrush (*Scirpus californica*) during wet years, and reverting to more dry-adapted species, such as brome (*Bromus* spp.) and slender wild oats (*Avena barbata*) during dry years.

Within the northern portion of the Project Area this vegetation community's spatial extent may vary greatly over decadal time spans, depending on water availability.

During drier periods this plant community may expand into areas that would normally have too-high groundwater to support arroyo willow. During wet periods, generally characterized by frequent winter storms, high flows on floodplains may remove young willows, and allow re-colonization of low-lying areas by more-hydrophytic plant communities, particularly bulrush-cattail.

Bulrush - Cattail (Mapping Unit 4101)

A small amount of acreage within the Project Area is occupied by a dominant canopy of bulrush (*Scirpus californicus* and *S. maritimus*), with a small subcomponent of cattail (*Typha dominguensis*). This vegetation community persists in the wettest portions of the Project Area that support a high groundwater table year round. This is a rare vegetation community on Santa Cruz Island, due to its aridity and generally small watersheds. Cañada del Puerto is the only watershed in the island to support a vegetation community dominated by obligate wetland vegetation, such as bulrush and cattail.

Fennel (Mapping Unit 4301)

Although many acres on Santa Cruz Island are heavily infested with this non-native plant, only a small percentage of the Project Area is mapped as dominated by fennel (*Foeniculum vulgare*). Fennel typically thrives on disturbed upland slopes and hillsides, although it can also invade drier portions of floodplains. Fennel stands on island the island typically co-exist with an herbaceous understory of *Avena* spp., *Bromus* spp., and *Hordeum* ssp., and with native shrubs such as coyote bush (*Baccharis pilularis*).

Within the Project Area fennel stands persist on disturbed terraces above the primary Cañada del Puerto floodplain and stream channel. These units are not directly adjacent to the channel, but border on arroyo willow and eucalyptus stands.

Silver Beachbur - Beach Sand Verbena Alliance (Mapping Unit 4410)

This alliance was mapped on coastal dune and beach habitats where the sparse canopy is dominated by a mix of silver beachbur (*Ambrosia chamissonis*) and sand verbena (*Abronia maritima*), with minor components of sea rocket (*Cakile maritima*), and salt grass (*Distichlis spicata*). Of these four plants, only sea rocket and salt grass have been observed within the Project Area by park staff.

In addition, the 1997 vegetation map identified one non-vegetated mapping unit within the Project Area: Stream Beds and Flats (Mapping Unit 9430), and two highly-disturbed and managed mapping units: Built-up (Mapping Unit 9100) and Planted Trees and Shrubs (Mapping Unit 9600).

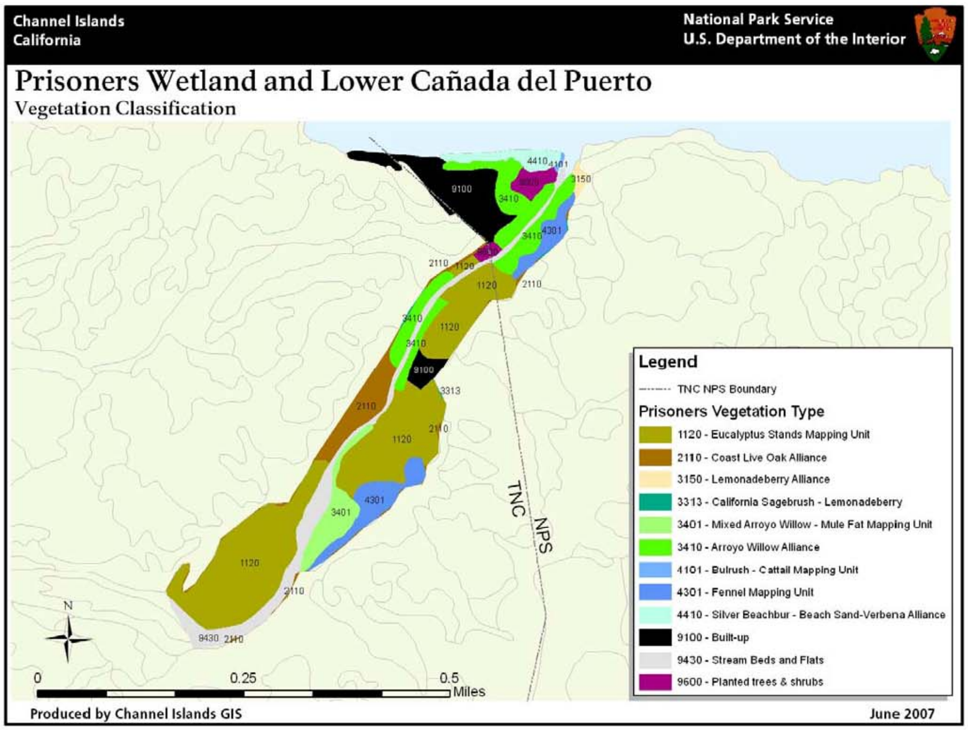

Figure 2: Plant Communities within the Project Area

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Plant Species List for Prisoners Harbor

During the July 2008 site-characterization visit to Prisoners Harbor and lower Cañada del Puerto, park staff created a preliminary inventory (Appendix A) of plants observed within the lower portion of the Project Area (Figure 3). Park and WRD staff characterized plants on the list by their fidelity to wetland habitats (as given by Reed 1988), their endemism or rarity status, and/or their degree of threat to native ecosystems (for non-native plants). The purpose of this map is to show the general locations of observed plant species only, not to designate the boundaries of wetland or riparian habitat.

Figure 3: Habitats Identified during Inventory of Vegetation at Prisoners Harbor (for a list of plants found in these habitats see Appendix A of this Memorandum)

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2008 Wetland and Riparian Area Map for Prisoners Harbor and Lower Cañada del Puerto

Between July 3rd and July 5th 2008 WRD and park staff visited Prisoners Harbor to conduct field surveys in order to create maps of Cowardin wetlands and riparian areas (Figure 4) within the potential Project Area.

The resulting Cowardin Wetland and Riparian Areas map for the Project Area shows three types of Cowardin wetlands - Palustrine Emergent Wetlands, Palustrine Forested Wetlands, and Riverine Intermittent Unconsolidated Bottom Wetlands. In addition the map shows four types of lotic (or stream-related) riparian habitat - Forested Deciduous, Forested Evergreen, Herbaceous, and Forested Mixed.

Palustrine Wetlands are freshwater wetlands that are typically dominated by trees, shrubs, or persistent herbaceous vegetation (commonly known as marshes or swamps). Though most palustrine wetland types are non-tidal, the palustrine system includes freshwater tidal wetlands (salinity < 0.5 ppt). These areas generally exhibit high year-round surface or groundwater and hydric soils.

Palustrine Emergent Wetlands are areas with high year-round ground or surface water that support herbaceous vascular plants at 30% or greater cover in most years, with a tree and shrub cover of less than 30%. Generally in the Project Area Palustrine emergent wetlands represent either the remnants of a backdune swale that was partially filled in the 19th and 20th centuries to support agriculture, vegetated areas bordering the outlet of Cañada del Puerto, or small polygons along Cañada del Puerto that may have high groundwater supported by artificial road-crossing structures.

Palustrine Forested Wetlands are areas with high year-round groundwater that support a tree canopy of 30% cover or more. In the Project Area these polygons are overwhelmingly represented by dense stands of Arroyo willow (*Salix lasiolepis*).

Riverine Wetlands are contained within a channel and exhibit sufficient water flow - at least seasonally - to maintain a bed and bank structure. These areas may support year-round surface water, seasonal surface water with a high year-round water table, or highly seasonal surface and groundwater.

Riverine Intermittent Unconsolidated Bottom Wetlands are non-tidal channelized systems containing flowing water for only part of the year, although surface water may persist in open pools year-round. These wetlands have a greater than 25% cover of rocky particles smaller than stones, and a vegetative cover of less that 30%. Within the Project Area this wetland type is found in the Cañada del Puerto channel. It supports a sparse cover (<5%) of opportunistic herbaceous vegetation in summer, and is scoured to sand and cobble during annual winter flooding.

Riparian Areas are a relatively recent addition to the US Fish and Wildlife Service (USFWS) wetland mapping program. USFWS personnel recognized a void in the

Cowardin classification system for defining riparian habitat, which is not technically wetland, but is still particularly vital for biota in lands in the Western United States. To address this need, the USFWS service published *A System for Mapping Riparian Areas in the Western United States* (USFWS 1997). It defines riparian areas as plant communities contiguous to and affected by surface and subsurface hydrologic features (e.g., rivers, streams, lakes, or drainageways) but not exhibiting the frequency or duration of saturation or flooding necessary for classification as wetlands.

Field mapping protocols for riparian areas are not well established. The Southern California Coastal Water Research Project has published draft guidance on *Standards for Mapping Wetland and Riparian Habitats in Southern California Coastal Watersheds* (SCCWRP 2007), based in part on USFWS 1997, however this guidance focuses on remote-sensing based mapping on the landscape scale. The criteria used for mapping "riparian" areas for this effort are based on the USFWS 1997 riparian definition described in the previous paragraph, and are as follows:

> Riparian areas have one or both of the following characteristics: 1) distinctively different vegetative species than adjacent areas, 2) species similar to adjacent areas, but exhibiting more vigorous or robust growth forms. Riparian areas are usually transitional between wetland and upland.

For this project, in general field observers delineated the higher-elevation boundary of the riparian polygons as either corresponding to the edge of the Project Area, corresponding to the edge of the dominant vegetation type (as mapped by The Nature Conservancy's vegetation map; Aerial Information Systems, Inc. 2007), or corresponding to an observed change in understory species within a larger vegetation polygon that indicated a fall-off in hydrologic influence on the vegetation community. Field observers delineated the lower-elevation boundary of the riparian polygons as corresponding with the TNC vegetation map's boundary of the Cañada del Puerto channel (Aerial Information Systems, Inc. 2007).

Riverine Lotic Emergent Areas are stream-side areas dominated by herbaceous plants. Within the Project Area these areas were mapped based on field observations and the TNC vegetation map for Santa Cruz Island, and generally corresponds with the vegetation map's 9600 unit - planted shrubs and trees and 3401 unit - mixed Arroyo willow and mule fat. Although these units are described in the TNC vegetation map as supporting substantial tree or shrub components, within the Project Area these units are dominated by herbaceous vegetation.

Riverine Lotic Forested Deciduous Areas are stream-side areas dominated by a canopy of deciduous trees. Within the Project Area these areas were mapped based on field observations and the TNC vegetation map for Santa Cruz Island, and generally corresponds with the vegetation map's 2110 unit - Coast live oak alliance.

Riverine Lotic Forested Evergreen Areas are stream-side areas dominated by a canopy of evergreen trees. Within the Project Area these areas were mapped based on field observations and the TNC vegetation map for Santa Cruz Island, and generally corresponds with the vegetation map's 1120 unit - Eucalyptus stands.

Riverine Lotic Forested Mixed Areas are stream-side areas dominated by a mixed canopy of evergreen and deciduous trees. Within the Project Area these areas were mapped based on field observations and the TNC vegetation map for Santa Cruz Island, and generally corresponds with the vegetation map's 2110 unit - Coast live oak alliance.

In addition to mapping Cowardin wetlands and riparian areas, field observers identified areas that may be jurisdictional wetlands according to the US Army Corps of Engineers wetlands delineation manual (Environmental Laboratory 1987) and its supplement for mapping wetlands in arid areas in the Western United States (USACOE 2006). However, a formal wetland delineation was not completed. Areas mapped as Cowardin wetlands in Figure 4 below exhibit a preponderance of hydrophytic vegetation and indications of wetland hydrology. In order to confirm the boundaries of these wetland polygons for project permitting purposes, presence of hydric soils will need to be verified with excavation of small soil pits on or near the polygons' margins.

Furthermore, classification of lower Cañada del Puerto - a water of the United States - as either "relatively permanent" or not "relatively permanent" may need to be finalized in order to evaluate whether or not some of the wetlands mapped in Figure 4 below will fall under the regulatory jurisdiction of the US Army Corps of Engineers. Because guidance on this issue is currently evolving (USACOE 2008), resolution of the status of lower Cañada del Puerto should wait until the park applies for a Nationwide Permit under section 404 of the federal Clean Water Act.

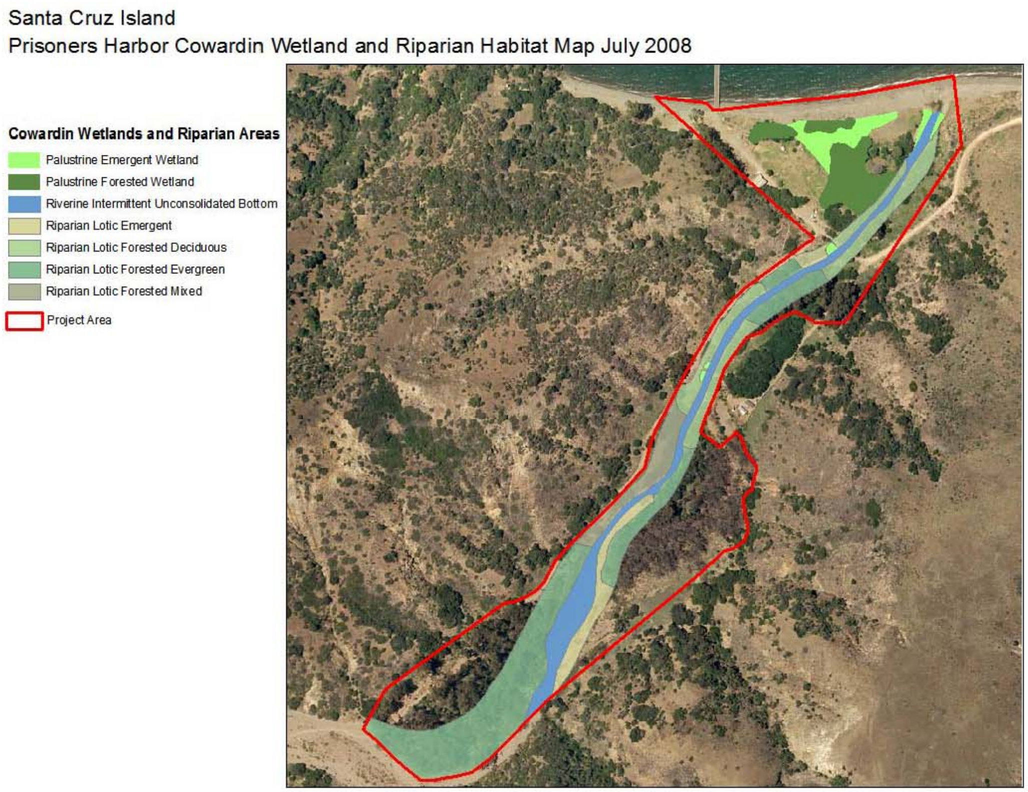

Figure 4: Cowardin Wetlands and Riparian Areas at Prisoners Harbor and Lower Cañada del Puerto

This map is appropriate for use in evaluating potential impacts to wetland resources in the upcoming Environmental Impact Statement and Environmental Impact Report (EIS/EIR). However, depending on the final extent of the Project Area additional field surveys may be needed to cover areas that were not surveyed during the July 2008 visit.

Additional Wetland Mapping and Assessment Needs

In order to adequately evaluate potential impacts to wetlands in the EIS/EIR park staff will need to complete the following tasks:

1) Finalize the extent of the Project Area

2) For lands within the final Project Area that were not surveyed for wetlands or riparian areas in July 2008 (*i.e.,* outside of the boundaries of the "Project Area" identified on maps in this Memorandum), determine if there are any Cowardin wetland areas or riparian areas present.

3) Complete a functional assessment of existing wetlands (chemical, physical, and biological functions) to facilitate evaluation of adverse impacts on them from the alternatives.

The map in this Memorandum is not adequate for full compliance with section 404 of the Clean Water Act or DO 77-1. Before the park requests a permit from the Army Corps of Engineers to alter wetlands or other waters of the United States at Prisoners Harbor, or completes compliance with DO 77-1, park staff will need to complete the following tasks:

1) Finalize the extent of the Project Area

2) Conduct a formal wetland delineation for all wetlands in the project area, using procedures described in Section 4.1.2 of Procedural Manual 77-1 to satisfy both Corps and NPS regulatory requirements.

   Note that formal delineation of wetlands will require excavation of small soil pits to confirm presence of hydric soils on the margins of the wetlands; this will likely require the on-site presence of an archeological monitor during field work.

   An application to the Corps for a Nationwide Permit should include the following items:
   a) Wetland delineation map
   b) Data sheets (from the 2006 Arid West Supplement) documenting conditions as specific locations around the margins of the mapped wetlands describing soil types, dominant vegetation, and hydrology indicators; and
   c) Preliminary evaluation of the nexus of mapped wetlands to Traditionally Navigable Waters such as the Santa Barbara Channel, and to any relatively permanent waters such as - potentially - lower Cañada del Puerto.

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Appendix A: List of Plants Observed at Prisoners Harbor, July 3rd 2008

Field identification of plants by Channel Islands National Park staff Dirk Rodriguez and Clark Cowan
Nativity and Common Name from Junak *et al.* 1997
Wetland Indicator Status from Reed 1988

Name	Common Name	Family	Native?	Special status or invasive?	Wetland Indicator Status	Location(s) observed
Avena barbata	Slender wild oats	Poaceae	No	Invasive	-	Backdune Wetlands
Baccharis douglasii	Sticky baccharis	Asteraceae	Yes		-	Backdune Wetlands
Baccharis pilularis	Coyote brush	Asteraceae	Yes		-	Backdune Wetlands
Conyza canadensis	Horseweed	Asteraceae	Unknown		FAC	Backdune Wetlands
Cynodon dactylon	Bermuda grass	Poaceae	No	Invasive	FAC	Backdune Wetlands
Distichlis spicata	Salt grass	Poaceae	Yes		FACW	Backdune Wetlands
Gnaphalium canescens	Fragrant everlasting	Asteraceae	Yes		-	Backdune Wetlands
Heteromeles arbutifolia	Toyon	Rosaceae	Yes		-	Backdune Wetlands
Lotus corniculatus	Bird's foot trefoil	Fabaceae	No		FAC	Backdune Wetlands
Pennisetum clandestinum	Kikuyu grass	Poaceae	No	Invasive	-	Backdune Wetlands
Polygonum lapathifolium	Willow smartweed	Polygonaceae	Yes		OBL	Backdune Wetlands
Polypogon monspeliensis	Rabbitsfoot grass	Poaceae	No		FACW	Backdune Wetlands
Rumex crispus	Curly dock	Polygonaceae	No	Invasive	FACW	Backdune Wetlands
Rumex salicifolia v. salicifolia	Willow dock	Polygonaceae	Yes		OBL	Backdune Wetlands
Salix lasiolepis	Red willow	Salicaceae	Yes		FACW	Backdune Wetlands
Scirpus californicus	California bullrush	Cyperaceae	Yes		OBL	Backdune Wetlands
Scirpus maritimus	Shore bullrush	Cyperaceae	Yes		OBL	Backdune Wetlands
Sonchus asper	Prickly sow-thistle	Asteraceae	No		FAC	Backdune Wetlands
Sonchus oleraceus	Common sow-thistle	Asteraceae	No		NI*	Backdune Wetlands
Typha dominguensis	Narrow-leaved cattail	Typhaceae	Yes		OBL	Backdune Wetlands
Ambrosia	Beach and Dunebur	Asteraceae	Yes		-	Beach and Dune

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chamissonis						
Bromus diandrus	Ripgut brome	Poaceae	No		-	Beach and Dune
Cakile maritima	Sea rocket	Brassicaceae	No		FACW	Beach and Dune
Chenopodium californicum	Soaproot	Chenopodiaceae	Yes		-	Beach and Dune
Cynodon dactylon	Bermuda grass	Poaceae	No		FAC	Beach and Dune
Distichlis spicata	Salt grass	Poaceae	Yes		FACW	Beach and Dune
Eriogonum grande grande	Island buckwheat	Polygonaceae	Yes	Endemic to Channel Islands	-	Beach and Dune
Eschscholtzia californica	California poppy	Papaveraceae	Yes		-	Beach and Dune
Foeniculum vulgare	Fennel	Apiaceae	No	Invasive	FACU	Beach and Dune
Gnaphalium canescens	Fragrant everlasting	Asteraceae	Yes		-	Beach and Dune
Heterotheca grandiflora	Telegraph weed	Asteraceae	Unknown		-	Beach and Dune
Lamarckia aurea	Goldentop	Poaceae	No		-	Beach and Dune
Lotus dendroideus v. dendroideus	Island deerweed	Fabaceae	Yes	Endemic to Channel Islands	-	Beach and Dune
Lupinus bicolor	Dove lupine	Fabaceae	Yes		-	Beach and Dune
Medicago polymorpha	Burclover	Fabaceae	No		-	Beach and Dune
Medicago sativa	Alfalfa	Fabaceae	No		-	Beach and Dune
Plantago lanceolata	English plantain	Plantaginaceae	No		FAC	Beach and Dune
Rhus integrifolia	Lemonade berry	Anacardiaceae	Yes		-	Beach and Dune
Silene gallica	Windmill pink	Caryophyllaceae	No		-	Beach and Dune
Anemopsis californica	Yerba mansa	Saururaceae	Yes		OBL	Corrals
Artemisia douglasii	Mugwort	Asteraceae	Yes		-	Corrals
Baccharis douglasii	Sticky baccharis	Asteraceae	Yes		-	Corrals
Baccharis pilularis	Coyote brush	Asteraceae	Yes		-	Corrals
Bromus carinatus	California brome	Poaceae	Yes		-	Corrals
Bromus diandrus	Ripgut brome	Poaceae	No		-	Corrals
Bromus diandrus	Ripgut brome	Poaceae	No		-	Corrals
Cakile maritima	Sea rocket	Brassicaceae	No		FACW	Corrals
Convolvulus	Bindweed	Convolvulaceae	No		-	Corrals

arvensis						
Conyza canadensis	Horseweed	Asteraceae	Unknown		FAC	Corrals
Distichlis spicata	Salt grass	Poaceae	Yes		FACW	Corrals
Foeniculum vulgare	Fennel	Apiaceae	No	Invasive	FACU	Corrals
Heteromeles arbutifolia	Toyon	Rosaceae	Yes		-	Corrals
Hordeum murinum	Foxtail	Poaceae	No		-	Corrals
Lactuca serriola	Prickly lettuce	Asteraceae	No		FAC	Corrals
Lepidium draba	Hoary cress	Brassicaceae	No	Invasive		Corrals
Lolium multiflorum	Italian ryegrass	Poaceae	No		-	Corrals
Lotus corniculatus	Bird's foot trefoil	Fabaceae	No		FAC	Corrals
Melilotus indicus	Yellow sweet-clover	Fabaceae	No		FAC	Corrals
Pennisetum clandestinum	Kikuyu grass	Poaceae	No	Invasive	-	Corrals
Plantago lanceolata	English plantain	Plantaginaceae	No		FAC	Corrals
Polypogon monspeliensis	Rabbitsfoot grass	Poaceae	No		FACW	Corrals
Rumex crispus	Curly dock	Polygonaceae	No	Invasive	FACW	Corrals
Rumex salicifolia v. salicifolia	Willow dock	Polygonaceae	Yes		OBL	Corrals
Salix lasiolepis	Red willow	Salicaceae	Yes		FACW	Corrals
Scirpus californicus	California bullrush	Cyperaceae	Yes		OBL	Corrals
Sonchus oleraceus	Common sow-thistle	Asteraceae	No		NI*	Corrals
Ulmus x hollancica	Dutch elm	Ulmaceae	No		-	Corrals
Scirpus maritimus	Shore bullrush	Cyperaceae	Yes		OBL	Lagoon
Typha dominguensis	Narrow-leaved cattail	Typhaceae	Yes		OBL	Lagoon
Agrostis viridis	Water bent	Poaceae	No		-	Riparian Corridor
Anagallis arvensis	Scarlet pimpernel	Primulaceae	No		FAC	Riparian Corridor
Artemisia douglasii	Mugwort	Asteraceae	Yes		-	Riparian Corridor
Atriplex triangularis	Spear-leaved saltbush	Chenopodiaceae	Yes		-	Riparian Corridor
Baccharis pilularis	Coyote brush	Asteraceae	Yes		-	Riparian Corridor
Baccharis salicifolia	Mulefat	Asteraceae	Yes		-	Riparian Corridor
Brassica nigra	Black mustard	Brassicaceae	No	Invasive	-	Riparian Corridor

Bromus diandrus	Ripgut brome	Poaceae	No		-	Riparian Corridor
Clarkia epilobioides	Fireweed clarkia	Ongraceae	Yes			Riparian Corridor
Cotula coronopifolia	Brass buttons	Asteraceae	No		FAC	Riparian Corridor
Epipactis giganteum	Stream orchid	Orchidaceae	Yes		OBL	Riparian Corridor
Equisetum laevigatum	Smooth scouring rush	Equisetaceae	Yes		FACW	Riparian Corridor
Eucalyptus camaldulensis	Red river gum	Myrtaceae	No	Invasive		Riparian Corridor
Foeniculum vulgare	Fennel	Apiaceae	No	Invasive	FACU	Riparian Corridor
Gnaphalium luteo-album	Weedy cudweed	Asteraceae	No		FACW	Riparian Corridor
Hirschfeldia incana	Short-podded mustard	Brassicaceae	Yes		-	Riparian Corridor
Juncus bufonis	Toad rush	Juncaceae	Yes		FACW	Riparian Corridor
Juncus xyphoides	Iris-leaved rush	Juncaceae	Yes		OBL	Riparian Corridor
Lolium multiflorum	Italian ryegrass	Poaceae	No		-	Riparian Corridor
Lotus corniculatus	Bird's foot trefoil	Fabaceae	No		FAC	Riparian Corridor
Lotus purshianus v. purshianus	Spanish clover	Fabaceae	Yes		-	Riparian Corridor
Lupinus bicolor	Dove lupine	Fabaceae	Yes		-	Riparian Corridor
Lythrum hyssopifolia	Common loosestrife	Loasaceae	Yes		FACW	Riparian Corridor
Malva parviflora	Cheeseweed	Malvaceae	No		-	Riparian Corridor
Medicago polymorpha	Burclover	Fabaceae	No	Invasive	-	Riparian Corridor
Melilotus indicus	Yellow sweet-clover	Fabaceae	No		FAC	Riparian Corridor
Mimulus cardinalis	Scarlet monkeyflower	Scrophulariaceae	Yes		OBL	Riparian Corridor
Mimulus guttatus	Common monkeyflower	Scrophulariaceae	Yes		OBL	Riparian Corridor
Paspalum distichum	Knotgrass	Poaceae	Yes		OBL	Riparian Corridor
Pennisetum clandestinum	Kikuyu grass	Poaceae	No	Invasive	-	Riparian Corridor
Piptatherum miliaceum	Smilo grass	Poaceae	No	Invasive	-	Riparian Corridor
Plantago lanceolata	English plantain	Plantaginaceae	No		FAC	Riparian Corridor
Polygonum	Willow smartweed	Plantaginaceae	No		OBL	Riparian Corridor

lapathifolium						
Polypogon interruptus	Ditch beardgrass	Poaceae	No		OBL	Riparian Corridor
Polypogon monspeliensis	Rabbitsfoot grass	Poaceae	No		FACW	Riparian Corridor
Rumex crispus	Curly dock	Polygonaceae	No	Invasive	FACW	Riparian Corridor
Salix lasiolepis	Red willow	Salicaceae	Yes		FACW	Riparian Corridor
Sllene gallica	Windmill pink	Caryophyllaceae	No		-	Riparian Corridor
Solanum douglasii	Douglas' nightshade	Solanaceae	Yes			Riparian Corridor
Sonchus oleraceus	Common sow-thistle	Asteraceae	No		NI*	Riparian Corridor
Trifolium microcephalum	Small-headed clover	Fabaceae	Yes		FACU*	Riparian Corridor
Trifolium willdenovii	Tomcat clover	Fabaceae	Yes		-	Riparian Corridor
Veronica anagallis-aquatica	Water speedwell	Scrophulariaceae	No		OBL	Riparian Corridor
Vicia bengalensis	Purple vetch	Fabaceae	No		-	Riparian Corridor
Woodwardia fimbriata	Giant chain fern	Blechnaceae	Yes		FACW	Riparian Corridor
Albizia lophantha	Plume acacia	Fabaceae	No		-	Willow Thicket
Bromus carinatus	California brome	Poaceae	Yes		-	Willow Thicket
Bromus diandrus	Ripgut brome	Poaceae	No		-	Willow Thicket
Foeniculum vulgare	Fennel	Apiaceae	No	Invasive	FACU	Willow Thicket
Pennisetum clandestinum	Kikuyu grass	Poaceae	No	Invasive	-	Willow Thicket
Polypogon monspeliensis	Rabbitsfoot grass	Poaceae	No		FACW	Willow Thicket
Salix lasiolepis	Red willow	Salicaceae	Yes		FACW	Willow Thicket
Sonchus oleraceus	Common sow-thistle	Asteraceae	No		NI*	Willow Thicket

APPENDIX E—PLANT SPECIES SURVEY

PRISONERS HARBOR COASTAL WETLAND RESTORATION PROJECT AREA PLANT SPECIES LIST

A plant survey of the Prisoners Harbor Coastal Wetland Restoration project area was conducted on July 3 and July 25 – 29, 2008. The project area was previously classified by vegetation type by The Nature Conservancy (*Aerial Information Systems, Inc. March 31, 2007)*. There are 12 vegetation types in the project area. Vegetation type polygons were downloaded to a Trimble GPS device and groups of two or three people were assigned one vegetation type polygon to survey. The survey was conducted by walking the entire vegetation type polygon and recording all plant species observed. If a plant was difficult to identify a sample was collected and keyed out to species later in the day.

Participants included NPS personnel: Paula Power, Dirk Rodriguez, Clark Cowan, James R. Roberts. Marie Denn; TNC Staff: Colleen Cory; and volunteer expert botanists: Ken Niessen and William Abbott.

The total number of species found on the site was 179. There were no federally listed species found in the project area. One state listed species was found in the main stream channel, Santa Cruz Island silver lotus (*Lotus argophyllus* ssp. *argenteus*). No unusual or unexpected plant species were identified.

The relative abundance of individual species is indicated by the following key:
D – dominant, C – common, O – occasional, R – rare

Some vegetation types were represented by more than one polygon. Where more than one polygon was surveyed for a given vegetation type, the higher overall abundance was used. In some cases a range was given, for example C – D, or if a species was more abundant locally this was noted as "C – edge" or "C – patch".

The species acronyms used were taken from the CHIS species list for the park islands. Stands of Blue gum and Red gum eucalyptus were treated separately in the species list.

The Vegetation Types included in the survey are:
1120 – Eucalyptus Stands Mapping Unit. Column heading is 1120 Blue Euc or 1120 Red Euc
2110 – Coast Live Oak Alliance is 2110 QUAG allian on the list
3150 – Lemonadeberry Alliance is 3150 RHIN allian on the list
3313 – California Sagebrush – Lemonadeberry is 3313 RHIN/ARCA on the list
3401 – Mixed Arroyo Willow – Mule Fat Mapping Unit is 3401 SALA/BASA on the list
3410 – Arroyo Willow Alliance is 3410 SALA on the list
4101 – Bulrush – Cattail Mapping Unit is 4101 SCCA/TYDO on the list
4301 – Fennel Mapping Unit is 4301 FOVU on the list
4410 – Silver Beachbur – Beach Sand-Verbena Alliance is 4410 AMCH/ABMA on the list
9100 – Built up

9430 – Stream Beds and Flats is Streambed-flat on the list
9600 – Planted trees and shrubs is Planted trees on the list

The vegetation map and vegetation classification are taken from:

Santa Cruz Island Photo Interpretation and Mapping Classification Report, The Nature Conservancy, Santa Cruz Island, Vegetation Map Final Report, Aerial Information Systems, Inc. March 31, 2007.

Prisoners Wetland Project Area Plant Species Survey
D- dominant C- common O- occasional R – rare

	VEGETATION TYPES						
SPECIES	**1120**	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
	BLUE	**RED**					
Acacia melanoxylon	O		D in 10				
Acourtia microcephala	R						
Adiantum jordanii	R						
Agave americana							
Agrostis viridis							O
Albizzia lophantha							
Amaranthus albus	R						
Ambrosia chamissonis							R
Amsinckia menziesii							
Anagallis arvensis							R
Anemopsis californicus			R				O
Artemisia californica	R					O	O
Artemisia douglasiana	C	C	O			O	C
Asclepias fascicularis	R	R					
Atriplex leucophylla							
Atriplex semibaccata							
Atriplex prostrata	R						
Avena barbata							
Avena fatua							
Baccharis douglasiana	C	O					C
Baccharis pilularis	D	O	C			O	C
Baccharis plummerae	O	R	O				O

Baccharis salicifolia	C	O	O			C	D
	1120	1120	2110	3150	3313	3401	3410
Brachypodium distachyon						R	
Brassica nigra	O		R			R	O
Brickellia californica	O					O	O
Bromus carinatus	C	O	O	C		R	C
Bromus diandrus	C	C		C		C	C
Bromus hordeaceus	O			O		O	O
Bromus madritensis ssp. *rubens*							
Cakile maritima	R						R
Calystegia marcostegia	C		O	O			O
Ceanothus arboreus	O						R
Ceanothus megacarpus	R						R
Centaurea melitensis	R						
Centaurea solstitialis	R		R				
Cercocarpus betuloides	O					R	
Chenopodium ambrosioides							
Chenopodium californicum	R	R					R
Chenopodium murale							
Clematis ligusticifolia	O						
Comarostaphylos diversifolia	R	R					O
Convolvulus arvensis	O						O
Conyza bonariensis						R	O
Conyza	O						R

canadensis							
Coreopsis gigantea							
Cotula coronopifolia							
	1120	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
Cynodon dactylon	O		O				O
Dichelostemma capitata	R			C			
Distichlis spicata							O
Dudleya candelabrum				C			
Epilobium canum	O			C		R	O
Epilobium ciliatum							O
Epipactis giganteum							
Equisetum laevigatum		O	O				O
Eremocarpus setigerus							R
Eriogonum arborescens	O					C	O
Eriogonum grande var. *grande*				C			O
Erodium cicutarium							
Eschscholtzia californica							
Eucalyptus calmadulensis	O	D	O			C	O
Eucalyptus globulus	D						O
Eucrypta chrysanthemifolia							
Foeniculum vulgare	C TO D	C	C			C	O TO C
Galium angustifolium			O			R	
Galium aparine	O	R					
Galium nuttallii insulare							

Gastridium ventricosum							
Gnaphalium californicum	R						O
Gnaphalium canescens	O			R		O	O
Gnaphalium luteo-album	R		R				R
	1120	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
Hazardia detonsa							R
Hazardia squarrosa							
Hedera helix	C	R					
Heteromeles arbutifolia	C	C	O	O		O	C
Heterotheca grandiflora	R						
Hirschfeldia incana	R	R				R	
Hordeum murinum	O	O					
Hypochaeris glabra						O	
Juncus bufonius							
Juncus mexicana		O	R				R
Juncus patens	R	O					
Juncus xyphoides							
Keckiella cordifolia	O						R
Lactuca saligna							
Lactuca serriola	O-ROAD					R	O
Larmarckia aurea							
Lathyrus vestitus	R	R	R			R	O
Lepidium draba	O						O
Lepidospartum squamatum						O	
Leymus triticoides	O	D - LOCALLY					
Lolium multiflorum							X

Lotus argophyllus						R	R
Lotus corniculatus						O-EDGE	O
Lotus dendroideus	R						
Lotus grandiflorus							
Lotus purshianus	R						C
Lupinus albifrons							R
Lupinus bicolor							
	1120	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
Lupinus hirsutissimus							R
Lythrum hyssopifolia							R
Madia sativa				C		R	
Malacothrix saxatilis							
Malva parviflora	O						O
Marah macrocarpus	O	O	O				R
Marrubium vulgare	O	O				R	R
Medicago polymorpha				C		O	O
Medicago sativa							
Melilotus albus			R				
Melilotus indicus	R		O			O-EDGE	O
Mimulus cardinalis							R-EDGE
Mimulus guttatus							
Mimulus longiflorus	O	O	O			O	O
Nasella cernua							
Oenothera elata ssp. *hirsutissima*						R	
Olea europaea		R					
Opuntia littoralis							
Oxalis corniculata		R					

Paspalum distichum							R
Pennisetum clandestinum	C-D	D	O			C-PATCH	C/D
Phacelia ramossisima			X				
Pholistoma auritum							
Pinus pinea							R
Piptatherum miliaceum	C	C	O			C	O
Plantago lanceolata	C-ROAD	O	O			O	C
	1120	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
Plantago major							
Platanus racemosa	R						R
Polygonum arenastrum	O-ROAD		O			O-EDGE	O-ROAD
Polygonum lapathifolium	R	O					O
Polypogon interruptus		R					O
Polypogon monspeliensis	R						O
Populus balsamifera		R					R
Prunus illicifolia ssp. *lyonii*	D	C	O				R
Quercus agrifolia	C/D	O	D			R	C-LOCALLY
Quercus x *macdonaldii*							R
Quercus pacifica	O	O					R
Raphanus raphinastrum							
Raphanus sativa							
Rhamnus californica	O	O					
Rhus integrifolia	O	C	O	D		O	O
Rhus ovata						R	
Robinia pseudoacacia	R						

Rosa californica	C-LOCALLY	O				O	
Rubus ursinus	O	O-C PATCHES					R
Rumex conglomeratus							
Rumex crispus	O	O				O	C
Rumex pulcher	O	O					R- EDGE
Rumex salicifolius		O					
Salix exigua			O				O
Salix lasiolepis	C-D		O			C	C/D
	1120	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
Scirpus californicus							O
Scirpus maritimus							
Silene laciniata							
Silybum marianum		O	R				
SIlene gallica	R						R
Solanum clokeyi							
Solanum douglasii	C	C	O			O	R
Sonchus asper	R						R
Sonchus oleraceus	O	O				R	O
Spergularia bocconii							
Stachys bullata	O/C	C	R			O	O
Stellaria media							
Stephanomeria cichoriacea				C			
Symphoricarpos mollis		O					
Tetragonia tetragonioides							
Toxicodendron diversiloba	O/C	R				R	R
Trifolium microcephalum							

Trifolium willdenovii							
Typha dominguensis							
Ulmus hollandica							
Urtica dioica	C	O-C PATCHES					R
Verbascum thapsis							
Verbena lasiostachys	R						
Veronica anagallis-aquatica							O
Vicia benghalensis	R						
Vicia sativa							R
	1120	**1120**	**2110**	**3150**	**3313**	**3401**	**3410**
Vinca major	C/D	C	O			O	O
Vulpia myuros							
Woodwardia fimbriata							

	VEGETATION TYPES					
SPECIES	**4101**	**4301**	**4410**	**9100**	**9430**	**9600**
Acacia melanoxylon			R	R		
Acourtia microcephala						
Adiantum jordanii						
Agave americana						O
Agrostis viridis	R			O	O	
Albizzia lophantha	R			R		
Amaranthus albus			R		O	
Ambrosia chamissonis			D	O		
Amsinckia menziesii				R		
Anagallis arvensis				C	O	
Anemopsis californicus				C		
Artemisia californica		R		O	R	O

Artemisia douglasiana				O		
Asclepias fascicularis						
Atriplex leucophylla			O	R		
Atriplex semibaccata			O	O		
Atriplex triangularis	C		R	R		C
Avena barbata				O	R	
Avena fatua				R		
Baccharis douglasiana	C		C	O		O
Baccharis pilularis		C-EDGE	O	O		D
Baccharis plummerae		R		O		O
Baccharis salicifolia	O	O	O	O	C	O
	4101	**4301**	**4410**	**9100**	**9430**	**9600**
Brachypodium distachyon					O	
Brassica nigra		O		O	O	
Brickellia californica		O			O	O
Bromus carinatus		C	R	O		C
Bromus diandrus		C	C	O	O	C
Bromus hordeaceus		O	R	O	O	
Bromus rubens			O			
Cakile maritima			C	O		
Calystegia marcostegia			R			O
Ceanothus arboreus					O	O
Ceanothus megacarpus					R	
Centaurea melitensis				O	R	R
Centaurea solstitialis				R	R	O
Cercocarpus betuloides						
Chenopodium ambrosioides			R			
Chenopodium californicum		R		C		O
Chenopodium murale				R		
Clematis ligusticifolia						

Comarostaphylos diversifolia						
Convolvulus arvensis		O		O	R	
Conyza bonariensis				O		
Conyza canadensis	O		R	O		
Coreopsis gigantea				R		C
Cotula coronopifolia	C		R			
Cynodon dactylon	C		C	C		
Dichelostemma capitata				R		
Distichlis spicata	C		D	C		
Dudleya candelabrum			R	R		
Epilobium canum					O	C
	4101	**4301**	**4410**	**9100**	**9430**	**9600**
Epilobium ciliatum				O	C	
Epipactis giganteum					R	
Equisetum laevigatum						
Eremocarpus setigerus					R	
Eriogonum arborescens				O	R	C
Eriogonum grande grande			O	O		O
Erodium cicutarium			O	R		
Eschscholtzia californica			R		O	
Eucalyptus calmadulensis		R		R	O	
Eucalyptus globulus				D		O
Eucrypta chrysanthemifolia				R		
Foeniculum vulgare		DDD	C	C		C
Galium angustifolium						
Galium aparine				R		
Galium nuttallii insulare						
Gastridium ventricosum		R				
Gnaphalium californicum				R		
Gnaphalium canescens		R	R	R	C	R

Gnaphalium luteo-album				R	C	
Hazardia detonsa				O		
Hazardia squarrosa			O			
Hedera helix						
Heteromeles arbutifolia				R		O
Heterotheca grandiflora			O	O		
Hirschfeldia incana			O	C		
Hordeum murinum			R	O	O	
Hypochaeris glabra			O	O		
Juncus bufonius						
Juncus mexicana						
	4101	**4301**	**4410**	**9100**	**9430**	**9600**
Juncus patens				C		
Juncus xyphoides					R	
Keckiella cordifolia						
Lactuca saligna						
Lactuca serriola				C		
Larmarckia aurea	O				R	
Lathyrus vestitus				O	R	O
Lepidium draba		O-LOCALLY		O		R
Lepidospartum squamatum				R	C	
Leymus triticoides						
Lolium multiflorum			O	R	O	
Lotus argophyllus					O	
Lotus corniculatus			R	R		
Lotus dendroideus			C	R	O	
Lotus grandiflorus					R	
Lotus purshianus	R				C	O
Lupinus albifrons	R			R	R	

Lupinus bicolor			O		O	
Lupinus hirsutissimus						
Lythrum hyssopifolia				O		
Madia sativa						
Malacothrix saxatilis					R	
Malva parviflora				C	R	
Marah macrocarpa		O		O		C
Marrubium vulgare		C				
Medicago polymorpha			R	O	O	
Medicago sativa		R	O			
Melilotus albus				R		
Melilotus indicus	O		R	C	O	
	4101	**4301**	**4410**	**9100**	**9430**	**9600**
Mimulus cardinalis				R	O	
Mimulus guttatus					O	
Mimulus longiflorus		O		R		O
Nasella cernua						O
Oenothera elata hirsuta				R		
Olea europaea						
Opuntia littoralis			R			
Oxalis corniculata						
Paspalum distichum						
Pennisetum clandestinum	C/D		C	D/C		D
Phacelia ramossisima						
Pholistoma auritum				R		R
Pinus pinea				R		
Piptatherum miliaceum				O/C		O
Plantago lanceolata		R	C	C		O
Plantago major			R	O	R	
Platanus racemosa					R	

Polygonum arenastrum				C		O
Polygonum lapathifolium			R	R	O	O
Polypogon interruptus					O	O
Polypogon monspeliensis	O		C	C	C	O
Populus balsamifera						
Prunus illicifolia lyonii						R
Quercus agrifolia		R		R		O
Quercus x macdonaldii						
Quercus pacifica		R				
Raphanus raphinastrum				O		
Raphanus sativa				O		
Rhamnus californica						
	4101	**4301**	**4410**	**9100**	**9430**	**9600**
Rhus integrifolia		O	R	O	O	O
Rhus ovata					O	
Robinia pseudoacacia				R		
Rosa californica						C
Rubus ursinus				R	O	
Rumex conglomeratus			R	R		R
Rumex crispus	O			C	O	
Rumex pulcher				R	O	
Rumex salicifolius					O	
Salix exigua					O	C
Salix lasiolepis	C/D		O	O	D-EDGE	D
Scirpus californicus	D		C	R		R
Scirpus maritimus	C		O			
Silene laciniata				R		
Silybum marianum				O		O
Sllene gallica			O	R	O	R

Solanum clokeyi					R	
Solanum douglasii			R	O	R	R
Sonchus asper			R	O		O
Sonchus oleraceus		R	R	O	O	O
Spergularia bocconii			R			
Stachys bullata		C		R		O
Stellaria media				R		
Stephanomeria cichoriacea						
Symphoricarpos mollis		R				
Tetragonia tetragonioides				O		
Toxicodendron diversiloba				R		
Trifolium microcephalum					R	
Trifolium willdenovii					R	
	4101	**4301**	**4410**	**9100**	**9430**	**9600**
Typha dominguensis	D					
Ulmus hollandica				O		
Urtica dioica				R		C
Verbascum thapsis					R	
Verbena lasiostachys						
Veronica anagallis-aquatica	R			R	C	O
Vicia benghalensis ?						
Vicia sativa				R		
Vinca major						O
Vulpia myuros				R		
Woodwardia fimbriata						

APPENDIX F—EUCALYPTUS SURVEY

A Survey of Eucalyptus Trees in Prisoners Harbor and lower Cañada del Puerto September 24, 2008

Introduction

The genus Eucalyptus includes about 450 species and is native to Australia. During the late 19th century, it was widely planted throughout California, including 4 species on Santa Cruz Island (Junak, et al. 1995) where they were planted for ornamental and utilitarian purposes such as windbreaks and future pier pilings. Trees planted in a row along the base of the cliff at Prisoners Harbor have persisted from the ranching era to the present and are considered historic (NPS Cultural Landscape Inventory, 2004). The majority of eucalyptus trees at Prisoners Harbor and in Cañada del Puerto have spread unintentionally from seed, displacing native vegetation over time, and are not considered historic. This survey of eucalyptus trees was conducted to improve our understanding of the number, size, and distribution of eucalyptus trees in the Prisoners Harbor Coastal Wetland Restoration project area (Fig 1).

Eucalyptus Survey and Mapping in Cañada del Puerto

During August and September 2008, Paula Power, Clark Cowan, and Jim Roberts mapped and recorded the diameter at breast height (dbh) of eucalyptus trees greater than 6" dbh in the Prisoners Harbor and lower Cañada del Puerto area. For ease of data collection and mapping, the project area was subdivided into smaller areas and each area was assigned a letter designation. The total number of eucalyptus trees greater than 6"dbh in the project areas was approximately 1737. There are 741 trees with a dbh less than 12" (30 cm), 692 trees with a dbh between 12" and 24" (30 cm and 60 cm), and 304 trees with a dbh greater than 24" (60 cm) (Fig 2). Area G and H had the greatest number of trees and 82% of trees were less than 24" (60 cm) dbh (Fig 2; Table 1).

Area G and H had many trees that were downed either by strong winds or felled with a chainsaw to open the area for re-colonization by native plants (Fig 1). It was estimated that up to 25% of trees in area H were standing dead wood. Downed trees and standing dead wood were not included in the survey.

Example of eucalyptus removal on the mainland

The City of Port Hueneme completed a eucalyptus removal project near the Sea Bee base in Port Hueneme in 2008. Ninety-five 60'-80'tall mature trees were declared a hazard by an arborist due to fungus and rot and the trees were removed. Twelve men worked for 2½ to 3 weeks using 1 crane and chainsaws with long bars. The trees were first limbed, then a 30-ton crane was used to choke a trunk section, the section was cut and lowered, and a stump grinder ground the stump to 12" below grade. The crane was used to lower the cut trunk sections to the ground to avoid damaging existing infrastructure such as power lines, sidewalks, pavement, and underground utilities. A loader picked up large logs and placed them in "end dumps". Logs small enough to put through a chipper were chipped and distributed to avocado orchards for mulch. Large logs were cut into smaller pieces for use as fire wood.

Three vendors were used for tree removal, chipping, and firewood. Tree removal cost was $1800.00/tree. The City of Port Hueneme contracted West Coast Arborist for the tree removal (www.wcainc.com; 2889 Bunsen Ave #P, Ventura, CA 93003, 805-644-2671). This is one of a number of local companies that are certified and equipped to remove large trees.

In 2008 the cost of disposing of material at Shoreline Organics, a green waste facility is $27.00/ton or the City of Oxnard is $43.00/ton.

Removing Eucalyptus trees on island

Trees could be disposed of using a number of methods. Trees with a dbh less than 12” (742 trees) could be chipped and the chipped material spread on the Central Valley and the Navy roads. The straightest trees with a dbh between 12” and 24” could be stock piled on island and eventually used in other repair or appropriate construction projects such as building a protective barrier around the archeological site and historic well, for future road work, or fire wood at the Main Ranch and the UC Field Station. There are fewer reasonable alternatives for disposing of trees with a dbh greater than 24”. Some can be burned or others used to create brush piles for habitat. Some could be transported off island.

The proposed fill disposal area for the wetlands restoration project is Area A, B, and C. The total number of eucalyptus trees in Area A, B, and C is 125 trees. One approach may be to remove the trees in phases beginning with area A, B, and C. Then remove additional trees in the remaining areas as funding becomes available.

The ecological cost of removing trees from the island would be the use of fossil fuels to transport equipment on and off the island, the use of fossil fuels to operate the hand-held and heavy equipment required to remove the trees, and the loss of habitat and carbon sequestration potential during the time the native plant community is recovering. The ecological benefit of removing the trees include opening the area for re-colonization by native plant species, restoring riaparian oak woodland ecological function, increasing habitat diversity, improving habitat for many species of birds including the Island scrub-jay and other passerine birds known to breed in the area and animal species including the island fox.

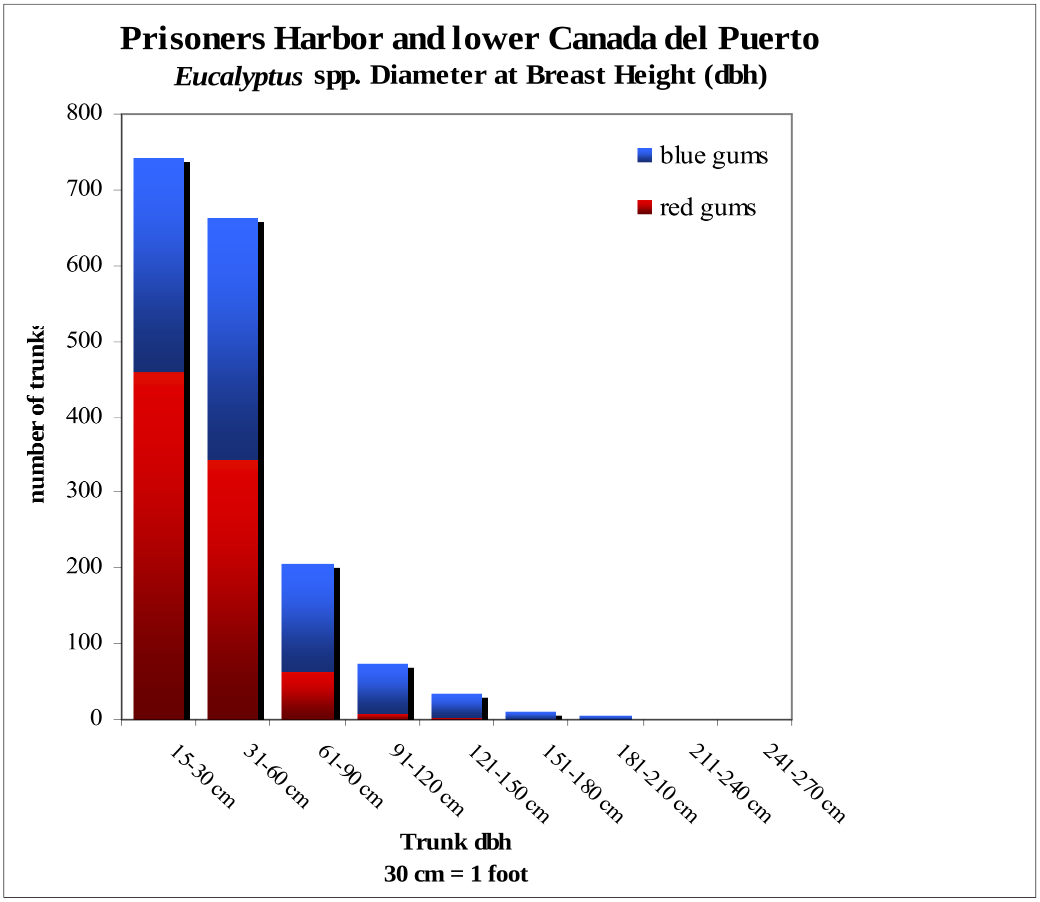

Figure 2. Red and blue gum eucalyptus diameter at breast height. 81% of trees have a dbh less than 60 cm (24”). The average dbh for red gum and blue gum eucalyptus was 34 cm (14”) and 52 cm (21”) respectively.

Table 1. The greatest number of trees are located in area G and H with dbh less than 60 cm.

Area	# of Trunks									Total
	15-30 (dbh cm)	31-60 (dbh cm)	61-90 (dbh cm)	91-120 (dbh cm)	121-150 (dbh cm)	151-180 (dbh cm)	181-210 (dbh cm)	211-240 (dbh cm)	241-270 (dbh cm)	
A	2	3	2	2	0	1	0			10
B	3	4	8	5	0	1	1			22
C	19	60	8	5	1	0	0			93
D	0	0	4	2	0	0	0			6
E	1	4	2	1	0	0	0			8
F	5	6	12	8	4	2	1			38
G	259	295	93	42	27	4	0			720
H	451	311	53	5	1	1	1			823
M	1	9	7	0	0	0	0			17
Total	741	692	189	70	33	9	3			1737

Eucalyptus

Area	1°Sp	No. of trunks	Ave. DBH(cm)
A	**Blue**	**10**	**80**
B	**Blue**	**22**	**80**
C	**Blue**	**93**	**62**
D	**Blue**	**6**	**88**
E	**Blue**	**8**	**86**
F	**Blue**	**38**	**89**
G	**Blue**	**720**	**47**
H	**Red**	**823**	**34**
M	**Blue**	**17**	**57**

Figure 1. Clusters of trees within the project area were assigned a letter designation to simplify the survey. The vast majority of trees were in area G and H. The proposed fill disposal area for the wetlands restoration is area A, B, and C. The total number of trees in these three areas is 125.

APPENDIX G—SHPO CONSULTATION

Consultation With State Historic Preservation Office

United States Department of the Interior

NATIONAL PARK SERVICE
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

IN REPLY REFER TO:

H4217- CHIS

April 15, 2008

Mr. Milford Wayne Donaldson, FAIA
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296-0001

Re: Early consultation regarding proposed wetlands restoration project on Santa Cruz Island, Channel Islands National Park, and effects on historic resources

Dear Mr. Donaldson:

Channel Islands National Park, a unit of the National Park Service headquartered in Ventura, California, is proposing to restore a functional, self-sustaining ecosystem at a former 9-acre back barrier coastal wetland site known as Prisoners Harbor, and a 40-acre associated stream corridor in the lower Cañada del Puerto on Santa Cruz Island. Restoring ecosystem function will require removing fill from the former coastal wetland. The park is in the early stages of project planning in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. 4321 et seq.).

We have identified several historic properties within the proposed area of potential effect. Archeological site SCrI-241, a contributing site within the National Register-listed Santa Cruz Island Archeological District, was bisected when the stream was channelized by the former island owners. The wetland restoration is being designed to provide greater protection to this important Chumash village site. Alternatives being considered in the draft environmental impact study call for the removal of all or a portion of the 1950s cattle corrals, in order to remove the fill and restore wetland conditions in that area. The cattle corrals are a contributing resource within the Santa Cruz Island Ranching District, which has been determined eligible for the National Register of Historic Places. In addition, eucalyptus trees along the stream corridor will be removed to reverse the negative impact of these invasive plants on wetland and riparian communities. While a number of these trees were planted at the turn of the 20th century and would therefore contribute to the historic ranching district, most of them have simply spread from seed and grown up in this area.

We would like to initiate consultation with your office at this early stage of project planning regarding the effects of this project on historic resources and compliance with Section 106 of the National Historic Preservation Act. We would be pleased to arrange a site visit to Santa Cruz Island for you and your staff or to meet with you at your earliest convenience.

We have enclosed background information and photographs of the project area for your information. Please contact Ann Huston, Chief of Cultural Resources, at 805/658-5752 at your earliest convenience to coordinate a site visit or consultation meeting.

Sincerely,

/s/ Russell Galipeau

Russell E. Galipeau, Jr.
Superintendent

Enclosures (7)

STATE OF CALIFORNIA – THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, Governor

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
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www.ohp.parks.ca.gov

2008 MAY 15 PM 1:13

us
Kate —
Ann —

9 May 2008

Reply To: NPS080421A

Russell E. Galipeau, Jr., Superintendent
National Park Service
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001-4354

Re: Section 106 Consultation for proposed restoration of wetlands on Santa Cruz Island, Channel Islands National Park, CA

Dear Mr. Galipeau:

Thank you for your letter of 15 April 2008 requesting my comment pursuant to the National Historic Preservation Act as amended and the implementing regulations codified at 36 CFR 800 with regards to the above undertaking. You are initiating consultation in the early project planning stages.

As I presently understand it, the undertaking involves restoring a functional, self-sustaining ecosystem at a former 9-acre back barrier coastal wetland site known as Prisoner's harbor. The site bisects a contributor within the Santa Cruz Island Archeological site. The site is a National Register listed site. Several historic era contributors to a ranching district on the site will be removed as well as several eucalyptus trees which have spread along the creek bed.

The NPS will continue consultation as the project planning moves forward.

I look forward to continued consultation on this project. If you have any questions, please contact Amanda Blosser of my staff at (916) 653-9010 or e-mail at ablosser@parks.ca.gov

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

MWD:ab

United States Department of the Interior

NATIONAL PARK SERVICE
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

IN REPLY REFER TO:

L7617-CHIS

October 24, 2008

Mr. Milford Wayne Donaldson, FAIA
State Historic Preservation Officer
Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

Re: NPS080421A, Proposed Restoration of Wetlands on Santa Cruz Island, Santa Barbara County, Channel Islands National Park, CA

Dear Mr. Donaldson:

We are enclosing a binder with additional information regarding the above-referenced project to seek your concurrence with the Area of Potential Effect (APE) and our determination of effects on properties listed on and eligible for the National Register of Historic Places.

We have defined the APE as the area that will be affected by the construction activities and the changes in stream flow dynamics, shown as the shaded area on the enclosed map. This portion of the island is included within the Santa Cruz Island Archeological District (copy of National Register nomination enclosed). The archeological site CA-SCrI-240, believed to be the historic Chumash village of Xaxas, is located within the APE. In addition, this portion of the island is included within the National Register-eligible Santa Cruz Island Ranching District. The Prisoners Harbor Ranch and its contributing resources are described in the Cultural Landscape Inventory (CLI) for the Santa Cruz Island Ranching District (see enclosed list of contributing/non-contributing resources).

The proposed action alternatives will remove fill material from the former wetland, restoring it to one-third to two-thirds of its original size, remove an existing levee, and remove eucalyptus trees from the creek channel. The removed fill will be stockpiled for later use on the island.

The Chumash village site SCrI-240, which is located along both sides of the stream channel, has special significance to the Native American community and has yielded significant scientific data pertaining to the Late Prehistoric and Early Historic era (see enclosed archeological site form and excerpts from Dr. Jeanne Arnold's *Origins of a Pacific Coast Chiefdom)*. The site was bisected in the late 1800s and was damaged again in the early 1900s when the stream was channelized, and has also been affected by subsequent erosion. Significant portions of the site remain, however, and recent hydrologic studies suggest that the re-creation of the wetlands and the removal of the levee will slow the dynamic water action that currently affects the site, improving the site's long term survivability. The park proposes to protect this site by stabilizing it in a manner to deflect potential flood waters away from the culturally dense area of the site. These actions would not have an adverse effect on the archeological resources.

The historic cattle corrals built in the 1940s and 50s are located in the area that existed as wetlands until the early 20th century. All or a portion of the corrals would be removed along with the fill material in order to restore the wetland. The scale and scale-house would be moved to their previous location at Prisoners Harbor, as shown in the enclosed historic photographs. This action would have an adverse effect on the corrals, which are included as a contributing resource within the Santa Cruz Island Ranching District. The park has recorded the extant corrals with HABS-level photography and has mapped them through the CLI.

Approximately 9,000-17,000 cubic yards of fill material will be removed in order to restore the wetlands. The locations that are currently proposed for stockpiling the fill are along the east side of the stream channel. The location north of the road is part of SCrI-240. Portions of the stockpile location south of the road may also contain archeological materials. We have determined that covering the archeological site with fill materials will not have an adverse effect on the archeological resources.

Non-native tree plantings at Prisoners Harbor, including Italian stone pine, Dutch elm, and eucalyptus, are contributing resources within the Santa Cruz Island Ranching District. While many of the historic tree plantings can be identified through historic photographs (see enclosed), such as the row of eucalyptus to the west of the warehouse building, many others no longer exist. Most of the eucalyptus trees that are growing along the stream channel have spread extensively from the early plantings. At this time, the park is analyzing historic photographs, maps, and tree measurements to determine whether any of the eucalyptus and other trees along the stream channel were part of the late-19th century development (when the island tree planting campaign took place). We currently plan to remove all of the eucalyptus along the stream channel unless we are able to identify trees that were part of the historic planting scheme, and have determined that the tree removal will not have an adverse effect on the contributing resources within the historic district. The park will identify historic plantings in the APE that were not included in the CLI and consult further with your office regarding their status as contributing or non-contributing, and the appropriate treatment or mitigation for removal of these plantings.

The area south of the National Park Service and The Nature Conservancy boundary has not been systematically surveyed due to the dense underbrush and number of fallen trees, and it is not known whether archeological resources are located in the eucalyptus removal area. We anticipate that cutting, dragging, hauling, and vehicle operation associated with the eucalyptus removal will cause ground disturbance in this area. We plan to monitor these activities to ensure that archeological resources are not affected; therefore, we have determined that there will be no adverse effect on archeological resources as a result of these activities.

Historic photos and an 1892 map of Prisoners Harbor show a rock retaining wall several hundred feet in length that was built along the west side of the stream, presumably to prevent flooding of the ranch area. This wall was either destroyed by later stream modifications or is currently buried beneath the existing levee. We plan to monitor the levee removal and any other ground-disturbing activity in this area to determine whether the wall or portions of it still remain. Should there be remaining portions that will be affected by this project, we will consult with your office to determine appropriate mitigation measures.

Other historic resources located within the Prisoners Harbor area include an 1887 stone and brick warehouse, a stone-lined well from the same era. These resources, which contribute to the National Register-eligible historic ranching district, will not be affected by the undertaking.

We seek your concurrence with the APE, as we have defined it. In addition, we seek your concurrence with our determination that the project will have "No Adverse Impact" on archeological resources that are listed on the National Register of Historic Places, and that the project will have an adverse impact on historic resources that contribute to the National Register-eligible Santa Cruz Island Ranching District.

We would like to request your assistance in developing mitigation measures for the adverse effects to historic resources and invite you and your staff to visit the project site to obtain a better understanding of the project alternatives and effects on historic resources.

Our consultant, Mangi Environmental, Inc., is preparing the first internal draft Environmental Impact Statement (EIS), to be completed by the end of this year. It would be very helpful to have your comments by the end of November, so that we can incorporate them into the internal draft and so that the draft EIS can be available for public comment in February 2009. Please contact Paula Power, Ecologist, at 805/658-5784 at your earliest convenience to coordinate a consultation meeting or site visit.

Sincerely,

/s/ Russell Galipeau

Russell E. Galipeau, Jr.
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

IN REPLY REFER TO:

H4217-CHIS

JUN 2 3 2009

Ms. Susan Stratton
State Historic Preservation Office
Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

Re: NPS080421A, Proposed restoration of wetlands on Santa Cruz Island, Santa Barbara County, Channel Islands National Park, CA

Dear Ms Stratton:

Following your site visit to the Prisoners Harbor project area on February 24, 2009 and our subsequent telephone conversation with you, the park identified a second fill disposal area for the Prisoners Coastal Wetland Restoration Plan, see the enclosed photograph. The 2.4-acre site is located upstream from the initial fill disposal site. It is overgrown with invasive fennel (*Feoniculum vulgare*) and is outside the 100-year floodplain. On June 15, 2009 the site was inspected by the park archaeologist, Kelly Minas, for cultural material. Mr. Minas examined the subsurface at four locations to a maximum depth of 60 cm and found no indication of cultural material. Dr. Lotus Vermeer, Director of The Nature Conservancy's Santa Cruz Island Project and a partner in this project, has agreed to the use of this site as an additional fill disposal area.

The park will continue consultation with the Chumash Tribe regarding treatment of the initial fill disposal site. If the Tribe agrees that capping the site would be an acceptable means of protecting the site, and approves the park's method of capping, the site would be covered with Coir geotextile, a natural product without chemical treatment or synthetic webbing. This layer would provide a demarcation between the existing soil layer and fill material. Fill material would be deposited to a depth of approximately 1 foot and a distance of 10' from the ordinary high water mark using a skid-steer loader bobcat beginning adjacent to the road and working across the site so that equipment is always operating on fill material.

We have determined that the alternative fill disposal site and capping of the initial fill disposal site, if acceptable to the Chumash Tribe, will result in no adverse effect to cultural resources. For further information please contact Paula Power, ecologist at 805/658-5784 or paula_power@nps.gov.

Sincerely,

/s/ Russell Galipeau

Russell E. Galipeau, Jr.
Superintendent

Enclosure

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

OFFICE OF HISTORIC PRESERVATION
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AUG 14 AM 10: 59

12 August 2009 Reply In Reference To: NPS080421A

Russell E. Galipeau, Superintendent
National Park Service
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001-4354

Re: Prisoners Harbor Coastal Wetland Restoration on Santa Cruz Island, Channel Islands National Park, Santa Barbara County, CA

Dear Mr. Galipeau:

Thank you for your June 23, 2009, letter providing additional information regarding a second fill disposal area and a methodology for placing fill in the initial identified disposal area for the Prisoners Coastal Wetland Restoration project. This second disposal area was identified and discussed in a telephone conversation between park staff and my staff with the intent of lessening the potential for impacts to cultural resources and to address concerns expressed by the Chumash tribe.

Park archaeologist, Kelly Minas, has surveyed the 2.4-acre proposed second fill disposal site for the presence of cultural resources. Due to the overgrown nature of the parcel with invasive fennel, shovel test probes were placed at four different locations to a maximum depth of 60 cm for purposes of examining the subsurface for the presence of cultural materials. No indication of cultural materials was found during the subsurface examination.

Regarding the initial fill disposal site, the park will continue consultation with the Chumash Tribe. The recommendation for this area involves capping the site by first placing Coir geotextile fabric on the surface prior to covering with fill materials. The geotextile fabric will provide a demarcation between the existing soil layer and fill material. The fill material would be deposited to a depth of approximately 1 foot and a distance of 10 feet from the ordinary high water mark using a skid-steer loader bobcat beginning adjacent to the road and working across the site so that the equipment is always operating on fill material. This method should provide adequate protection for the archaeological site.

You have determined that the alternative fill disposal site and capping of the initial fill disposal site, if acceptable to the Chumash Tribe, will result in no adverse effect to cultural resources. I concur with a finding of no adverse effect with conditions (36 CFR Part 800.5(b)), the condition being tribal agreement for the described methodology utilized for placing fill at the initial disposal site. If for some reason the Tribe does not agree with the proposed methodology, you will continue consultation with my office to discuss alternate means of fill disposal.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Mark Beason, Project Review Unit historian, at (916) 653-8902 or mbeason@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

United States Department of the Interior

NATIONAL PARK SERVICE
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

IN REPLY REFER TO:
L7617-CHIS

NOV 13 2009

Mr. Milford Wayne Donaldson, FAIA
State Historic Preservation Officer
Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

Re: NPS080421A, Proposed Restoration of Wetlands on Santa Cruz Island, Santa Barbara County, Channel Islands National Park, CA

Dear Mr. Donaldson:

We are enclosing additional information regarding the above-referenced project to seek your concurrence with the Area of Potential Effect (APE), and a determination of no adverse effect on properties listed on and eligible for the National Register of Historic Places.

Following the site visit to the Prisoners Harbor project area on February 24, 2009, and evaluating suggestions made by the Office of Historic Preservation (OHP) staff, Susan Stratton and Mark Beason, the park consulted with the Tribe regarding treatment of the east side of the drainage. The Tribe agreed that capping the site on the east side of the drainage would help protect the site. The park supports the Tribe's suggestion for a mid-project evaluation (after tree removal) to determine the best solution for protecting the site. We have enclosed a copy of the letter provided by the Tribe for your information.

The park would like OHP to consider a proposal to use eucalyptus chips rather than geotextile coir as a demarcation layer when capping the site. The chips are readily available, do not require transportation to the island, and are a completely natural product. As per your staff's suggestion, the park would use a lightweight tractor beginning adjacent to the road to spread the demarcation layer and capping material.

The upstream, alternative fill disposal site located on property owned by The Nature Conservancy would be available for surplus fill material.

An archeological monitor would be on-site during all potential ground disturbing activities. In the case of an accidental find of cultural material or remains, the park will notify the State Historic Preservation Officer and the Tribe.

For further information please contact Paula Power, ecologist, at 805/658-5784 or paula_power@nps.gov.

Sincerely,

/s/ Russell Galipeau

Russell E. Galipeau, Jr.
Superintendent

Enclosure (1)

STATE OF CALIFORNIA – THE RESOURCES AGENCY
ARNOLD SCHWARZENEGGER, *Governor*

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RECEIVED
CHANNEL ISLAND NAT'L PK
2010 JAN 22 PM 12: 43

January 20, 2010

Reply in reference to: NPS080421A

Channel Islands N.P. — FILE — ACTION — FYI — RESPOND
Supt. — Admin. — Cult. RM CC — Interp. — Maint. — Nat. RM (Power) ce — Protection — Transp. — Marine Sci. — NBS - Terr. — NBS - Mar.

Mr. Russell Galipeau, Jr.
Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

Re: Prisoners Harbor Coastal Wetland Restoration on Santa Cruz Island, Channel Islands National Park, Santa Barbara County, CA

Dear Mr. Galipeau:

Thank you for your November 13, 2009, letter documenting your consultation with the Santa Ynez Band of Chumash Indians and providing us a copy of their comments. To ensure protection of cultural resources, the park proposes to cap the portion of SCrI-240 on the east side of Cañada del Puerto creek. A demarcation layer composed of eucalyptus chips will separate original soil from capping material. An alternative fill stockpile area on The Nature Conservancy property will be available if needed. An archeological monitor will be on site during all potential ground-disturbing activities; in the event of an accidental discovery of cultural materials or human remains the park will stop work and consult with the SHPO and the Santa Ynez Band of Chumash Indians.

The Tribe has concurred with the proposal to cap the portions of archeological site SCrI-240 east of the drainage and the use of a lightweight tractor to place materials to cap the site. The Tribe has suggested a mid-project evaluation to determine the best solution for continued protection of the site, with which NPS is in accord.

I have previously concurred (letter of August 12, 2009) with the Channel Islands National Park's "no adverse effect" determination for the archeological resources. I have no objection to the use of eucalyptus chips forming the interface between the layer of fill and the archaeological site. I would also suggest considering the use of a semi-permeable geo-textile fabric for use as the demarcation layer between the fill and archaeological site. The geo-textile fabric would be longer lasting, less prone to breaking down and degradation caused by natural conditions.

Also within the undertaking's area of potential effect are historic resources including a circa 1950s corral complex, scale house, concrete water troughs, telephone poles, a 19th-century stone well, an 1887 masonry warehouse building, and blue gum eucalyptus plantings adjacent to the warehouse and in the Cañada del Puerto, which are all considered contributing resources within the National Register-eligible Santa Cruz Island Ranching District. The project is designed to protect the 19th-century stone well and warehouse building, the scale house and water troughs, while the corral system and telephone poles will be partially or completely removed and the eucalyptus trees in the Cañada del Puerto will be removed. I have determined that the undertaking will have no adverse effect on the Santa Cruz Island Ranching District.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Mark Beason, Project Review Unit historian, at (916) 653-8902 or mbeason@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

Consultation with Santa Ynez Band of Mission Indians

United States Department of the Interior

NATIONAL PARK SERVICE
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

IN REPLY REFER TO:

H4217-CHIS

JUN 3 0 2009

Tribal Elders Council
Santa Ynez Band of Chumash Indians
P.O. Box 365
Santa Ynez, CA 93460

Re: Prisoners Harbor Coastal Wetland Restoration Plan

Dear Tribal Elders Council:

Channel Islands National Park has been in consultation with you regarding the restoration of the wetlands at Prisoner's Harbor on Santa Cruz Island and potential impacts to archeological resources in the project area. A draft Environmental Impact Statement has recently been submitted for public review and the Section 106 consultations with the State Historic Preservation Officer are in progress. While conducting a site visit at the Prisoners Harbor Coastal Wetland Restoration project area on February 24, 2009, questions were raised by Freddy Romero regarding the possible presence of Chumash burials in the proposed project fill disposal site 1 across the creek, which is within the recorded boundaries of the archaeological site (SCrI-240). Upon investigating further, we located the following references. According to Dr. Jeanne Arnold, author of *The Origins of a Pacific Coast Chiefdom*, human remains were exposed and removed in the 1920's when the Cañada del Puerto stream course was redirected. Other archaeologists have removed burials from the archeological site but the location descriptions have been vague. It is possible that remains may still be buried in the east-central portion of SCrI-240.

The park wishes to continue the consultation process with you regarding selection and treatment of the proposed fill disposal location. The wetlands restoration project would remove the eucalyptus trees that currently shield that portion of the archeological site, which will make the site more visible and accessible. The park believes that capping the archaeological site on the east side of the drainage would help to protect that portion of the site. The park would cover it with coir geotextile, a natural product without chemical treatment or synthetic webbing, which would provide a demarcation between the existing soil layer and fill material. Fill material would then be deposited to a depth of approximately 1 foot and a distance of 10' from the ordinary high water mark using a skid-steer loader bobcat beginning adjacent to the road and working across the site so that equipment is always operating on fill material. The fill material would be covered with coir geotextile to prevent erosion and re-vegetated with native plants.

The park has identified a second proposed fill disposal area for the Prisoners Coastal Wetland Restoration Plan (see the illustration below). The 2.4-acre site is located upstream from the initial fill disposal site 1. It is overgrown with invasive fennel (*Foeniculum vulgare*) and is outside the 100-year floodplain. No archaeological sites have been recorded at this location and the nearest recorded archaeological site is more than 250 meters away. On June 15, 2009, the new location was inspected by park archaeologist, Kelly Minas, for cultural material. The surface of the ground was not visible due to dense vegetation. He examined the subsurface at four locations using a soil auger to a maximum depth of 60 cm and found no indication of cultural material.

We would like to know your thoughts about capping the eastern portion of SCrI-240 or whether you prefer that all of the project fill material be disposed of on the alternative site. We look forward to hearing from you. Please feel free to contact Paula Power, Ecologist, at 805/658-5784 or by email at paula_power@nps.gov if you have any questions or comments.

Sincerely,

/s/ Russell Galipeau

Russell E. Galipeau, Jr.
Superintendent

Enclosure

SANTA YNEZ BAND OF MISSION INDIANS
Tribal Elders Council
P.O. Box 365 • Santa Ynez • CA • 93460
Phone: (805) 688-8446 • Fax: (805)686-9578 • Email: elders@santaynezchumash.org

September 4, 2009

Mr. Russell Galipeau Jr.
Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

Dear Superintendent Galipeau:

Thank you for your letter of June 30, 2009 wherein you describe the Channel Islands National Park Prisoner's Harbor wetlands restoration project on Santa Cruz Island and the efforts to ensure protection of potential cultural sites by analyzing two areas where fill may be deposited in the course of the project.

In that removal of the eucalyptus trees which currently shield a portion of the archaeological site (SCrI-240) would make it more visible and accessible to park visitors, we agree that capping the site on the east side of the drainage would help protect that portion of the site. As it is unknown what potential cultural material may be discovered in the area of the tree removal, we suggest a mid-project evaluation (after tree removal) in order to determine the best solution to protect the site.

After mid-project evaluation and the absence of cultural material, your staff's solution of using a lightweight tractor beginning adjacent to the road to place one foot of fill at a distance of 10 feet from the ordinary high water mark on the area a little at a time in order to ensure that the tractor only drive on fill seems appropriate.

In that the second proposed fill disposal area (2.4-acre site located upstream from the initial fill disposal site 1) mentioned in your letter is further away from potential sites, and that no archaeological sites have been recorded at that location, the nearest recorded archaeological site is more than 250 meters away and testing for archaeological material done on June 15, 2009 by park archaeologist Kelly Minas (soil augur at four locations to a maximum depth of 60 cm) was negative, this seems like the preferred location for surplus fill material.

With regards to the removal of the berm located near the village area, what is the plan by NPS to prevent erosion of the site and loss of cultural material in the event of flooding?

We understand that an archaeological monitor will be present during this project in case there is an accidental find of cultural material or remains. If such a find occurs, please notify the Santa Ynez Band of Chumash Indians.

Sincerely,
Carmelita Cordero
Tribal Elders Council Chair
Santa Ynez Band of Mission Indians

*To Protect And Preserve
Tribal Ancestry,
Traditions
And Culture*

APPENDIX H—FWS CONSULTATION

L7617-CHIS

Mr. Roger Root
U.S. Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, CA 93003

Reference: Channel Islands National Park, Santa Cruz Island
Prisoners Harbor Coastal Wetland Restoration

Dear Mr. Root:

In compliance with the National Environmental Policy Act, the National Park Service is preparing an Environmental Impact Statement to evaluate possible alternatives for restoring the former coastal wetland at Prisoners Harbor and associated riparian corridor in the lower Cañada del Puerto. Please refer to the U.S. Geological Survey (USGS) quadrangle titled Santa Cruz Island *C* and the enclosed vicinity map. The project area extends over approximately 50 acres of land owned by Channel Islands National Park and The Nature Conservancy. Action is needed because prior modifications to the site, including filling the wetland, channelizing the stream, and introducing invasive species, degraded the ecosystem function of the coastal wetland and riparian corridor.

At this early stage in the planning, we wish to ensure that we are working with a complete list of species that should be considered under Section 7 of the Endangered Species Act and to solicit any early input or concerns that you may have regarding this proposed action. A search of the California Natural Diversity Database, herbarium specimens, and on-the-ground field surveys indicate that the federally listed species in the project area is the Santa Cruz Island fox (*Urocyon littoralis santacruzae*). The known listed species within the project action area, USGS quad *Santa Cruz Island C* are listed below.

Threatened and Endangered Species in USGS quad *Santa Cruz Island C*

Scientific Name	Common Name	Federal	State	Anacapa	Santa Cruz	Santa Rosa	San Miguel	Santa Barbara
Urocyon littoralis cruzae	Santa Cruz Island fox	E	T		C			
Arabis hoffmannii	Hoffmann's rock-cress	E		A!	C	R		
Galium buxifolium	Box-leaved bedstraw	E			C		M	
Helianthemum greenei	Island rush-rose	T			C	R		
Malacothrix indecora	Santa Cruz Island malacothrix	E			C	R	M	
Malacothrix squalida	Island malacothrix	E		A	C			

Thysanocarpus conchuliferus	Santa Cruz Island lacepod	E			C			

Legend

E = ***Endangered***
T = ***Threatened***
(EE) = ***Single island endemic***
(E) = ***Endemic to the islands***
! = ***Extirpated (no longer occurs)***
******* = ***Thought to be extinct***
A, C, R, M, B = ***Island of occurrence***

We look forward to working with your office and the public as we proceed with the environmental planning process for this project. If you have any questions, please contact Paula Power, Ecologist, at 805/658-5784 or at paula_power@nps.gov

Sincerely,

Russell E. Galipeau, Jr.
Superintendent

Enclosure

bcc: CHIS-File, K. Faulkner, P. Power
CHIS:PPOWER:cl:07/29/08

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

Kate —
Paula —

IN REPLY REFER TO:
2008-SL-0577

Septembj- 11^2008

Russell E. Gah'peau, Jr., Superintendent
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

Subject: Species List for Santa Cruz Island Prisoners Harbor Wetland Restoration, Santa Barbara County, California, L7617-CHIS

Dear Mr. Galipeau:

We are responding to your request, dated August 1, 2008, and received in our office on August 4, 2008, for information on endangered and threatened species that may occur at or near Prisoner's Harbor, Santa Cruz Island. The National Park Service (NPS) is preparing an environmental impact statement to evaluate possible alternatives for the restoration of the coastal wetland at Prisoner's Harbor and the associated riparian corridor in lower Canada del Puerto. The project area is approximately 50 acres in area and would occur on land owned by the NPS and The Nature Conservancy. We understand mat me NPS is the lead Federal agency for this project and would assume responsibility under section 7 of the Endangered Species Act of 1973, as amended (Act).

This letter fulfills our requirements under section 7(c) of the Act The NPS, as the lead Federal agency for the project, has the responsibility to review its proposed activities and determine whether any listed species may be affected. If the project is a construction project that may require an environmental impact statement[1], the NPS has the responsibility to prepare a biological assessment to make a determination of the effects of the action on the listed species or critical habitat If the NPS determines that a listed species or critical habitat is likely to be adversely affected, it should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation may be used to exchange information and resolve conflicts with respect to threatened or endangered species or their critical habitat prior to a written request for formal consultation. During this review process, the NPS may engage in planning efforts but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(d) of the Act.

"Construction project" means any major Federal action which significantly affects the quality of the human environment designed primarily to result in the building of structures such as dams, buildings, roads, pipelines, and channels. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorizations or approval which may result in construction.

Russell E. Galipeau 2

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Based upon our review of the species list enclosed with your request, records in our files, and th proposed project location, we beifieve the proposed project site could support the federally endangered Santa Cruz Island Fox *(Urocyon littoralis cruzae)*. Furthermore, because the proposed project site is located in a previously disturbed canyon bottom, and the listed plant species in the vicinity of the project area occur on coastal bluffs, we do not believe any federally listed plant species occur in the area of the proposed restoration work.

Should you have any questions regarding this matter, please contact Robert McMorran at (805) 644-1766, extension 232.

Sincerely,

Chris Dellith Senior
Biologist

APPENDIX I—CALIFORNIA COASTAL COMMISSION

United States Department of the Interior

NATIONAL PARK SERVICE
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001-4354

IN REPLY REFER TO:

L7617-CHIS

MAR 12 2010

Mr. Mark Delaplaine
Federal Consistency Supervisor
California Coastal Commission
45 Fremont Street, Suites 1900 & 2000
San Francisco, California 94105-2219

Dear Mr. Delaplaine:

In accordance with the Federal Coastal Zone Management Act of 1972 as amended, Section 307c (1), the National Park Service (NPS) has determined that the restoration of the Prisoners Harbor coastal wetland and associated riparian corridor on Santa Cruz Island, Channel Islands National Park would have no effect upon coastal uses or resources and therefore, does not require a consistency determination. Santa Cruz Island is located 19 miles offshore in Santa Barbara County.

The NPS proposes to restore ecosystem function to the buried coastal wetland at Prisoners Harbor and the associated riparian corridor, improve hydrologic function and connectivity between the creek and floodplain, protect archeological resources in the project area, and improve the visitor experience. These goals will be accomplished by removing approximately 10,000 cubic yards of fill from the buried coastal wetland, removing non-native plant species, including eucalyptus trees (*Eucalyptus* spp.) and fennel (*Foeniculum vulgare*), removing a portion of the berm channelizing the creek, building a protective berm around the Chumash archeological site, and improving interpretation of the project area. Action is needed because prior modifications to the site degraded the ecosystem function of the coastal wetlands and riparian corridor. This resulted in diminished habitat quality for island species including the Santa Cruz Island fox, bald eagle, and the island scrub-jay; migratory waterfowl traveling the Pacific flyway and passerine birds.

Prisoners Harbor is the principal access point for 90% of Santa Cruz Island. Island residents, researchers, park staff, and visitors disembark at the Prisoners Harbor pier and travel on foot or by vehicle to the isthmus, central valley, and west end of the island. Restoring Prisoners Harbor coastal wetland will not affect access to Prisoners Harbor, beaches within the project area, or other island destinations (CCMP Chap 3, article 2, section 30210). Recreational opportunities will remain the same and will not be affected by this project (CCMP Chap 3, article 3, section 30220).

Project activities are focused on restoring ecosystem function of wetland and riparian communities and will not alter the seabed. Mitigation and Storm Water Pollution Control Plans will prevent discharge or deposit of material in the seabed during construction (CCMP Chap 3, article 4, section 30231 and 30233(6)).

The 60-acre project area occurs on land owned by the NPS and by The Nature Conservancy (TNC). The NPS and TNC have a cooperative agreement to manage the island as one ecological unit. See the enclosed maps (Figure 1.1 and 2.1) of the 60-acre project area and environmentally preferred alternative.

The NPS has prepared an Environmental Impact Statement (EIS) in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. 4321 et seq.). The California Coastal Commission was notified of the availability of the draft EIS and the public comment period. All public comments received during the comment period were reviewed and responses to substantive comments were incorporated in the EIS, please see enclosed CD of the final draft EIS. There were no substantive comments regarding the coastal zone. The park consulted with the State Historic Preservation Office and the Santa Ynez Band of Mission Indians (Chumash) on possible impacts to cultural resources. After developing appropriate mitigation and avoidance measures, the NPS received concurrence on no adverse affect on cultural resources.

The NPS has determined that the restoration of the Prisoners Harbor coastal wetland and riparian corridor in the lower Cañada del Puerto would not affect public access, recreation, the marine environment, or the coastal zone. If you need additional information, or if you have any questions, please contact Paula Power, Ecologist, at 805/658-5784 or paula_power@nps.gov.

Sincerely,

Russell E. Galipeau, Jr.
Superintendent

Enclosures (3)

cc: P. Power, CHIS

Channel Islands National Park
1901 Spinnaker Drive
Ventura, CA 93001

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