

ENVIRONMENTAL ASSESSMENT

RESTORATION OF THE LOWER GLENBROOK QUARRY AND DAM REMOVAL AT TURNEY POINT



Lower Glenbrook Dam: View to Chimney Rock

Point Reyes National Seashore

National Park Service

January 2008

Environmental Assessment

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PROJECT SUMMARY

Point Reyes National Seashore proposes the restoration of natural hydrologic and shoreline process to the Glenbrook estuary portion of Drakes Estero, adjacent to the historic Turney Ranch. The remnant portions of the Glenbrook Dam represent a nonconforming wilderness structure within the Phillip Burton Wilderness Area in Point Reyes National Seashore. The estuary is a part of the greater Drakes Estero system, which has been characterized as one of the most important estuaries on the Pacific coast. The Glenbrook Estuary, one of the numerous fingers of Estero de Limantour, lies at the mouth of Glenbrook Creek.

When it was first completed in the early 1960s, and until its failure in 1982, the lower Glenbrook Dam impounded more than 100 acre-feet of water, consisted of over 30,000 cubic yards of material, and stood nearly 15 feet high. Landowners obtained material for the dam by creating adjacent borrow pits, now the Lower Glenbrook quarry. The completed dam bisected the estuary - preventing tidal flushing of its upper reaches - and dramatically altered natural processes by conversion of approximately half of the estuary from a saltwater dominated system to a freshwater dominated system.

Although the upper estuary regained limited tidal flushing after the 1982 dam breach, tidal passage remains constrained by the narrow dam opening. The current hydrologic regime restricts the formation of subtidal and intertidal mudflats, which are ecologically important transition zones between the estuary and its adjacent uplands. In addition, the eroding earthen dam results in minor sedimentation into the Glenbrook Estuary aquatic habitat and poses a minor safety hazard to park visitors. The unnatural structure creates a visual intrusion, as it is visible to visitors from popular Limantour Beach, and from hiking trails within the Phillip Burton Wilderness Area. The Glenbrook Quarry remains a disturbed area, with limited vegetation growing on the site after more than 40 years.

The purpose of the proposed project is:

- To restore natural hydrologic and shoreline processes,
- To mitigate a public safety hazard,
- To remove a nonconforming Wilderness structure and
- To restore the natural visual character of this portion of the Phillip Burton Wilderness Area.

The project is also consistent with park enabling legislation, General Management Plan and Wilderness Designation, as well as National Park Service Management Policies

This EA evaluates the potential environmental consequences of three alternative strategies for analysis. The Project Area incorporates the dam, quarry, and spillway site as well as access routes to the work area from Home Ranch. Presented for public review are the NEPA-required No Action Alternative (Alternative A) which continues the current management strategy, an alternative which would completely remove the non-conforming dam fill and restore the spillway and quarry areas (Alternative B), and an alternative which would remove just the western arm of the dam, resulting in limited restoration (Alternative C).

The potential for short and long-term direct impacts, cumulative impacts, and determination of impairment and unacceptable impacts are presented as part of this Environmental Assessment. Resource topics include Water Resources and Shoreline Processes; Wetlands; Vegetation – including potential to introduce or promote non-native species; Wildlife; Special Status Species; Cultural Resources; Air Quality; Soundscape; and Wilderness Impact.

The NPS has selected Alternative B as the preferred alternative. Alternative B restores natural process to the project area by completely removing the non-conforming Wilderness structure and restoring disturbed lands associated with the quarry and spillway. Because it best achieves the long-term natural ecological process, Alternative B has also been identified as the environmentally preferred alternative. The project avoids further impacts to Wilderness resources and removes the need to revisit the site to complete restoration. Alternative B would require the least maintenance in the future and would provide the widest range in beneficial uses to this area of national trust lands. Alternative B also provides more aesthetic enhancement and restoration than Alternative C. Further, Alternative B removes all engineered fill from the estuary and Wilderness to promote natural hydrologic and shoreline process within the Project Area.

CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

The National Park Service (NPS) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969, to assist the NPS, other jurisdictional agencies, and the general public in evaluating a proposed restoration action at the Lower Glenbrook Dam and Quarry in Point Reyes National Seashore. The EA examines three alternatives to enhance natural ecological processes to the Glenbrook Estuary, and assesses the potential environmental effects of each alternative. After reviewing this document and considering agency and public concerns, NPS managers will either identify needs for further environmental impacts analysis or publish a Finding of No Significant Impact (FONSI). The FONSI would specify parameters and mitigations for the implementation of this project that would ensure that the Glenbrook Dam Removal and Quarry Restoration Project would have no significant adverse effects.

PROJECT NEED

The remnant of the Glenbrook Dam is a nonconforming wilderness structure in the Glenbrook Estuary within the Phillip Burton Wilderness Area in Point Reyes National Seashore (Figure 1.1). The estuary is a part of the greater Drakes Estero system, which has been characterized as one of the most important estuaries on the Pacific coast. The Glenbrook Estuary, one of the numerous fingers of Estero de Limantour, and is located at the mouth of Glenbrook Creek. The entire Glenbrook Watershed is within Point Reyes National Seashore.

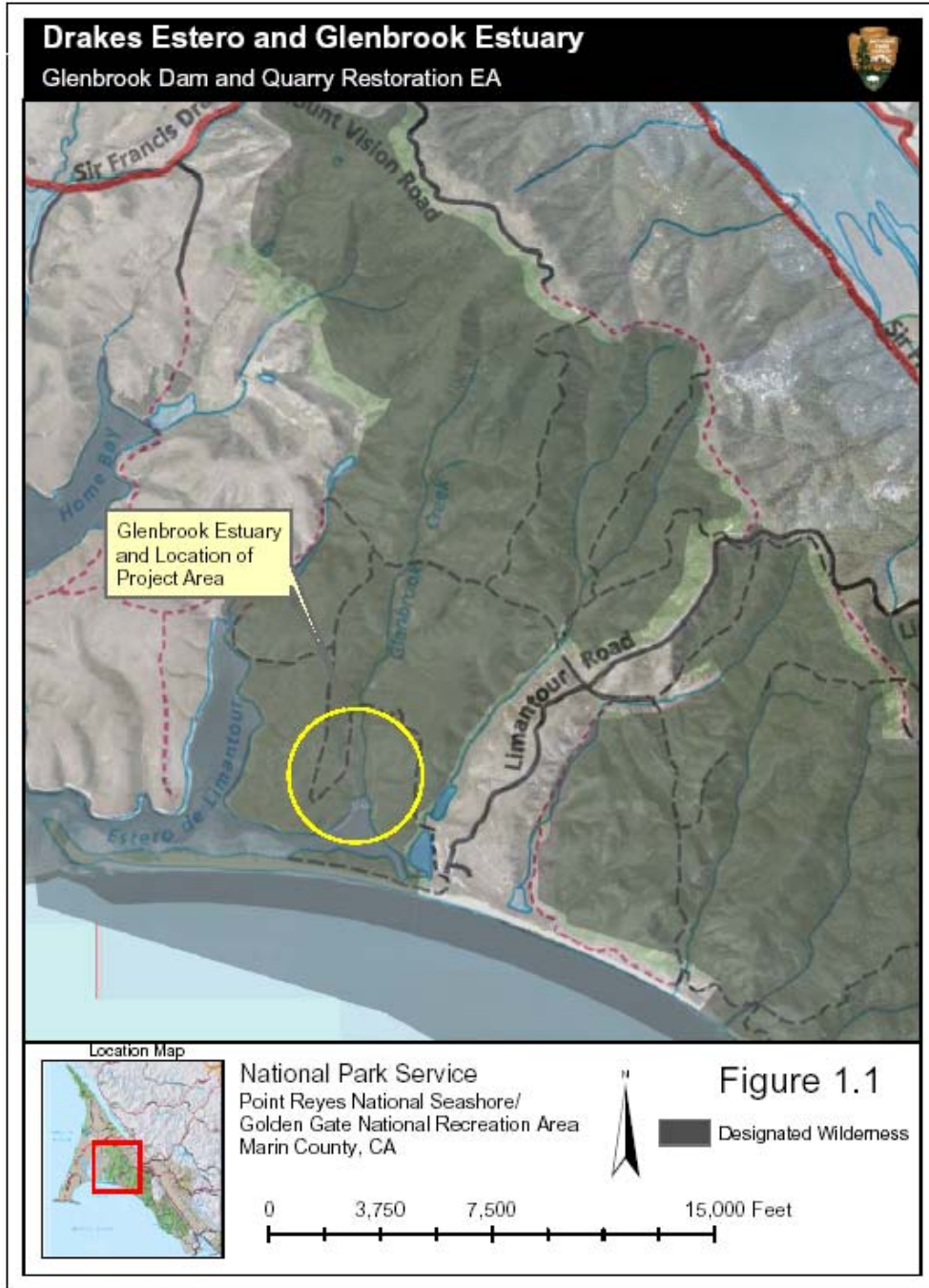
Soon after Congress enacted legislation to create Point Reyes National Seashore in 1962, landowners initiated infrastructure improvement projects, including subdivision, installation of a road network, and the construction of an earthen dam across the Glenbrook Estuary, to increase the value of the property.

When it was first completed in the early 1960s, the lower Glenbrook Dam impounded more than 100 acre-feet of water, consisted of over 30,000 cubic yards of material, and stood nearly 15 feet high. Landowners obtained material for the dam by creating adjacent borrow pits, now the Lower Glenbrook quarry (Figure 1.2). The completed dam bisected the estuary - preventing tidal flushing of its upper reaches - and dramatically altered natural processes by conversion of approximately half of the estuary from a saltwater dominated system to a freshwater dominated system.

The National Park Service acquired the Turney Ranch property in 1963 and incorporated it into Point Reyes National Seashore. The dam impoundment remained until early January, 1982, when a large winter storm created an 80-foot breach in the dam and restored partial tidal flushing to the estuary's upper reaches.



Although the upper estuary regained limited tidal flushing after the 1982 dam breach, tidal passage remains unnaturally constrained by the narrow dam opening. The current hydrologic regime restricts the formation of subtidal and intertidal mudflats, which are ecologically important transition zones between the estuary and its adjacent uplands. In addition, the earthen dam is continuing to erode, creating issues of sedimentation into the Glenbrook Estuary aquatic habitat and poses a minor safety hazard to park visitors. The unnatural structure creates a visual intrusion, as it is visible to visitors from popular Limantour Beach, and from hiking trails within the Phillip Burton Wilderness Area. The Glenbrook Quarry remains a disturbed area, with limited vegetation growing on the site after more than 40 years.



Glenbrook Dam, Quarry Sites and Estuary

Glenbrook Dam and Quarry Restoration EA




Location Map

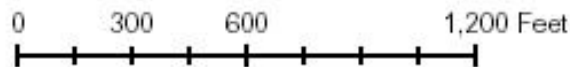


National Park Service
Point Reyes National Seashore/
Golden Gate National Recreation Area
Marin County, CA



Figure 1.2

 Disturbed Lands



PROJECT PURPOSE

The purpose of the proposed project is:

- To restore natural hydrologic and shoreline processes,
- To mitigate a public safety hazard,
- To remove a nonconforming Wilderness structure and
- To restore the natural visual character of this portion of the Phillip Burton Wilderness Area.

The project is also consistent with park enabling legislation, General Management Plan and Wilderness Designation, as well as National Park Service Management Policies.

This federal action is intended to restore natural process and remove nonconforming structures from the Philip Burton Wilderness Area through removal of a breached, non-historic dam structure and restoration of the adjacent quarry. The project is consistent with the Seashore Wilderness Preserve enabling legislation objectives to support "...the maximum protection, restoration, and preservation of the natural environment within the [Wilderness] area" (PL 94-567).

Point Reyes National Seashore Enabling Legislation

As set forth in the 1962 legislation that created PRNS, protection of the unique coastal resources in the park is a primary purpose for its establishment:

...to save and preserve, for the purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped (PL 87-657).

An amendment to the legislation passed in 1976 provides the NPS with specific management goals for PRNS:

...the property ... shall be administered ...without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area (PL 94-544).

Consistent with these mandates, the National Park Service proposes to restore natural hydrologic functioning to the Glenbrook Estuary within the Seashore by removing an artificial structure – Glenbrook Dam – which impedes tidal flushing of the upper estuary, and filling the associated borrow pit created during the construction of the dam – the Glenbrook Quarry.

Point Reyes National Seashore General Management Plan

The Point Reyes National Seashore GMP objectives that guide this project include the following:

- To identify, protect, and perpetuate the diversity of existing ecosystems which are found at Point Reyes National Seashore.
- To preserve and manage as Wilderness those lands so designated under Public Law 94-567 and to also manage as wilderness to the extent possible those tidelands and lands legislatively designated as potential wilderness.
- To manage seashore activities in the pastoral and estuarine areas in a manner with resource carrying capacity.

- To provide opportunities for emphasizing environmental education and programs related to the resource, including the coastal environment.
- In addition to fulfilling the objectives of the GMP and Wilderness Act, the project intends to restore the aesthetics of both wilderness and coastal values along the California coast.

NPS Management Policies

NPS Management Policies, Section 4.1.5, directs actions to restore natural systems in the national parks. The NPS is directed to:

...reestablish natural functions and processes in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation is necessary to protect other park resources, developments, or employee and public safety. Impacts on natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes. The Service will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated (NPS 2006, p.55).

Furthermore, section 4.8.1.1 of the NPS Management Policies addresses the management objective to restore natural shoreline processes:

Natural shoreline processes (such as erosion, deposition, dune formation, overwash, inlet formation, and shoreline migration) will be allowed to continue without interference. Where human activities or structures have altered the nature or rate of natural shoreline processes, the Service will, in consultation with appropriate state and federal agencies, investigate alternatives for mitigating the effects of such activities or structures and for restoring natural conditions (NPS 2006, p.81).

Section 4.6.5 of the NPS Management Policies addresses the restoration of wetlands on NPS lands. Wetlands comprise most of the Glenbrook Estuary project area:

When natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human actions, the Service will, to the extent practicable, restore them to predisturbance conditions (NPS 2006, p.78).

Section 4.6.6 of the NPS Management Policies supports the project objective to restore natural hydrologic process to the Glenbrook Estuary project area:

The Service will manage watersheds as complete hydrologic systems... The Service will achieve the protection of watershed and stream features ... by allowing natural fluvial processes to proceed unimpeded (NPS 2006, p.79).

The project would result in restoration of 2.5 acres of disturbed lands, consistent with GPRA Goal IA1a – Restoration of Disturbed Lands.

PROJECTS CONSIDERED IN CUMULATIVE IMPACTS ANALYSIS

The proposed restoration of Glenbrook Estuary is one of several restoration projects currently in the planning process proposed for the improvement and/or expansion of PRNS water resources. Related actions are described below:

Projects within the Drakes Estero Watershed:

- Coastal Watershed Restoration Project – This project includes the replacement of culverts and the restoration of natural hydrologic process at nine sites within the Drakes Estero Watershed. The project will include replacement or repair of seven culvert facilities impeding natural channel process and fish passage, and removal of two dams impeding natural estuarine and shoreline process. 2007 projects include replacement of three road crossings (Mt Vision, Estero Road and Home Ranch) and the restoration of the Glenbrook Crossing. 2008 work includes removal of Muddy Hollow and Limantour Beach Pond dams, as well as rehabilitation at the Upper Laguna Road Crossing.
- Fire Management Program – The Seashore completed a Fire Management Plan in 2006. The selected plan would result in prescribed fire and mechanical treatment on no more than 3,000 acres per year within park fire management units (FMUs). While 27% of the Drakes Bay/Drakes Estero watershed is included in the plan as active treatment FMUs, the plan does not anticipate treatment on more than 10% of any one watershed within Drakes Bay in any given year.
- Point Reyes Quarry Restoration Project – The park is currently in the inventory, planning and compliance phases of the restoration of quarry sites found in Point Reyes National Seashore. The seven high priority sites are seeking funding for FY 2009 through FY 2011 and will be included in restoration activities concurrent with the Giacomini Wetland Restoration Project, where fill from levee removal will be used in the quarry rehabilitation and restoration process.

Projects outside the Drakes Estero Watershed

- Dune Restoration Project – This project involves the removal of non-native European beach grass from the dune areas within the Seashore. Methods of removal and restoration strategies are currently being tested near Abbotts Lagoon and will be employed at a larger scale under a Line-Item Construction project planned for FY 2009.
- Giacomini Wetland Restoration Project – The park has completed permitting and compliance for implementation of the Giacomini Wetland Restoration Project a 563 – acre property at the head of ecologically sensitive Tomales Bay. The property is protected behind levees and supported a dairy operation until fall 2006. The restoration activities (Phase I) began in fall 2007, with Phase II anticipated for summer/fall 2008. The project objective would result in the restoration of natural hydrologic and estuarine process to a large portion of the property, for the purpose of ecological restoration. The ROD was signed in August 2007. This project is within the Tomales Bay watershed.
- Restoration of Coastal Marsh Habitat at Ken Patrick Visitors Center – Through 20% fee demo funding, the park is initiating planning to restore wetland and ecological habitat at the Ken Patrick Visitor Center Marsh. The NPS is in the planning and assessment phases of this project. Restoration would occur in fall 2009 or fall 2010.
- General Management Plan – Point Reyes National Seashore is in the process of revising the park General Management Plan. This is a long-term strategic planning document that will establish management direction in the park for the next 10 to 20 years. Public scoping has been conducted and the NPS anticipates the planning process to be completed in FY2009.

ISSUES RAISED DURING PROJECT SCOPING

Public Scoping

PRNS solicited public comment regarding this project, and the Horseshoe Pond Restoration Project between July 19, 2002 and August 19, 2002. One comment regarding the proposed Glenbrook Estuary restoration was submitted to the National Park Service. Issues raised in these responses are listed below and are addressed within this Environmental Analysis. It should be noted that the Horseshoe Pond Restoration to Coastal Lagoon was completed in September 2004.

Comment #1: Comments supported the idea of restoring the quarry and spillway using material for the dam. They noted the presence of *Frittilaria affinis* var. *tristulis* (CNPS List 1b) near the east end of the dam. This information was used in development of restoration alternatives (access from east side avoided to avoid impact to rare plant populations).

Concurrent with public scoping, PRNS solicited comments and concerns regarding the proposed project from NPS staff and from additional federal and state agency personnel.

IMPACT TOPICS ADDRESSED IN THE ENVIRONMENTAL ASSESSMENT

The proposed alternatives have a potential for both beneficial and adverse impacts to the topics discussed in this section. Each of these impact topics are addressed in the body of this Environmental Assessment, in order to convey the results of analyses which ascertained the type, severity, and duration of impacts to the environment that would occur as a result of project implementation.

Water Resources and Shoreline Processes

The project proposes to restore natural hydrologic and shoreline process to the Glenbrook Estuary. Topics evaluated as part of this section include Shoreline Process/Marine and Estuarine Resources, Aquatic Habitat, and Water Quality. Manipulation of the system may result in impacts to wetland and water quality resources within the area. Projects that may result in impacts to water quality are required to obtain permits through the Regional Water Quality Control Board under Section 401 of the Clean Water Act. Additional regulations protecting wetlands are described separately.

Wetlands

A portion of the project area includes tidal and freshwater wetland resources. Wetlands are protected and regulated through a variety of measures including the Clean Water Act, River and Harbors Act, Executive Order 11990, National Park Service Director's Order 71, and the California Coastal Commission Coastal Zone Management Act. The US Army Corps of Engineers is the agency responsible for enforcement and permitting under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act. This project also requires a coastal permit from the California Coastal Commission. Through Directors Order 71-A, the National Park Service has established policy and guidelines to comply with Executive Order 11990.

Vegetation

As with any restoration project of this type, there would be ground and vegetation disturbance. This topic is included to ensure that adequate measures are taken regarding site re-grading and planting plans. Monitoring for invasive species and revegetation success is addressed in Section 2 - Project Alternatives.

Special Status Species

The project area has been documented to support a variety of plants and animals with specific federal or state legal protection. Based on site surveys and document review, the NPS determined that the following species were located in, or have the potential to occur within the project area:

- Point Reyes bird's beak (*Cordylanthus maritimus ssp. palustris*) (FSC)
- Marin knotweed (*Polygonum marinense*) (FSC)
- Steelhead (*Oncorhynchus mykiss*) (FT)

Wildlife Assemblages

Although PRNS staff conducted no formal mammal inventories at Glenbrook Estuary, incidental observations have been noted during all field visits. Many mammals including deer and a small herd of Tule Elk occur adjacent to the project area. The estuary is not a major resource to these larger mammals and changes proposed through this project would not affect these species. In addition, because the dam is already breached, and there is an active channel through the site, the dam is not an active wildlife corridor.

Birds may use barren cliff faces as a perch. The project would result in negligible to minor effects to mammal or bird species within the project area and would not result in impairment of park resources or values.

Cultural Resources

The east side of the estuary is the site of the historic Turney Ranch. While ranching was an historical land use of the eastern area, the Lower Turney Dam was constructed after the Turney Ranch operations ended (post-1960) and bears no related historical significance.

An archeological and cultural resource investigation and survey has been completed for the site, and no historic or archaeological features were identified in the project area (Newland, 2002).

Air Quality

Effects from alternatives would be adverse but negligible to moderate over the short-term due to the generation of pollutants from heavy equipment and blowing dust particles during the brief deconstruction period. Operation of multiple pieces of heavy equipment would result in increased production of NOx and particulates for the duration of the restoration activities.

Soundscapes

Sounds from equipment, machinery and other deconstruction work related noises would affect the project area only during the mobilization for project work, deconstruction of the dam and quarry restoration work and post-project demobilization. Effects from alternatives would be adverse but negligible over the short-term during this time period.

Wilderness Impacts

The project area is located within the Philip Burton Wilderness Area and some alternatives would have minor short term impacts during construction, but in the long-term, the project would result in beneficial impacts on the wilderness aesthetic and visual values. Minimum tool analysis (Appendix B) has identified the use of appropriate mechanized equipment as the proper approach to remove the non-conforming structure from the Wilderness (for extensive discussion and justification for use of mechanized equipment in the wilderness, see Wilderness Minimum tool, Appendix B).

IMPACT TOPICS DISMISSED FROM FURTHER ASSESSMENT

Through project scoping it was determined that any of the alternatives described in this document would have a less than significant effect on the impact topics discussed in this section. The purpose of this Environmental Assessment is to identify whether implementation of an alternative could have a significant effect on the environment. Therefore, the EA focuses on those issues with a potential for causing significant impact.

Geology and Soils

The project will occur on sites that are already disturbed by previous land management activities. In addition the soils within the project area do not qualify as prime farmland soils and are not integral to long-term agricultural activities in the region. The effects of this project on geology and soils are no effect to negligible and would not result in impairment to National Park Service Resources. Further evaluation of impacts to geology and soils is not required for this project.

Geohazards

There are no structures or recreational facilities in the project area that could result in the exposure of visitors or staff to a geologic hazard.

Stream Flow Characteristics

Alternatives would affect the Glenbrook Estuary only. Actions would not affect the character, location, or amount of streamflow within the watershed or project area.

Unique Ecosystems, Biosphere Reserves

Effects from the alternatives on the uniqueness of Point Reyes National Seashore as a valued ecosystem and internationally-recognized Biosphere Reserve are considered negligibly beneficial in the long-term.

Tribal Land Use, Sacred Sites

The archeological and cultural resource investigation and survey, which included participation by a representative of the Federated Indians of Graton Rancheria, did not identify any tribal land uses or sacred sites in the project area (Newland, 2002).

Land Use and Socioeconomic Impacts

Current land use in the project area includes open space, wildlife habitat, and passive recreational use within Point Reyes National Seashore. Alternatives would not result in any change from current land use patterns.

Visitor Experience and Aesthetic Resources

The action alternatives would improve the aesthetic resources of the immediate area of the Glenbrook Dam, through removal of the earthen dam and revegetation of the degraded quarry scars. Visitor Experience and Aesthetic Resource effects for Point Reyes National Seashore would be long-term, negligible, and positive.

Public Access and Recreation

During project implementation, short-term closures of the project area due to heavy equipment use may cause short-term, negligible, adverse impacts to public access and recreational value of the site. Visitors access the Glenbrook Watershed from nearby Limantour Road via the Muddy Hollow, Glenbrook, and Estero trails. These trails attract day hikers and birdwatchers. The Glenbrook dam does not serve as a trail, as it is already breached. In addition to day hiking, some

visitors recreate in the area via horseback and kayak. During project restoration visitors will be excluded from areas where heavy equipment is in use. In addition, visitors may experience short-term adverse effects from noise and visual intrusions due to equipment use. However, the restoration would achieve minor long-term beneficial recreation affects from increased bird habitat.

Disproportionate Effect on Minority and Low-Income Populations

The proposed alternatives focus on natural resources and would not result in changes to visitor demographics, including minority or low-income user groups. No residential or commercial areas would be impacted by any of the proposed alternatives.

Energy Resources

The proposed project does not require the sustained use of energy supplies. The proposed alternatives would have a short-term, negligible, adverse effect on energy resources.

Prime and Unique Farmlands

To ensure compliance with the Farmland Policy Act (FPPA; PL97-98; 7 USC 4201 et. seq.), the Council on Environmental Quality requires consideration of impacts to prime and unique farmland as a result of federal action. Prime and unique farmlands are defined by the US Department of Agriculture and are determined by the Natural Resource Conservation Service. The project area does not occur within any areas defined by the NRCS as prime and unique farmland, and therefore this issue is dismissed from further analysis.

RELEVANT LAWS, REGULATIONS, POLICIES

This section describes key legislation and NPS policy that forms the legal context relevant to the Glenbrook Dam and Quarry Restoration Environmental Assessment. Legislation specific to Point Reyes National Seashore and National Park Service Policies relevant to the proposed project are discussed in section 1.3, Project Purpose.

National Park Service Legislation and Policy

National Park Service Organic Act of August 25, 1916 (PL 64-235, 16 USC §1 et seq. as amended). On August 15, 1916, Congress created the National Park Service with the National Park Service Organic Act. This act, as reaffirmed and amended in 1970 and 1978, establishes a broad framework of policy for the administration of national parks:

The Service thus established shall promote and regulate the use of the Federal areas known as National Parks, Monuments, and Reservations... by such means and measures as to conform to the fundamental purpose of the said Parks, Monuments, and Reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

The National Parks Omnibus Management Act of 1998 (SB 1693). This act provides for improved management and increased accountability for National Park Service programs. Specifically, Title I, Sec. 101 states:

Recognizing the ever increasing societal pressures being placed upon America's unique natural and cultural resources contained in the National Park System, the Secretary shall continually improve the ability of the National Park Service to provide state-of-the-art management, protection, and interpretation of and research on the resources of the National Park System.

In Title II, Sec 201, the stated purposes of the National Park System resource inventory and management programs are to:

- 1) more effectively achieve the mission of the NPS, 2) enhance the management and protection of national park resources by providing clear authority and direction for the conduct of scientific studies and to use the information gathered for management purposes, 3) ensure appropriate documentation of resource conditions in the National Park System, and 4) encourage others to use the National Park System for study to the benefit of park management as well as broader scientific value where consistent with the Organic Act.

Point Reyes Wilderness Area (PL 94-567). This law established the Point Reyes Wilderness Area. In 1985 (PL 99-68), Congress designated the Point Reyes wilderness area as the Philip Burton Wilderness in recognition of this congressman's dedication to the protection of the nation's resources and role in the establishment of national parks in the San Francisco Bay Area.. Areas that had been designated as potential Wilderness (Muddy Hollow, Limantour, and Abbotts Lagoon) were changed to full Wilderness status through notice in the Federal Register on November 18, 1999. The Glenbrook Restoration project area falls within the Philip Burton Wilderness.

National Park Service Management Policies, 2006. This document contains Service-wide policies of the NPS. National Park Service units must adhere to the policy unless it is specifically waived or modified by the Secretary, the Assistant Secretary, or the Director of NPS. In addition to sections cited in Chapter 1, Section 3 of this EA, other sections relevant to the proposed actions are Section: 4.1.5 Restoration; 4.6.5 Wetlands; 4.6.6 Watershed and Stream Processes; 4.8.1.1 Shorelines and Barrier Islands.

Government Performance Results Act (1993) (GPRA) Goal IA1a

The passage by Congress of the Government Performance Results Act of 1993 (GPRA) mandated that the NPS and all government agencies define measurable management goals and tie public funding expenditures to the achievement of those goals and objectives. In response, the NPS defined hierarchical GPRA goals that relate primarily to natural and cultural resource protection, visitor satisfaction and organizational effectiveness. Mission Goal Ia states, "Natural and cultural resources and associated values are protected, restored and maintained in good condition and managed within their broader ecosystem and cultural context."

Federal Environmental Legislation and Regulations

National Environmental Policy Act (NEPA) of 1970. PL 91-190, 83 Stat. 852, 42 USC §4341 et seq. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. Regulations implementing NEPA are set forth by the Council on Environmental Quality. This document has been prepared following NPS Directors Order 12 meeting Department of Interior and NPS standards.

Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) (40 CFR Parts 1500-1508). The Council on Environmental Quality regulations for implementing NEPA establishes the process by which federal agencies fulfill their obligations under the NEPA process. The Council on Environmental Quality regulations ascertains the requirements for environmental assessments and environmental impact statements that document the NEPA process. The Council on Environmental Quality

regulations also defines such key terms as "cumulative impact," "mitigation" and "significantly" to ensure consistent application of these terms in environmental documents. This environmental analysis was prepared as directed in the Council on Environmental Quality regulations.

Clean Air Act, as amended, PL Chapter 360, 69 Stat. 322, 42 USC §7401 et seq. Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations.

Federal Water Pollution Control Act (Clean Water Act) and subsequent amendments of 1977 (33 USC 1251 et seq.). The Clean Water Act provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Section 404 of the act prohibits the discharge of fill material into navigable water of the United States, including wetlands, except as permitted under separate regulations by the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. The project will be conducted within jurisdictional wetlands as confirmed by the US Army Corps of Engineers August 13, 2002. The project will require 404 permits through the Corps, and 401 certification through the San Francisco Regional Water Quality Control Board. Application for these permits will be submitted subsequent to the Environmental Assessment.

Rivers and Harbors Act (1899). Predating the Clean Water Act, the jurisdiction of the US Army Corps was limited to waters subject to Section 10 of the Rivers and Harbors Act (1899). The Corps continues to oversee Section 10 jurisdictional waters, which are navigable waters that are subject to the ebb & flow of the tide, and/or those that are presently used, have been used in the past, or could be used for interstate transport or foreign commerce. Section 10 jurisdiction extends to mean high water (MHW) and includes tidal areas presently subject to tidal influence, as well as unfilled areas currently behind levees that were historically below MHW. Section 10 jurisdiction also extends upstream to the ordinary high water (OHW) of non-tidal waters designated as navigable waters of the United States. The US Army Corps regulates and permits Section 10 in addition to CWA Section 404. The US Army Corps of Engineers jurisdictional delineation (August 13, 2002) confirmed that the project is outside of waters regulated under Section 10.

Coastal Zone Management Act. This act protects coastal environments. While this act transferred regulatory authority to the States and excluded federal installations from the definition of the "coastal zone," it requires that federal actions be consistent with state coastal management plans. Activities taking place within the coastal zone under the definition established by the California Coastal Management Plan require a federal consistency determination. This project will require federal consistency review by the California Coastal Commission. Application for these permits will be submitted subsequent to the Environmental Assessment.

Endangered Species Act of 1973, as amended, PL 93-205, 87 Stat. 884, 16 USC §1531 et seq. The Endangered Species Act protects threatened and endangered species from unauthorized "take", and directs federal agencies to ensure that their actions do not jeopardize the continued existence of listed species. Section 7 of the act defines federal agency responsibilities for consultation with the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service for fish and marine mammal species. Consultation requires preparation of a Biological Assessment to identify any threatened or endangered species that is likely to be affected by the proposed action. The NPS has initiated consultation with the U.S. Fish and Wildlife Service and NOAA Fisheries regarding this project.

Wilderness Act of 1964 (P.L. 88-577). Established a National Wilderness Preservation System, allowing Congress to designate wilderness areas for preservation and protection of their natural condition. “The areas shall be administered... in such a manner as will leave them unimpaired for future use and enjoyment as wilderness.” Wilderness is defined in the act as “an area where the earth and community of life are untrammelled by man, where man himself is a visitor who does not remain.” This project is not within designated wilderness.

Cultural Resources Legislation

Antiquities Act of 1906, PL 59-209, 34 Stat. 225, 16 USC §432 and 43 CFR 3. This act provides for the protection of historic or prehistoric remains, "or any antiquity," on federal lands. It protects historic monuments and ruins on public lands. It was superseded by the Archeological Resources Protection Act (1979) as an alternative federal tool for prosecution of antiquities violations in the National Park System.

Archeological Resources Protection Act of 1979, PL 96-95, 93 Stat. 712, 16 USC §470aa et seq. and 43 CFR 7, subparts A and B, 36 CFR. This act secures the protection of archeological resources on public or Indian lands and fosters increased cooperation and exchange of information between private, government, and the professional community in order to facilitate the enforcement and education of present and future generations. It regulates excavation and collection on public and Indian lands. It requires notification of Indian tribes who may consider a site of religious or cultural importance prior to issuing a permit. The act was amended in 1988 to require the development of plans for surveying public lands for archeological resources and systems for reporting incidents of suspected violations.

National Historic Preservation Act of 1966, as amended, PL 89-665, 80 Stat. 915, 16 USC §470 et seq. and 36 CFR 18, 60, 61, 63, 68, 79, 800. The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places. The Advisory Council on Historic Preservation has developed implementing regulations (36 CFR 800), which allow agencies to develop agreements for consideration of these historic properties. The NPS, in consultation with the Advisory Council, the California State Historic Preservation Officer (SHPO), American Indian tribes and the public, has developed a Programmatic Agreement for operations and maintenance activities on historic structures. This 1995 Programmatic Agreement (available on the web at <http://www.achp.gov/npspa1.html>) provides a process for compliance with National Historic Preservation Act, and includes stipulations for identification, evaluation, treatment, and mitigation of adverse effects for actions affecting historic properties.

American Indian Religious Freedom Act, PL 95-341, 92 Stat. 469, 42 USC §1996. This act declares policy to protect and preserve the inherent and constitutional right of the American Indian, Eskimo, Aleut, and Native Hawaiian people to believe, express, and exercise their traditional religions. It provides that religious concerns should be accommodated or addressed under NEPA or other appropriate statutes.

Executive Orders

Executive Orders are issued by the Office of the President and apply to all Federal agencies.

Executive Order 11593: Protection and Enhancement of the Cultural Environment. This Executive Order instructs all federal agencies to support the preservation of cultural properties. It directs them to identify and nominate cultural properties under their jurisdiction to the National Register of Historic Places and to "exercise caution... to assure that any federally owned property

that might qualify for nomination is not inadvertently transferred, sold, demolished, or substantially altered."

Executive Order 11988: Floodplain Management. This Executive Order requires federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains, and to avoid development in floodplains whenever there is a practical alternative. If a proposed action is found to be in the applicable regulatory floodplain, the agency shall prepare a floodplain assessment, known as a Statement of Findings.

Executive Order 11990: Protection of Wetlands. This Executive Order established the protection of wetlands and riparian systems as the official policy of the federal government. It requires all federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The Park Service requires a Statement of Finding and mitigation for any projects that may impact > 0.25 acres of "natural" wetlands except for those related to recreational facilities (e.g., overlooks, bike/foot trails, and signs) and minor stream crossings that completely span channel and wetlands (i.e., no pilings, fill, or other support structures).

Executive Order No. 12898: Environmental Justice in Minority Populations and Low Income Populations. This Executive Order requires that programs, policies or activities of the NPS (or any federal agency) do not have disproportionate "high and adverse human health or environmental effects" on minority or low-income populations of the US.

Executive Order No. 13112: Invasive Species. This Executive Order prevents the introduction of invasive species and directs federal agencies to not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species. Actions proposed in the Glenbrook Dam EA include measures to prevent the introduction and spread of invasive species.

Relationship to Other Plans and Policies

Marin County Local Coastal Program, Unit 1 (LCP)(1980) supports and encourages the enhancement of public recreational opportunities. Referring to PRNS and GGNRA, the LCP states "public access to these lands seems to be assured." The LCP assumes that a major portion of the access and visitor services needs within Unit I would and can be successfully integrated into federal park development and management programs. The Seashore has determined that the project is within the Local Coastal Planning area, and will require federal consistency review by the California Coastal Commission.

Marin County Community Plan. PRNS and the GGNRA North District are part of the Marin County Coastal Recreation Corridor. The Countywide Plan recommends that PRNS and GGNRA be retained in their natural state to the greatest extent possible, and that recreation uses be low intensity. The County Community Plan is currently undergoing a revision.

Point Reyes National Seashore General Management Plan (GMP)

The current PRNS General Management Plan (NPS 1980) and Statement for Management (NPS 1990) identify objectives for the management of natural and cultural resources. The PRNS Statement for Management sets the primary resource management objectives for PRNS as the identification, protection, perpetuation, and restoration of significant cultural and historic

resources and of the diversity of natural ecosystems representative of the California coast (NPS 1993).

Resources Management Plan. The Resources Management Plan (RMP) for the park was updated in 1999. The Plan presents an inventory and description of natural and cultural resources; describes and evaluates the current resources management program; and prescribes an action program based on legislative mandates, NPS policies, and provisions of related planning documents. Restoration of the Glenbrook Estuary is identified in the RMP.

PRNS General Management Plan Update. The planning process to update the 1980 PRNS General Management Plan (GMP) is in progress; scoping for the GMP update has been conducted. The process is expected to take 4-5 years. The Glenbrook Dam project is consistent with the mission and objectives of the NPS and the existing GMP. The NPS continues to implement the goals of the 1980 GMP and the direction and guidance it provides, while updating specific actions, such as the Glenbrook Dam project, through the NEPA and planning processes in conformance with NPS policies.

ANTICIPATED PERMITS AND CONSULTATION

This project will require consultation and permits through the following agencies:

- California Coastal Commission – Federal consistency review and coastal permit
- San Francisco Regional Water Quality Control Board – Clean Water Act Section 401 certification
- US Army Corps of Engineers – Clean Water Act Section 404 consultation and permit
- US Fish and Wildlife Service – Endangered Species Act – Section 7 consultation
- National Marine Fisheries Service – Endangered Species Act – Section 7 consultation
- California Historic Preservation Office – Section 106 documentation and compliance

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CHAPTER 2: PROJECT ALTERNATIVES

The Seashore has identified restoration as a priority at this site. The proposed alternatives cover three physical treatment variables. Figure 2.1 provides a close-up of the project area and quarry sites under consideration.

Outline of proposed alternatives:

- A. No Action
- B. Quarry Restoration through Dam Removal {Preferred Alternative}
- C. Removal of West Branch of Dam and Western Quarry Restoration

Alternatives considered but rejected:

- Removal of east branch only

ALTERNATIVE A – NO ACTION

Under this alternative, no action would be taken within the project area. The quarry scars will remain, and the breached dam will continue to impinge upon the tidal action within the estuary. While the site will remain disturbed, over time, vegetation may establish and provide a thin organic layer for long-term growing media. The physical scars and features of the quarry, dam, and spillway facilities will remain as non-conforming structures within the Philip Burton Wilderness.

No regulatory consultation would be required under this alternative.

Alternative A would not achieve any project objectives.

ACTIONS COMMON TO ALL ACTION ALTERNATIVES

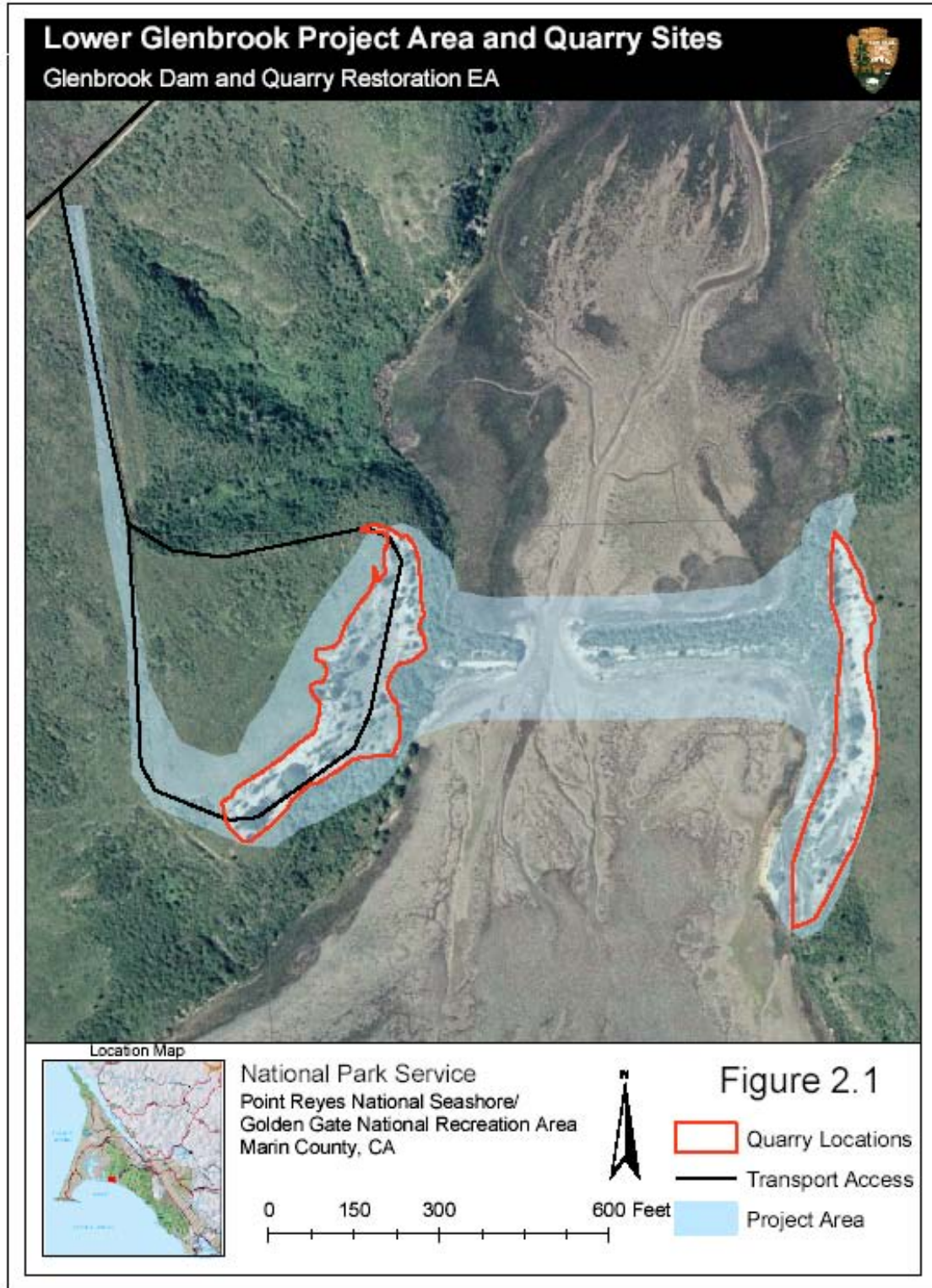
The proposed project is located within the Philip Burton Wilderness and is intended to remove non-conforming structures and restore natural processes to the area. The tools and equipment necessary to conduct the work proposed under the Action Alternatives involves the use of heavy equipment within Wilderness.

In order to determine the minimum tool in Wilderness, Point Reyes National Seashore has completed a Minimum Requirement and Minimum Tool Analysis (included as Appendix B).

The Minimum Requirement Analysis is composed of two parts; 1) the determination that the proposed action is necessary for administration of the wilderness area as wilderness (the minimum requirement), and 2) the selection of the best method for implementing the action with the least impact to wilderness (the minimum tool determination). The Wilderness Act and National Park Service Policy require that generally prohibited actions undertaken in wilderness complete a Minimum Requirement Analysis. This analysis is included as a part of environmental compliance documentation, generally as an appendix to an Environmental Assessment.

Site access would be achieved from Estero Road, through Home Ranch. Wilderness access along Muddy Hollow and Estero Trail is shown in Figure 2.2. This route is the same as that used for the restoration of Glenbrook Crossing, part of the Coastal Watershed Project – Geomorphic Restoration Project EA. This route would not require temporary fill.

The equipment necessary to conduct this work includes a 30,000 lb + excavator, 1-2 off-road dump trucks, 1-2 bulldozers (D-7 or D-8 equivalent size), and various support and crew vehicles. Minimum tool analysis has identified the use of appropriate mechanized equipment as the proper approach to remove the non-conforming structure from the Wilderness.



ALTERNATIVE B – QUARRY RESTORATION THROUGH DAM REMOVAL {PREFERRED}

Dam removal and recontouring of the quarry and spillway is proposed through this alternative. This project would require mobilization of mechanical equipment and short-term site disturbance during construction. This alternative would result in a stable restored site at the project location. It would result in removal of approximately 19,000 cubic yards of material from the Glenbrook Estuary and recontouring and restoration of the 2.5-acre quarry and spillway scar areas.

Restoration Activities

The restoration and fill removal logistics are complicated by the limited access to only one side of the dam, the breach in the dam, and the dynamics of the tidal fluctuation. Five weeks are allocated for completion of this project. The equipment used in the restoration would include a large excavator, two off-road dump trucks, a bulldozer, water truck, and other smaller support equipment. The project area, specifically the dam excavation area, would be delineated by installation of temporary silt fencing. The silt fence would represent both a project work boundary, as well as boundary for incidental fall back material.

Temporary Crossing of Breach: In order to accomplish the restoration, the project would require a temporary crossing of the breach in the dam for the duration of the construction window. Evaluation has determined that a solid fill would potentially result in more hydraulic pressure and less stability in the crossing. Installation of multiple culverts or use of temporary floating bridges may be used as a temporary crossing of the breach, while maintaining limited tidal flow through the project area. The temporary crossing requires rock and minor amounts of fill from the dam to cover and armor temporary culverts that would allow for tidal flow in the estuary for the duration of the project. This crossing would allow access for construction equipment to both sides of the dam, and would minimize potential effects of temporary closure to the estuarine habitat upstream of the dam and work area. The temporary crossing (fill and culverts, or floating structure) would be removed at the end of the project, and salvaged, or disposed of appropriately. The area requiring fill would be isolated and cleared with seine nets to minimize potential impacts to aquatic species. Once the crossing is installed, isolation nets would be removed to allow biological exchange through the project area.

The dam would be deconstructed using a large excavator and bulldozer. Once the crossing is established, topsoil from the dam and spillway (east) side of the dam would be removed and stockpiled within the project area. Material would either be pushed by the dozer, or hauled to proper locations using the off-road dump trucks. The spillway area would be scarified, fill would be added to the cut area, with minor recontouring required. Topsoil would be salvaged from the spillway access area, the dam, and the highwall layback area for topsoiling. Prior to implementation, areas of iceplant would be removed by volunteers to minimize potential of introduction into topsoil materials.

Project Site Access

Glenbrook Dam and Quarry Restoration EA



Location Map



National Park Service
Point Reyes National Seashore/
Golden Gate National Recreation Area
Marin County, CA



0 0.3 0.6 1.2 Miles

Figure 2.2
— Primary Site Access
■ Designated Wilderness

Fill from the dam, approximately 19,000 cubic yards, would be removed and transported to the spillway or quarry sites for fill and recontouring. Fill removal would be limited to the footprint of the dam. Restoration of the mudflats involves only minor smoothing adjacent to the dam. Ultimately, the tidal action would be allowed to make the final adjustments in the mudflats.

Restoration of the quarry would require scarification of the compacted quarry surfaces, layback of the highwall, recontouring, and grading using appropriately sized bulldozer with the excavator and loader used to conduct finish work. The vertical quarry wall would be laid back to a less severe slope after topsoil is removed and stockpiled. Site contouring would be performed in order to grade the fill into the existing landscape.

Erosion Control

Topsoiling and revegetation would accelerate recovery of the site and erosion control measures would be implemented. Upon completion of grading, erosion control measures, including installation of coir fiber blankets and straw wattles would be installed at contour. Intervals between blankets and wattles would not exceed 10 feet. Materials would be placed to minimize establishment of flow pathways and potential for rilling at the site. Topsoiling would be augmented by distribution of native seed local seed stock, collected from the adjacent plant communities and spread over the topsoil layer during fall rains.

Post-Construction Monitoring

A long-term monitoring and maintenance program for erosion and vegetation would be implemented once the site construction is completed. Long-term monitoring would concentrate on control of non-native vegetation, and monitoring surface conditions to prevent major erosion. Photo-monitoring would be implemented for long-term recovery and interpretation at the site. Site monitoring would also include patrols for invasive non-native species including pampas grass, ivy, etc. Success of seeding with native grass seed would be evaluated using monitoring plots.

Attainment of Project Objectives

Alternative B most completely achieves the project objectives. Complete removal of dam fill from the estuary and restoration of disturbed lands within the Wilderness will allow for recovery of a natural ecological condition within the project area.

ALTERNATIVE C – REMOVAL OF WEST ARM OF DAM AND RESTORATION OF WESTERN QUARRY

This alternative would involve partial removal of the dam, extracting the west arm of the Glenbrook dam. The east arm of the dam would remain so as to not require installation of temporary culverts to build a crossing for machinery and equipment, with the purpose of limiting impacts to water quality from sedimentation during the work period.

Only partial dam removal and recontouring of the quarry and spillway is proposed through this alternative. This project would require mobilization of mechanical equipment and short-term site disturbance during construction. This alternative would result in a stable restored site at the project location in place of the west arm of the dam, but effects and impacts of the east side of the dam would remain. It would result in removal of approximately 5,000 cubic yards of material from the Estero de Limantour and recontour of the west side quarry. The spillway area would not be treated and would remain denuded and highly erosive.

Restoration Activities

The restoration and fill removal logistics are complicated by the limited access to only one side of the dam, the breach in the dam, and the dynamics of the tidal fluctuation. Three weeks are allocated for completion of this project. The equipment used in the restoration would include a large excavator, one dump truck, a bulldozer, water truck, and other smaller support equipment.

The west arm of the dam would be deconstructed using a large excavator and bulldozer. Topsoil from the west arm of the dam would be removed and stockpiled. Topsoil would be salvaged from the dam for topsoiling.

Fill from the west arm of the dam plus some fill below grade within the footprint of the dam would be removed and used to restore the quarry. Fill removal would be limited to the footprint of the west arm of the dam. Restoration of the mudflats involves only minor smoothing adjacent to the dam. Ultimately, the tidal action would be allowed to make the final adjustments in the mudflats.

Restoration of the quarry would require scarification of the compacted quarry surfaces, recontouring, and grading using an appropriately sized bulldozer with the excavator and loader used to do some of the finish work. Site contouring would be performed in order to grade the fill into the existing landscape. Topsoiling and revegetation would accelerate recovery of the site and erosion control measures would be implemented.

The volume of sediment stored in the west portion of the remaining dam is less than 5,000 cubic yards. This would allow for scarification and replanting, but only removal of 25% of the material stored in the dam structure and estuarine area. This alternative would require mobilization equivalent to that required for full restoration alternative with much less treatment. The cost benefit to this mobilization is far less than that identified in Alternative B.

Erosion Control

Topsoiling and revegetation would accelerate recovery of the site and erosion control measures would be implemented. Upon completion of grading, erosion control measures, including installation of coir fiber blankets and straw wattles would be installed at contour. Intervals between blankets and wattles would not exceed 10 feet. Materials would be placed to minimize establishment of flow pathways and potential for rilling at the site. Topsoiling would be augmented by distribution of native seed from a park approved supplier, or local seed stock.

Post-Construction Monitoring

A long-term monitoring and maintenance program for erosion and vegetation would be implemented once the site construction is completed. Long-term monitoring would concentrate on control of non-native vegetation, and monitoring surface conditions to prevent major erosion. Photo-monitoring would be implemented for long-term recovery and interpretation at the site.

Attainment of Project Objectives

Alternative C partially meets project objectives, but the remains of the eastern dam arm and spillway would persist reducing the overall benefit of this alternative.

ALTERNATIVES CONSIDERED BUT REJECTED

East arm removal and treatment of spillway

Access to the east side of the dam would entail cutting a new tread for equipment access. Though the Seashore is lined with roads, access from the east requires approximately ½ mile of new road to reach the spillway area. Access to the east arm would disturb a healthy native coastal grassland including extensive intact areas of native bunchgrass and rare fragrant fritillary.

The intrusion required to access the site via new road is considered an inappropriate means of treating the site. This treatment is not considered a viable restoration alternative and has been rejected.

Partial removal of dam to water level

Excavation of the dam remains only to water level would require the same level of effort as documented in Alternative B, including crossing the existing breach, etc, but would leave the dam remains at a higher level. This would not achieve the project objective of restoring natural shoreline process. This is not considered a viable restoration alternative as the dam remains would continue to interact with local hydraulics.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is the alternative that will promote the national environmental policy expressed in NEPA (sec 101 (b)). It is the alternative that would cause the least damage to the biological and physical environment and best protects, preserves, and enhances historic, cultural, and natural resources.

The project alternatives represent a range of treatment actions intended to protect and enhance the cultural and natural resources documented within the project area. The current state limits natural shoreline process and aquatic habitat. These conditions would persist under Alternative A. While this alternative would not result in direct impacts to resources, ongoing degraded conditions are not environmentally desirable for this area.

Alternative C would result in limited restoration to just the western portion of the project area. The spillway scar would remain, and the eastern arm of the former dam would continue to impede natural process in the estuary, and a visual intrusion to the Wilderness. The mobilization and demobilization would be equivalent to that discussed under Alternative B, with far more limited restoration occurring.

The NPS has determined Alternative B is the environmentally preferred alternative. Under Alternative B, complete removal of the remnant dam, a non-conforming Wilderness feature, and restoration of natural shoreline process and aquatic habitat conditions would occur. This alternative involves the most extensive restoration effort, but will remove anthropogenic fill from the Glenbrook Estuary, and restore conditions in the adjacent spillway and quarry areas. Alternative B sets the stage for full-scale recovery of natural process to the project area and Glenbrook Estuary. It removes the human made constraints and features and is more consistent with preserving the untrammled nature of Wilderness in the long-term. Despite increased potential short-term impacts, Alternative B would facilitate the development of a more ecologically stable system that meets the NPS management policies related to natural shoreline and hydrologic process.

IMPACT AVOIDANCE AND MITIGATION MEASURES

Impact avoidance and mitigation measures are measures and practices that will be implemented as standard procedures during the project to reduce or avoid adverse impacts resources within the project area. The NPS is committed to ensuring that all actions proceed in the most environmentally sensitive manner possible. Consequently, a number of environmental commitments have been adopted for the proposed action, and will be incorporated into restoration activities. The following sections describe the environmental commitments that will be implemented for the proposed action.

The measures identified below apply to all alternatives associated with the project.

Erosion and Sediment Control Measures

- All conduct construction activities during the dry season.
- All construction work will be conducted in accordance with site specific construction specifications that minimize the potential for increased delivery of sediment to surface waters.
- Minimize removal of and damage to native vegetation.
- Install temporary construction fencing to identify all areas that require clearing, grading, revegetation, or recontouring, and minimize the extent of areas to be cleared, graded, recontoured, or otherwise disturbed.
- As appropriate, implement erosion control measures to prevent sediment from entering surface waters, including the use of silt fencing or fiber rolls to trap sediments and erosion control blankets on slopes and channel banks.
- Avoid operating equipment in flowing water by using temporary cofferdams and/or other suitable materials to divert flow around the channel and bank construction area.

Spill Prevention and Response Plan

NPS will require the construction contractor to prepare a spill prevention and response plan that regulates the use of hazardous and toxic materials, such as fuels and lubricants for construction equipment. NPS would oversee implementation of the spill prevention and response plan. Elements of the plan would ensure that:

- workers are trained to avoid and manage spills;
- construction and maintenance materials are prevented from entering surface waters and groundwater;
- all spills are cleaned up immediately and appropriate agencies are notified of any spills and of the cleanup procedures employed;
- staging and storage areas for equipment, materials, fuels, lubricants, solvents, and other possible contaminants are located at least 100 feet away from surface waters;
- no vehicles are fueled, lubricated, or otherwise serviced within the normal high water area of any surface water body;
- vehicles are immediately removed from work areas if they are leaking; and
- no equipment is operated in flowing water (suitable temporary structures are installed to divert water around in-channel work areas).

Measures to Protect Cultural Resources

The NPS will coordinate with the Federated Indians of Graton Rancheria to insure that either an NPS or FIGR representative is on site during the construction activities. While the project has been designed to remain away from documented resource areas, the NPS employee will be on site

to insure that this is indeed the case. In the case that resources are discovered during the course of construction, the NPS will act immediately and appropriately as documented in 36 CFR 800.13 “Post-review discoveries” (<http://www.achp.gov/regs.html#800.13>). Based on the amount of exploratory work conducted as part of this planning process, the chances are likely very low that the project will encounter any resources of concern.

Measures to Protect Recreational Use

NPS will take feasible measures to minimize the effects of project construction on recreational use. Information on upcoming closures, including closure dates and arrangements for alternative parking, restroom facilities, and trail access points will be posted on the park website, distributed at the Bear Valley and Ken Patrick Visitor Centers, and posted at each construction site.

Measures to Protect Plant Life and Prevent the Introduction and Spread of Invasive Plant Species

Measures to protect riparian, tidal marsh, coastal vegetation and special status plants during construction will be incorporated into construction activities. They will include, but may not be limited to, the following.

- Temporary construction fencing will delimit work areas. Fencing will be installed before any site preparation work or earthwork begins.
- Exclude foot and vehicle traffic from sensitive areas using temporary construction fencing and flagging tape in a conspicuous color.
- Washing off the tires or tracks of trucks and equipment entering and leaving project sites to prevent seed transport.
- The project site will be surveyed for the below list of rare plants prior to construction actions and flagging placed to mark any locations. During construction, the area will be fenced off to protect against disturbance. In areas where the plant is known to occur, but is not present at the time of survey, the surface sand layer would be stockpiled and spread to nearby areas following construction, allowing for natural regeneration of rare plants from seed the following season. These rare plants include:
 - Point Reyes bird’s beak (*Cordylanthus maritimus ssp. Palustris*)
 - Marin knotweed (*Polygonum marinense*)
 - fragrant fritillary (*Fritillaria liliacea*)
 - mission bells (*Fritillaria affinis var. tristulis*)
 - San Francisco owl’s clover (*Triphysaria floribunda*)
 - Gairdner’s yampah (*Perideridia gairdneri spp. Gairdneri*)

Measures to Protect Wildlife

To prevent disturbance of migratory birds—protected under the federal Migratory Bird Treaty Act, the California Fish and Game Code, and CEQA, site checks will be conducted to ensure no bird nests are disturbed as part of the project. Work on the site would be projected for June/July 2008, following surveys of the area. The survey for nesting activity must be conducted within one week of the start of project activities.

If preconstruction surveys identify active nests belonging to common migratory bird species, a 100-foot exclusion zone will be established around each nest to minimize disturbance-related impacts on nesting birds. If active nests belonging to special-status migratory birds are identified, a no-activity buffer zone will be established around each nest. The radius of the no-activity zone and the duration of exclusion will be determined in consultation with the U.S. Fish and Wildlife Service.

The proposed speed limit associated with dust control (10 mph on unpaved roads), will also limit potential impacts to Myrtle's silverspot butterfly.

Measures to Protect Natural Quiet and Soundscapes

Seashore staff and NPS contractors will implement the following measures to reduce construction noise and lessen the impacts of noise that cannot be avoided.

Construction equipment will be required to have sound control devices at least as effective as those originally provided by the manufacturer, and no equipment will be operated with an unmuffled exhaust. In general, construction will take place between 7:00 a.m. and 7:00 p.m., Monday through Saturday.

In addition, NPS will post signs at each restoration site and on the park website providing the name and contact information for an NPS staff member the public can contact with noise concerns. This person will be responsible for recording and monitoring complaints related to construction noise, and for ensuring that logged complaints are mitigated to the maximum extent possible. Construction times and contact information for noise concerns will also be publicized in the park newsletter.

Measures to Protect Air Quality

The NPS and its contractors will implement the following measures to control the generation of fugitive dust during site preparation and construction activities. These measures are contained in the Bay Area Air Quality Management District's (BAAQMD's) Feasible Control Measures for PM10 Emissions from Soil Removal Activities (BAAQMD 1999).

- Limit the area subject to excavation, grading and other construction activity at any one time.
- Water unpaved access roads, parking areas, and staging areas as necessary, or stabilize them with nontoxic soil stabilizers approved for use adjacent to surface waters.
- Apply (nontoxic) soil stabilizers to inactive earthwork areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water, or apply nontoxic soil stabilizers to exposed stockpiles as necessary.
- Maintain properly tuned equipment and limit idling time to 5 minutes.
- Cover trucks hauling soil, sand, or other loose materials, or require them to maintain at least 2 feet of freeboard.
- Replant vegetation or topsoil disturbed areas as quickly as possible.
- Limit traffic speeds on unpaved roads to 10 mph.

Measures to Protect Public Safety

The NPS and its contractors will require the construction contractor to prepare and implement a traffic safety plan. The traffic safety plan will address appropriate vehicle size and speed, travel routes, closure plans, detour plans (if any), flagperson requirements (if any), locations of turnouts to be constructed (if any), coordination with law enforcement and fire control agencies, measures ensuring emergency access, and additional need for traffic or speed limit signs. Delivery and haulage access, including contractor mobilization and demobilization, will be scheduled to minimize impacts on traffic on area roadways, including US-101. Construction worker parking and access will be managed to avoid impeding access for park visitors and emergency vehicles.

In addition, the NPS is committed to the following design and construction commitments:

- Restoration and spoils disposal earthwork: Caltrans Standard Specifications (California Department of Transportation 1999).
- Structural features for water conveyance: relevant guidance of the American Waterworks Association.
- Other structural features, such as bridge: Uniform Building Code (International Conference of Building Officials).

NPS will ensure that design and construction of project features, including earthwork and infrastructure, proceeds in accordance with the appropriate codes and standards.

Measures to Protect Water Quality

Seashore staff and NPS contractors will implement the preferred alternative to abide by the following stipulations in order to protect Water Quality at and downstream of the project Sites:

- Conduct construction activities during the dry season.
- Conduct construction work in accordance with site specific construction plans that minimize the potential for increased delivery of sediment to surface waters.
- Ensure that concentrated runoff and concentrated discharge are diverted away from channel banks.
- Minimize removal of and damage to native vegetation.
- Install temporary construction fencing to identify areas that require clearing, grading, revegetation, or recontouring, and minimize the extent of areas to be cleared, graded, recontoured, or otherwise disturbed.
- Grade and stabilize spoils sites to minimize erosion and sediment input to surface waters and generation of fugitive dust (see discussions under Measures to Protect Air Quality below).
- As appropriate, implement erosion control measures to prevent sediment from entering surface waters, including the use of silt fencing or fiber rolls to trap sediments and erosion control blankets on slopes and channel banks.
- Avoid operating equipment in flowing water by using temporary cofferdams and/or other suitable structures to divert flow around the channel and bank construction area.

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MATRIX SUMMARIZING THE IMPACTS OF ALTERNATIVES

| Impact Topic | Alternative A - No Action | Alternative B - Dam Removal and Quarry Restoration | Alternative C - Removal of West Arm of Dam and Western Quarry Restoration |
|---|---|--|--|
| <p>Water Resources and Shoreline Processes</p> | <p>Under Alternative A, the dam portions would remain, resulting in short-term and long-term minor adverse impacts to shoreline process and water quality, and negligible adverse impacts to aquatic habitat.</p> | <p>Alternative B would result in short-term minor adverse impacts to shoreline process, water quality and aquatic habitat associated with construction and initial ecological recovery. In the long-term, proposed actions would result in moderate beneficial impacts to natural shoreline and estuarine process, with minor beneficial impacts to aquatic habitat and water quality.</p> | <p>Alternative C would result in short-term negligible adverse impacts to shoreline process, water quality and aquatic habitat associated with construction and initial ecological recovery. In the long-term, proposed actions would result in negligible beneficial impacts to natural shoreline and estuarine process, aquatic habitat and water quality.</p> |
| <p>Wetlands</p> | <p>Alternative A would result in no effect to wetlands in the short-term. Continued degradation of dam fill and limitations to natural process would result in adverse negligible long-term impacts to wetland resources.</p> | <p>Alternative B would result in short-term adverse minor impacts to tidal waters and wetlands, and non-jurisdictional isolated wetlands associated with temporary wetland fill (0.055 acres) for construction access. In the long-term, permanent fill of 0.01 acres of jurisdictional wetland will be offset by the permanent increase in Section 404 tidal wetlands and/or waters by 0.54 acres. Alternative B would result in long-term minor beneficial effects on wetland resources.</p> | <p>Alternative B would result in short-term negligible adverse impacts to non-jurisdictional isolated wetlands associated with construction access. In the long-term, removal of the western arm would result in the net increase of 0.20 acres of Section 404 tidal wetlands. Alternative C would result in long-term negligible beneficial effects on wetland resources.</p> |

| Impact Topic | Alternative A - No Action | Alternative B - Dam Removal and Quarry Restoration | Alternative C - Removal of West Arm of Dam and Western Quarry Restoration |
|------------------------|---|--|--|
| Vegetation | Alternative A would have no effect on vegetation resources in the short-term. In the long-term, persistence of these disturbed land areas would result in negligible adverse impacts to vegetation resources in the area. | Alternative B would result in short-term minor adverse impacts to vegetation along construction routes, staging and work areas. Recontouring, erosion control, and reseeding with native species would result in minor beneficial impacts to vegetation in the long-term. | Alternative C would result in short-term minor adverse impacts to vegetation along construction routes, staging and work areas. Recontouring, erosion control, and reseeding with native species would result in negligible to minor beneficial impacts to vegetation in the long-term. |
| Special Status Species | There would be no impacts to special status species within the project area. | <p>Alternative B would not result in direct impacts to federally threatened or endangered species. The project would occur in late summer with approximately a 25 day duration, to avoid potential impacts to migrating steelhead, and the location is more than 200 meters away from feeding areas for snowy plover. Brown pelican is known to feed within the Glenbrook estuary, which would remain open due to installation of culverts at the temporary crossing.</p> <p>Proposed actions would result in direct impacts to a small percentage (approximately 5%) of the overall Point Reyes birds-beak (<i>Cordylanthus maritimus ssp palustris</i>) populations within the project area.</p> <p>Overall, the proposed project actions are timed to avoid direct interaction with special status species. The project actions would result in short-term negligible to minor adverse impacts in</p> | <p>Alternative B would not result in direct impacts to federally threatened or endangered species. The project would occur in late summer, with approximately a 15 day duration, to avoid potential impacts to migrating steelhead, and the location is more than 200 meters away from feeding areas for snowy plover. Brown pelican is known to feed within the Glenbrook estuary, which would remain open due to installation of culverts at the temporary crossing.</p> <p>Proposed actions would result in direct impacts to a small percentage (<2%) of the overall Point Reyes birds-beak (<i>Cordylanthus maritimus ssp palustris</i>) populations within the project area.</p> <p>Overall, the proposed project actions are timed to avoid direct interaction with special status species. The project actions would result in short-term negligible adverse impacts in the short-term. Recovery of natural shoreline and</p> |

| Impact Topic | Alternative A - No Action | Alternative B - Dam Removal and Quarry Restoration | Alternative C - Removal of West Arm of Dam and Western Quarry Restoration |
|-----------------------------|---|--|--|
| | | the short-term. Recovery of natural shoreline and estuarine process to the area would result in negligible to minor beneficial impacts to special status species in the project area. | estuarine process to the area would result in negligible beneficial impacts to special status species in the project area. |
| Wildlife Assemblages | Alternative A would not affect terrestrial or aquatic wildlife assemblages. | Alternative B would result in negligible to minor impacts to aquatic and terrestrial wildlife assemblages in the short-term. In the long-term, actions would result in negligible adverse impacts to terrestrial wildlife, but minor beneficial impacts to aquatic wildlife. | Alternative C would result in negligible to minor impacts to aquatic and terrestrial wildlife assemblages in the short-term. In the long-term, actions would result in no effects to terrestrial wildlife, but negligible beneficial impacts to aquatic wildlife. |
| Cultural Resources | Alternative A would not affect cultural resources. | While site surveys for cultural resources did not document the presence of cultural resources in the area, the potential for proposed actions to encounter such resources remains. Project actions are not likely to effect cultural resources in the short or long-term. | While site surveys for cultural resources did not document the presence of cultural resources in the area, the potential for proposed actions to encounter such resources remains. Project actions are not likely to effect cultural resources in the short or long-term. |
| Air Quality | Alternative A would not affect air quality. | Analysis of the pollutants generated in association with Alternative B resulted in determinations of negligible adverse impacts associated with particulate matter (PM10), reactive organic gasses (ROG), and sulfur dioxide (SOX); minor adverse impacts associated with generation of carbon monoxide (CO); and moderate adverse impacts associated with generation of nitrogen dioxide (NOX). There would be no impacts over the long-term. | Analysis of the pollutants generated in association with Alternative C resulted in determinations of negligible adverse impacts associated with particulate matter (PM10), reactive organic gasses (ROG), sulfur dioxide (SOX) and carbon monoxide (CO); and minor adverse impacts associated with generation of nitrogen dioxide (NOX). There would be no impacts over the long-term. |

| Impact Topic | Alternative A - No Action | Alternative B - Dam Removal and Quarry Restoration | Alternative C - Removal of West Arm of Dam and Western Quarry Restoration |
|---------------------------|---|---|---|
| Soundscapes | Alternative A would not affect soundscapes. | Alternative B would result in elevated noise levels within and adjacent to the work area during the approximately 25 day period of construction. The natural wind and wave noise would buffer construction noise, resulting in short-term adverse minor impacts to soundscape. In the long-term, removal of non-conforming Wilderness structure would result in permanent protection of natural quiet in the area, considered a minor beneficial soundscape effect. | Alternative C would result in elevated noise levels within and adjacent to the work area during the approximately 15 day period of construction. The natural wind and wave noise would buffer construction noise, resulting in short-term adverse minor impacts to soundscape. Partial removal of non-conforming Wilderness structure may result in the necessity to conduct more work in the future, resulting in an adverse minor effect to the Wilderness soundscape in the long-term. |
| Wilderness Impacts | The presence of a non-conforming structure and disturbed lands within the designated Wilderness conflicts with the maintenance and provision of an untrammeled area. The persistence of these facilities within the Wilderness is considered a minor adverse impact to the Wilderness character within the Glenbrook Estuary. | Construction equipment, described in Section 2.2, would be used to conduct this work. Construction activities are estimated to take approximately 25 days, with work occurring between 7am and 7pm, along with reduced visitor access to the Wilderness during the construction period would result in minor to moderate adverse impacts in the short-term. In the long-term, the removal of non-conforming structures, restoration of disturbed lands, and restoration of natural process and the natural wilderness aesthetic to the Glenbrook Estuary is considered moderate beneficial. | Construction equipment, described in Section 2.2, would be used to conduct this work. Construction activities are estimated to take approximately 15 days, with work occurring between 7am and 7pm, along with reduced visitor access to the Wilderness during the construction period would result in minor adverse impacts in the short-term. Partial removal of non-conforming Wilderness structure may result in the necessity to conduct more work in the future, resulting in an adverse minor effect to the Wilderness resources in the long-term. |

CHAPTER 3: PROJECT SETTING AND AFFECTED ENVIRONMENT

Proposed restoration activities at Glenbrook Estuary require evaluation of potential impacts to biological, physical and cultural resources as part of the three restoration alternatives. For the purposes of this Environmental Assessment, the “affected environment” under consideration is contained within the Project Area boundaries (as seen in Figure 2.1). This section reports the results of literature reviews, the compilation of existing data, and primary field surveys conducted to inventory and evaluate current environmental conditions within the Project Area.

This section provides an understanding of both the general environmental setting of the project area and a more focused description of those specific resources that could be affected by the proposed project. The Project Setting is presented to foster a fuller understanding of the Project Area. The Affected Environment is required (by the NEPA regulations [Section 1502.15]) to provide a description of the specific resources that could be affected, directly or indirectly, by project implementation. Information provided in this chapter was gathered from literature reviews; the compilation of existing data, and primary field surveys conducted to inventory and evaluate current environmental conditions within the Project Area.

PROJECT SETTING

The project setting section includes description of physical and biological resources that occur within the project planning area, but where effects from alternatives are expected to have no to negligible impact.

Environmental Conditions

Construction of the lower Glenbrook (Turney) Dam occurred about the time that the Seashore was established in the early 1960’s. The dam flooded approximately ten acres of tidal marsh at the mouth of Glenbrook Creek. This habitat was converted from tidal marsh and estuary to a large pond. In 1982, the dam breached, resulting in reconnection of the estuarine system to the footprint of the pond. While the estuary has returned to a more naturally functioning system, the tidal circulation is limited to the 80-foot breach in the dam. The remains of the dam and the associated quarry are visible from a number of vistas within the Wilderness area and are not consistent with the Wilderness management objectives.

The dam impounded water approximately 10 feet above the tidal limit and limited access to the watershed for spawning anadromous fish populations. *Oncorhynchus mykiss* has been documented in the watershed. Anadromy is limited to the lower reach of the watershed, as there is a barrier to passage approximately one mile upstream that the Seashore plans to address through the Coastal Watershed Restoration Project – Glenbrook Crossing in 2008.

Geology, Soils and Seismicity

The cliffs surrounding Drakes Bay are part of the Purisima Formation (Clark et. al. 1997). This formation is described as typically thick to very thick bedded, light olive gray siltstone that, upon weathering becomes nodular and yellowish gray. On the syncline between Inverness Ridge and Point Reyes Headlands, the formation is as much as 490 meters thick. Throughout the Drakes Bay area, the top of the Purisima formation has been removed by erosion.

Turney Point stands up to 200 feet above sea level and is typical of a Purisima Formation bluff on Drakes Bay. Gradual slopes to the sea are bounded by steep slopes in excess of 50% where tidal

estuaries flood more ancient river valleys. The end of the bluff is a vertical wall, but is protected behind the Limantour Spit, allowing for vegetation to dominate the cliffs.

Soils within the area are predominantly Tomales fine sandy loams. Derived from the marine sedimentary Purisima Formation, the Tomales Soil series are deep, moderately well-drained coastal upland soils. The effective rooting depth is 40-60". Permeability is very slow, and runoff is medium to rapid, depending upon slope. Slopes range from 2% to 50%. The hazard of water erosion is moderate to high, depending upon slope. Annual precipitation is 25-35". The Soil Conservation Service derived Marin County Soils Map breaks Turney Point into four soil sub-series associated with the described range of slopes.

In addition, the Rodeo clay loam at the head of the estuary (general area of the Estero Trail Bridge) and Pablo Bayview loam (represented by low gradient, rounded slopes) are found in limited distribution within the project area.

Roads

Roads accessing the project area were constructed prior to 1960. Since acquisition by the Seashore, most roads accessing the site have been maintained at least as trails. However, maintenance on some roads has been discontinued. For the purpose of this project, access to the site would be accomplished through use of these historic roadbeds.

Quarry

The quarry was extracted for the sole purpose of dam construction. The quarry scar covers approximately 2.5 acres at the end of Turney Point. The quarry remains mostly barren, with steep walls and a wide flat table. Quarry vegetation is limited, though there has been some increase in pine growing on the site since the 1995 Mt. Vision Fire.

Dam

The lower Glenbrook (Turney) Dam, when completed impounded 100 acre-feet of water. Made up of more than 30,000 cubic yards of material and standing nearly 15 feet high, this structure across the Glenbrook estuary dramatically altered natural processes until its breach in 1982. The dam and its 80-foot wide gap have been a visible feature of the Seashore from a variety of vistas, namely Mount Vision and the Limantour spit.

Spillway

The spillway to the pond was excavated from the hillslope east of the dam. The spillway is more than 300 feet long and up to 15 feet deep in some areas. The hillslope continues to erode into the spillway area, and has delivered some topsoil and seeds to the area. The western edge of the spillway cut supports native grasses and rare plants. Work in the spillway area would stay off these western slopes.

Land Use Planning at Point Reyes National Seashore

Point Reyes National Seashore is managed according to guidelines established in the Point Reyes General Management Plan (National Park Service 1980), which defines management practices and identifies the land uses that are permitted throughout the park. The land use designations used in the General Management Plan were developed to support management of Point Reyes National Seashore lands and development of their future based on the value of the Seashore's resources, identified management objectives, and the expectations of the public. Those relevant to the project sites and immediate vicinity are defined below.

Environmental Protection—Wilderness: There are 32,730 acres of Wilderness designated within the Seashore. These lands are managed in accordance with the mandates of the federal Wilderness Act of 1964.

AFFECTED ENVIRONMENT FOR IMPACT ANALYSIS

Water Resources and Shoreline Processes

Currently, the Glenbrook Estuary has limited tidal influence due to the constraints put on the system by the size of the breach in the Lower Glenbrook Dam. Prior to dam construction, the freshwater and saltwater currents and circulation in the estuary was uninhibited across the project area. This area is now limited by the dam breach.

Shoreline Process/Marine and Estuarine Resources

The unnaturally occurring narrow estuary outlet increases the velocity of water flow through the breach, which can have a number of effects on shoreline processes and estuarine resources. Increased velocity can lead to scouring the dam slopes on the east and west side of the dam arms and increased sediment loading in both outgoing freshwater flow and incoming tidal flow. Increased sediment can lead to increases water temperature, which affects aquatic habitat and wildlife behavior for fish, birds and mammals both in Drakes Estero and the Glenbrook Estuary, and increased deposition on mudflats, sandbars on downstream beaches. The narrowed channel also limits the effects that naturally uninhibited currents would have on vegetation and fish habitat within the estuary. These limitations can effect the circulation of oxygen and nutrients through the estuarine system.

The prominence of European beach grass (*ammophylla*) on Limantour Spit has altered the typical breaching actions and thereby limits natural shoreline and estuarine process.

Water Quality and Aquatic Habitat

Water quality in the Glenbrook Estuary is not influenced by any source areas outside of the Wilderness watershed. Several upstream impediments (to fish passage) exist, and would be addressed by the Coastal Watershed Project. Impacts to water quality from the dam and circulation between tidal and freshwater currents on the Glenbrook Estuary have the potential to alter the ecosystem's conditions of the water as habitat for fish, vegetation and invertebrates. Increases to the naturally occurring sediment load can affect the elevation of mudflats or depth of silt layers and produce changes such as the growth of vegetation in areas that would otherwise be low nutrient systems, or vice versa. Mudflats, sandbars, shoals and shallows can all be affected by these changes. Salinity, oxygen and nutrient levels also affect water as habitat for invertebrates, plants and fish in estuarine and intertidal systems.

Wetlands

The dam was constructed across the Glenbrook portion of the Estero de Limantour. Two wetland communities, northern coastal salt marsh and a pickleweed vegetation series, can be found within the project area. Implementation of alternatives would remove fill from the estuarine area allowing for development of more intertidal and subtidal habitat, and return natural hydrologic processes to the ecosystem, which would lead to negligible to minor beneficial impacts to both estuarine and wetland species.

In addition to the project area, the access route was assessed and jurisdictional responsibilities relating to US Army Corps of Engineers jurisdictional oversight. These wetlands were delineated via the Park Service's methods in a 2002 study, based on the Cowardin classification system.

Details from this effort can be found in the *Delineation of Potential Jurisdictional Wetlands and “Other Waters” – Glenbrook Dam Removal Project* (Parsons 2002). Consultation with the US Army Corps of Engineers (hereafter Corps) to confirm the extent of these delineations and subsequent Corps jurisdiction was completed on September 23, 2002.

Potential Jurisdictional Section 10 Waters of the Rivers and Harbors Act

Potential Section 10 jurisdiction within the Delineation Study Area would include the subtidal channel that crosses through the gap in the dam and the adjacent intertidal mudflats and low marsh areas dominated by California cord grass and *Scirpus maritimus* (Figure 3.1).

Potential Section 404 Jurisdictional Wetlands and Waters of the United States

The Corps regulates several types of activities in waters of the United States, which includes special aquatic sites (e.g., wetlands) and “other waters” (e.g., rivers, streams, lakes, and other water features). These waters are regulated under Section 404 of the Clean Water Act (40 CFR Section 328.3). Based on our review of the literature and field surveys, we have concluded that the following jurisdictional features were or were not present (Figure 3.1).

“Other Waters” of the United States

Potential jurisdictional tidal waters were mapped both within the immediate project area and areas upstream and downstream of the project area. Potential jurisdictional tidal waters were comprised of 2.95 acres (128,553.3 square feet) of unvegetated subtidal channels and intertidal mudflats extending up to the High Tide Line (HTL) in the immediate vicinity of the dam structure. There were no non-tidal “other waters” present in the project area.

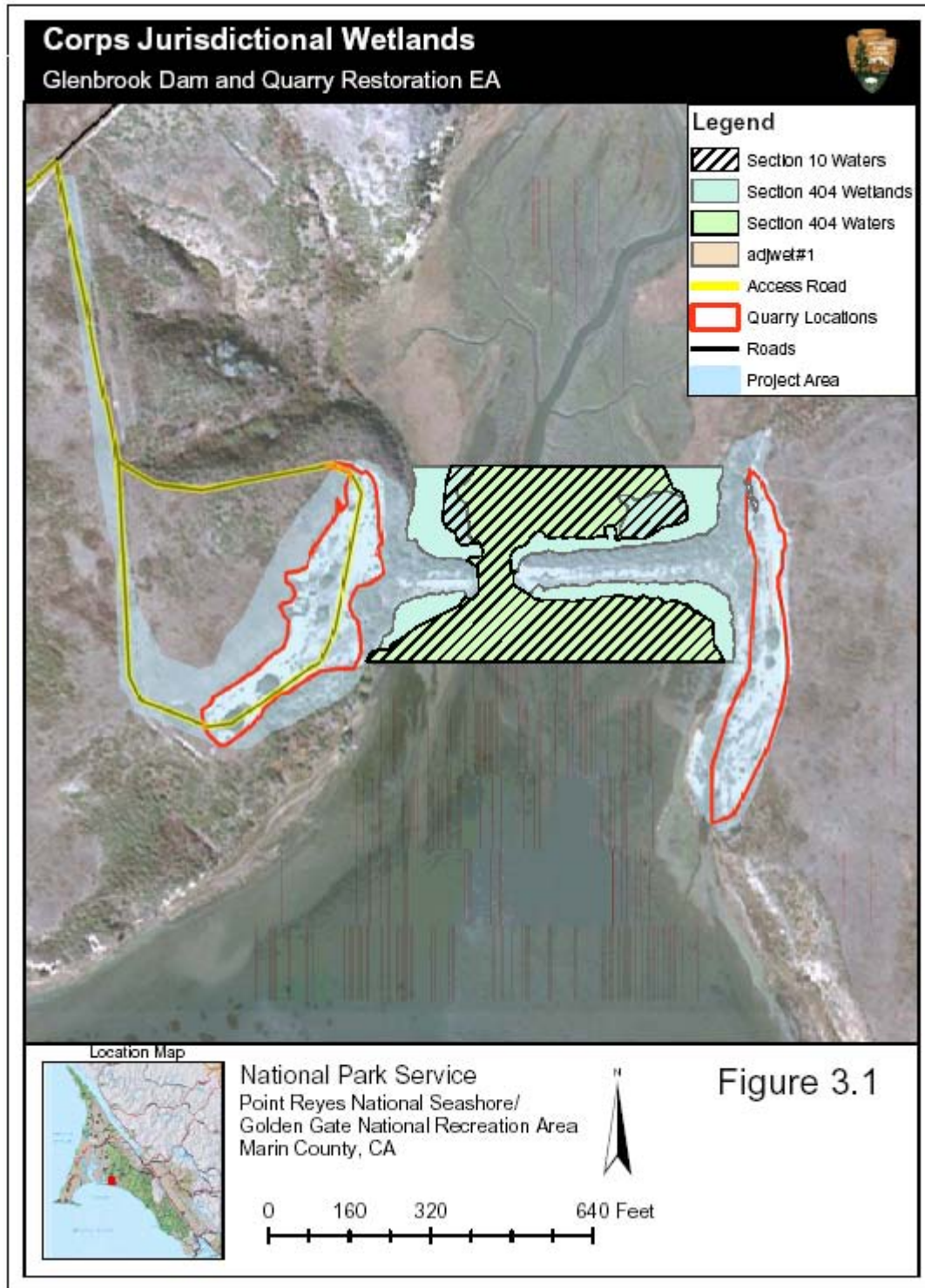
Special Aquatic Sites

Potential jurisdictional wetlands within the project area consisted of vegetated areas below the HTL in the immediate vicinity of the dam structure; four (4) adjacent wetlands on the east side of the dam and in the southern and northern portions of the construction access road; and approximately eight (8) isolated depressional, swale, or drainage features along the construction access road.

- Approximately 1.68 acres (73,432.4 square feet) of potential jurisdictional tidal wetlands appear to be present in the study area, which includes the immediate Project Area and areas upstream and downstream of the Project Area).
- Approximately 0.06 acres (2736.4 square feet) of potential jurisdictional adjacent wetlands appear to be present.
- Approximately 0.97 acres (42,188.4 square feet) of potential jurisdictional isolated wetlands appear to be present.

Potential Jurisdictional “Other Waters”

- **Tidal** – Potential jurisdictional tidal waters are defined as unvegetated areas up to “high tide line.” Within the Delineation Study Area, potential jurisdictional tidal waters would be comprised primarily of the main subtidal channel that flows through the 80-foot gap left when the dam broke and the adjoining unvegetated intertidal mudflats (Figure 3.1).
- **Non-Tidal** – There were no potential jurisdictional non-tidal waters present in the Delineation Study Area.



Potential Jurisdictional Wetlands (Special Aquatic Sites)

- **Tidal** – Potential jurisdictional tidal wetlands incorporate vegetated areas below the HTL. The low marsh is characterized by either Pacific cord grass or a species more adapted to brackish salinities, *Scirpus maritimus*. The low marsh intergrades into the mid marsh, which is characterized primarily by species such as pickleweed, jaumea, and arrow grass.

Above the mid marsh is a thin band of vegetation that is typically inundated only at the highest high tides or extreme storm tides. This so-called high marsh supports species such as salt grass (*Distichlis spicata*), western marsh rosemary, and gumplant.

- **Non-Tidal/Adjacent** – Four potential jurisdictional adjacent wetlands were delineated in the project area. The first feature occurs on the east side of the dam adjacent to one of the quarry sites from which material used to construct the dam was taken (Figure 3.1). Construction of the earthen berm and removal of material from the quarry appears to have created a depressional feature that serves as a catchment basin for precipitation and surface run-off from the adjoining bluff/quarry slopes. The depressional feature was densely vegetated by an almost monotypic cover of spikerush (*Eleocharis macrostachya*), although rush (*Juncus balticus*), California blackberry, and velvet grass (*Holcus lanatus*) were also present. The remaining adjacent wetlands are outside of the potential work area.
- **Non-Tidal/Isolated** – Approximately eight potential jurisdictional isolated wetland features were mapped within the project area. These features occurred in or directly alongside the construction access road and were comprised of small depressional features (e.g., “dips” in road) or long, linear swales or erosional gullies paralleling the road.

Primary hydrologic sources for the depressional features were precipitation and surface and seep run-off from adjoining uplands. Most of these depressional features are seasonal, drying out relatively rapidly once most of the winter rains had ceased. Linear swales or erosional gullies paralleling the construction access road were concentrated in the northern portion of the wetland delineation study area. Principal hydrologic sources for these features were surface and seep run-off from adjacent uplands.

Vegetation

Most of the vegetation communities within the Project Area are wetland- and riparian-associated communities or ones that are ecotonal or adjacent to wetlands and riparian areas. In addition to special status plants, the California Natural Diversity Database (NDDDB) also tracks occurrences of rare and significant vegetation communities that have been imperiled by commercial and residential development, invasion by non-native species, etc. (CDFG 2005). A search of the NDDDB identified several special habitats or Natural Communities with potential to occur within the Seashore, although none occurred within the Project Area or immediate vicinity. Special habitats included Coastal and Valley Freshwater Marsh, Northern Coastal Salt Marsh, Central Dune Scrub, Coastal Terrace Prairie, and Northern Maritime Chaparral. Descriptions of the primary communities observed within the Project Area are listed below.

Coastal Freshwater Marsh (NDDDB Natural Community) – Coastal Freshwater Marsh communities are flooded perennially or at least through the large portion of the growing season, establishing in slow-moving, low gradient, or stagnant water areas fed by groundwater, seeps, and streams consists of a mixture of herbaceous hydrophytic species¹. Marshes are often defined by either supporting tall emergents such as bulrush (*Scirpus californicus*), cattails (*Typha* spp.), or bur-reed (*Sparganium* spp.) or by low-growing emergents such as water parsley (*Oenanthe sarmentosa*), hydrocotyle (*Hydrocotyle ranunculoides*), knotweed (*Polygonum* spp.), and water plantain (*Alisma* spp.).

¹ *Hydrophytic species* or *hydrophytes* are plants that grow in water or on a substrate that is at least periodically deficient in oxygen as a result of high water content.

Northern Coastal Salt Marsh (NDDDB Natural Community) – Northern Coastal Salt Marsh is a transitional habitat between freshwater and marine environments that develops within sheltered embayments, stream mouths, and along the fringes of larger water bodies such as estuaries and bays. It is dominated by species that have developed a tolerance to salt water. Most of this community supports a low-growing emergent community on large flood or marshplains, with slightly taller emergents occurring in the “low marsh” directly adjacent to intertidal and subtidal tidal channels. The most common species at the project sites are pickleweed (*Salicornia virginica*). Other common associates include saltgrass (*Distichlis spicata*) and fleshy jaumea (*Jaumea carnosa*). Sea lavender (*Limonium californicum*), arrow-grass (*Triglochin concinna*), alkali heath (*Frankenia salina*) and Point Reyes bird’s-beak (*Cordylanthus maritimus* ssp. *palustris*) are often associates as well.

Coastal Brackish Marsh – The boundary between Coastal Freshwater Marsh and Coastal Salt Marsh often constitutes a highly dynamic zone in terms of variable salinity throughout the year. Plant species that thrive in this interface zone must be capable of tolerating salinities that drop during the winter to 0-2 parts per thousand (ppt) and climb as high as 18-20 ppt or even higher during the summer (Ocean salinity is approximately 34 ppt). Coastal Brackish Marsh is also variable in terms of vegetation height. Low-growing plant species occur on marshplains with medium- to tall emergents occurring alongside or within channels or in open water areas. Because brackish marsh does not typically have a unique group of species -- most of these plant species can occur either in Coastal Freshwater Marsh or Coastal Salt Marsh – these areas are often characterized more by the mixture of species and a knowledge of salinity regimes present. Some common species in Coastal Brackish Marsh include bulrush (*Scirpus californicus*), alkali bulrush (*Scirpus maritimus*), fat hen (*Atriplex triangularis*), brass-buttons (*Cotula coronopifolia*), and annual beard grass (*Polypogon monspeliensis*).

Coastal Scrub – Approximately 90% of coastal scrub is dominated by coyote brush (*Baccharis pilularis*), a small-leaved evergreen shrub. Coyote brush scrub is highly diverse and variable, ranging from fairly low open areas where coyote brush associates with grasses to tall dense multi-species scrubs. Coyote brush scrub can be roughly equally divided in the project area between these open and dense variations. In its more open variation, coyote brush commonly associates with non-native and native grasses and California blackberry. It may also be found in association with sedges (*Carex* spp.) and rushes (*Juncus* spp.). In its taller, denser variation, poison oak (*Toxicodendron diversilobum*) is the most commonly associating shrub, often in fairly high cover. Coffeeberry (*Rhamnus californica*), thimbleberry, California blackberry and California sagebrush (*Artemisia californica*) are common associates in dense coyote brush scrub.

Coastal Grassland (Coastal Terrace Prairie – NDDDB Natural Community) – Although pristine coastal prairie is dominated by native perennial bunchgrasses, roughly 80% of the grasslands in the Seashore are dominated by non-native grasses, as are most of the grasslands within California. The most common non-native is the hydrophytic, invasive perennial purple velvet grass (*Holcus lanatus*), although the hydrophytic, annual Italian wild rye (*Lolium multiflorum*), farmer’s foxtail (*Hordeum murinum*), and rattail fescue spp. (*Vulpia* spp.) also cover large acreage. Pacific reedgrass (*Calamagrostis nutkaensis*), along with tufted hairgrass (*Deschampsia cespitosa*), California oatgrass (*Danthonia californica*), meadow barley (*Hordeum brachyantherum*), and California brome (*Bromus carinatus*) are constituents of the native coastal grassland. Native grasses are often found in association with annual non-native grasses, coyote brush, California blackberry, and a variety of native and weedy herbs.

The northern coastal salt marsh supports obligate wetland vegetation and has hydrologic indicators of a wetland. Soils within this area have not been assessed to determine whether or not

they are hydric. The subtidal habitat north of the dam consists of a single inlet channel branching to three or four smaller channels. The subtidal channels flood out onto the north coastal salt marsh and patches of spartina. The estuary extends upstream approximately 300 meters where it grades into a mix of fresh and saline vegetation at the mouth of Glenbrook Creek. Growing conditions within the quarry and spillway are severely degraded due to the mining of the organic soil horizon. Conditions on the dam are better, with a dense cover of coyote brush and annual grasses dominating the structure.

Northern coastal salt marsh (Holland 1986) occurs adjacent to the interior and exterior portions of the breached dam. Also classified as a pickleweed vegetation series (Sawyer and Keeler-Wolf 1995), this plant community type has been deemed rare in California (Holland 1986). The salt marsh was reestablished subsequent to the breaching of the dam.

Special Status Species

A total of 81 special-status species (31 plants species, 3 fish species, and 47 avian and terrestrial wildlife species) were considered for this EA analysis. They are listed in Appendix A. The following sections provide brief descriptions of the special-status species that have the potential to be found at the project sites, and thus could be affected by the proposed restoration activities. A list of federally threatened and endangered species found in Point Reyes National Seashore and having potential to be found near the project area are listed in Table 3.1.

Table 3.1 Potential Threatened and Endangered Species in or near the Project Area

| COMMON NAME | SCIENTIFIC NAME | LISTING STATUS ^A | KNOWN TO OCCUR WITHIN PROJECT AREA | KNOWN TO OCCUR ADJACENT TO PROJECT AREA |
|------------------------------------|---|-----------------------------|------------------------------------|---|
| Plants | | | | |
| Sonoma alopecurus | <i>Alopecurus aequalis</i> var. <i>sonomensis</i> | E | No | No |
| Sonoma spineflower | <i>Chorizanthe valida</i> | E | No | No |
| Marin dwarf flax | <i>Hesperolinon congestum</i> | T | No | No |
| Beach layia | <i>Layia carnosa</i> | E | No | No |
| Tidestrom's lupine | <i>Lupinus tidestromii</i> (var. <i>layneae</i>) | E | No | No |
| Amphibians | | | | |
| California red-legged frog | <i>Rana aurora draytonii</i> | T | No | YES |
| Fish | | | | |
| Central California coho salmon | <i>Oncorhynchus kisutch</i> | T | No | No |
| Central California Coast steelhead | <i>Oncorhynchus mykiss</i> | T | No | YES |
| Coastal Chinook Salmon | <i>Oncorhynchus tshawytscha</i> | T | No | No |
| Tidewater goby | <i>Eucyclogobius newberryi</i> | E | No | No |
| Invertebrates | | | | |
| Myrtle's silverspot butterfly | <i>Speyeria zerene myrtilleae</i> | E | No | YES |
| California freshwater shrimp | <i>Syncharis pacifica</i> | E | No | No |
| Birds | | | | |
| Western snowy plover | <i>Charadrius alexandrinus nivosus</i> | T | No | YES |
| Bald eagle | <i>Haliaeetus leucocephalus</i> | T | No | No |
| California brown pelican | <i>Pelecanus occidentalis californicus</i> | E | No | YES |
| Northern spotted owl | <i>Strix occidentalis caurina</i> | T | No | No |

A variety of special status species are known to occur near the project area, but only Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*) and Marin knotweed (*Polygonum marinense*), USFWS Species' of Concern, have been found in the project area. The project timing, during summer season will also avoid potential for interactions with steelhead. They are anticipated to occur in this area in the winter (potential adult access), and spring (smolt outmigration).

Special Status Plant Species

There are no federally or state listed plant species known to occur near the project area. Figure 3.1 includes locations of a number of rare plant species, including Marin checker lily (*Fritillaria affinis* var. *tristulis*) – CNPS List 1B.1 (Rare, threatened or endangered in California and elsewhere and seriously endangered in California), fragrant fritillary (*Fritillaria liliaceae*) – CNPS 1B.2 (Rare, threatened or endangered in California, fairly endangered in California and a federal Species of Concern), San Francisco Owl's clover (*Triphysaria floribunda*) – CNPS 1B.2 (and a federal Species of Concern), and Gairdner's yampah (*Perieridia gairdneri* spp. *Gairdneri*) – CNPS 4.2 (Limited distribution, fairly endangered in California and a federal Species of Concern). These plants are not expected to be impacted by project work as they lie outside the project area or, in the case of small patches of fritillaria and polygonum near and in the spillway on the east side of the dam, care will be taken to specifically survey, flag and avoid these small occurrences.

The potential for presence of wetland-related special status species in the project area has been increased greatly by the rapid development of intertidal marsh in the vicinity of the dam since its failure in 1982. This potential is enhanced by the fact that certain species such as Point Reyes birds-beak (*Cordylanthus maritimus* ssp. *paulstris*) and Marin knotweed (*Polygonum marinense*) have been observed in adjacent bays or esteros, such as Estero de Limantour and Drakes Bay. Rare surveys have been conducted in June 2001 and March 2002.

Point Reyes birds-beak (*Cordylanthus maritimus* ssp. *paulstris*)

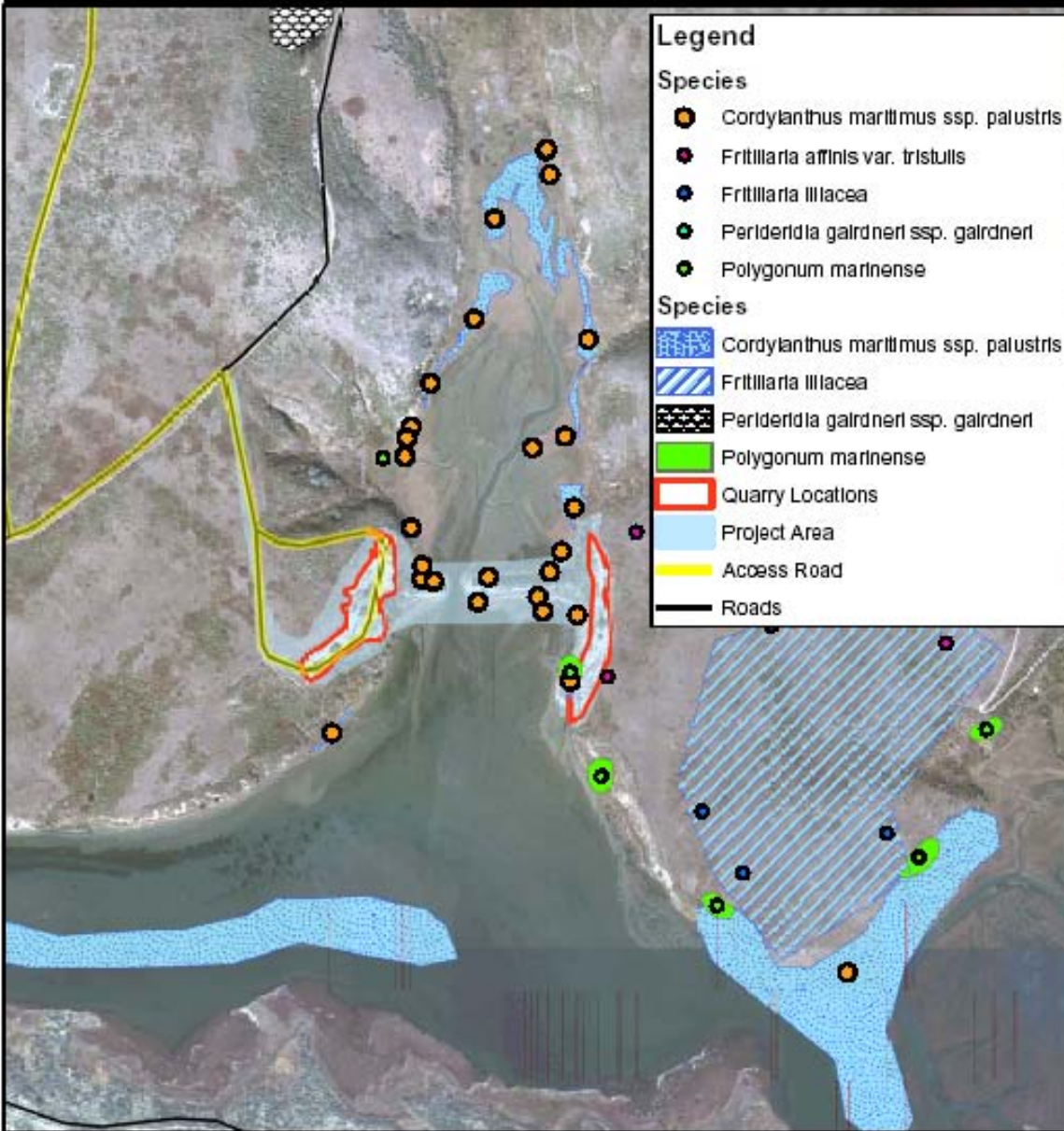
A population of Point Reyes bird's-beak occurs in coastal salt marsh habitat immediately north of the east arm of the breached dam. This population was first documented in 1990 by California Native Plant Society (CNPS) members (population #12 in NPS records). In 1990, the population supported approximately 725 plants. July 2001 surveys of the Point Reyes Birds Beak resulted in a much more robust count. Results of this survey indicated thousands of plants in numerous locations around the Glenbrook Estuary. In the project area itself, 10 locations totaling ~800 plants were counted. The locations are shown in Figure 3.2.

Point Reyes bird's beak is an annual plant that occurs in coastal salt marshes below 10 m in elevation. It is known to occur in Humboldt, Sonoma, and Marin counties in California, and in Oregon. This taxon is on CNPS List 1B.2 (Rare, threatened or endangered in California and fairly endangered in California). It is a federal Species of Concern (formerly a Category 2 Candidate).

Point Reyes bird's-beak is a hemiparasitic annual herb that grows in the high marsh areas of coastal salt marshes. Blooming from June through October, it is distinguished by its distinctive purple-tipped white flowers. Marin County represents the southern end of the existing range for this species, which stretches into Oregon (CNPS 2005). It once occurred in Alameda, Santa Clara, and San Mateo counties, but the historical populations are believed to have been extirpated (CNPS 2005). In Marin County, this species occurs both in coastal salt marshes along the coast and in marshes on the margin of San Francisco Bay.

Rare Plant Resources

Glenbrook Dam and Quarry Restoration EA



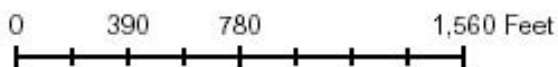
Location Map



National Park Service
 Point Reyes National Seashore/
 Golden Gate National Recreation Area
 Marin County, CA



Figure 3.2



Point Reyes bird's-beak has been documented in several locations within the Seashore, principally in Drakes Estero, Limantour Marsh, and in marshes within Tomales Bay. Most occurrences of this species within the Seashore number from hundreds to thousands of individuals (Michelle Coppoletta, pers comm. 2003). In the Study Area, thousands of *Cordylanthus maritimus* ssp. *palustris* were mapped in 2001 in the coastal salt marsh habitat that has developed in the former pond interior since the dam breached spontaneously in 1982. Small and large patches of bird's beak ranging in size from 3 to 250 plants occurred directly adjacent to the dam and quarry sites. Throughout its range, this species has experienced a dramatic decrease in numbers due to impacts such as development, foot traffic, non-native plants, and altered hydrology (CNPS 2005). Within the Seashore, the main threats to this species appear to be trampling and grazing by tule elk and cattle.

Marin knotweed (*Polygonum marinense*)

Marin knotweed (*Polygonum marinense*) is found in coastal salt marsh and brackish marsh habitats in Marin, Napa, Sonoma, and Solano Counties. This annual herb is found principally in Marin, Napa, and Sonoma counties. Few occurrences have been documented (CNPS 2005). It is considered a "List 3" species by the CNPS, meaning that existing information is inadequate to resolve the species' status and prognosis. Several recorded locations of this species are known in the marsh area upstream of the project area. Hickman (1993) noted that the taxonomic status of the species is uncertain and that it may either be related to *Polygonum aviculare* or may actually be *Polygonum robertii*, a non-native species from the Mediterranean. Populations of this species found within the Seashore have typically been small, although sometimes spatially dispersed (M. Coppoletta, pers comm.). It is possible that the extent of Marin knotweed within the Seashore has been underestimated due to the difficulty of seeing this non-descript plant.

Two occurrences of Marin knotweed were found growing within the Study Area. One of these occurrences was directly adjacent to the quarry site on the east side of the Study Area. It supported approximately 245 plants when it was censused in 2001. The other occurrence was located in the former pond interior and numbered only three individuals in 2001. *Polygonum marinense* has an extended flowering period, with its tiny white flowers typically appearing in April and lasting as long as October. The primary threat to this species has been characterized as salt marsh development (CNPS 2005).

Marin Checker Lily – Marin checker lily (*Fritillaria affinis* spp. *tristulis*) (= *Fritillaria lanceolata* var. *tristulis*) has been identified in some 10 occurrences in coastal bluff scrub, coastal prairie, and coastal scrub habitats in Marin County. It is considered a List 1B species by CNPS. Several recorded locations of this species are known to occur upslope and west of the spillway (see Figure 3.2).

Fragrant Fritillary – Fragrant fritillary (*Fritillaria liliacea*) is known from Alameda, Contra Costa, Monterey, Marin, San Benito, Santa Clara, San Francisco, San Mateo, Solano, and Sonoma Counties. It is found in cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland habitats, commonly on serpentine soils. It is considered a List 1B species by CNPS. Several recorded locations of this species are known to occur upslope and west of the spillway (see Figure 3.2).

San Francisco Owl's Clover – San Francisco owl's clover (*Triphysaria floribunda*) is known from Marin, San Francisco and San Mateo Counties. It is found in coastal scrub, coastal prairie and valley and foothill grassland habitats. It is considered a List 1B.2 species by CNPS. There are no recorded locations of this species directly in or near the project area.

Gairdner's Yampah – Gairdner's Yampah (*Perieridia gairdneri* spp. *Gairdneri*) is known from Contra Costa, Del Norte, Kern, Los Angeles, Mendocino, Monterey, Marin, Napa, Orange, San Benito, Santa Clara, Santa Cruz, San Diego, San Luis Obispo, San Mateo, Solano, Sonoma Counties. It is found in broadleaved upland forest, chaparral, coastal prairie, valley and foothill grassland, and in vernal pool habitats. It is considered a List 4.2 species by CNPS. There is one recorded location of this species documented to occur north of the project area west of Estero Trail (see Figure 3.2).

Special Status Plant Community

At least one of the habitats mapped in the survey could potentially qualify as a NDDB special habitat: northern coastal salt marsh. Northern coastal salt marsh occurred at the base of the remnant dam and in the former pond interior. Since 1982, extensive mudflats and a network of tidal creek drainages have developed in what was once the pond bottom. The mudflat supports sparse patches of California cord grass (*Spartina foliosa*) and *Scirpus maritimus*. The edges of the estuary are fringed by intertidal “zones” of low, mid, and high marsh. A thin band of Pacific cord grass or bulrush typically adjoins the tidal creek channels, intergrading into characteristic mid- and high marsh assemblages of species such as pickleweed (*Salicornia virginica*), jaumea (*Jaumea carnosa*), seaside arrow grass (*Triglochin maritima*), arrow grass (*Triglochin concinna*), western marsh rosemary (*Limonium californicum*), salt grass (*Distichlis spicata*), and gumplant (*Grindelia* sp.).

Eelgrass (*Zostera* sp.) is located within Drakes Estero, but the location of the project area does not include subtidal habitat. Eelgrass is not documented to occur within the project area.

Special Status Fish Species

Three listed fish species; tidewater goby (*Eucyclogobius newberryi* FE), coho salmon (*Oncorhynchus kisutch* FT), or steelhead trout (*Oncorhynchus mykiss* FT) have the potential to occur in the Drakes Bay and Inverness Quadrangles.

Steelhead (FT) – The only special-status fish known to occur at the project sites is the steelhead. Steelhead were listed as a threatened species on August 17, 1997 (Federal Register 1997). As of February 6, 2006 the former steelhead Evolutionary Significant Unit has been changed to a Distinct Population Segment (DPS). The central California coast steelhead DPS includes all naturally spawned populations of steelhead (and their progeny) in California streams from the Russian River (inclusive) to Aptos Creek (inclusive), and the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers; excluding the Sacramento-San Joaquin River Basin. The artificially propagated stocks from the Don Clausen Fish Hatchery and the Kingfisher Flat Hatchery/Scott Creek are also included (Federal Register 2006). As of the 2006 Federal Register, only ocean-run *O. mykiss* (steelhead trout, not resident rainbow trout) are protected under the ESA. In 2000, critical habitat was designated for steelhead along the California coast. In 2002 these designations were withdrawn due to a National Marine Fisheries Service (NMFS) decree and weren't reinstated until a final ruling in August 2005. This critical habitat became effective January 2, 2006 (Federal Register 2006). Critical habitat only encompasses the *O. mykiss* anadromous range.

Steelhead begin migrating up coastal and inland streams from November through early May to spawn in freshwater streams. Juvenile steelhead spend up to 3 years rearing in freshwater, and then migrate to the ocean, where they feed and mature for another 3 years before returning to their natal streams to breed. NPS has documented the presence of steelhead at the Glenbrook Crossing site and in the Muddy Hollow drainage below the existing dam (Self and Ranlett

1984; Cappellini and Everly 1997). They may also be present at Limantour Beach, although this drainage offers even more limited connectivity to inland waters.

Glenbrook Creek historically supported a population of steelhead trout. Evaluation of fisheries in 1997 identified the presence of *O. mykiss* within the watershed. It is unclear whether the observed populations are ocean-going or land bound (steelhead or rainbow trout) and cannot be determined without more intensive spawning or smolt trapping within the watershed, however for the purpose of this planning effort and evaluation, *O. mykiss* potentially occurring in the project area would be considered steelhead.

Tidewater goby have been identified as potential to occur in the area but have not been documented. The head of Estero de Limantour, one drainage to the west has been identified as potential goby habitat, though there are no records for that location. The USFWS Recovery Plan identifies this area as Greater Bay Area Recovery Unit sub-unit GB-4b, and is identified as a potential introduction site (USFWS 2005).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires all federal agencies to consult with NOAA Fisheries on all cumulative and synergistic actions or proposed actions that may adversely affect Essential Fish Habitat (EFH). The assessment of cumulative effects on EFH is consolidated with the assessment of cumulative effects under ESA.

EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity that would allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem.

The species covered under EFH include coho salmon (*Oncorhynchus kisutch*), chinook salmon (*Oncorhynchus tshawytscha*), and pink salmon (*Oncorhynchus gorbuscha*). Neither pink nor chinook salmon have been documented in the project area historically or presently, but coho were historically present in the Drakes Estero watersheds of PRNS. Coho are currently unknown in the project area and are believed to be extirpated from the action area. Other types of habitat that are considered Essential Fish Habitat include areas of eelgrass. There is no eelgrass within the project area as the entire area is subject to mudflat exposure at low tide.

Special Status Bird Species

Literature review concluded that 8 birds listed as federally endangered or threatened by the US Fish and Wildlife Service have potential to occur within the Glenbrook Estuary area. Federally endangered brown pelicans (*Pelecanus occidentalis*) are now fairly common along the coastline of PRNS. Federally endangered brown pelicans (*Pelecanus occidentalis*) are now fairly common along the coastline of PRNS. Brown pelicans have been observed in the estuary feeding and preening. Restoration activities at will not have any impacts to habitat for these species and may actually enhance attractiveness for foraging and roosting. During the spring and fall migrations, American peregrine falcons (*Falco peregrinus anatum*), a now federally delisted species, are attracted to Drakes Estero by the large numbers of gathering shorebirds and waterfowl.

Since 1986, the Point Reyes Bird Observatory has conducted regular surveys to Drakes Spit to survey for federally threatened western snowy plovers (*Charadrius alexandrinus nivosus*) during spring breeding seasons (Peterlein 2005). The western snowy plover is known to occur on Limantour spit, across the estero from the project site, but have not been observed within or adjacent to the project area.

The short-tailed albatross, and California least tern are migratory marine birds, with albatross preferring nesting at offshore islands near California and in the northern latitudes of the Pacific. Albatross are only very rare visitors to PRNS. Viable California least tern breeding habitat does exist at PRNS, but the species has not been recorded within the action areas of the proposed projects and is relatively rare in the vicinity Point Reyes. Marbled murrelets and bald eagles are also uncommon visitors to PRNS, but are preferential to mature forest canopies at outside of the action area and are uncommon on Point Reyes. Marbled murrelets occur in Drakes Bay nearshore in the non-breeding season but not in the proposed action area. For these reasons, it is highly unlikely that the proposed projects would impact these species. The northern spotted owl occurs in the park in very high densities. The project would occur outside of the nesting season, and none of the project areas are within ¼ mile of known nesting sites.

Western snowy plover (FT)

Western snowy plovers use the Point Reyes peninsula as both wintering and nesting habitat. Wintering birds occur around Drakes Estero and Abbott's Lagoon, and along Limantour Spit and the Great Beach. During the 1980's nesting took place along the entire Great Beach Drake s Beach, and at Limantour Spit. In recent years, erosion along the southern portion of the Great Beach has diminished the upper beach area such that the entire beach can be washed by waves. Nesting is occurring on the northern portion of this beach, between the North Beach parking area and Kehoe Beach, which is backed by extensive dunes. Snowy plovers also nest along the western edge of Abbott's Lagoon. Erosion has also affected Limantour Spit, and it has not been used by snowy plovers for nesting since 2000 when Limantour had three nests on it. Limantour beach and spit continue to be used as wintering habitat by plovers.

Restoration activities are not projected to impact wintering federally threatened western snowy plovers (*Charadrius alexandrinus nivosus*) because construction would occur in the summer and in more than 10 years of monitoring, the NPS has not documented the plovers on this beach.

California Brown Pelican (FE)

The California brown pelican (*Pelecanus occidentalis californicus*) is one of six recognized subspecies of brown pelican. Brown pelicans are distinguished by their large size and brown color. Adults weigh approximately 9 pounds, and have a wingspan of over 6 feet. They have long, dark bills with big pouches for catching and holding fish. The brown pelican is easily distinguished from the American white pelican, the only other pelican in its range, which is white with black primary and secondary flight feathers.

Pelicans breed in nesting colonies on islands without mammal predators. They typically build a nest of sticks on the ground. All courtship occurs at the nest site. The male brings nesting materials to the female and she builds the nest. Normal clutch size is three eggs, which are laid in March or April. Both take turns incubating the eggs and rearing the chicks.

The brown pelican is found in estuarine, marine subtidal, and marine pelagic waters along the California coast. Brown pelicans breed on Channel Islands: Anacapa, Santa Barbara, and Santa Cruz (Garrett and Dunn 1981) from March to early August; most numerous then within 20 km (12 mi) of those islands (Briggs et al. 1987). In northern California, the species is common June to November, rare to uncommon December to February and May, and very rare and irregular March and April (Anderson and Anderson 1976, Cogswell 1977, McCaskie et al. 1979). These species are known to feed in the estuary adjacent to the project area during summer.

Tricolored Blackbird

Tricolored blackbird (*Agelaius tricolor*), a state species of special concern, is a permanent resident in California's Central Valley from Butte County south to Kern County, and is also found at scattered coastal locations from Marin County south to San Diego County. The species breeds at scattered locations in Lake, Sonoma, and Solano Counties and rarely in Siskiyou, Modoc, and Lassen Counties as well. Tricolored blackbirds forage in open areas that offer abundant insect prey, such as marshes, pastures, agricultural wetlands, dairies, and feedlots. They are colonial nesters and prefer nest sites in emergent marsh vegetation such as cattails, or upland nest sites that offer blackberries or grain crops and a nearby source of water. Suitable habitat is present in areas upstream of the project area.

Little Willow Flycatcher

The little willow flycatcher (*Empidonax traillii brewsteri*) is a state species of special concern. This species nests in wet meadows with abundant willows, and may use willow thickets in the upstream of the project area.

Salt Marsh Common Yellowthroat

The salt marsh common yellowthroat (*Geothlypis trichas sinuosa*) is a state species of special concern. Yellowthroats inhabit areas between freshwater and tidal marsh and are also found in upland grasslands. They typically use salt marshes during winter and prefer brackish or freshwater marshes during the breeding season. Nests are found on the ground in low herbaceous vegetation or emergent vegetation, to a height of approximately 5 feet above the ground. Suitable nesting habitat for this species is present in riparian areas upstream of the project area.

California Black Rail

The California black rail is listed as threatened under the California Endangered Species Act. The species' range is currently confined to the northern San Francisco Bay Estuary, with small, isolated populations along the outer coast in Tomales Bay, Bolinas Lagoon, Morro Bay, and Bodega Bay (Manolis 1978, Evens et al. 1991); in the Sacramento Valley and foothills (Aigner et al. 1995); and in the Colorado River basin (Evens et al. 1991). Black rails primarily use tidal salt marsh habitat, but they are also observed in freshwater marsh (Evens et al. 1991, Evens and Page 1986, Grinnell and Miller 1944, Manolis 1978, Aigner et al. 1995). Suitable habitat may be present at Limantour Beach and Muddy Hollow, but habitat in these areas is likely too exposed to support sustained use by rails.

Special Status Amphibian Species

The California red-legged frog (*Rana aurora draytonii*) is identified as threatened by the US Fish and Wildlife Service (USFWS 2000). Habitat requirements for the RLF include breeding, non-breeding, and migration. Breeding and tadpole rearing habitat is provided in impoundments and/or slow-moving water. Frogs lay their eggs between November and April. Eggs hatch within 8 to 16 days. Tadpoles rear in the same body of water before molting.

California red-legged frogs are sensitive to high salinity, which often occurs in coastal lagoon habitats. When eggs are exposed to salinity levels greater than 4.5 parts per thousand (ppt), 100% mortality occurs (Jennings and Hayes 1989).

Nussbaum et. al. (1983) state that early embryos of northern red-legged frogs are tolerant of temperatures only between 9 and 21 degrees Celsius (48 and 70 degrees Fahrenheit). Both the upper and lower lethal limits are the most extreme known for any North American ranid frog. Data specific to the California red-legged frog are not available although field observations indicate that the RLF is absent when temperature exceeds 22 degrees Celsius (70 degrees

Fahrenheit), particularly when the temperature throughout a pool is this high and there are no cool, deep portions (S Bobzein pers. comm. 1998).

The factors associated with declining populations of the frog include degradation and loss of its habitat through agriculture, urbanization, mining, overgrazing, recreation, timber harvesting, non-native plants, impoundments, water diversions, degraded water quality, and introduced predators.

The adjacent wilderness area ponds are known to support the California red-legged frog. The project work area is within an estuarine system. The red-legged frog does not use open tidal water and would not be impacted by quarry restoration and dam removal. The California red-legged frog will not be discussed further in this EA.

Special Status Reptile Species

There are no federally listed reptile species known to occur in the project area. The northwestern pond turtle (*Clemmys marmorata marmorata*), which is a state species of special concern, are typically observed in quiet waters of ponds, reservoirs, and slow-moving streams. Because this is an estuarine area, it is not likely that the turtle is using the area. No turtles have been documented in the project area. Removal of the spillway is not expected to remove potential nesting habitat.

Actions associated with the proposed restoration project would result in negligible impacts to the western pond turtle (*Clemmys marmorata marmorata*) and associated habitat.

Special Status Mammal Species

Literature review identified potential occurrences of two species considered US Fish and Wildlife Service species of concern: the southwestern river otter (*Lutra canadensis sonorae*) and the Point Reyes jumping mouse (*Zapus trinotatus orarius*). Harbor seals (*Phoca vitulina richardsi*) and California sea lions (*Zalophus californianus*), both protected under the Marine Mammal Protection Act of 1972, occur near the mouth of Drakes Estero. Harbor seals are documented extensively within Drakes Estero, but are not documented to have used the site adjacent to the project area as a primary or secondary haul-out and resting area. Northern elephant seals (*Mirounga angustirostris*), also occur in Drakes Bay, but have not been observed within Drakes Estero.

The Point Reyes mountain beaver (*Aplodontia rufa phaea*), which is not listed but is considered a species of concern by the U.S. Fish and Wildlife Service. This subspecies of the common mountain beaver is only known to occur in Marin County, and its range is almost entirely within Point Reyes National Seashore. The Point Reyes mountain beaver inhabits moderately dense coastal scrub habitat in colluvial hollows, and may use scrub habitat in areas far upstream of the project area.

The Point Reyes jumping mouse (*Zapus trinotatus orarius*) occurs in riparian and grassland habitat within the Seashore. The mouse has been documented near Abbotts Lagoon and Limantour beach.

Special Status Invertebrate Species

Literature review identified eight special status invertebrate species with the potential to occur at Glenbrook Estuary. None of these were documented as part of site surveys. The project would not impact special status invertebrates within the project area and would not result in impairment of park resources or values associated with special status invertebrates.

Myrtles Silverspot Butterfly (FT)

Myrtle's silverspot butterflies inhabit coastal dune, coastal prairie, and coastal scrub habitats at elevations ranging from sea level to 300 meters, and as far as 5 kilometers inland (Launer et al. 1992). The species historic distribution is believed to have extended from near Fort Ross south to Punta Ano Nuevo. By the 1970's populations south of the Golden Gate were believed to be extinct and extant populations of the butterfly were believed to exist only within PRNS. Reasons for this decline include urban and agricultural development, invasive non-native plants, livestock grazing, over-collecting, and other human impacts.

Following discovery of a population near the Estero de San Antonio in the early 1990's, field surveys were conducted by the Center for Conservation Biology at Stanford University. Two additional apparently separate populations in PRNS were located and fieldwork was done to estimate population sizes. One population, centered on North Beach, extended from Abbott's Lagoon to South Beach and east to Drakes Estero and Drakes Beach. The highest numbers were found along the dune-scrub interface in the back dune area of the central peninsula on F and G ranches and the AT&T property, and on the bluffs on either side of the Drakes Beach visitor center. The population was estimated to number in the low thousands in 1993. More recent survey work in 1997 put the population estimate at 50-200 individuals, with no silverspots being found in portions of the 1993 range. The other population was found on the Tule Elk Reserve, with small numbers on the adjacent J Ranch. In 1993, the number of individuals in this population was estimated to be in the mid-hundreds. The 1997 survey of this northern Point Reyes population gave a population estimate of 250-500 (Launer et al. 1998).

Silverspot numbers in the area outside of park lands around the Estero de San Antonio were estimated at 2,000-5,000 individuals in 1991. Other nearby areas with potentially suitable habitat was not surveyed. Together with those found at Point Reyes, estimated numbers for the three known populations of the species total less than 10,000 individuals (USFWS 1998).

Known Myrtle's silverspot nectar plants include bull thistle (*Cirsium vulgare*), gum plant (*Grindelia* spp.), western pennyroyal (*Monardella undulata*), yellow sand verbena (*Abronia latifolia*), seaside daisy (*Erigeron glaucus*), and mule ears (*Wyethia* spp.). Brownie thistle (*Cirsium quercetorum*) and groundsel (*Senecio* spp.) are also fed upon. Many of these species are commonly found at Point Reyes. Oregon silverspot (*Speyeria zerene hippolyta*) feeds on other common plant species that may also be used by Myrtle's silverspot.

Myrtle's silverspot larvae are known to use only one species as a host plant, western dog violet (*Viola adunca*). It is possible that, like other subspecies of *Speyeria zerene* and other species of silverspots, Myrtle's silverspot uses other violet species as larval hosts, although this has not been observed. The perennial, rhizomatous western dog violet is found on open grassy slopes sandy flats behind dunes, and on the edge of brush under pines (Howell 1970). While it is described as "rather common near the coast", including the Point Reyes dunes, distribution of the species is patchy. Abundance of western dog violet alone is not a good predictor of silverspot presence. Myrtle's silverspot presence also is associated with protection from high coastal winds that are common during the summer flight season (Launer et al. 1992). The complex habitat needs of breeding Myrtle's silverspots may be the species' limiting factor.

In 2002 and 2003, Point Reyes National Seashore biologists conducted vegetation surveys for the larval host plant and nectar sources and butterfly surveys for Myrtle's silverspot butterflies. In 2002, the first Myrtle's silverspot butterfly sighting was made on June 26th and the last sighting was on September 10th, with the peak population size the last week of July. Over 30 butterfly transects (203 km) were performed in the 2002, spanning a period of 13 weeks and included areas in Tomales Point, North Beach, South Beach, and Drakes Estero. Overall, biologists observed a

total number of 598 butterflies in all areas. Similar efforts and results were obtained in 2003 (Adams pers. comm. 2004). Very few observations of the butterfly were made on the Turney Point Bluff, adjacent to the project area. Biologists' notes additional nectar species used by Myrtle's silverspot butterflies during survey transects, including goldenrod (*Solidago* sp., 2 visits), Yarrow (2 visits), *Cammissonia* (1 visit), *Jaumea carnosa* (1 visit), *Ericomeria ericoides* (1 visit), the coast fiddleneck (*Amsinkia spectabilis*, 1 visit) (Adams pers. comm. 2004).

Wildlife Assemblages

The project area includes coastal bluff and estuarine habitat. The quarry and spillway provide limited habitat to terrestrial species, while the dam itself provides structure and cover for small terrestrial mammals and birds. The dam is slowly eroding, but the limited cliff faces provide habitat for tunnel or cliff dwelling birds. Limited surveys of the site have not indicated presence of many species within the project area. Tule Elk and deer have been observed crossing the marsh upstream of the project area, and numerous bird and aquatic species have been observed in the estuarine habitat both upstream and downstream of the project area.

PRNS field surveys and Stallcup surveys (unpubl. data) recorded the following eight federal species of concern within the Project Area at Glenbrook Estuary: tricolored blackbird (*Agelaius tricolor*), grasshopper sparrow (*Ammodramus savannarum*), American bittern (*Botaurus lentiginosus*), saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), long-billed curlew (*Numenius americanus*), bank swallow (*Riparia ripari*), Allen's hummingbird (*Selasphorus sasin*), and snowy egret (*Egretta thula*). Literature regarding the nesting habits of tricolored blackbirds, grasshopper sparrows, saltmarsh common yellowthroat, and Allen's hummingbird indicate that these species likely nest either regularly or periodically within the Glenbrook Estuary area. Because restoration activities will not occur during nesting season and impacts to habitat will be temporary (this project will not result in habitat conversion from fresh to tidal), none of the federal bird species of concern that occur within or in the vicinity of the Project Area would be impacted by the Glenbrook Estuary restoration.

Cultural Resources

The Seashore's history of Native American settlement, European exploration, and eventual colonization by Spaniards and Americans left it a legacy of important archeological and historic resources. NPS 28m the National Park Service Cultural Resources Management Guidelines (NPS 1998) recognizes 5 types of cultural resources: archeological resources, historic structures, ethnographic resources, cultural landscapes, and museum objects as defined in. Archeological resources are "the remains of past human activity and records documenting the scientific analysis of these remains." These include artifacts, ecofacts, and features. Structures are "material assemblies that extend the limits of human capacity," and comprise such diverse objects as buildings, bridges, vehicles, monuments, vessels, fences, and canals. Ethnographic resources "are basic expressions of human culture and the basis for continuity of cultural systems" and encompasses both the tangible (native languages, subsistence activities) and intangible (oral traditions, religious beliefs). Cultural landscapes "are settings we have created in the natural world." Finally, museum objects "are manifestations and records of behavior and ideas that span the breadth of human experience and depth of natural history." Examples of typical museum objects include field and laboratory notes, artifacts, and photographs.

Archeological Resources – At least 124 Native American archeological sites exist within PRNS, primarily on the coastal lowlands. These known prehistoric sites are primarily shell middens,

voluminous deposits of rich organic soil with a relatively high content of local shell, created by human habitation of the site. The park also has 92 historic terrestrial archeological sites. These sites typically reflect historic occupation and use of the peninsula, first by homesteaders and dairy ranch communities, and later by government lighthouse and lifesaving personnel and private radio telecommunications companies. They include discrete trash pits containing old bottles, tins, broken tools and crockery, buried corduroy roads, ruined ranch sites, and radio communication facilities.

More than 87% of the PRNS lands have not been surveyed for archeological resources, mostly because of thick vegetation and rugged topography.

As part of the project planning, field surveys were conducted in conjunction with a record search at the Northwest Information Center (NWIC) of the California Historical Resources Information System (Rohnert Park, Calif, Newland 2004). There were no records of past archeological finds, and no archeological resources were found within the project areas (Newland 2004).

No historic or prehistoric resource areas were documented in the project area during project surveys (Newland 2004).

Air Quality

The primary factors controlling air quality include the locations of air pollutant sources and the amount and nature of the pollutants emitted from those sources. Meteorologic processes and topography are also important factors: atmospheric conditions, such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

PRNS is classified as a mandatory Class I area under the federal Clean Air Act (CAA) and amendments. Title I of the CAA Amendments of 1990, Part C, "Prevention of Significant Deterioration of Air Quality," Section 162, defines Class I areas as including national parks larger than 6,000 acres. The areas must have been in existence on the date of the enactment of the CAA amendments in 1977.

The NPS, as the federal land manager of PRNS, is responsible for the protection of the park from ambient air quality impacts. It is mandated to preserve visibility and to protect plants, animals, soils, water quality, cultural and historic structures from the effect of contaminants. PRNS is located in the San Francisco Bay Area Air Basin (SFBAAB) and is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The SFBAAB is composed of the counties of Alameda, Contra Costa, Napa, San Francisco, San Mateo, and Santa Clara, along with the southeast portion of Sonoma County and the southwest portion of Solano County. It covers an area of approximately 5,540 square miles. The BAAQMD is directly responsible for the protection of air quality and implementation of local and State Implementation Plan (SIP) measures within the Bay Area region. The BAAQMD regulates air quality under the auspices of the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA), Region 9. Both CARB and the EPA have general oversight responsibilities to ensure that local rules, regulations and stationary source permits consistently maintain California and National Ambient Air Quality Standards (AAQS).

The project areas enjoy a Mediterranean climate characterized by warm, dry summers and cool, damp winters. The coastal portion of the SFBAAB differs, however, somewhat dramatically from inland areas because oceanic influences moderate temperature swings and maintain a consistent cool and moist microclimate. The climate is controlled by a semi-permanent high-pressure system

centered over the northeastern Pacific Ocean. This high pressure system blocks summer precipitation, keeping it low (<0.2 inches per month), but it also makes summer cool because of the fog belt that develops when the marine air is cooled as it passes over the offshore upwelling region. Conversely, in the winter, proximity to the ocean keeps the coastal regions relatively warm (BAAQMD 2003a). Average temperatures in PRNS during the summer vary from about 45° to 75°. During the winter, average temperatures vary from about 35°F to 60°F. Approximately 84% of the average 38.2 inches of rainfall every year occurs during November through March, generally in association with storm systems. The warmest months are September and October, when temperatures are in the mid- to high 60s and offshore breezes are dominant (BAAQMD 2003).

Oceanic influences also affect wind direction and speed. Many areas of PRNS, particularly along the Drakes Bay, the Lighthouse, and Point Reyes Headlands, are exceptionally windy. Wind speed along the west Marin Coast averages 8- to 10 mph (BAAQMD 2003). During the winter, the predominant regional surface winds flow from the north-northeast (Bell 1958). During spring and summer, stronger north-northwest winds dominate (Bell 1958). These northwesterly winds are primarily caused by the combination of high pressure offshore and the warmer air inland. These winds blow off the ocean and are slowed down, if not intercepted completely, by the complex terrain of the Bolinas Ridge (BAAQMD 2003). During the fall transition, warm easterly winds from the hot, dry inland areas often break through to the coast.

Bolinas Ridge provides a topographic barrier air pollutants from San Francisco Bay since winds play a major role in dispersing pollutants far from respective sources. Air pollution in the region is moderated by strong, westerly winds most of the year. Other sources of pollutants are inversions. When cold air becomes trapped under warm air, the air masses cannot mix, and pollutants begin to accumulate. The frequent occurrence of temperature inversions over PRNS could concentrate air pollution levels near the ground. Pollutants are more concentrated near the ground during colder weather or after sunset. In general, “the influence of the marine air keeps the pollution levels low” (BAAQMD 2003).

The air pollutants of greatest concern in the SFBAAB are ozone, carbon monoxide, and inhalable particulate matter (particulate matter <10 microns in diameter, or PM10). The proposed action is not expected to generate problematic amounts of other pollutants. Consistent with guidance the BAAQMD and standard industry practice, this EA focuses on the pollutants of greatest concern in the area. Their characteristics are summarized in Table 3.2.

Table 3.2. Overview of Pollutants of Greatest Concern in the BAAQMD

| Pollutant | Sources | Health and Other Concerns |
|-----------|---|--|
| Ozone | Formed by a photochemical reaction in the atmosphere; ozone precursors, including reactive organic gases and oxides of nitrogen (NO _x), react in the atmosphere in the presence of sunlight to form ozone. Ozone precursors are emitted by mobile sources such as vehicles, and by stationary combustion equipment. | A severe eye, nose, and throat irritant; increases susceptibility to respiratory infections. An oxidant; can cause substantial damage to synthetic rubber, textiles, and other materials. Produces leaf discoloration and cell damage in plants. |

| Pollutant | Sources | Health and Other Concerns |
|-----------|---|--|
| PM10 | Results from many kinds of dust- and fume-producing activities, such as demolition, construction, and vehicular traffic; entrained road dust from motor vehicles accounts for approximately two-thirds of the regional PM10 inventory in the project area. | Health concerns focus on particles small enough to be drawn into the lungs when inhaled (PM10). Can increase the risk of chronic respiratory disease with extended exposure. |
| CO | Motor vehicles are the primary source of CO emissions in most areas. In the urbanized portions of the San Francisco Bay Area, high CO levels primarily develop during the winter near congested intersections, when periods of light winds combine with the formation of ground-level temperature inversions from evening through early morning. In addition, motor vehicles exhibit increased CO emission rates at low air temperatures. | Combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death. |

Sensitive receptors refer to land uses that are considered particularly sensitive to decreases in air quality. The designation typically refers to uses such as residences, schools, libraries, hospitals, and other similar facilities where there are large concentrations of children and young people; the elderly; and/or the chronically ill. Because the project sites are within Point Reyes National Seashore, few sensitive receptors of these types are located near the sites. However, the area is widely used for recreation, wildlife viewing, and scientific research, and these uses are potentially vulnerable to air quality degradation.

The only air pollutant currently measured in the Point Reyes region is PM2.5, small particulate aerosols that affect acid deposition and regional haze. Recent data (1999-2001) indicate a daily average concentration of 8.3330 ug/m³ or less averaged over these 3 years of data, well below the state and federal AAQs of 12 and 15 ug/m³, respectively. No other ambient air pollution is measured in this region.

Soundscapes

One of the intrinsic values of national parks remains the lack of urban noise or the potential for hearing “natural” noises such as crashing waves or singing birds. Unlike more urban parks, PRNS is located in a rural portion of western Marin County and has to contend less with the intrusive influences of urbanization than its sister park to the south, GGNRA. Regardless of location, however, the NPS is directed to preserve, to the greatest extent possible, the natural soundscapes of parks and to protect natural soundscapes from degradation due to noise, defined as “undesirable human-caused sound” (NPS 2006). This is a more stringent standard than set by the federal Noise Control Act of 1972 or most general plans produced by cities or counties.

The federal Noise Control Act required federal agencies to promote an environment free of the noise that can jeopardize public health or welfare. The agency tasked with implementing this act, the U.S. Environmental Protection Agency, established outdoor limits of 55 decibels and indoor limits of 45 decibels averaged through a 24-hour period. In 1994, the Marin County Noise Element mandated that residences, public spaces, and institutions not be subjected to noise levels above an average of 60 decibels over a 24-hour period. Marin County is currently in the process of revamping its General Plan and noise standards.

Major noise producers in most areas include highway traffic, trains, planes, boats, and industry-related machinery within industrial zones. In rural areas such as PRNS, major producers of undesirable human-caused sound are limited to automobile and truck traffic, jet airplanes,

individual businesses, agricultural ranches, and individual construction projects. In general, ambient noise levels remain lower in rural areas than in urban areas. In urban areas, ambient noise levels typically range from approximately 60 to 70 dBA, whereas, in rural areas, ambient noise levels range from 40 to 50 dBA. The project area is within the Philip Burton Wilderness Area. Natural quiet is the normal condition for this area.

Wilderness Resources

The estuary supports a very vibrant system of avian and aquatic species. The free ranging herd of Tule Elk does frequent the Turney Ranch and Point area. The project area is visible from many areas, but no formal trails are maintained to access the site.

Wilderness is managed and protected as a resource. Wilderness characteristics and values, including primeval character, preservation of natural conditions implies that the Wilderness is to be preserved and used in unimpaired condition. Prior to establishment of the Seashore, the entire designated Wilderness was part of intensive agriculture and in many areas logging was common. Roads and ponds persist within the Wilderness. Evaluation of physical conditions and process in the wilderness indicate that in many areas, particularly associated with roads and stream crossings, the pre-Wilderness land uses continue to influence and impede natural process, and thus the wilderness character and quality. Considering restoration within Wilderness includes weighing the impacts of implementation with those of leaving the site alone. Particularly with facilities, such as road crossings, culverts, and dams, the implications of these man-made facilities conflict with the 'untrammelled' nature of Wilderness.

The project site is located approximately two miles inside of the Wilderness boundary. It is accessible from Home Ranch via Estero Road, Muddy Hollow and Estero Trail (former roads). The remains of the dam and disturbed lands of the quarry and spillway are considered non-conforming wilderness features. The dam is conspicuous from Mount Vision and Limantour spit and is not compatible with wilderness aesthetic and visual values. Deconstruction of the dam and removal of the quarry scar would be a long-term benefit to wilderness values and aesthetics. These facilities, the materials that allow them to remain, and the equipment used to construct them are considered non-conforming with the wilderness character.

Section 4(c) of the Wilderness Act of 1964 prohibits certain activities in wilderness by the public, and, at the same time allows the agencies to engage in those prohibited activities in some situations. Section 4(c) states:

... except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

Through this Wilderness Act language, Congress acknowledged that there are times when exceptions are allowed to meet the minimum required administration of the area as wilderness. The minimum tool requirements analysis required determine the least impactful way of administering the wilderness. The wilderness manager may authorize any of the generally prohibited activities or uses listed in Sec. 4(c) of the Wilderness Act if they are determined to be the minimum necessary to do the job and meet wilderness management objectives. The Wilderness Minimum Requirements Decision Guide to determine minimum tool has been conducted, and is included as Appendix B to this EA.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

METHODS OF ANALYSIS

The National Environmental Policy Act (NEPA) requires that Environmental Assessments (EAs) disclose:

- a. Environmental impacts of the proposed federal action,
- b. Reasonable alternatives to that action, and
- c. Adverse environmental effects that cannot be avoided if the proposed project action is implemented.

Section 4 of this document analyzes the potential environmental impacts of the proposed Glenbrook Estuary restoration project on water resources and shoreline processes, wetlands, vegetation, special status species, wildlife assemblages, cultural resources, air quality, soundscapes and land use/socioeconomic impacts. NEPA also requires consideration of context, intensity, and duration of direct impacts, indirect impacts, and measures to mitigate impacts. NPS policy requires that potential “impairment” of resources be disclosed in all environmental documents. The following definitions are used to evaluate the project alternatives.

Analysis of Incremental Effects

Incremental Effects refer to the effects specific to a particular proposed action or activity, independent of other activities taking place at the Seashore. Consistent with NEPA requirements, the analysis in this chapter considers the context, intensity, and duration of the potential incremental effects.

Context describes the setting within such an impact is analyzed. In this Environmental Assessment direct impacts are evaluated within a local (i.e. project area, see Figure 2.1) context and cumulative impacts are evaluated in a regional, park-wide context.

Intensity is a measure of the severity of an impact. The intensity of an impact may be Negligible, Minor, Moderate, or Major. The intensity of impacts is described for each impact topic.

Duration is a measure of the time period over which the effects of an impact persist. The duration of the impacts evaluated in this EA is defined as Short-term or Long-term. The duration of impacts is described for each impact topic in Section 4.3 below.

Type of Impact. Impacts were evaluated in terms of whether they are potentially beneficial or adverse. Beneficial impacts would improve environmental conditions, while adverse impacts would negatively alter or degrade environmental conditions.

Possible impacts to natural resources may include action that could:

- Exceed the established thresholds of environmental laws, or executive orders.
- Fail to conform to NPS Management Policies or Director’s Orders.
- Affect a legally-protected plant or animal species or cause a net change to the habitat of the species.
- Restrict the movement of any resident or migratory fish or wildlife species.
- Cause any measurable changes in a plant or animal community with special legal status.
- Cause change directly or indirectly to the stability of slopes or erodibility of soils within the project area or adjacent property.
- Alter hydrologic processes, shoreline process, water quality, wetlands or aquatic habitat.

Possible impact to cultural resources may include actions that could:

- Fail to conform to NPS Management Policies or Director's Orders.
- Cause direct or indirect adverse effects to prehistoric or historic archaeological sites listed or eligible for listing on the National Register of Historic Places or the California Register of Historic Resources, or that contribute to a National Historic Landmark District
- Violate laws relating to archaeological and ethnographic sites.
- Change established recreational, educational, religious, or scientific uses of the project area.
- Alter aesthetic resources or viewsheds in the project area.

Cumulative Context

The Council on Environmental Quality (CEQ) regulations implementing NEPA defines a cumulative impact as "...the impact on the environment which results 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (CEQ Section 1508.7). A list of projects considered as part of the cumulative context is included in Section 1.4. The discussion of potential cumulative effects is included in the discussion of each impact topic. Overall discussion of cumulative impacts for the preferred project alternatives is found below.

Impairment and Unacceptable Impacts of Park Resources

NPS Management Policies (NPS 2006) and NPS Director's Order 12, *Conservation Planning, Environmental Impact Analysis, and Decision Making*, require decision makers to consider impacts and determine in writing, whether a proposed action would lead to an impairment of park resources and values before approving the action. An impairment is "an impact that ... in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values." In general, an impact is more likely to constitute an impairment if it affects a resource or value whose conservation is necessary to specific purposes identified in the legislation or proclamation that created the park unit; one that is essential to the park's natural or cultural integrity, or to the public's opportunities to enjoy a park; or one that is specifically identified as a goal in the General Management Plan or other relevant NPS planning documents.

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Service will apply a standard that offers greater assurance that impairment will not occur. The Service will do this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment.

At PRNS, the park resources and values that are the focus of the no impairment and unacceptable impacts standards include the ecological, biological, and physical processes that created the park and continue to act upon it, as well as the cultural resources that reflect the region's legacy of Native American use. With these resources in mind, analysis of incremental effects considered the proposed actions' potential to impair the natural and cultural resources of Point Reyes National Seashore.

A determination of impairment and unacceptable impact is made for each natural and cultural resource impact topic.

IMPACT ANALYSIS BY TOPIC

Water Resources and Shoreline Processes

Policies and Regulations

The Clean Water Act requires the NPS to “comply with all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution.” The NPS Freshwater Resource Management Guidelines (found in NPS-77) requires the NPS to “maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems.”

NPS Management Policies 2006 states the NPS must:

... re-establish natural functions and processes in human-disturbed components of natural systems in parks unless otherwise directed by Congress....Impacts to natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes. The Service will seek to return human-disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated (Section 4.1.5).

The NPS Management Policies also include direction related to the protection and restoration of shoreline process (Section 4.8.1.1):

Natural shoreline processes (such as erosion, deposition, dune formation, overwash, inlet formation, and shoreline migration) will be allowed to continue without interference. Where human activities have altered the nature or rate of natural shoreline process, the Service will... investigate alternatives for mitigating the effects of such activities or structures, and for restoring natural conditions.

Assessment Methodology

Particular consideration was given to actions with potential to affect the natural hydrology, aquatic habitat features, and surface water quality of the Glenbrook Estuary. The following three primary aspects of water resources were assessed when considering potential Water Resources and Shoreline impacts:

- Shoreline Process/Marine and Estuarine Resources – Natural processes such as beach and wave dynamics, unimpeded tidal circulation, erosion, deposition, and maintenance of natural channel patterns.
- Water Quality – Conditions necessary to support aquatic life within a lagoonal or tidally influenced system.
- Aquatic Habitat – Attributes that support or provide habitat within stream or pond systems.

Table 4.1 Descriptors for Water Resources and Shoreline Process

| | |
|----------------|---|
| Type of Effect | Beneficial: the proposed action would restore natural hydrologic and shoreline process by removing impediments to tidal flows and removing fill from the estuary; the project would improve water quality and improve or maintain aquatic habitat; the proposed actions would improve or maintain aquatic habitat. |
| | Adverse: the proposed action has the potential to alter or constrain natural |

| | |
|---------------------|---|
| | surface water and shoreline process. The proposed action could alter or prevent progress toward natural hydrologic and shoreline processes. The proposed action has the potential to degrade surface water quality, impede progress toward improved water quality, or degrade aquatic habitat |
| Duration of Effect | Short-term: effects would be confined to the construction period, and to the period two years after construction |
| | Long-term: effects would persist for two years or more beyond the construction period |
| Intensity of Effect | Negligible: effects would be so slight as to be immeasurable, and would be limited to the immediate project site vicinity |
| | Minor: effects would be measurable, but would be limited in areal extent; |
| | Moderate: effects would be apparent at the local scale, and affect an area beyond the immediate project vicinity. |
| | Major: effects from this action would be substantial, highly noticeable, and regional. |

Alternative A

Water Resources and Shoreline Processes

Shoreline Process/Marine and Estuarine Resources

The presence of the dam structure impinges on the natural dynamics of the Estero de Limantour. The constriction results in increased water velocity through the dam from stream flow and tidal influx due to the unnatural limitations imposed by the breach. In addition the dam structure changes wind patterns leading to altered depositional conditions upstream and downstream of the dam. These limitations alter the mixing of freshwater and saltwater, affects nutrient and oxygen cycling, changes sediment depositional patterns and increases sediment loading from the dam. Under Alternative A, these effects are anticipated to persist over the short and long-term and have adverse, minor impacts on the shoreline processes and marine and estuary resources of the Estero de Limantour.

Under Alternative A, the remains of the dam would remain within the tidal estuary and would continue to affect natural shoreline process in relation to large storm and tidal flood events, as well as potential tsunami impacts. No new construction would occur under Alternative A, and a floodplain Statement of Findings would not be necessary.

Water Quality

Under Alternative A, the dam structure alters hydrologic flow patterns as well as coastal wind dynamics. Reduced wind energy over the majority of the estuarine area, and concentrated flow through the breach zone result in altered sediment distribution and depositional conditions. Changed hydrologic dynamics associated with the altered wind patterns would also continue to affect distribution and mixing of salinity, oxygen, and nutrients in the estuary. These effects are anticipated to persist over the short and long-term and have adverse, minor impacts on water quality. These effects would persist with decreasing levels of impact as the dam erodes over time until the estuary returns to a system responding under natural tidal influences.

Aquatic Habitat

Under Alternative A, increases to the naturally occurring sediment load and impacts to mudflats, sandbars, shoals and shallows would persist. The dam structure provides more perching habitat for avian predators, but potentially more upland edge structure for other aquatic species. These

effects are anticipated to persist over the short and long-term and have adverse, negligible impacts on aquatic habitat. These effects would persist with decreasing levels of impact as the dam erodes over time until the estuary returns to a system responding under natural tidal influences.

Cumulative Impacts

Under Alternative A, the dam would remain an impediment to the natural tidal influence on shoreline processes and continue to affect water quality. The dam's presence would remain inconsistent with NPS policy.

Conclusion

Under Alternative A, there would be short-term and long-term adverse, minor impacts to shoreline processes and water quality, and negligible adverse impacts to aquatic habitat.

Alternative A would not result in impairment or unacceptable impacts to park water resources, shoreline process and aquatic habitat.

Alternative B

Alternative B would remove the primary impediment to natural shoreline and estuarine process within the Glenbrook estuary of Estero de Limantour. Removal of this feature would allow for development of natural hydrologic process and wind dynamics to this portion of the estuary.

Shoreline Process/Marine and Estuarine Resources

Under Alternative B, the gap in the dam would require a temporary crossing to be installed during the deconstruction phase of the project. The installation of temporary culverts and rip-rap to maintain tidal flow is less impacting than cutting a mile-long access road to access the south side, or simply using fill to dam the area temporarily. Multiple culverts would allow adequate inflow and outflow from the estuary, though tidal conditions during the construction would likely be muted. The installation of a temporary crossing, but use of culverts to provide tidal exchange, is considered a minor adverse short-term impact to shoreline processes and marine and estuarine resources are expected.

Upon project completion, the current limitations on tidal and wave influence would be removed. Hydrologic currents and wind patterns would be redistributed to the breadth of the estuary in the project area, allowing for a more natural circulation pattern. The restoration of these natural patterns and currents would encourage better mixing and circulation of salinity, nutrients and oxygen to occur throughout the estuary. Sedimentation would return to a natural cycle and the system would not experience the increased sediment from the dam. Alternative B would result in moderate beneficial shoreline and estuarine conditions in the long-term.

Under Alternative B, the remains of the dam located within a tidal estuary, not a floodplain, would be completely removed, and would not interact with natural shoreline process in relation to large storm and tidal flood events, as well as potential tsunami impacts. The temporary crossing will be installed only during the construction period, and removed immediately. The construction window is during the dry season, and would not impede tidal flooding or floodplain process. In the very unlikely event of tsunami during the construction period, there could be impacts, however, the location of the site, and presence of the sand spit between the work area and Drakes Bay would dramatically reduce the scale of any potential tsunami event. The end result of Alternative B would be removal of, and no new infrastructure within the tidal estuary, and therefore a floodplain Statement of Findings is not required.

Water Quality

Under Alternative B, mitigation steps would be taken to minimize impacts to water quality during project operations. It is expected that limited amounts of sediment may erode into the estuary and/or estero from earthwork and operations of heavy machinery. Chapter 2 identifies a series of Environmental Commitments intended to identify appropriate response procedures that should be followed in case of any inadvertent spills or issues during construction. With these protections in place, the short-term impacts to water quality are expected to be minor adverse.

In the long-term, the dam removal would restore conditions of sediment and water temperature to those influenced naturally by Glenbrook Creek and ocean influences. Impacts from the dam on hydrologic and wind circulation patterns which altered salinity, oxygen and nutrient cycling would no longer persist. In the long-term, Alternative B would result in minor beneficial impacts to water quality.

Aquatic Habitat

Evaluation of the current dam conditions shows that most of the project area is above Mean High Tide. The extent of the excavation area would be delineated on site, but includes upland and limited high tide habitat. Installation of the temporary crossing would result in direct impacts within that work footprint, but use of culverts to maintain tidal exchange would support and maintain aquatic habitat upstream of the work area. Evaluation of other crossing scenarios, such as fill only, would have resulted in the isolation of the upstream habitat for a period of 2-3 weeks which was determined to be problematic. Identification of appropriate work areas, and use of silt fencing to surround the majority of the work area would limit the amounts of sediment introduced to the estuary during construction. Once work is completed, and the site is exposed to normal flow conditions, it is likely that sediment levels originating from the site would be high in the first year after restoration. In the short-term impacts to habitat are anticipated to be minor, adverse.

In the long-term, the dam removal would restore habitat conditions to those influenced naturally by Glenbrook Creek and ocean influences. Impacts from the dam on sedimentation, salinity, oxygen and nutrient cycling would no longer persist. In the long-term, the project would result in minor, beneficial impacts to aquatic habitat.

Cumulative Impacts

Under Alternative B, the Glenbrook Dam would no longer remain an impediment to the natural tidal influence on shoreline processes or continue to affect water quality. Short-term impacts are expected to stabilize within 1 or 2 years. The intent of implementing the project is to enhance water quality. The dam's removal would return the estuary system and landscape to an area managed consistently with NPS policy. This project, in concert with other coastal protection and restoration activities would result in minor adverse impacts to water resources as sites recover, but in the long-term the project would result in minor beneficial cumulative impacts to water resources, estuarine processes, water quality and aquatic habitat.

Conclusion

Under Alternative B, short-term impacts from project would result in minor adverse impacts to shoreline process, water quality and aquatic habitat. Implementation of Environmental Commitments identified in Chapter 2 would minimize potential for greater impacts during construction.

In the long-term, the actions proposed under Alternative B would result in moderate beneficial impacts to natural shoreline and estuarine process, with minor beneficial impacts to water quality, and aquatic habitat.

Alternative B would not result in impairment or unacceptable impacts of park water resources.

Alternative C

Shoreline Process/Marine and Estuarine Resources

Under Alternative C, only the western arm of the dam would be removed. This would leave the eastern arm within the estuary and the denuded spillway area would remain disturbed. This action would result in only a partial restoration of natural process to the site. Currents and water velocity would be redistributed across a wider breadth of the estuary in the project area, allowing mixing and circulation of salinity, nutrients and oxygen to occur throughout the estuary less inhibited by the dam. Sedimentation would cease from the western arm of the dam but would continue on the eastern arm – but would return to a more natural cycle. These effects would produce long-term, beneficial, minor (the system does currently experience some level of these effects via circulation through the dam breach) impacts to the estuary and estero.

Under Alternative C, the east arm of the dam would remain within the tidal estuary and would continue to affect natural shoreline process in relation to large storm and tidal flood events, as well as potential tsunami impacts. There would be no temporary crossing or structure in the channel. In the very unlikely event of tsunami during the construction period, there could be impacts, however, the location of the site, and presence of the sand spit between the work area and Drakes Bay would dramatically reduce the scale of any potential tsunami event. No new construction would occur under Alternative C, and a floodplain Statement of Findings would not be necessary.

Water Quality

Under Alternative C, mitigation steps would be taken to minimize impacts to water quality during project operations. It is expected that limited amounts of sediment may erode into the estuary and/or estero from earthwork and operations of heavy machinery. These impacts are expected to be short-term, adverse, but negligible.

In the long-term, the dam removal would partially restore conditions of sediment and water temperature to those influenced naturally by Glenbrook Creek and ocean influences. Impacts from the dam on salinity, oxygen and nutrient cycling would be muted by greater circulation. These effects would achieve minor, beneficial impacts to restoring the estuary to natural conditions over the long-term.

Aquatic Habitat

Under Alternative C, the work area within or adjacent to aquatic habitat would be far less than in Alternative B. The limited amounts of sediment produced in estuarine waters from project work are not expected to affect aquatic habitat. There are no short-term impacts anticipated to aquatic habitat.

In the long-term, the dam removal would begin to restore habitat conditions to those influenced naturally by Glenbrook Creek and ocean influences. Impacts from the dam on sedimentation, salinity, oxygen and nutrient cycling would persist in a much more muted effect. Alternative C would achieve minor, beneficial impacts to restoring the habitat in the Glenbrook Estuary to natural conditions.

Cumulative Impacts

Under Alternative C, the Glenbrook Dam would remain less of an impediment to the natural tidal influence on shoreline processes or continue to affect water quality. Short-term impacts are expected to stabilize within 1 or 2 years as the footprint of the western arm of the dam completely erodes. Part of the intent of implementing the project is to enhance water quality, which would be achieved under Alternative C. The primary benefit to implementing Alternative C is that there would be no impacts to shoreline processes or tidal influences by constructing a crossing at the dam breach.

Conclusion

Under Alternative C, short-term impacts from project work would have negligible adverse impacts to shoreline processes, marine or estuarine resources or aquatic habitat and minor effects on water quality. Long-term impacts from the work would result in beneficial, negligible effects on shoreline and estuarine processes, aquatic habitat and water quality.

Alternative C would not result in impairment or unacceptable impacts of park water resources.

Wetlands

Policies and Regulations

Wetlands are addressed separately from other vegetation types in this impact analysis as they are protected by a specific set of laws and regulations. Wetlands are lands that are transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is covered by shallow water. Wetlands buffer the effects of hydrologic and erosional cycles, influence biogeochemical cycles of nitrogen and other key nutrients, and create unique microclimates for animal and plant species.

Section 4.6.5 of the NPS Management Policies addresses the restoration of wetlands on NPS lands, "When natural wetland characteristics or functions [of wetlands] have been degraded or lost due to previous or on-going human actions, the Service would, to the extent practicable, restore them to predisturbance conditions" (NPS 2006).

The protection of wetlands within NPS units is facilitated through the following laws and mandates:

- Executive Order 11990, Protection of Wetlands.
- NPS Director's Order 77-1, Wetland Protection and its accompanying Procedural Manual 77-1.
- Rivers and Harbors Act, Section 10.
- Clean Water Act, Section 404.
- The "no net loss" goal outlined by the White House Office on Environmental Policy in 1993.

Executive Order 11990 requires that agencies work to minimize the destruction, loss, or degradation of wetlands. Director's Order 77-1 and Procedural Manual 77-1 provide specific procedures for implementing Executive Order 11990. Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act authorize the U.S. Army Corps of Engineers to grant permits for construction and disposal of dredged material in waters of the United States, which includes wetlands.

Assessment Methodology

For this assessment, wetlands that could be subject to impacts were identified using the U.S. Fish and Wildlife Service Cowardin Method (Cowardin et. al. 1979) surveyed in the field (Parsons 2002). Federal policy requires proposed actions to result in no net loss of wetlands, and Park Service Management Policies push parks to strive for a net gain in wetland acreage. For this reason, impact thresholds reflect this mandate by establishing more stringent thresholds for adverse impacts. Adverse impact thresholds draw upon federal, state, and local policies. The Park Service requires a statement of finding and mitigation for any projects that may impact > 0.25 acres of “natural” wetlands except for those related to recreational facilities (e.g., overlooks, bike/foot trails, and signs) and minor stream crossings that completely span channel and wetlands (i.e., no pilings, fill, or other support structures). Under the Local Coastal Plan, diking, filling, and dredging in wetlands are allowable for the purpose of restoration if the alternative with the greatest environmental benefit is selected.

Beneficial impacts to wetlands through “net gain” in wetland acreage are evaluated using a broader range of criteria, because the high losses of wetlands that have occurred historically requires a higher percentage gain to be considered significant, particularly when viewed in a larger context such as the Drakes Estero watershed. Analysis of changes in cover or areal extent of wetlands is based on maps that predict long-term changes in vegetation communities in the Project Area once equilibrium, or, more accurately, dynamic equilibrium conditions have been reached.

Definitions

Type, duration, and intensity of impacts to wetlands are described in Table 4.2.

Table 4.2 Descriptors for Wetland Impacts

| | |
|---------------------|--|
| Type of Effect | Beneficial: the proposed project would promote natural processes necessary for wetland vegetation, soils, or hydrology to develop, or increase the areal extent of wetlands; the project would facilitate processes associated with natural floodplain development |
| | Adverse: the proposed action would shift plant species composition to a higher percentage of non-wetland indicator species; alter hydrologic features/factors that are required to maintain the wetland; alter soil properties that are required to maintain the wetland; or reduce the areal extent of wetlands |
| Duration of Effect | Short-term: effects wetlands would persist for two years or less |
| | Long-term: effects on wetlands would persist for two years or more beyond the construction period |
| Intensity of Effect | Negligible Beneficial: There would be a negligible increase (≤ 0.05 acre) in the overall areal extent of wetlands. Negligible Adverse: There would be a negligible decrease (≤ 0.1 acre) in the overall areal extent of wetlands. |
| | Minor Beneficial: There would be a minor increase (> 0.05 and ≤ 1 acre) in the overall areal extent of wetlands. Minor Adverse: There would be a minor decrease (> 0.1 acre and ≤ 0.25 acre) in the overall areal extent of wetlands. |
| | Moderate Beneficial: There would be a moderate increase (> 1 and ≤ 5 acres) in the overall areal extent of wetlands. Moderate Adverse: There would be a moderate decrease (> 0.25 acre and ≤ 1.0 acre) in the overall areal extent of wetlands. If the decrease in overall areal extent of wetlands is > 1.0 , the loss must be for the purpose of stream and |

| | |
|--|--|
| | wetland restoration activities as defined by conditions in the Corps' Nationwide Permit #27. |
| | <p>Major Beneficial: There would be a substantial and major increase (> 5 acres) in the overall areal extent of wetlands.</p> <p>Major Adverse: There would be a substantial or major decrease (> 1.0 acre) in the overall areal extent of wetlands.</p> |

Alternative A

Under Alternative A, there would be no change to wetland habitat in the short-term, and in the long term, continued erosion of the dam may result in more limited conditions for wetland species to persist in areas proximate to the dam (see Figure 3.1).

Cumulative Impacts

Under Alternative A, there would be no cumulative effects to wetlands in the short or long term.

Conclusion

Alternative A, would not affect wetlands or their condition in the short-term, and in the long-term, continued degradation of the dam fill and limitations to natural hydrologic and shoreline dynamics would result in negligible adverse impacts to wetland resources.

Alternative A would not result in impairment or unacceptable impacts to park wetland resources.

Alternative B

Wetland resources within the project area are described in Chapter 3. The project includes excavation of the dam remnants and hauling of that material to the adjacent spillway and quarry areas. Small wetland areas have been described in the spillway and quarry areas.

Temporary impacts to non-jurisdictional isolated wetlands along access route to the project site. These seasonal wetlands are adjacent to the access road, and would have temporary impacts in the dry season. No scraping would be conducted along the access route, so impacts are considered temporary.

Within the project area, there would be temporary fill of the breached section of the dam. Culverts would be installed to allow tidal flow to persist during the project. The Section 404 tidal waters are also considered Section 10 jurisdictional waters. The installation of temporary fill would facilitate access across the dam for complete removal of the fill and restoration of natural hydrologic and shoreline process. The temporary fill would impact up to 0.055 acres of Section 404 tidal waters and Section 10 waters. As the deconstruction is conducted, the project would result in the removal of existing and temporary fill from the estuarine habitat. The project would result in a net increase of 0.54 acres of Section 404 tidal wetlands, with a small portion of that representing Section 404 tidal waters and Section 10 waters.

Disposal of fill from the dam to the former spillway and quarry areas would result in permanent fill to a 0.01 acre jurisdictional wetland. The NPS will request authorization for these actions under US Army Corps Nationwide Permit 27.

Within the proposed excavation area, work would be limited to the upper intertidal elevations at the base of the dam. Minor excavation would occur below this level, but there would be no fill except for incidental fallback. The excavation would be limited to the footprint of the dam.

It is anticipated that the return of the estuary to a system influenced by tidal and wave influence would return more of the estuary to wetland habitat better able to support native wetland plant and animal species.

Cumulative Impacts

Within the Drakes Estero watershed, additional projects to restore fish passage through existing culvert facilities would be undertaken at six stream-riparian sites. Larger scale dam removal actions proposed as part of the Coastal Watershed Restoration Project would be conducted in 2008. The proposed restoration of natural dynamics to stream and estuarine habitat within the Drakes Estero watershed in 2007 and 2008 would result in minor adverse cumulative impacts to wetlands. These activities, to removed dams and fill from estuaries and restore hydrologic connectivity in the stream areas would result in long-term minor to moderate benefits to wetland habitat in the Drakes Estero watershed.

Conclusion

Under Alternative B, during construction access and fill removal activities, there would be short-term impacts to isolated non-jurisdictional wetlands, tidal wetlands and waters, and Section 10 waters. During construction, fill of the breach to access the eastern arm of the dam for removal would result in temporary fill impacts to approximately 0.055 acres of jurisdictional tidal and Section 10 waters. Construction activities would occur adjacent to active wetland areas and while temporary impacts are anticipated to be less than 0.1 acres, which would be considered negligible. However, the location and complexity of the excavation activities are such that the impacts are considered adverse minor.

In the long-term, the permanent fill of 0.01 acres of adjacent jurisdictional wetlands would be offset by the permanent increase in Section 404 tidal wetlands and/or waters by 0.54 acres. As a result, the long-term impacts of Alternative B to wetland resources are considered minor, beneficial.

Alternative B would result in impacts (short and long-term) of less than 0.25 acres, therefore a Statement of Findings under DO 77-1 is not required.

Alternative B would not result in impairment or unacceptable impacts of park wetland resources.

Alternative C

Under Alternative C, the restoration activities would be limited to the western arm. Excavation of fill from this area would result in the net gain of 0.20 acres of tidal wetland habitat. Temporary impacts to non-jurisdictional wetlands along the access route would be similar to those described under Alternative B. There would be no permanent impact to the 0.01 acre adjacent wetland in the eastern spillway area. There would be no temporary impacts to tidal waters or wetlands, as there would not be access to the eastern arm of the dam.

Cumulative Impacts

Within the Drakes Estero watershed, additional projects to restore fish passage through existing culvert facilities would be undertaken at six stream-riparian sites. Larger scale dam removal actions proposed as part of the Coastal Watershed Restoration Project would be conducted in 2008. Alternative C would contribute to the partial restoration of natural dynamics to stream and estuarine habitat within the Drakes Estero watershed in 2007 and 2008 would result in minor adverse cumulative impacts to wetlands. These activities, to removed dams and fill from estuaries and restore hydrologic connectivity in the stream areas would result in long-term minor benefits to wetland habitat in the Drakes Estero watershed.

Conclusion

Under Alternative C, during construction access and fill removal activities, there would be short-term impacts to isolated non-jurisdictional wetlands and tidal wetlands. Construction activities would occur adjacent to active wetland areas and while temporary impacts are anticipated to be less than 0.1 acres. Alternative C would result in negligible adverse impacts to wetland resources in the short-term. The partial restoration would result in a minimal net wetland increase of 0.20 acres of Section 404 tidal wetlands, resulting in negligible beneficial impacts in the long-term.

Alternative C would result in impacts (short and long-term) of less than 0.25 acres, therefore a Statement of Findings under DO 77-1 is not required.

Alternative C would not result in impairment or unacceptable impacts of park wetland resources.

Vegetation

Policies and Regulations

NPS Management Policies (2006) states “The National Park Service would maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems.” (NPS, 2006). The policies define “native plants and animals” as inclusive of flowering plants, ferns, mosses, lichens, algae, fungi, and microscopic plants. The NPS is to preserve and restore the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of these native species. Additionally, the NPS is to prevent the introduction of non-native species into units of the National Park System.

Assessment Methodology

Vegetation in the project area was digitally mapped using aerial photographs in 1999/2000. Field data on plant species composition were collected to characterize and classify plant communities delineated in the mapping effort. The classification describes the vegetation alliances and associations that occur in the study area, and was initially based on the classification system described by Sawyer and Keeler-Wolf (Sawyer and Keeler-Wolf 1995). For purposes of this document, alliances and associations found in the project area have been grouped together into 10 broad vegetation classes that are described in Chapter 3.

The presence and abundance of non-native plants in the affected vegetation classes is an important consideration, as many non-native plant species are stimulated to grow and reproduce as a result restoration actions or other disturbance. The presence of some non-native plant species can have substantial adverse effects on native vegetation, including the following:

- Non-native plant species can out-compete native plants for light, nutrients, water and growing space, which may lead to extinction or local extirpation of rare plant species;
- Non-native plant species can degrade the quality of wildlife habitat by out-competing native food sources, or altering nesting or resting habitat; and
- Non-native plant species can disrupt the genetic integrity of native plant communities if crossbreeding occurs.

Definitions

Type, duration, and intensity of impacts to vegetation communities are described in Table 4.3.

Table 4.3 Descriptors for Vegetation

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| Type of Effect | Beneficial: the proposed action would improve habitat vegetation, and protect and/or restore the natural abundance and distribution of vegetation communities. |
| | Adverse: the proposed action would degrade habitat for vegetation, and cause a decrease in the natural abundance and distribution of vegetation communities. |
| Duration of Effect | Short-term: effects on the habitats of species would persist for two years or less; immediate changes in the abundance and/or distribution of vegetation may occur during the construction period, but a return to original conditions would be expected within two generations of that species |
| | Long-term: effects on the habitats of species would persist for two years or more beyond the construction period; changes in the abundance and/or distribution of vegetation would continue beyond two generations of that species |
| Intensity of Effect | Negligible: the proposed action would not measurably alter habitats for species, or create a measurable difference in the distribution and abundance of vegetation. |
| | Minor: adverse effects to habitats of species would be perceptible, but would be localized in extent; would affect less than ± 10 to 25% of the total extent of that plant community in the Lower Glenbrook Estuary Area. |
| | Moderate: adverse effects to habitats of species would be apparent and readily noticeable, but would be localized in extent; would affect from 25 to 50% of the total extent of that plant community in the Lower Glenbrook Estuary Area. |
| | Major: adverse effects to habitats of species would be substantial, and would affect a significant portion of the Drakes Estero Watershed; changes in the distribution and abundance of species would be substantial, and would effect a large geographic area; would affect more than 50% of the total extent of that plant community in the Lower Glenbrook Estuary Area. |

Alternative A

Under Alternative A, the denuded quarry and spillway would remain as primarily unvegetated areas. Over time there is potential for vegetation to fill in and establish a thin organic layer for growing in the long-term.

Cumulative Impact

Under Alternative A, there would be no direct effects as a result of project activities, and therefore, would not result in cumulative effects to park vegetation resources in the short or long term.

Conclusion

Alternative A, would not result in direct effects to park vegetation resources. The disturbed lands associated with the quarry and spillway remain relatively unvegetated due to the lack of an organic soil horizon. Under Alternative A, the site would remain limited for vegetation growth. Alternative A would result in no effect in the short term, and the limited conditions are considered negligible adverse in the long-term.

Alternative A would not result in impairment or unacceptable impacts to park vegetation resources.

Alternative B

Under Alternative B, material removed from the Glenbrook Dam would be used to restore the natural grade of slope at the adjacent quarry sites. These areas would then undergo steps to restore topsoil and revegetation, including seeding and erosion control measures. Native seed would be used to revegetate the sites and monitoring would follow to ensure that invasive plant species do not overtake the areas.

There is always a short-term impact associated with moving and replacing soil. The project involves laying soil in at more than a 2:1 grade to insure that surface erosion, or more serious slope failure do not occur. Replacement of the soil on the borrow pit would require compaction activities similar to those undertaken for levee or dam construction. Although the dam was built from the borrow pit, it is unlikely that even 50% of the original soil volume would be recovered. This would require that the slopes above the pit be reshaped to grade into the new slopes. These areas would also provide topsoil for spreading over the whole site, which would contain seed to enhance revegetation.

In the first winter there would be erosion, however, much of it would be contained along and at the bottom of the slope by using temporary slope protection. Tubes of rice straw would be installed at 10-foot contours to intercept flow and retain sediment. The site would be reseeded with locally collected seed of native plant species.

As described, topsoil would be spread across the site to provide a bed for vegetation to germinate and grow. Brush and vegetation growing on the dam would be mulched and mixed with the soil as it is brought to the quarry location. The site would be monitored for the invasion of non-native plant species including milk, Italian, and bull thistles, velvet grass, broom, and pampas grass. These non-natives would be removed if they become established. Vegetation and grasses should be established enough after the first winter to allow removal of any residual erosion control materials.

Heavy equipment is necessary for this project. The access route is along Muddy Hollow Trail, from Home Ranch, to the Estero Trail. All of the equipment would be mobilized and demobilized using this route. The access routes may be mowed, but not scraped to support vehicle access. Minor compaction would occur along the edges of the trail, but this would recover without treatment. Potential ripping of the area to decompact the access route would result in broader impacts to vegetation. There would be some temporary impacts to vegetation along the route, staging areas and in the project area as equipment and heavy machinery are transported in and used to remove the dam fill.

Cumulative Impacts

Under Alternative B, vegetation at the quarry sites would experience some damage from project work due to the use and transport of equipment and machinery. Treatment on these disturbed lands would create new areas for potential invasion by non-native species. Continued monitoring would be necessary to ensure that the area recovers with native species. In the short-term, the potential for the project, along with other projects in the Drakes Estero watershed would result in adverse minor impacts to vegetation and potential for import of non-native species. In the long-term, revegetation with native grassland seeds, and monitoring would result in a more natural vegetated condition in the upland. Within the estuary, the native vegetation would expand into the footprint of the former dam. The long-term impacts are considered minor beneficial.

Conclusion

The project would allow for the natural redistribution and expansion of intertidal estuarine habitats, and the potential recovery of coastal grassland/prairie on currently disturbed land/denuded areas. Under Alternative B, there is expected to be minor, adverse impacts to vegetation along access routes, staging and work areas over the short-term. Recontouring, erosion control and reseeded with native species would result in minor, beneficial impacts to vegetation within the project area over the long-term.

Alternative B would not result in impairment or unacceptable impacts to park vegetation resources.

Alternative C

Under Alternative C, material removed from the west arm of the Glenbrook Dam would be used to partially restore the conditions in the adjacent quarry. There would be no change to the denuded spillway area or eastern arm of the dam. Within the quarry site, steps to restore topsoil and revegetation, including seeding and erosion control measures would be conducted. Native seed would be used to revegetate the sites and monitoring would follow to ensure that invasive plant species do not overtake the areas.

There is always a short-term impact associated with moving and replacing soil. The project involves laying soil in at more than a 2:1 grade to insure that surface erosion, or more serious slope failure do not occur. Replacement of the soil on the borrow pit would require compaction activities similar to those undertaken for levee or dam construction. Because only the western arm of the dam would be removed, approximately 5,000CY would be excavated and replaced within the quarry area. This represents approximately 20% of the original site excavation. The grading plan under Alternative C would be to improve the lower portions of the excavated quarry bench to support revegetation. This would allow for growth of vegetation that could mask the high-wall over time.

In the first winter there would be erosion, however, much of it would be contained along and at the bottom of the slope by using temporary slope protection. Rice straw or coir fiber logs would be installed at 10-foot contours to intercept flow and retain sediment. The site would be reseeded with locally collected seed of native plant species.

As described, topsoil would be spread across the site to provide a bed for vegetation to germinate and grow. Brush and vegetation growing on the dam would be mulched and mixed with the soil as it is brought to the quarry location. The site would be monitored for the invasion of non-native plant species including milk, Italian, and bull thistles, velvet grass, broom, and pampas grass. These non-natives would be removed if they become established. Vegetation and grasses should be established enough after the first winter to allow removal of any residual erosion control materials.

Heavy equipment is necessary for this project. The access route is along Muddy Hollow Trail, from Home Ranch, to the Estero Trail. All of the equipment would be mobilized and demobilized using this route. The route may be mowed, but not scraped to provide vehicle access. Minor compaction would occur along the edges of the trail, but this would recover without treatment. Potential ripping of the area to decompact the access route would result in broader impacts to vegetation. There would be some temporary impacts to vegetation along the route, staging areas and in the project area as equipment and heavy machinery are transported in and used to remove the dam fill.

Cumulative Impacts

Under Alternative C, vegetation at the quarry sites would experience some damage from project work due to the use and transport of equipment and machinery. Treatment on these disturbed lands would create new areas for potential invasion by non-native species. Continued monitoring would be necessary to ensure that the area recovers with native species. In the short-term, the potential for the project, along with other projects in the Drakes Estero watershed would result in adverse minor impacts to vegetation and potential for import of non-native species. In the long-term, revegetation with native grassland seeds, and monitoring would result in a more natural vegetated condition in the upland. Within the estuary, the native vegetation would expand into the footprint of the former dam. The long-term impacts are considered minor beneficial.

Conclusion

The project would allow for the limited expansion of intertidal estuarine habitats in the footprint of the excavated western arm, and the potential recovery of coastal grassland/prairie on currently disturbed land quarry site. Under Alternative C, there is expected to be minor, adverse impacts to vegetation along access routes, staging and work areas over the short-term. Recontouring, erosion control and reseeding with native species would result in negligible to minor, beneficial impacts to vegetation within the project area over the long-term.

Alternative C would not result in impairment or unacceptable impacts to park vegetation resources.

Special Status Species

Policies and Regulations

Numerous species of plants and animals have exhibited local, state, or national declines, which has raised concerns about possible extinctions and extirpations of native flora and fauna. As a result, the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) have established lists of species with special legal protection, and outline species-specific plans for monitoring, protection, and recovery. PRNS also avoids and mitigates impacts to species listed by the California Native Plant Society, and other species that are locally rare or of concern. Collectively, species in all of these categories are referred to in this document as “special status species.”

The Federal Endangered Species Act (ESA) of 1973, as amended, requires federal agencies to consult with the USFWS before taking actions that (1) could jeopardize the continued existence of any federally listed plant or animal species or species proposed for listing, or (2) could result in the destruction or adverse modification of critical or proposed critical habitat for federally-listed species. The USFWS provided upon request a list of species that must be considered for this EA.

The Council of Environmental Quality Regulations for Implementing the NEPA (Section 1508.27) also requires an analysis to determine if a federal action may violate federal, state, or local laws or requirements imposed for the protection of the environment. For this reason, species listed under the California Endangered Species Act by the California Department of Fish and Game are included in this Environmental Assessment. Any potential impacts that this action may cause to species proposed for listing, either under federal or state statutes, are also considered in this Environmental Assessment.

NPS Management Policies (NPS, 2006) state:

The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Service will fully meet its obligations

under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species.

Additionally, park managers are to ensure that park operations do not adversely impact endangered, threatened, candidate, or sensitive species and their critical habitats within or outside the park, and must consider federal and state listed species and other special-status species in all plans and NEPA documents (NPS-77 Natural Resource Management Guidelines).

Furthermore, NPS-77 states:

The following legislation, policies, and agreements provide the authority for NPS policies on management of threatened and endangered species: the Endangered Species Act; state-specific endangered species acts; other state wildlife statutes or agreements pursuant to Section 6, ESA; the Migratory Bird Conservation Act; the Fish and Wildlife Coordination Act; the Wild and Scenic Rivers Act; the Marine Mammal Protection Act; the Bald and Golden Eagles Protection Act; the Wilderness Act; the Convention on International Trade in Endangered Species; and maritime and other international agreements.

The USFWS takes lead Departmental responsibility for coordinating and implementing provisions of the Federal Endangered Species Act for listed endangered, threatened, and candidate species, particularly for terrestrial plants and animals and freshwater aquatic species. However, for certain listed groups of species such as Cetacea (all whales and porpoises), most Pinnipedia (Steller sea lions, Hawaiian monk seals, etc.), sea turtles, and anadromous fish (steelhead, coho salmon, etc), the National Marine Fisheries Service (NOAA Fisheries) is the lead reviewing agency under provisions of both the Endangered Species Act (1973) and the Marine Mammal Protection Act (1972). For those marine species including fish USFWS and NOAA Fisheries often share responsibilities, with NOAA Fisheries frequently assuming the lead role.

The federal, state, and California Native Plant Society (CNPS) categories for special-status species are defined as:

- Federal endangered: Any species that is in danger of extinction throughout all or a significant portion of its national range.
- Federal threatened: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its national range.
- California endangered: Any species that is in danger of extinction throughout all or a significant portion of its range in the state.
- California threatened: Any species that is likely to become an endangered species with the foreseeable future throughout all or a significant portion of its state range.
- California rare (plants only): A native plant that, although not currently threatened with extinction, is present in small numbers throughout its range, such that it may become endangered if its present environment worsens.

CNPS List 1A: Presumed Extinct in California

CNPS List 1B: Rare or Endangered in California and Elsewhere

CNPS List 2: Rare or Endangered in California, More Common Elsewhere

CNPS List 3: Need More Information

CNPS List 4: Plants of Limited Distribution

Essential Fish Habitat, as established under the Magnusen-Stevens Fishery Management Act, is intended to protect spawning and rearing habitat of more than 65 commercially fished species. Protection is managed through the National Marine Fisheries Service.

The Federal Migratory Bird Treaty Act enacts the provisions of treaties between North American and European countries. Over 800 bird species are protected under the legislation. It mandates federal agencies to consider impacts to protected breeding birds during implementation of projects on Federal lands, including disruption to nesting and egg-laying activities.

Assessment Methodology

Point Reyes National Seashore is home to 27 federally protected species. However no special status animals are known to occur within the Glenbrook Estuary restoration project area. No special status animal species will be potentially affected by the proposed restoration alternatives.

During implementation of the restoration project, special-status plants would be protected by avoiding any work in plant habitat where possible, otherwise ensure that the project causes no net loss of habitat. The following parameters have been used to evaluate the consequences of the various alternatives on special-status plants:

- The spatial distribution of the species affected and its degree of local, regional, national, and global rarity.
- The numbers of plants, or proportion of the species range, affected by the action.
- The life history of the species, and response to disturbance (if known).

Table 4.4 Descriptors for Special Status Species

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| Type of Effect | Beneficial: the proposed action would improve habitat for a special-status plant or animal, and protect and/or restore the natural abundance and distribution of a special-status plant or animal species |
| | Adverse: the proposed action would degrade habitat for a special-status plant or animal, and cause a decrease in the natural abundance and distribution of a special-status plant or animal species |
| Duration of Effect | Short-term: effects on the habitats of special-status species would persist for two years or less; immediate changes in the abundance and/or distribution of special-status species may occur during the construction period, but a return to original conditions would be expected within two generations of that species |
| | Long-term: effects on the habitats of special-status species would persist for two years or more beyond the construction period; changes in the abundance and/or distribution of special-status species would continue beyond two generations of that species |
| Intensity of Effect | Negligible: the proposed action would not measurably alter habitats for special-status species, or create a measurable difference in the distribution and abundance of special-status species |
| | Minor: effects to habitats of special-status species would be perceptible, but would be localized in extent; changes in the distribution and abundance of special-status species would be restricted to the project site |
| | Moderate: effects to habitats of special-status species would be apparent and readily noticeable, but would be localized in extent; changes in the distribution and abundance of special-status species would be restricted to the project site and sites immediately adjacent; changes in distribution and abundance of species may be permanent, unless (if adverse) actively managed |
| | Major: effects to habitats of special-status species would be substantial, and |

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| | would effect a significant portion of the Drakes Estero Watershed; changes in the distribution and abundance of special-status species would be substantial, and would effect a large geographic area; changes in distribution and abundance of these species is irreversible, even (if adverse) with active management. |
|--|--|

Alternative A

Under Alternative A, the existing conditions would likely persist. The presence of the dam structure reduces wind and hydrologic dynamics resulting in more vegetated intertidal habitat upstream of the project area. These lower energy areas provide habitat for Point Reyes bird's-beak. Other rare plant species are not expected to be affected by Alternative A.

Under Alternative A, there would be no changes to aquatic species, including steelhead trout populations.

Cumulative Impact

Under Alternative A, there would be no direct effects as a result of project activities, and therefore, would not result in cumulative effects to special status species in the short or long term.

Conclusion

Alternative A, would not result in direct effects to special status species. Alternative A would result in no effect in the short term, and the limited conditions are considered negligible adverse in the long-term.

Alternative A would not result in impairment or unacceptable impacts to special status species.

Alternative B

Table 3.1 documents the potential impacts to Threatened and Endangered species likely to occur adjacent to the project area. Based on the location of the project, within and adjacent to tidal wetlands primarily, the park has concluded that the project would not result in direct impacts to federally listed species. While federally threatened steelhead are likely to occur within the project area in the early summer, during smolt outmigration, or in winter, during adult spawning, the timing of the project would not result in direct or indirect impacts to steelhead. Though California red-legged frogs are known to occur upstream, the location of this project, in active tidal marsh, would not result in direct or indirect impacts to the California red-legged frog.

Some rare, but not federally or state listed plant species known to occur near the project area (see Figure 3.2) include Marin checker lily (*Fritillaria affinis* var. *tristulis*) – CNPS List 1B.1 (Rare, threatened or endangered in California and elsewhere and seriously endangered in California), fragrant fritillary (*Fritillaria liliaceae*) – CNPS 1B.2 (Rare, threatened or endangered in California, fairly endangered in California and a federal Species of Concern), San Francisco Owl's clover (*Triphysaria floribunda*) – CNPS 1B.2 (and a federal Species of Concern), and Gairdner's yampah (*Perieridia gairdneri* spp. *Gairdneri*) – CNPS 4.2 (Limited distribution, fairly endangered in California and a federal Species of Concern) (see Figure 3.2).

Most prominent is the presence of Point Reyes birds-beak (*Cordylanthus maritimus* ssp. *paulstris*) which has been observed throughout the fringing intertidal marsh habitat of the Glenbrook Estero. Northern coastal salt marsh occurs at the base of the remnant dam and in the former pond interior supporting California cord grass (*Spartina foliosa*) and *Scirpus maritimes*.

The project would result in impacts to Point Reyes birds-beak surrounding the base of the dam, however, there would not be impacts to the extensive remaining populations surrounding the Glenbrook estuary. Plant numbers in occurrences adjacent to the dam and quarry sites are relatively low and represent less than 5 percent of the total Glenbrook Estuary population. While the Project would permanently eliminate some of the coastal salt marsh habitat that fringed the remnant dam, restoration of full tidal exchange is expected to result ultimately in increased wetland acreage, thereby providing more potential habitat for this species. The existing population provides an optimal source of seeds for increasing the aerial extent of this species within the Study Area. However, some additional measures that might be taken to ensure that the Project does not negatively affect the population might include:

- 1) timing dam removal towards the latter half of the summer when the plants have already gone to seed;
- 2) stockpiling topsoils from marsh areas identified as having the species for use in construction area rehabilitation once the dam is removed; or
- 3) collecting seed prior to dehiscence for sowing in nearby existing coastal salt marsh areas.

Numbers of Marin knotweed within Glenbrook Estuary are very low. The only occurrence that has potential to be impacted by the Project is the one adjacent to the spillway site on the east side of the Study Area. This population would be flagged and avoided as part of the restoration project.

Under Alternative B, steelhead trout would be affected positively by this project. Fish passage in this area is adequate. Further up the watershed there are barriers to migration that are scheduled to be removed as part of future projects. This project would remove structures intruding to the estuary and would benefit existing *O. mykiss* populations. Construction and removal of the temporary crossing would result in the most direct potential impact to fish. The timing of the project – summer, is intended to limit impact on both avian and aquatic species. The project would not impede movement of adult or juvenile steelhead trout.

Alternative B would not result in impact to tidewater goby (none have been documented in this area), however, it would result in improved conditions for potential goby introduction to this area.

The project area also lies within the ESU and includes designated critical habitat for Central California Coast Coho salmon, but coho have not been found in streams within the project area (Ketcham pers. comm. 2004).

During surveys in 2002-2003, very few observations of Myrtle's silverspot butterfly were made on the Turney Point Bluff, adjacent to the project area. The potential for western dog violet, the primary host plant, in the area exists and surveys for this species would be conducted. Areas of the western dog violet would be identified and avoided. The primary period of work would avoid the peak season, and vehicle speeds would be limited in the access roads and on site to 10 mph, to minimize potential for dust generation and butterfly mortality.

While snowy plover historically occurred on Limantour Beach, they have not been documented in the area for breeding in recent surveys. It is possible that they would occur on the Limantour spit in the fall for feeding. This is more than 200 yards from the project area and it is not anticipated that the construction equipment would affect the feeding behavior of the snowy plover. Adjacent to the project area is primarily mudflats and vegetated intertidal habitat. Because the snowy plover prefer sandy beach and dune habitat, it is not likely they would occur near the work site.

Brown pelican (FT) has been documented to feed in the Glenbrook Estuary at high tides. Construction activities may limit use of this area until completion, but in the long-term feeding habitat for the brown pelican would be enhanced.

The project area does not contain any special status aquatic vegetation, including eelgrass. Marine mammals, including harbor seal which occur extensively in Drakes Estero, have not been documented in this area of Estero de Limantour.

Cumulative Impacts

Under Alternative B, as tidal forces restore the estuary to dynamic equilibrium, Point Reyes birds-beak is expected to repopulate on sites that represent appropriate stability to the species' requirements. The Coastal Watershed Restoration Project is intended to restore fish passage within multiple watersheds draining to Drakes Estero, including Glenbrook Creek. The Coastal Watershed Project would not result in impacts to any T&E or CNPS listed plant species. In the short-term, construction impacts associated with this project would avoid potential impacts to steelhead and not contribute to any potential cumulative impacts. The benefits of this project, in conjunction with the Coastal Watershed Project are considered moderate in the long-term.

Conclusion

Alternative B would not result in direct impacts to any federally threatened or endangered species. The timing, location, and actions associated with the project would avoid potential for direct impacts to federally listed species. The project would occur in late summer with approximately a 25 day duration, to avoid potential impacts to migrating steelhead, and the location is more than 200 meters away from feeding areas for snowy plover. Brown pelican is known to feed within the Glenbrook estuary, which would remain open due to installation of culverts at the temporary crossing.

Proposed actions would result in direct impacts to a small percentage (approximately 5%) of the overall Point Reyes birds-beak (*Cordylanthus maritimus ssp palustris*) populations within the project area. Other rare plant species would be flagged and avoided.

Overall, the proposed project actions are timed to avoid direct interaction with special status species. The project actions would result in short-term negligible to minor adverse impacts in the short-term. Recovery of natural shoreline and estuarine process to the area would result in negligible to minor beneficial impacts to special status species in the project area.

Alternative B would not be impairment or unacceptable impacts to special status species.

Alternative C

As described in Alternative B, there are no federally threatened or endangered species likely to occur within the project area. Under Alternative C, removal of the western arm of the dam only would limit potential direct impacts to rare plant species occurring within the project area, namely Point Reyes birds-beak.

Alternative C would not include a temporary crossing and would avoid restoration or potential impacts to the eastern arm of the dam and spillway. Alternative C would avoid any potential impacts to aquatic species, including steelhead, and would avoid all documented rare plant populations with the exception of a few isolated instances of Point Reyes bird's beak. These populations represent less than 2% of overall documented populations within the Glenbrook estuary.

Under Alternative C, excavation would be limited to the western arm, with little to no impacts on aquatic areas. The timing of the project – summer, is intended to limit impact on both avian and aquatic species. The project would not impede movement of adult or juvenile steelhead trout. The project area also lies within the ESU and includes designated critical habitat for Central California Coast Coho salmon, but coho have not been found in streams within the project area (Ketcham pers. comm. 2004). Alternative B would not result in impact to tidewater goby (none have been documented in this area).

During surveys in 2002-2003, very few observations of Myrtle's silverspot butterfly were made on the Turney Point Bluff, adjacent to the project area. The potential for western dog violet, the primary host plant, in the area exists and surveys for this species would be conducted. Areas of the western dog violet would be identified and avoided. The primary period of work would avoid the peak season, and vehicle speeds would be limited in the unpaved access roads and on site to 10 mph, to minimize potential for dust generation and butterfly mortality.

While snowy plover historically occurred on Limantour Beach, they have not been documented in the area for breeding in recent surveys. It is possible that they would occur on the Limantour spit in the fall for feeding. This is more than 200 yards from the project area and it is not anticipated that the construction equipment would affect the feeding behavior of the snowy plover. Adjacent to the project area is primarily mudflats and vegetated intertidal habitat. Because the snowy plover prefer sandy beach and dune habitat, it is not likely they would occur near the work site.

Brown pelican (FT) has been documented to feed in the Glenbrook Estuary at high tides. Construction activities may limit use of this area until completion, but in the long-term feeding habitat for the brown pelican would be enhanced.

The project area does not contain any special status aquatic vegetation, including eelgrass. Marine mammals, including harbor seal which occur extensively in Drakes Estero, have not been documented in this area of Estero de Limantour.

Cumulative Impacts

Under Alternative C, as tidal forces restore the estuary to dynamic equilibrium and erode the eastern arm of the dam, Point Reyes birds-beak is expected to repopulate on sites that represent appropriate stability to the species' requirements. The Coastal Watershed Restoration Project is intended to restore fish passage within multiple watersheds draining to Drakes Estero, including Glenbrook Creek. The Coastal Watershed Project would not result in impacts to any T&E or CNPS listed plant species. In the short-term, construction impacts associated with this project would avoid potential impacts to steelhead and not contribute to any potential cumulative impacts. The benefits of this project, in conjunction with the Coastal Watershed Project are considered minor to moderate in the long-term.

Conclusion

Alternative C would not result in direct impacts to any federally threatened or endangered species. The timing, location, and actions associated with the project would avoid potential for direct impacts to federally listed species. Most of the listed species in this area are linked to the presence of freshwater habitat. The project would occur in late summer, with approximately a 15 day duration, to avoid potential impacts to migrating steelhead, and the location is more than 200 meters away from feeding areas for snowy plover. Brown pelican is known to feed within the Glenbrook estuary, which would remain open due to installation of culverts at the temporary crossing.

Proposed actions would result in direct impacts to a small percentage (<2%) of the overall Point Reyes birds-beak (*Cordylanthus maritimus ssp palustris*) populations within the project area. No other rare plant species would be affected by the work on the western arm and quarry.

Overall, the proposed project actions are timed to avoid direct interaction with special status species. The project actions would result in short-term negligible adverse impacts in the short-term. Recovery of natural shoreline and estuarine process to the area would result in negligible beneficial impacts to special status species in the project area.

Based on this analysis the project would result in negligible adverse impacts to special status species in the short-term and negligible beneficial impacts in the long-term.

Alternative C would not be impairment or unacceptable impacts to special status species.

Wildlife Assemblages

Policies and Regulations

The NPS Management Policies (2006) states that, “The Service would successfully maintain native plants and animals by...restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur...[and] minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them (Section 4.4.1, emphasis added).”

Assessment Methodology

The Glenbrook Estuary and the restoration project area provide habitat and resources for numerous assemblages of aquatic, riparian and upland wildlife species. While the work in the project area would not impact these species groups directly, the dam removal and restoration of the quarry slopes may affect habitat or environmental factors (i.e., transportation corridors or food sources) that different species depend on. Consideration for wildlife assemblages would seek to balance the Park Service’s desire to restore natural dynamics and habitat as well as minimize impacts to wildlife populations, ecosystems, communities and processes.

Definitions

Descriptors for evaluating impacts effect, duration, and intensity are shown in Table 4.5.

Table 4.5 Descriptors for Wildlife

| | |
|--------------------|---|
| Type of Effect | Beneficial: the proposed action would protect and/or restore the natural wildlife abundance and distribution |
| | Adverse: the proposed action would cause a decrease in the natural abundance and distribution of wildlife habitat |
| Duration of Effect | Short-term: effects on wildlife habitat would persist for two years or less; immediate changes in the abundance and/or distribution may occur during the construction period, but a return to original conditions would be expected within two generations of that species |
| | Long-term: effects on wildlife habitat would persist for two years or more beyond the construction period; changes in the abundance and/or distribution of special-status species would continue beyond two generations of that species |
| Intensity of | Negligible: the proposed action would not measurably alter wildlife habitat, or |

| | |
|--------|--|
| Effect | create a measurable difference in the distribution and abundance of wildlife |
| | Minor: effects to wildlife habitat would be perceptible, but would be localized in extent; changes in the distribution and abundance of wildlife would be restricted to the project site |
| | Moderate: effects to wildlife habitat would be apparent and readily noticeable, but would be localized in extent; changes in wildlife distribution and abundance would be restricted to the project site and sites immediately adjacent |
| | Major: effects to wildlife habitats would be noticeable at the scale of the Drakes Estero Watershed; changes in the distribution and abundance of wildlife species would effect a large geographic area; changes in distribution and abundance of these species is irreversible, even (if adverse) with active management |

Alternative A

Under Alternative A, no changes to wildlife assemblages are expected.

Cumulative Impact

Under Alternative A, there would be no direct effects as a result of project activities, and therefore, would not result in cumulative effects to terrestrial or aquatic wildlife assemblages in the short or long term.

Conclusion

Alternative A, would not result in direct effects to terrestrial or aquatic wildlife assemblages. Alternative A would result in no effect in the short term or long-term.

Alternative A would not result in impairment or unacceptable impacts to wildlife assemblages.

Alternative B

The existing breach in the dam is of the scale that it is not passable by terrestrial species. The exposed cliffs provide some perch areas, and the scrub/shrub habitat provides some limited nesting habitat. Under Alternative B, site checks will be conducted to ensure no bird nests are disturbed as part of the project. Work on the site would be projected for June/July 2008, following surveys of the area. The survey for nesting activity must be conducted within one week of the start of project activities.

If preconstruction surveys identify active nests belonging to common migratory bird species, a 100-foot exclusion zone will be established around each nest to minimize disturbance-related impacts on nesting birds. If active nests belonging to special-status migratory birds are identified, a no-activity buffer zone will be established around each nest. The radius of the no-activity zone and the duration of exclusion will be determined in consultation with the U.S. Fish and Wildlife Service.

The actions proposed under Alternative B would not change existing migration routes, but would remove some limited perch and scrub/shrub nesting areas along the remains of the dam. Alternative B would result in negligible to minor adverse impacts on wildlife assemblages. The extent of area that might affect cliff-dwelling birds is comparatively small given the wide expanse of similar habitat along the seashore locally and regionally. There are no known birds nesting in the quarries or project area.

Aquatic species would be impacted by construction activities, but proposed restoration actions to remove fill and restore natural estuarine and shoreline process would result in expansion of aquatic habitat and direct benefits to aquatic species in the long-term.

Cumulative Impacts

Cumulative impacts to terrestrial and aquatic wildlife species and assemblages associated with proposed activities associated with the Coastal Watershed Restoration and these activities are considered adverse negligible in the short-term. In the long-term, the cumulative impacts associated with the actions proposed under Alternative B, and the Coastal Watershed Project would result in restoration of natural process at multiple sites. Overall, the long-term impacts to terrestrial species are considered beneficial negligible, with the beneficial impacts to aquatic species considered beneficial minor to moderate.

Conclusion

Impacts to terrestrial and aquatic wildlife assemblages are expected to be negligible to minor in the short-term. In the long-term, actions proposed under Alternative B would result in negligible adverse impacts to terrestrial wildlife, but minor beneficial impacts to aquatic wildlife.

Alternative B would not result in impairment or unacceptable impacts to park wildlife resources.

Alternative C

The existing breach in the dam is of the scale that it is not passable by terrestrial species. The exposed cliffs provide some perch areas, and the scrub/shrub habitat provides some limited nesting habitat. Under Alternative C, site checks will be conducted to ensure no bird nests are disturbed as part of the project. Work on the site would be projected for June/July 2008, following surveys of the area. The survey for nesting activity must be conducted within one week of the start of project activities.

If preconstruction surveys identify active nests belonging to common migratory bird species, a 100-foot exclusion zone will be established around each nest to minimize disturbance-related impacts on nesting birds. If active nests belonging to special-status migratory birds are identified, a no-activity buffer zone will be established around each nest. The radius of the no-activity zone and the duration of exclusion will be determined in consultation with the U.S. Fish and Wildlife Service.

The actions proposed under Alternative C not change existing migration routes, but would remove some limited perch and scrub/shrub nesting areas along the remains of the dam. Alternative C would result in negligible adverse impacts on wildlife assemblages. Removal of the west arm only would leave some perch areas and nesting areas along the eastern arm of the dam.

Aquatic species would be impacted by construction activities, but proposed limited restoration actions to remove fill and restore some estuarine and shoreline process would result in limited expansion of aquatic habitat and limited benefits to aquatic species in the long-term.

Cumulative Impacts

Cumulative impacts to terrestrial and aquatic wildlife species and assemblages associated with proposed activities associated with the Coastal Watershed Restoration and these activities are considered adverse negligible in the short-term. In the long-term, the cumulative impacts associated with the actions proposed under Alternative C, and the Coastal Watershed Project would result in restoration of natural process to some sites. Overall, the long-term impacts to terrestrial species are considered beneficial negligible, with the beneficial impacts to aquatic species considered beneficial minor.

Conclusion

Impacts to terrestrial and aquatic wildlife assemblages are expected to be negligible in the short-term. In the long-term, actions proposed under Alternative C would result in no effect to terrestrial wildlife, but negligible beneficial impacts to aquatic wildlife.

Alternative C would not result in impairment or unacceptable impacts to park wildlife resources.

Cultural Resources

Policies and Regulations

Federal Agencies are mandated to protect cultural resources by the National Historic Preservation Act, Section 106. Although NHPA § 106 requires a slightly different impact analysis than does the National Environmental Policy Act (NEPA), compliance obligations under these two federal mandates are typically integrated into a single NEPA assessment document. These differences are described below under “Assessment Methods.”

The NHPA requires that before initiating an action, the NPS must evaluate the project’s potential adverse effects on resources eligible for listing on the National Register of Historic Places. In addition, the NPS must solicit comments from the Advisory Council on Historic Preservation, the California State Historic Preservation Office (SHPO), and other interested parties. The NPS and the SHPO must come to an agreement regarding mitigation for adverse effects on historic resources. This agreement must be outlined in a Memorandum of Agreement between the two agencies.

In addition, NPS Director’s Order #28 provides guidance for managing archeological resources, cultural landscapes, historic and pre-historic structures, museum objects, and ethnographic resources. When evaluating potential impacts to these resources, NPS managers must consider the resources’ significance, context, and integrity.

NPS policy and legislation directs the agency to consult with local tribal government prior to initiating an action that may effect the human environment.

Assessment Methods

Under Section 106 of the NHPA the NPS must evaluate a project’s potential direct impacts, operational impacts, and indirect impacts on cultural resources.

Direct effects are those where the actions associated with the project are the cause of the impacts.

Operational effects occur as a result of associated operations like staging.

Indirect effects are ones where the actions result in changes to local context such that cultural resources would be affected. As such, direct and operational effects for cultural resources are the equivalent of direct impacts under NEPA, while indirect effects on cultural resources correspond to indirect and cumulative impacts.

Different from NEPA, NHPA § 106 process considers only the adverse effects upon cultural resources, not potentially beneficial ones. A qualitative scale of impact intensity (negligible, minor, moderate, major) is also foreign to the Section 106 process - effects are either adverse (when the integrity of the historic property is diminished due to the undertaking) or they are not. Duration is not typically factored when assessing effects during the Section 106 process.

For the purpose of this evaluation, Section 106 effect categories are considered, and a qualitative scale is used to show impact intensity. Descriptors for evaluating impacts effect, duration, and intensity are shown in Table 4.6.

Table 4.6 Descriptors for Cultural Resources

| | |
|---------------------|---|
| Type of Effect | Beneficial: the proposed action would protect the significant characteristics of cultural resources from adverse effects, or would restore them to some desired condition |
| | Adverse: the proposed action would result in adverse changes in the significant characteristics of cultural resources; adverse effects may include perceptible and measurable effects, as well as imperceptible psychological or emotional effects |
| Intensity of Effect | Negligible: adverse effects to the integral characteristics of cultural resources would be so slight as to be immeasurable and imperceptible |
| | Minor: adverse effects create perceptible and measurable changes to the integral characteristics of cultural resources, but would affect only a small percentage of the resources' integral characteristics; adverse effects would not reduce the interpretive potential of the site |
| | Moderate: adverse effects create perceptible and measurable changes to the integral characteristics of cultural resources, but would affect only a moderate percentage of the resources' integral characteristics; adverse effects would not reduce the interpretive potential of the site |
| | Major: adverse effects create perceptible and measurable changes to a substantial portion of the integral characteristics of cultural resources; adverse effects could or would reduce the interpretive potential of the site |

Alternative A

Under Alternative A, there would be no activities on site.

Cumulative Impact

Under Alternative A, there would be no construction related or cumulative impacts to cultural resources.

Conclusion

Alternative A, would not result in impacts to cultural resources.

Alternative A would not result in impairment or unacceptable impacts to park cultural resources.

Alternative B

As part of the project planning, field surveys were conducted in conjunction with a record search at the Northwest Information Center (NWIC) of the California Historical Resources Information System (Rohnert Park, Calif, Newland 2004). There were no records of past archeological finds, and no archeological resources were found within the project areas (Newland 2004).

No historic or prehistoric resource areas were documented in the project area during project surveys (Newland 2004).

Several factors influence the damage to cultural resource resulting from the various alternatives. Some of these factors relate to direct effects of excavation, operational effects of staging of construction equipment, or indirect effects of changes in hydrology, geomorphology, or

vegetation. Examples of indirect effects include erosion of artifacts following changes in stream course or erosional patterns. Indirect effects may be delayed and incremental and may be highly correlated with the degree of change inherent to each of the proposed actions.

Impacts resulting from the operation of heavy equipment in close proximity to cultural resources would correlate directly with the nature and extent of the disturbance, local sediment characteristics, and the cultural resources themselves. Impacts associated with construction are generally restricted to displacement, breakage and looting. Except in rare situations, construction-related effects are likely to be most pronounced on cultural resources found on and near the ground surface.

Because of the Point Reyes area's long history of human use, unknown resources, including human burials, may be present, and disturbing or damaging such resources would constitute an adverse effect. In order to protect unknown cultural resources, NPS would implement the measures for unknown cultural resources and human remains required. With these measures in place, potential adverse effects on cultural resources would be mitigated to the extent feasible, and are expected to be negligible. However, because the act of unearthing buried cultural resources, particularly human remains, may constitute the majority of the impact, some potential for effects of greater severity remains.

Cumulative Impacts

In general, the proposed actions would contribute very little to overall park trends in cultural resource integrity. This proposed action would avoid direct impacts and preserve historic materials, resulting in beneficial long-term effects on cultural resources. Actions that could potentially cause impacts in conjunction with existing operation and management of the crossing infrastructure would be: the Coastal Watershed Restoration Project – Geomorphic Restoration. At all sites, the intent is to avoid impacts to cultural resource areas.

Conclusion

There are no documented cultural resources at the other project areas, nor were any observed during field investigation. It is possible that the degree of riparian overgrowth in some areas has hidden resources, therefore, there is some risk the proposed actions could destroy or harm unknown cultural resources. However, measures would be taken to protect resources discovered during the project. As a result, project actions would not likely effect cultural resources in the short or long-term.

Alternative B would not result in impairment or unacceptable impacts to park cultural resources.

Alternative C

Under Alternative C, implementation activities would be limited to the western arm of the dam and quarry. As described under Alternative B, cultural resource surveys and assessments indicated no records of past archeological finds, and no archeological resources, and no historic or prehistoric resource areas documented in the project area (Newland 2004).

Several factors influence the damage to cultural resource resulting from the various alternatives. Some of these factors relate to direct effects of excavation, operational effects of staging of construction equipment, or indirect effects of changes in hydrology, geomorphology, or vegetation. Examples of indirect effects include erosion of artifacts following changes in stream course or erosional patterns. Indirect effects may be delayed and incremental and may be highly correlated with the degree of change inherent to each of the proposed actions.

Impacts resulting from the operation of heavy equipment in close proximity to cultural resources would correlate directly with the nature and extent of the disturbance, local sediment characteristics, and the cultural resources themselves. Impacts associated with construction are generally restricted to displacement, breakage and looting. Except in rare situations, construction-related effects are likely to be most pronounced on cultural resources found on and near the ground surface.

Though more limited in scope from Alternative B, the actions proposed under Alternative C are considered to have the same potential for impact because of the Point Reyes area's long history of human use. The potential for unknown resources, including human burials, may be present, and disturbing or damaging such resources would constitute an adverse effect. In order to protect unknown cultural resources, the NPS would implement the measures for unknown cultural resources and human remains required. With these measures in place, potential adverse effects on cultural resources would be mitigated to the extent feasible, and are expected to be negligible. However, because the act of unearthing buried cultural resources, particularly human remains, may constitute the majority of the impact, some potential for effects of greater severity remains.

Cumulative Impacts

In general, the proposed actions would contribute very little to overall park trends in cultural resource integrity. This proposed action would avoid direct impacts and preserve historic materials, resulting in beneficial long-term effects on cultural resources. Actions that could potentially cause impacts in conjunction with existing operation and management of the crossing infrastructure would be: the Coastal Watershed Restoration Project – Geomorphic Restoration. At all sites, the intent is to avoid impacts to cultural resource areas.

Conclusion

There are no documented cultural resources at the other project areas, nor were any observed during field investigation. It is possible that the degree of riparian overgrowth in some areas has hidden resources, therefore, there is some risk the proposed actions could destroy or harm unknown cultural resources. However, measures would be taken to protect resources discovered during the project. As a result, project actions would not likely effect cultural resources in the short or long-term.

Alternative C would not result in impairment or unacceptable impacts to park cultural resources.

Air Quality

Policies and Regulations

Beyond the NPS's responsibility to protect air quality under the Clean Air Act and the 1916 Organic Act, NPS Management Policies (2006) state that the NPS will, "seek to perpetuate the best possible air quality in parks to; (1) preserve natural resources and systems; (2) preserve cultural resources; and (3) sustain visitor enjoyment, human health, and scenic vistas. The Service will... minimize air quality pollution emissions associated with park operations...(Section 4.7.1)." Further guidance for managing air quality in National Parks can be found in NPS Natural Resource Management Reference Manual 77 (RM-77, under revision).

Assessment Methodology

For this assessment, the consideration of air quality will be subject to the highest level of protection described under Class I areas (national parks over 6,000 acres and national wilderness areas over 5,000 acres) as specified in the Clean Air Act. The Glenbrook Dam and quarries do not currently contribute to air quality issues. This assessment will determine the effect of

implementing project alternatives on air quality. The period of impact is related to construction emissions. Once construction is complete, the location of the site, within the Wilderness, would not be subject to future activities associated with motorized equipment.

Definitions

Type, duration, and intensity of impacts to air quality are described in Table 4.7.

Table 4.7 Descriptors for Air Quality

| | |
|---------------------|---|
| Type of Effect | Beneficial: the proposed action would improve or maintain air quality while lowering the potential for substantial pollutant releases |
| | Adverse: the proposed action would result in the degradation of ambient air quality or increase the potential for pollutant releases |
| Duration of Effect | Short-term: discharge of air-born pollutants would be confined to the construction period, and would persist for no more than three days past project completion at each project area |
| | Long-term: discharge of air-born pollutants would continue past the construction period, and/or air quality degradation as a result of the project would persist for more than three days past project completion at each project area |
| Intensity of Effect | <u>Negligible</u> : There would be potential for impact, because implementation would involve use of construction equipment and vehicles used to transport personnel to and from the Project Area, however, impacts would be barely detectable, because: 1) all the appropriate control measures recommended by BAAQMD would be implemented; OR 2) estimated emissions from construction equipment would NOT exceed the following thresholds based on pounds per day: 1) PM10 (<27); 2) CO (<183); 3) ROG ² (<27), 4) NOX (<27), and 5) SOX (<27). |
| | <u>Minor</u> : There would be potential for measurable impact, because implementation would involve use of construction equipment and vehicles used to transport personnel to and from the Project Area, however, impacts would be relatively small, with estimated emissions from construction equipment falling in the following ranges based on pounds per day generated: 1) PM10 (27-53); 2) CO (183-367); 3) ROG (27-53), 4) NOX (27-53), and 5) SOX (27-53). |
| | <u>Moderate</u> : There would be potential for impact, because implementation would involve use of construction equipment and vehicles used to transport personnel to and from the Project Area, and impacts would be appreciable, with estimated emissions from construction equipment falling in the following ranges based on pounds per day generated: 1) PM10 (54-80); 2) CO (368-550); 3) ROG (54-80), 4) NOX (54-80), and 5) SOX (54-80). |
| | <u>Major</u> : There would be potential for impact, because implementation would involve use of construction equipment and vehicles used to transport personnel to and from the Project Area, and impacts would be major, with estimated emissions from construction equipment exceeding the following thresholds based on pounds per day generated: 1) PM10 (>80); 2) CO (>550); 3) ROG (>80), 4) NOX (>80), and 5) SOX (>80). |

Alternative A

Under Alternative A, there would be no activities on site.

Cumulative Impact

Under Alternative A, there would be no construction related or cumulative impacts to air quality.

² ROG=Reactive Organic Gas

Conclusion

Alternative A, would not result in impacts to air quality.

Alternative A would not result in impairment or unacceptable impacts to park air resources.

Alternative B

Deconstruction activities would result in handling of approximately 19,000 CY of material as part of the project. It is estimated that the construction would take approximately 25 days. Exhaust from earthmoving equipment and machinery and dust on roads and in the project area from transporting equipment and earthwork would produce limited amounts of localized air pollution. Analysis of pollutant load generated as a result of the project was conducted using standard BAAQMD methods. The results indicate generally negligible to minor adverse impacts for most of the pollutants, with the exception of nitrogen dioxide (NOX) which was considered moderate adverse. Environmental commitments described in Chapter 2 are recommended by BAAQMD for similar construction activities.

As described in Chapter 3, the project area is in a windy coastal zone where atmospheric conditions disperse most of these airborne pollutants quickly. Our experience in these areas is that PM10 type materials (and smoke) persist, but other pollutants are dispersed. In addition, there are no sensitive receptors in the local area, thereby reducing potential impacts associated with the generation of these pollutants.

Cumulative Impacts

In addition to these activities, culvert replacement actions as part of the Coastal Watershed Restoration Project - Drakes Estero Road Crossing Improvement Project would be implemented. These restoration activities would be using multiple pieces of heavy equipment and would result in moderate adverse impacts to air quality within the local Drakes Estero area. At all sites, standard all the appropriate control measures recommended by BAAQMD would be implemented. The construction-related cumulative air quality impacts are considered moderate, with no effect in the long-term.

Conclusion

Under Alternative B, excavation, fill, and grading actions would result in impacts associated with a variety of air pollutants. Analysis of the pollutants generated in association with the restoration activities resulted in determinations of negligible adverse impacts associated with particulate matter (PM10), reactive organic gasses (ROG), and sulfur dioxide (SOX); minor adverse impacts associated with generation of carbon monoxide (CO); and moderate adverse impacts associated with generation of nitrogen dioxide (NOX). There would be no impacts over the long-term.

Alternative B would not result in impairment or unacceptable impacts to park air resources.

Alternative C

Deconstruction activities associated with Alternative C would result in handling of approximately 5,000 CY of material as part of the project. It is estimated that the construction would take approximately 15 days. Exhaust from earthmoving equipment and machinery and dust on roads and in the project area from transporting equipment and earthwork would produce limited amounts of localized air pollution. Analysis of pollutant load generated as a result of the project was conducted using standard BAAQMD methods. The results indicate generally negligible to

minor adverse impacts for all of the pollutants, including NOX. Environmental commitments described in Chapter 2 are recommended by BAAQMD for similar construction activities.

Cumulative Impacts

In addition to these activities, culvert replacement actions as part of the Coastal Watershed Restoration Project - Drakes Estero Road Crossing Improvement Project would be implemented. Cumulatively, these restoration activities would be using multiple pieces of heavy equipment and would result in minor to moderate adverse impacts to air quality. At all sites, standard all the appropriate control measures recommended by BAAQMD would be implemented. The construction-related cumulative air quality impacts are considered moderate, with no effect in the long-term.

Conclusion

Under Alternative B, excavation, fill, and grading actions would result in impacts associated with a variety of air pollutants. Analysis of the pollutants generated in association with the restoration activities resulted in determinations of negligible adverse impacts associated with particulate matter (PM10), reactive organic gasses (ROG), and sulfur dioxide (SOX) and carbon monoxide (CO); and minor adverse impacts associated with generation of nitrogen dioxide (NOX). There would be no impacts over the long-term.

Alternative C would not result in impairment or unacceptable impacts to park air resources.

Soundscapes

Policies and Regulations

Management Policies for the NPS (2006) state that, “the National Park Service would preserve, to the greatest extent possible, the natural soundscapes of parks.” The NPS defines natural soundscapes as, “all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes (Section 4.9).”

Assessment Methodology

The soundscape of the Glenbrook Estuary, located in the Philip Burton Wilderness Area, is defined by natural quiet. The area is not located near communities, developments or roads and is subject to human sounds only by park visitors or aircraft flying overhead. Impacts to the Glenbrook Estuary from the range of alternatives are based off this relatively pristine soundscape.

Definitions

Type, duration, and intensity of impacts to vegetation communities are described in Table 4.8.

Table 4.8 Descriptors for soundscape and natural quiet

| | |
|--------------------|---|
| Type of Effect | Beneficial: the proposed action would preserve or improve natural quiet at and/or adjacent to the project site |
| | Adverse: the proposed action would increase noise levels at and/or adjacent to the project Site |
| Duration of Effect | Short-term: changes to natural quiet would be confined to the construction period |
| | Long-term: changes to natural quiet would continue past project completion; “operation” of the sites would create changes to natural quiet relative to existing conditions |

| | |
|---------------------|--|
| Intensity of Effect | Negligible: Changes to natural quiet would be barely perceptible or detectable, and would effect only the project Site |
| | Minor: Changes to natural quiet would be detectable but small, and would be limited to the project site and to access roads between main roads and the project site |
| | Moderate: Changes to natural quiet would be readily perceptible; these changes may effect park animals but only slightly; impacts would be perceptible beyond the immediate project site and associated access roads |
| | Major (adverse): Changes to natural quiet would be substantial, and potentially damaging to humans working in or visiting the project site; impacts may measurably impact park animals through loss of foraging ability or reproductive success; impacts would be noticeable throughout the Drakes Estero Watershed, impacts would be permanent, not temporary in nature. |

Alternative A

Under Alternative A, there would be no activities on site.

Cumulative Impact

Under Alternative A, there would be no construction related impacts to soundscapes..

Conclusion

Alternative A, would not result in impacts to soundscapes.

Alternative A would not result in impairment or unacceptable impacts to park soundscapes.

Alternative B

Deconstruction activities would impact the natural quiet for visitors and wildlife in the area during working hours. The duration of work is anticipated to be approximately 25 days, between 7am and 7pm, Monday – Saturday. By limiting work between August and October, the construction activities would not result in direct effects on nesting season or habitat. The project would occur within the Philip Burton Wilderness, and the use of equipment would impact the natural quiet of the area.

Due to the nature of the area, along the coast, with typical wind patterns, it is not expected that the project would alter the natural sound conditions beyond the local area. Even at Limantour spit, within a few hundred meters of the work area, the combination of natural wind and waves would buffer most construction noise. The type of noise would be limited mainly to the operation of the equipment.

As described in Section 2.2, the equipment necessary to conduct this work includes a 30,000 lb + excavator, 1-2 off-road dump trucks, 1-2 bulldozers (D-7 or D-8 equivalent size), and various support and crew vehicles. Minimum tool analysis (Appendix B) has identified the use of appropriate mechanized equipment as the proper approach to remove the non-conforming structure from the Wilderness. Impacts associated with this project are short-term and temporary in nature.

Removal of this feature would eliminate the need to address or return to this location in the future, and permanently restore a natural quiet to the area.

Cumulative Impacts

The proximity of other project activities to this site would not result in cumulative soundscape impacts. The duration of impacts to soundscape would be limited to the construction period. The short-term impacts to soundscape are considered adverse minor, while in the long-term, there would be no cumulative effect on soundscapes.

Conclusion

Under Alternative B, the project activities would result in elevated noise levels within and adjacent to the project area, and along access routes for the duration of the construction period (approximately 25 days). The natural sound of the wind and waves in the area would buffer potential impacts of the noise. The short-term impacts are considered adverse minor. The removal of the structure from the Wilderness would eliminate the need for equipment to access the site in the future, resulting in a permanent protection of natural quiet to the area, considered a minor long-term benefit.

Alternative B would not result in impairment or unacceptable impacts to park soundscapes.

Alternative C

Similar to Alternative B, Alternative C would involve deconstruction activities which would impact the natural quiet for visitors and wildlife in the area during working hours. The activities conducted under Alternative C would reduce the approximate number of operational days from 25 to 15. Work would occur between 7 am and 7pm, Monday – Saturday. By limiting work between August and October, the construction activities would not result in direct effects on nesting season or habitat. The project would occur within the Philip Burton Wilderness, and the use of equipment would impact the natural quiet of the area.

Due to the nature of the area, along the coast, with typical wind patterns, it is not expected that the project would alter the natural sound conditions beyond the local area. Even at Limantour spit, within a few hundred meters of the work area, the combination of natural wind and waves would buffer most construction noise. The type of noise would be limited mainly to the operation of the equipment.

As described in Section 2.2, the equipment necessary to conduct this work includes a 30,000 lb + excavator, 1-2 off-road dump trucks, 1-2 bulldozers (D-7 or D-8 equivalent size), and various support and crew vehicles. Minimum tool analysis (Appendix B) has identified the use of appropriate mechanized equipment as the proper approach to remove the non-conforming structure from the Wilderness. Impacts associated with this project are short-term and temporary in nature.

Leaving a portion of the dam may result in future impacts to soundscape as the feature may be treated mechanically in the future.

Cumulative Impacts

The proximity of other project activities to this site would not result in cumulative soundscape impacts. The duration of impacts to soundscape would be limited to the construction period. The short-term impacts to soundscape are considered adverse minor, while in the long-term, there would be no cumulative effect on soundscapes.

Conclusion

Under Alternative C, the project activities would result in elevated noise levels within and adjacent to the project area, and along access routes for the duration of the construction period (approximately 15 days). The natural sound of the wind and waves in the area would buffer

potential impacts of the noise. The short-term impacts are considered adverse minor. Partial removal of non-conforming Wilderness structure may result in the necessity to conduct more work in the future, resulting in an adverse minor effect to the Wilderness soundscape in the long-term.

Alternative C would not result in impairment or unacceptable impacts to park soundscapes.

Wilderness Impacts

Policies and Regulations

The Glenbrook Estuary and project area under consideration is located in the Phillip Burton Wilderness. This wilderness designation defines a cluster of land uses that are allowed in the area, based on wilderness laws, regulations, policies and plans. Park actions must comply with the Wilderness Act (1964) and NPS Management Policies (2006).

The park also must comply with E.O. 12898, which requires that NPS actions do not have disproportionate “high and adverse human health or environmental effects” on minority or low-income populations of the US.

Assessment Methodology

Alternatives considered under the Glenbrook Dam Removal and Quarry Restoration Project would not affect minority or low-income populations. The project is not located near significant population centers, and the alternatives under consideration would affect all socioeconomic groups alike. This assessment would not consider socioeconomic impacts.

As the Glenbrook Estuary is located within the Philip Burton Wilderness, this assessment would focus on the compliance of the alternatives with laws, regulations, policies and plans under the wilderness land use designation. The project under consideration would not affect the land use designation. The assessment would focus on potential impacts from the alternatives on wilderness resources and character. The NPS defines a wilderness area as, “where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain (Section 6.1, NPS Management Policies, 2006).” Criteria that are used by the NPS (as outlined in the Wilderness Act) to determine wilderness character for an area are;

- determination that the area and community of life is “untrammelled by man” and that humans do not remain;
- that the area is undeveloped, retains “primeval character” and that there are no permanent improvements or inhabitation;
- that the human imprint is substantially unnoticeable;
- that the area is protected and managed to preserve natural conditions; and
- that the area offers opportunities for solitude or primitive and unconfined recreation.

Definitions

Type, duration, and intensity of impacts to vegetation communities are described below.

Assessment Methodology

The proposed action’s likely effects on Wilderness resources were evaluated qualitatively, based on anticipated short- and long-term change in the character of the sites as a result of restoration activities and their potential to alter existing wilderness values.

The following specific questions were factored into the analysis, as required by the minimum requirement decision guide (See Appendix B).

Table 4.9 summarizes the descriptors used to evaluate effects on Wilderness resources.

Table 4.9 Descriptors for Wilderness Effects

| | |
|---------------------|---|
| Type of Effect | Beneficial: Actions would maintain, support or protect wilderness character. This may include promotion of natural process or naturalness to enhance ecological sustainability in the Wilderness area. |
| | Adverse: Actions would degrade wilderness resource values, through reduction of wildness in the designated wilderness areas. |
| Duration of Effect | Short-term: Effects of the actions would result in visible Wilderness effects for less than two years. |
| | Long-term: Effects would persist beyond two years following the completion of construction |
| Intensity of Effect | Negligible: Effects would be localized and limited to a confined area |
| | Minor: Effects would be slight and/or the area affected would be small. The proposed action would have a limited effect on the wilderness character, naturalness, and natural function of the area |
| | Moderate: Effects would be more noticeable and a greater proportion of the project site(s) and surrounding area would be affected. Wilderness character would be noticeably degraded, with a loss of wildness and naturalness. |
| | Major: Effects would be extremely conspicuous and a large proportion of the project area would be affected. Wilderness values and character would be permanently and substantially degraded. |

Alternative A

Under Alternative A, there would be no proposed use of mechanized equipment to treat the project site.

The dam and quarry areas are not consistent with the Wilderness Act. This alternative would leave the non-conforming wilderness facilities in place. Alterations to the tidal system would continue. The remnant of the structure impacts the Wilderness aesthetic, passing the message on to visitors that such a structure is a “natural” feature in the Wilderness environment. This feature is visible from Mount Vision and the Limantour spit.

Cumulative Impacts

Under Alternative A, the dam would remain an impediment to visitor appreciation of the wilderness aesthetic until natural processes remove the dam permanently. The dam’s presence would maintain the sites inconsistency with NPS policy.

Conclusion

The presence of a non-conforming structure and disturbed lands within the designated Wilderness conflicts with the maintenance and provision of an untrammled area. The persistence of these facilities within the Wilderness would result in short-term and long-term minor adverse impacts to the Wilderness character of the Glenbrook Estuary.

Alternative A would not result in an impairment or unacceptable impacts to park Wilderness resources.

Alternative B

As described in Section 2.2, the equipment necessary to conduct this work includes a 30,000 lb + excavator, 1-2 off-road dump trucks, 1-2 bulldozers (D-7 or D-8 equivalent size), and various support and crew vehicles. Minimum tool analysis (Appendix B) has identified the use of appropriate mechanized equipment as the proper approach to remove the non-conforming structure from the Wilderness (for extensive discussion and justification for use of mechanized equipment in the wilderness, see Wilderness Minimum tool, Appendix B). Use of mechanized equipment within the wilderness area is prohibited without authorization from the Superintendent. The expected result from project implementation is the removal of a non-conforming structure from wilderness, and restoration of disturbed lands. The Seashore is actively removing non-conforming structures and facilities from wilderness areas. Restoration of the quarry and spillway would allow for the surrounding coastal scrub community to cover the barren areas, and in time, there would be no signs of the former dam.

It is estimated that the work associated with Alternative B would take approximately 25 days, with construction activities occurring between 7am and 7pm, Monday – Saturday. In order that construction activities are accomplished efficiently, and that visitors are not affected by construction activities. Limited trail closures would be necessary during the duration of the project. This would provide safety and protection for visitors, but would result in limits to recreational use of the Wilderness.

The dam is a facility that is not consistent with the Wilderness Act. Removal of the dam would restore the wilderness aesthetic for visitors to the Glenbrook Estuary, as well as those who currently view the structure from Mount Vision and Limantour spit – two heavily visited areas of the park.

Cumulative Impacts

Under Alternative B, the wilderness aesthetic of the Glenbrook estuary and side slopes (where quarry scars are currently located) would be restored. Impacts, such as the presence of mechanized equipment and bare soil, would be an adverse, negative impact to the wilderness aesthetic over the short term. As restoration measures take place and natural processes return more fully to the estuary, these impacts would dissipate. Eventually, there would be no sign of the dam, spillway or quarry and these impacts would be negated. This project, in conjunction with actions proposed for the wilderness as part of the Coastal Watershed Restoration – Geomorphic Restoration Project, would result in short-term minor adverse impacts to wilderness. However, removal of non-conforming structures from the Wilderness, and restoration of natural process is considered moderate and beneficial in the long-term.

Conclusion

Construction equipment, described in Section 2.2, would be used to conduct this work. Construction activities (totaling approximately 25 days), along with reduced visitor access to the Wilderness during the construction period would result in minor to moderate adverse impacts in the short-term. In the long-term, the removal of non-conforming structures, restoration of disturbed lands, and restoration of natural process and the natural wilderness aesthetic to the Glenbrook Estuary is considered moderate beneficial.

Alternative B would not result in impairment or unacceptable impacts to park Wilderness resources.

Alternative C

As described in Section 2.2, the equipment necessary to conduct this work includes a 30,000 lb + excavator, 1-2 off-road dump trucks, 1-2 bulldozers (D-7 or D-8 equivalent size), and various support and crew vehicles. Minimum tool analysis (Appendix B) has identified the use of appropriate mechanized equipment as the proper approach to remove the non-conforming structure from the Wilderness (for extensive discussion and justification for use of mechanized equipment in the wilderness, see Wilderness Minimum tool, Appendix B). Use of mechanized equipment within the wilderness area is prohibited without authorization from the Superintendent.

The actions proposed under Alternative C, though they avoid temporary impacts to wetlands and other resources by limiting work to just the west side, would leave a large section of the non-conforming structure within Wilderness. The Seashore is actively removing non-conforming structures and facilities from wilderness areas. Restoration of the quarry would allow for the surrounding coastal scrub community to cover the barren areas. Alternative C would treat the western side of the project area, but the non-conforming structure and disturbed land (spillway) on the eastern side of the dam would not be addressed.

It is estimated that the work associated with Alternative C would take approximately 15 days, with construction activities occurring between 7am and 7pm, Monday – Saturday. In order that construction activities are accomplished efficiently, and that visitors are not affected by construction activities, the Seashore would close trails accessing the work area for the duration of the project. This would provide safety and protection for visitors, but would result in limits to recreational use of the Wilderness.

The dam facility is not consistent with the Wilderness Act. Partial removal of the dam would, to some degree, would reduce the scale, but the site would remain visible from Mount Vision and Limantour spit – two heavily visited areas of the park.

Cumulative Impacts

Under Alternative C, the wilderness aesthetic of the Glenbrook estuary and side slopes (where quarry scars are currently located) would be partially restored. Impacts, such as the presence of mechanized equipment and bare soil, would be an adverse, negative impact to the wilderness aesthetic over the short term. As restoration measures take place and natural processes return more fully to the estuary, these impacts would dissipate. Eventually, there would be no sign of the dam, spillway or quarry, thereby negating these impacts. This project, in conjunction with actions proposed for the wilderness as part of the Coastal Watershed Restoration Project, would result in short-term minor adverse impacts to wilderness. Partial removal of non-conforming Wilderness structure may result in the necessity to conduct more work in the future, resulting in an adverse minor long-term cumulative effect to the Wilderness resources.

Conclusion

Construction equipment, described in Section 2.2, would be used to conduct this work. Construction activities would be less than Alternative B (approximately 15 days) along with reduced visitor access to the Wilderness during the construction period would result in minor adverse impacts in the short-term. Partial removal of non-conforming Wilderness structure may result in the necessity to conduct more work in the future, resulting in an adverse minor effect to the Wilderness resources in the long-term.

Alternative C would not result in impairment or unacceptable impacts to park Wilderness resources.

CHAPTER 5: CUMULATIVE IMPACTS

The Council on Environmental Quality (CEQ) NEPA regulations 1508.7 states, ‘Cumulative impact is the impact on the environment which results 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.’”

CURRENT AND ONGOING ACTIONS

Cumulative impacts are described at the watershed (Glenbrook Estuary), and coastal scale (Drakes Bay and Estero).

Within the Glenbrook watershed, the ranching associated operations have been removed since the 1960s, and the upland pastures are no longer used for managed grazing. The watershed is managed as wilderness and recreation is the only activity currently taking place.

Within the Drakes Estero watershed, the restoration actions proposed for Glenbrook Estuary are similar to those implemented for the Horseshoe Pond restoration (summer 2004). In addition, other restoration activities associated with the Coastal Watershed Restoration Project, including dam removal and tidal marsh restoration, are anticipated for summer and fall 2008. All of these projects intend to restore natural hydrologic and ecological process to the area. The timing of these multiple restoration projects is such that the central Drakes Estero watershed would have multiple activities occurring at the same time.

The analysis in this document has considered the potential of these activities cumulatively effecting park resources. The timing, location, and objective of this project make it appropriate. Based on analysis, the largest cumulative impacts are construction associated and affect Wilderness character and air quality. The short-term wilderness impacts are far outweighed by the long-term benefits associated with removal and restoration of non-conforming wilderness structures and disturbed lands. This is consistent with park enabling legislation acknowledging the developed character of the Wilderness and recognition that restoration was necessary to meet the intent of Wilderness.

Air quality is a concern, and standard BMPs identified by the Bay Area Air Quality Management District would be implemented. The location and nature of the work are such that most exhaust would be dispersed by coastal winds and would not contribute to the overall air basin air quality. Further, restoration of these areas in the long-term would result in more native vegetation and wetland habitat which can play a positive role in nutrient and carbon uptake in the future.

PAST RESTORATION AND MONITORING ACTIVITIES

The extent of past activities in the watershed is limited to historic ranching. The proposed residential housing development that was to take place in the 1950s never occurred, and the land was purchased by the Park Service in the 1960s. The NPS initiated monitoring of the Glenbrook Estuary site in 2001 to document resources described in this document.

The restoration of our Wilderness resources is a growing initiative within the Seashore. Post-restoration monitoring for sediment erosion and invasion by non-native weed species would be ongoing. Overall changes to wetland composition and habitat are anticipated, however, due to

the location and nature of the site, only aerial imagery would be used to track changes within the project area.

CUMULATIVE IMPACTS

This cumulative impacts section analyzes the potentially compounded impacts of implementation at all project sites. Because each of these projects (see Section 1.4.1) is identified, individually, as a restoration of natural ecological and physical process, this section is important to ensure that cumulatively, the ecological resources can adjust to the changes in process brought about by these federal actions. This section summarizes the cumulative impacts by alternative.

Alternative A – No Action

Under Alternative A, no direct action would occur as a result of the project. Under Alternative A, there would be no contribution to cumulative impacts associated with direct actions within the project area. In the long-term, continued degraded water quality conditions and constraints on natural shoreline and hydrologic process would continue in the Drakes Bay area. Impacts to wilderness aesthetic that the dam and quarry sites currently have would also continue.

Conclusion

Alternative A would not contribute cumulatively to impacts of any other projects.

Alternative B – Lower Glenbrook Dam Removal and Estuary Restoration {Preferred Alternative}

Under Alternative B, treatment actions would result in the excavation of fill and restoration of the lagoon outlet to the south side of the waterbody. The short-term impacts associated with construction are, in most cases, minor, as the project would occur in an area where dynamic processes are desirable. Tidal influences to the estuary would be restored over the short and long-term.

All of these projects within the cumulative impact analysis intend to restore natural hydrologic or physical process which would have some level of impact on water resources. Nearly all of these projects are being conducted with the intent of protecting or enhancing water quality, and the restoring natural hydrologic and/or shoreline process, consistent with NPS management policies. The effects to water quality and hydrologic process at each site would be localized during construction and would stabilize in 1-2 years. The restoration of natural hydrologic and shoreline process would enhance long-term function and habitat throughout the area. In the short-term, negligible cumulative adverse effects to water resources would result. In the long-term, minor cumulative benefits to the Drakes Estero and Drakes Bay system would occur in association with Alternative B.

Effects from other impacts would be localized and temporary. Impacts to air quality, soundscapes, vegetation, special status species and wildlife assemblages would not significantly compound or magnify impacts to other elements of consideration. Wetlands and water or shoreline resources are related, but negative impacts to wetlands have been considered and assessed to be short-term and negligible.

Long-term impacts from all elements considered in this assessment would result in cumulative benefits to wilderness land uses, such as recreation and wildlife habitat.

Conclusion

Overall cumulative analysis for Alternative B indicates that it would result in short-term adverse minor impacts for all impact topics with the exception of air quality. Activities conducted in association with this project would result in moderate cumulative impacts related to NOX generation (all other pollutant parameters remain minor). The restoration of natural shoreline and hydrologic process would result in long-term minor to moderate beneficial impacts to the Glenbrook Estuary, Drakes Estero and Estero de Limantour.

Alternative C – Removal of West Arm of Dam and Restoration of Western Quarry

Under Alternative C, the partial removal of the dam and associated fill would result in negligible impacts at both the watershed and Drakes Bay scale. Tidal influences to the estuary would be partially restored over the short and long-term, though the eastern arm of the dam would remain an impediment. Overall, the cumulative impacts of Alternative B would be negligible and adverse in the short term, but negligible and beneficial in the long-term.

All of these projects within the cumulative impact analysis intend to restore natural hydrologic or physical process which would have some level of impact on water resources. Nearly all of these projects are being conducted with the intent of protecting or enhancing water quality, and the restoring natural hydrologic and/or shoreline process, consistent with NPS management policies. The effects to water quality and hydrologic process at each site would be localized during construction and would stabilize in 1-2 years. The restoration of natural hydrologic and shoreline process would enhance long-term function and habitat throughout the area. In the short-term, negligible cumulative adverse effects to water resources would result. In the long-term, negligible cumulative benefits to the Drakes Estero and Drakes Bay system would occur in association with Alternative C.

Effects from other impacts would be localized and temporary. Impacts to air quality, soundscapes, vegetation, special status species and wildlife assemblages would not significantly compound or magnify impacts to other elements of consideration. Wetlands and water or shoreline resources are related, but negative impacts to wetlands have been considered and assessed to be short-term and negligible to non-existent.

Long-term impacts from all elements considered in this assessment would result in some cumulative benefits to wilderness land uses, such as wildlife habitat (aquatic), but would not result in any cumulative benefits to recreational use.

Conclusion

Overall cumulative analysis for Alternative B indicates that it would result in short-term adverse negligible impacts. The restoration of natural shoreline and hydrologic process would result in long-term, negligible, beneficial impacts to the Glenbrook Estuary, Drakes Estero and Estero de Limantour.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

Considering short-term uses versus long-term productivity, the benefits of implementing Alternative B are considered to be the best alternative when all options are weighed objectively. The preferred alternative would restore natural hydrologic and shoreline process, consistent with NPS management policies (NPS 2006) and park enabling legislation. The historic shoreline process supported a viable estuary system that functioned within a healthy dynamic equilibrium. The current constraints have resulted in increased sedimentation, degraded water quality and an

inability of the system to adjust to conditions, limiting the ecological condition and productivity of the system.

The local short-term uses of the environment following implementation of the preferred alternative would include estuary habitat restoration. The resulting long-term productivity would include sustainable hydrologic, coastal, and ecological process, enhancement of rare estuary habitat in the area, and improved tidal influences on conditions at this site. The area would provide an enhanced landscape for individuals that visit the park seeking to appreciate the natural California seashore or a wilderness experience.

CHAPTER 6: CONSULTATION AND COORDINATION

AGENCIES AND ORGANIZATIONS

- Point Reyes National Park, National Park Service
- Geologic Resources Division, National Park Service
- Point Reyes National Seashore Association

ANTICIPATED PERMITS

- US Army Corps of Engineers – Clean Water Act Section 404
- San Francisco Bay Regional Water Quality Control Board – Clean Water Act Section 401
- National Marine Fisheries Service – Endangered Species Act – Section 7 consultation
- US Fish and Wildlife Service – Endangered Species Act – Section 7 consultation
- California Coastal Commission – Federal Consistency Review
- National Park Service – Wilderness Act Minimum Tool determination

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SUMMARY OF DISTRIBUTION

Notification of availability for the Environmental Assessment is conducted through mailings to a standard list of individuals, agencies and organizations that have expressed an interest in park management and planning issues in the past. At this time the list includes more than 275 addresses. In addition, notification and CDs of the document are provided to the California State Clearinghouse for distribution to the pertinent state agencies. The Clearinghouse assigns a review

number and consolidates agency comments at the end of the comment period. Copies of the document, either digital or in hard copy are provided upon request.

The document has been posted on the park web site summarizing this project:

http://www.nps.gov/pore/parkmgmt/planning_glenbrook_restoration.htm

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APPENDIX A

List of Federally Endangered Plant and Animal Species with potential to occur within the Coastal Watershed Project Area including Glenbrook Dam and Quarry Site.

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List of Federally threatened and endangered plant and animal species with potential to occur in the Coastal Watershed Restoration Project Area including Glenbrook Dam and Quarry Restoration Site. Potential to occur based on known species ranges, general habitat requirements, and historical sightings.

| Scientific name | Common name | Status | Habitat | Comments | Known to Occur | Subject to Impacts |
|--|--------------------------|--------|--|--|----------------|--------------------|
| Mammals | | | | | | |
| No terrestrial or freshwater mammals. Marine mammals (Guadalupe fur seal, Steller sea lion, sei whale, blue whale, fin whale, right whale, and sperm whale) are not known or expected to occur in the project areas ^{1,2} | | | | | | |
| Birds | | | | | | |
| <i>Pelecanus occidentalis californicus</i> | California brown pelican | FE | Open water and roosts on mud flats and offshore rocks; breed in Channel Islands. | Brown Pelicans do not breed at PRNS, but commonly occur in the estuaries and along the coastline in the summer, fall, and winter. | Abundant | Yes |
| <i>Brachyramphus marmoratus</i> | Marbled murrelet | FT, FX | Mature, coastal coniferous forests for nesting; nearby coastal water for foraging; nests in conifer stands greater than 150 years old and may be found up to 35 miles inland; winters on subtidal and pelagic waters often well offshore | No suitable habitat or known occurrences in the vicinity of the proposed projects | Uncommon | No ⁴ |
| <i>Charadrius alexandrinus nivosus</i> | Western snowy plover | FT,FX | Sandy beaches, salt pond levees; needs sandy, gravelly, or friable soil for nesting. | Nests on the Great Beach between North Beach and Kehoe and NW Limantour Beach (PRBO 2001). Historically nested at Drakes Beach. Limantour Spit used for feeding, no documented nesting | Yes | Yes |
| <i>Diomedea albatrus</i> | Short-tailed albatross | FE | Adults spend the summer non-breeding season at sea in the Aleutian Islands, Bering Sea, and Gulf of Alaska. | There are no known breeding colonies at PRNS and only rare sightings of individuals at sea in the vicinity of Cordell Bank near Point Reyes | Rare | No ⁴ |
| <i>Haliaeetus leucocephalus</i> | Bald eagle | FT | In western North America, nests and roosts in coniferous forests within a mile of a significant body of water (e.g. lake, reservoir, river, or the ocean) | Reintroduced into central coast, but PRNS currently known only as winter habitat. | No | No ⁴ |
| <i>Sterna antillarum (=albifrons) browni</i> | California least tern | FE | Nests on sandy, upper ocean beaches, and occasionally uses mudflats; forages on adjacent surf line, estuaries, or the open ocean | Suitable habitat exists within the action areas, but species occurrences are rare. | Rare | No ⁴ |
| <i>Strix occidentalis caurina</i> | Northern spotted owl | FT | Dense old-growth or mature forests dominated by conifers with topped trees or oaks available for nesting crevices | A permanent resident throughout its range; found in the north Coast, Klamath, and western Cascade Range from Del Norte County to Marin County | No | No ⁴ |
| Reptiles | | | | | | |

No terrestrial or freshwater reptiles. Marine turtles (loggerhead turtle, green turtle, leatherback turtle, and olive (=Pacific) Ridley sea turtle) are not known or expected to occur in the project areas²

| Amphibians | | | | | | |
|---------------------------------|--------------------------------|----|--|---|---------------------------------|-----------------|
| <i>Rana aurora draytonii</i> | California red-legged frog | FT | Deep pools with dense, shrubby, or emergent vegetation | Present in numerous areas in PRNS. Project area is within Estuarine habitat. Project would not convert habitat or affect existing frog breeding or non-breeding habitat | Yes | No |
| Fish | | | | | | |
| <i>Lucylogobius newberryi</i> | Tidewater goby | FE | Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water & high oxygen levels. | Potentially occurred but never documented in Horseshoe Lagoon or Drakes Estero system (Jacobs personal communication 2004). Site identified as potential experimental reintroduction site for tidewater goby. | No, but reintroduction proposed | No ⁵ |
| <i>Oncorhynchus kisutch</i> | Coho salmon – central CA coast | FT | Needs beds of loose, silt-free coarse gravel for spawning; needs cover, cool water and sufficient dissolved oxygen. | Spawn in Olema Creek, Lagunitas Creek, Devil's Gulch, and San Geronimo Creek (NDDDB, 2000). Not found in any action area streams in 2002 surveys | No | No ⁶ |
| <i>Oncorhynchus mykiss</i> | Central CA coastal steelhead | FT | Needs beds of loose, silt-free coarse gravel for spawning; needs cover, cool water and sufficient dissolved oxygen. | Spawn in most coastal drainages in PRNS, including several streams in the Drakes Estero watershed. | Yes | Yes |
| <i>Oncorhynchus tshawytscha</i> | CA coastal chinook | FT | Cold, clear water with clean gravel of appropriate size for spawning; most spawning occurs in headwater streams; migrate to the ocean to feed and grow until sexually mature | Not known to occur historically or presently within action area watersheds | No | No ⁶ |
| Invertebrates | | | | | | |
| <i>Speyeria zerene myrtilae</i> | Myrtle's silverspot butterfly | FE | Dune and coastal grassland. <i>Viola adunca</i> is host plant. | Host plant and individual butterflies observed within Horseshoe Pond watershed, but not Project Area. | Yes | Yes |
| <i>Syncaris pacifica</i> | California freshwater shrimp | FE | Lowland coastal perennial streams | Found primarily in Sonoma, Marin, and Napa counties. Reported upstream in Lagunitas Creek; observed in lower Olema Creek, Walker Creek and tributary to Keys Creek (NDDDB 2000, Fong and Lo Bianco 2003). | No | No ³ |
| Plants | | | | | | |
| <i>Alopecurus aequalis</i> var. | Sonoma | FE | Freshwater marshes and swamps; riparian | Known from fewer than five native occurrences (CNPS 2001). Present in | No | No ⁷ |

| | | | | | | |
|----------------------------|---------------------|----|---|--|----|-----------------|
| <i>Sonomensis</i> | alopecurus | | scrub; wet meadows. | coastal areas of PRNS. | | |
| <i>Chorizanthe robusta</i> | Robust spineflower | FE | Coastal sand, scrub. | Known to occur within PRNS | No | No ⁷ |
| <i>Chorizanthe valida</i> | Sonoma spineflower | FE | Sandy areas in coastal prairie. | Thought extinct at one time; only known extant occurrence in PRNS (CNPS 2001; PRNS 2001). | No | No ⁷ |
| <i>Layia carnosa</i> | Beach layia | FE | Coastal dunes. | Present in PRNS (PRNS 2001). | No | No ⁷ |
| <i>Lupinus tidestromii</i> | Tidestrom's lupine | FE | Coastal dunes. | Present in PRNS (PRNS 2001). | No | No ⁷ |
| <i>Trifolium amoenum</i> | Showy Indian clover | FE | Valley and foothill grassland; coastal bluff scrub; sometimes on serpentine soil; open, sunny areas; swales | Last recorded in Olema area in 1886. Thought extinct, but rediscovered twice since 1993: only one extant as of 1996 (CNPS 2001). | No | No ⁷ |

FEDERAL STATUS CODES

FEDERAL LISTING

FE = Listed as endangered under federal Endangered Species Act.

FT = Listed as threatened under federal Endangered Species Act.

FD = Delisted from federal Endangered Species Act.

FX = Critical Habitat Designation

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APPENDIX B

Minimum Requirement Process

Congress passed the Wilderness Act in 1964 “to secure for the American people of present and future generations the benefits of an enduring resource of wilderness... for this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as ‘wilderness areas’, and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character.”

The Wilderness Act established certain restrictions on activities permitted within wilderness to preserve its wild and untrammelled nature and to ensure that it remain wild for future generations. Two explicit restrictions prohibited the construction of permanent roads and commercial enterprises within wilderness. Other generally prohibited activities include landing of aircraft, construction of temporary roads, the use of mechanized transport, the use of motorized equipment and the placement of structures. These restrictions are detailed in Section 4(c) of the act and apply to users and managers alike. The act did however; authorize certain narrow exceptions to these prohibitions for agencies administering wilderness areas. Specifically, agencies were permitted exception in the instance of emergencies pertaining to the health and safety of persons within wilderness, and actions necessary to meet the minimum requirement for preserving wilderness and protecting an enduring resource of wilderness.

The Minimum Requirement Analysis stems from the language in the act pertaining to actions that are minimally required to permit the agency to administer wilderness areas as wilderness. The minimum requirement applies only to the managing agency and not the public, which is explicitly bound by the restrictions of the act. The concept of Minimum Requirement flows directly from Section 4(c) of the Wilderness Act of 1964.

Except as specifically provided for in the Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and except as necessary to meet minimum requirements for the administration of the area for the purpose of this act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area. (emphasis added)

The Minimum Requirement Analysis is designed to assist program managers in making appropriate decisions affecting wilderness that are consistent with the Wilderness Act and National Park Service Management Policies.

Applicable actions include, but are not limited to, scientific monitoring, research, recreational developments (trails, bridges, signs, etc.) and activities related to special provisions mandated by the Wilderness Act or subsequent legislation. Agency policy may also influence determination of minimum requirement. National Park Service policy direction on wilderness management is contained in Section 6.3.5 of the Management Policies 2001:

All management decisions affecting wilderness must be consistent with a minimum requirement concept. When determining minimum requirement, the potential disruption of wilderness

character and resources will be considered before, and given significantly more weight than economic efficiency and convenience. If a compromise of wilderness resource or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts will be acceptable. ...the method used must clearly weigh the benefits and impacts of the proposal, document the decision-making process and be supported by an appropriate environmental compliance document.

The Minimum Requirement Analysis is composed of two parts; 1) the determination that the proposed action is necessary for administration of the wilderness area as wilderness (the minimum requirement), and 2) the selection of the best method for implementing the action with the least impact to wilderness (the minimum tool determination). The Wilderness Act and National Park Service Policy require that generally prohibited actions undertaken in wilderness complete a Minimum Requirement Analysis. This analysis is included as a part of environmental compliance documentation, generally as an appendix to an Environmental Assessment or Environmental Impact Statement.

The key point of the Minimum Requirement Analysis is that the proposed action is necessary for the administration of the wilderness area as wilderness. The philosophical dilemma with undertaking actions within wilderness is whether a generally prohibited activity with transitory impact will, in the long run, enhance wilderness and ensure the long-term viability of the area as wilderness. This is the decision that agencies and managers must make through the minimum requirement analysis and minimum tool determination. It is a measured determination that the proposed action will enhance the wilderness and natural character of the area and will enhance the likelihood that the wilderness values will be better maintained and preserved in the future.

Minimum Requirement Analysis

Minimum Requirement Analysis Worksheet

Point Reyes National Seashore

Proposed Action: Glenbrook Dam Removal and Quarry Restoration

Project Lead: Brannon Ketcham, Hydrologist

Date: February 2007

PART A: Minimum Requirement (Should the action be done in wilderness)

1

IS THE ACTION AN EMERGENCY?

YES

Act according to established procedures

NO



Answer: Yes No

Explain:

Non-conforming structures present no immediate risk to health and safety. Restoration can proceed at the most ecologically beneficial time.

2

Does the Action conflict with legislation, wilderness goals or DFC?

YES

Do Not Undertake

NO



Answer: Yes No

Explain

The Point Reyes Wilderness Act amended the National Seashore enabling legislation by inserting specific reference to wilderness restoration as a goal. Section 4(c) of the Wilderness Act permits a minimum requirement/minimum-tool process for the administration of wilderness areas.

3

Can the action be accomplished with less intrusive means?

YES

Do It

NO



Answer: Yes No

Explain

Large non-conforming structures in wilderness were constructed with heavy equipment prior to wilderness establishment. The only feasible way to remove /restore these sites is with the use of excavation equipment.

4

Can the action be accomplished outside of wilderness?

YES
Do it There

NO
↓
Proceed to PART B

Answer: Yes No
 Explain
 The non-conforming structures are physically located within wilderness. Options for removing the non-conformities would be to either remove them or redraw the wilderness boundary to exclude them.

5

PART B - Determining the Minimum Requirement

Responsive Questions for Minimum Requirements Analysis:

| RESPONSIVE STATEMENT | |
|---|--|
| EFFECTS ON WILDERNESS CHARACTER | |
| How does the project or activity benefit the wilderness resource as a whole as opposed to maximizing one resource? | The final restoration goal is removal of this non-conforming structure from the Wilderness and restoration of natural hydrologic process. This project intends to achieve this objective. The proposed dam removal will restore tidal influence and natural hydrology to the Glenbrook Estuary as well as restore natural vegetation to the quarry sites, which is consistent with Wilderness standards. |
| If this project or activity were not completed, what would be the beneficial and detrimental effects to the wilderness resource? | Detrimental effects: <ul style="list-style-type: none"> • Altered natural hydrologic, shoreline, estuarine and ecologic processes continue within the Estero de Limantour and Glenbrook estuary. • Public safety hazard remains • Non-conforming man-made structure and altered natural visual character remains Beneficial effects: <ul style="list-style-type: none"> • Short-term impacts to the estuary from dam removal activities would not take place |
| How would the project or activity help ensure that human presence is kept to a minimum and that the area is affected primarily by the forces of nature rather than being manipulated by humans? | Completion of proposed work at this site would eliminate the necessity for future restoration work and removal of this non-conforming facility within the Wilderness area and return the estuary to a system affected primarily by forces of nature, as opposed to a system directly affected by a human built structure. |
| How would the project or activity ensure that the wilderness provides outstanding opportunities for solitude or a primitive and unconfined type of recreation? (i.e. does the project or activity contribute to people's sense that they are in a remote place with opportunities for self-discovery, adventure, quietness, connection with | The construction actions would likely take 20-25 days to complete. This would represent a short-term intrusion on the values of wilderness and solitude. In the long-term these actions and removal of a non-conforming structure is considered a benefit to Wilderness. |

| | | |
|---|---|---------------------|
| nature, freedom, etc.) | | |
| <i>MANAGEMENT SITUATION</i> | | |
| What does your management plan, policy, and legislation say to support proceeding with this project? | PORE Guidelines for Management (1990), the PORE GMP, and enabling legislation recognize that restoration of natural process is likely necessary within the Wilderness area. The preferred restoration alternative (Alternative B) is intended to insure that natural process is sustained, and that NO FURTHER manipulation is required at this location. | |
| How did you consider wilderness values over convenience, comfort, political, economic or commercial values while evaluating this project or activity? | The site is within Wilderness and is a reason that this site is a priority for treatment. Restoration is intended to enhance wilderness values. | |
| <i>SHOULD WE PROCEED?</i> | <i>YES: We should proceed Go to Step 2</i> | <i>NO: Stop</i> |

STEP 2

| | | | |
|---|--|---|-----------------------------------|
| What is Proposed: Removal of unnatural structures impeding natural hydrologic function. <ul style="list-style-type: none"> • Removal of Lower Glenbrook Dam • Restoration and revegetation of Lower Glenbrook Dam quarry and spillway | | | |
| Location: Mouth of Glenbrook Creek at Glenbrook Estuary | | When will the action occur: Start: 8/2007 End: 10/2007 | |
| <input type="checkbox"/> Method 1 | <input type="checkbox"/> Method 2 | <input checked="" type="checkbox"/> Method 3 | <input type="checkbox"/> Method 4 |
| Use of motorized equipment or mechanical transport | Use of non-motorized equipment or non-mechanical transport | Combination of Methods 1 & 2 | Other methods |

Rational for Method

The project is needed to restore natural shoreline, estuarine, and hydrologic conditions and increase estuarine habitat at Point Reyes. At the Glenbrook Dam, construction across estuarine habitat impedes natural process and is not consistent with long-term park and NPS management objectives. The dam fill within the estuary and adjacent disturbed lands are not consistent with Wilderness objectives. This site impedes access to the Glenbrook Estuary which supports federally threatened coastal California steelhead.

Prior to establishment of the Seashore, much of the entire designated Wilderness was part of intensive agriculture; including grazing and cropping and in many areas logging was common. Roads, ponds and other facilities were constructed and many still persist within the Wilderness. Many of these facilities, particularly roads and dams, have altered the natural functioning of the wilderness ecosystem. This has been especially evident in regard to hydrologic functioning, erosion and sedimentation and their impacts upon wildlife.

Point Reyes National Seashore enabling legislation (Point Reyes Act of Sept 13, 1962) tasks the National Park Service "...to save and preserve, for the purpose of public recreation, benefit, and

inspiration, a portion of the diminishing shoreline of the United States that remains undeveloped”. Subsequently, the Point Reyes Wilderness Act (PL 94-567) amended the Seashore’s enabling legislation to include the following language “...*SEC. 7. (a) Section 6(a) of the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a) is amended by inserting "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the **maximum protection, restoration and preservation of the natural environment with the area**" immediately after "shall be administered by the Secretary."*

Preservation and restoration of natural processes at Point Reyes and within the Point Reyes (Phillip Burton) Wilderness have been given great importance by Congress. The Wilderness Act though, contains a dilemma between the mandates of remaining “untrammeled” but “natural”. The issue becomes to what extent does restoration for naturalness conflict with untrammeled? If non-conforming intrusions to wilderness are permitted to perpetuate, with their continued effect upon ecosystem function, then the area is neither untrammeled nor natural. Actions taken to correct non-conforming, ecologically disruptive conditions may have a short-term affect upon wilderness character, but in the long-term will remove the “imprint of man” and increase naturalness.

Considering restoration within Wilderness includes weighing the impacts of implementation with those of leaving the site alone. Particularly with facilities, such as road crossings, culverts, and dams, the implications of these man-made facilities being a part of wilderness reduces the strength of the overall Wilderness objective of ‘untrammeled by man’.

The Glenbrook Dam and quarry sites are located approximately two miles inside of the Wilderness Boundary. It is accessible on the Muddy Hollow Trail (a former road). The Glenbrook Dam, the materials that allow it to remain, and the equipment used to construct it are considered non-conforming with the wilderness character.

Section 4(c) of the Wilderness Act of 1964 prohibits certain activities in wilderness but, at the same time allows the agencies to engage in those activities in some situations as long as it meets the minimum requirement for administration of the area as wilderness. Section 4(c) states:

... except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

Through this Wilderness Act language, Congress acknowledged that there are times when exceptions are allowed to meet the minimum required administration of the area as wilderness. The minimum tool requirements analysis required determines the least impacting way of administering the wilderness. The wilderness manager may authorize any of the generally prohibited activities or uses listed in Sec. 4(c) of the Wilderness Act if they are determined to be the minimum necessary to do the job and meet wilderness management objectives.

Impacts to wilderness resources and wilderness character

The creation of an estuary (the Glenbrook Estuary) that is influenced purely by natural hydrologic processes will result in a short-term impact to wilderness character. This impact will be manifested through the use of mechanized equipment and mechanical transport to the restoration site. Utilization of construction equipment will alter the ambient sound quality and the character

of the local soundscape during the deconstruction/restoration phase of the project. An increase in airborne dust and emissions associated with the operation of heavy equipment can be expected. Visitor access to the area will be restricted during the time when the deconstruction and restoration work is taking place for the duration of the project. Impacts are expected to be of short duration and transitory. Impacts will be mitigated to the greatest extent possible.

Glenbrook Dam

The Glenbrook Dam, quarry sites and Estuary are located approximately two miles into the Wilderness area from the Muddy Hollow Trailhead. The intent of actions at this location are to remove a non-conforming structure from the Wilderness and restore natural hydrologic process to Glenbrook Creek.

The construction activities are estimated to take approximately five weeks, requiring daily access to the site and work at the site. The contractor would be required to stage heavy equipment at the dam site and run a shuttle between the access and the site to minimize impacts from trips between the sites. A staging area will be located in an already impacted area, or in an area that will be the least impacted by equipment staging.

The logistics of the restoration and fill removal are complicated by the limited access to only one side of the dam, the breach in the dam, and the dynamics of the tidal fluctuation. For the project narrative and specific tasks, Figure 2.1 of the EA identifies specific reference sites (spillway, quarry, etc.). The detailed restoration plan has been developed. Pending environmental compliance, the project is scheduled for implementation in July/August 2008.

The project will require a temporary crossing across the breach in the dam. This will involve rock and minor amounts of fill from the dam to cover and armor temporary culverts while allowing for tidal flow during the project. Large culverts will be installed to accommodate for wave and tidal action.

The dam will be deconstructed using a large excavator with a 48 inch bucket, two off-road dump trucks, and one to two bulldozers. Once the crossing is established, topsoil from the dam and spillway (east) side of the dam will be removed and stockpiled. The spillway area will be scarified, fill will be added to the cut area, with minor recontouring required. Topsoil will be salvaged from the spillway access area and the dam for topsoiling.

All of the fill in the dam and hardened keyway will be removed and returned to the quarry. Once work is completed on the spillway, dam fill removal will continue until the material texture returns to silts and clays or until mechanically impractical. These materials will be transported across the dam to the quarry site by off-road dump trucks. The removal will be limited to the footprint of the dam. Restoration of the mudflats will involve only minor smoothing adjacent to the dam. Ultimately, the tidal action will be allowed to make the final adjustments in the mudflats.

Restoration of the quarry will require scarification of the compacted quarry surfaces, recontouring, and grading using appropriately sized bulldozer (D-7 or D-8) with the excavator and loader used to do some of the finish work. The vertical wall will be laid back to a less severe slope after topsoil is removed and stockpiled. As the entire volume removed from the quarry is not available, the contouring will be performed in order to grade the fill into the existing landscape. Topsoiling and revegetation will accelerate recovery of the site. Native seed collection from the site has been initiated, with this seed spread across the site after restoration.

The work area would be accessed daily along the established access corridor (former ranch roads now part of park trail network). Crews will stage at an established area outside of the Wilderness and will be shuttled to the work area daily to minimize truck trips. An area for equipment storage and refueling will be established in an upland area away from aquatic resources. All equipment would be left in this area at the end of each day.

A long-term monitoring and maintenance program for erosion and vegetation will be implemented once the site construction is completed.

Impact Avoidance and Mitigation Measures

- Deconstruction/restoration use of mechanized construction equipment will be scheduled at times so as to minimize disruption to the public from noise and dust.
- Maintain properly tuned equipment and limit idling time to 5 minutes.
- Cover trucks hauling soil, sand, or other loose materials, or require them to maintain at least 2 feet of freeboard.
- Replant vegetation or topsoil disturbed areas as quickly as possible.
- Limit traffic speeds on unpaved roads to 10 mph.
- All construction equipment will be equipped with approved mufflers and spark suppression devices.
- Construction equipment will be cleaned prior to arrival on site to reduce the potential importation of non-native weed species.
- Construction access will be limited to old roadbeds and non-riparian areas to the greatest extent possible. If access or staging must occur in wetland/riparian areas, access within these areas will be minimized to reduce impacts.
- Construction sites will be watered as necessary to reduce fugitive dust.
- Educational materials explaining the restoration and the minimum requirement process for wilderness will be made available to park visitors at public contact points within the seashore. Notices and informational materials will be placed at normal access points to the construction zone to inform visitors of the rationale and duration of temporary closures.

SIGNATURES

| <u>Approvals</u> | Signature | Name | Position | Date |
|------------------|-----------|-----------------|----------------|------|
| Prepared by: | | | | |
| Recommended by: | | Brannon Ketcham | Hydrologist | |
| Approved by: | | Don Neubacher | Superintendent | |