

National Park Service

San Juan Island National Historical Park
Friday Harbor, WA 98250



San Juan Island National Historical Park

Fire Management Plan –Environmental Assessment

2005



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CHAPTER 1 – PURPOSE AND NEED

INTRODUCTION

This environmental assessment (EA) documents the potential environmental impacts of an action proposed by the National Park Service (NPS) to amend the San Juan Island National Historical Park Fire Management Plan (FMP).

This EA has been prepared in compliance with:

- The National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) 4321 et seq.), which requires an environmental analysis for major federal actions having the potential to impact the quality of the human environment;
- Council of Environmental Quality Regulations at 40 Code of Federal Regulations (CFR) 1500-1508, which implement the requirements of NEPA;
- US Dept. of Interior Conservation Planning, Environmental Impact Analysis, and Decision Making; Director's Order #12 and Handbook.

This EA provides information to allow NPS officials to make decisions and recommendations related to the San Juan Island National Historical Park FMP. This decision will be made within the overall management framework already established in the San Juan Island National Historical Park General Management Plan (GMP)¹. The alternative courses of action to be considered at this time are crafted to be consistent with the concepts established in the 1978 General Management Plan.

This EA addresses whether the actions of the various alternatives proposed by San Juan Island National Historical Park (NHP) significantly impact or impair resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park and (3) identified as a goal in the park's general management plan or other NPS planning documents.

PURPOSE AND NEED

NPS Wildland Fire Management Guidelines (DO-18) state that "all parks with vegetation that can sustain fire must have a fire management plan." The purpose of this federal action is to develop a fire management plan and program that utilizes the benefits of fire to achieve desired natural and cultural resource conditions while minimizing the fire danger to the public, park resources, and adjacent lands from hazardous fuel accumulations.

A fire management plan for San Juan Island NHP was approved in 1998 but is required to be updated by the end of 2004, and every five years thereafter. A revised FMP and EA needs to be completed that will consider fire management activities over the next five years. This plan will

¹ The park is expected to have a new GMP in 2005. This document will become the reference guide for the fire management plan once a record of decision is finalized.

assist park managers in meeting cultural and natural resource management goals while ensuring that firefighter and public safety are not compromised. If a fire management plan is not in place by the end of 2004, fire management projects involving hazard fuel reduction and prescribed fire would not be allowed until an approved plan is in place.

BACKGROUND

LOCATION AND ACCESS

San Juan Island NHP is located on San Juan Island, Washington. The park headquarters is in Friday Harbor, population 2,040 (Washington State Office of Financial Management 2003), which is the county seat and the only incorporated town in the San Juan Islands. The American Camp unit of the park (1,223 acres) is located six miles south of Friday Harbor on Cattle Point Road. The English Camp unit (529 acres) is located on West Valley Road, nine miles northwest of Friday Harbor and 13 miles from American Camp. English Camp can also be accessed by boat by using the dock the park maintains on Garrison Bay.



Washington State ferries run between Friday Harbor and the mainland a half-dozen or more times a day; inter-island ferries transit Friday Harbor a similar number of times. An international ferry travels once daily to Sidney, British Columbia on Vancouver Island; from there one can travel by road to Victoria or by road and ferry to Vancouver, British Columbia.

Two commercial airlines and a seaplane service plus several charter airlines serve Friday Harbor. An airport at Friday Harbor accommodates commercial and private planes; private aircraft can also land at a small airstrip at Roche Harbor.

FIRE HISTORY

Most forest, shrub, and grass ecosystems rely on fire to maintain their vegetative structure and species composition. Lightning-caused fires, though infrequent on San Juan Island, were undoubtedly a part of the park's fire history. Historical accounts have also established that Native Americans burned grasslands and oak woodlands to create habitat for game animals and promote the growth of weaving materials and foodstuffs (Agee 1987, Thilenius 1968, and Habeck 1961). The frequency with which a given area burned depended most directly on a number of natural and human ignited fires. Other factors affecting fire frequency and fire intensity include plant community types, changes in topography (i.e. slope and aspect), varying fuel accumulations, and variation in seasonal precipitation.

Nearly a century of active fire suppression has disrupted the ecosystem regulating effects of recurrent natural and aboriginal fire. This along with human activity in the area, has resulted in

changes to the fuel structure that can potentially generate unnaturally large and intense wildland fires that may threaten human life and property and have negative effects on natural ecosystems. Between 1980 and 2003, 111 fires were reported in the park. All but five of these were human caused. Most resulted from camp fires or warming fires that were not built in established fire rings and were not extinguished properly. The largest fire occurred in 1981 and burned 77 acres at American Camp.

Prescribed fire activities in the park have mainly been limited to pile burning to dispose of materials generated from hazardous fuel reduction activities and/or maintenance activities. The exception to this was a 25-acre prescribed fire conducted on Young Hill in July 2003. Douglas fir had been thinned from the understory of the Garry oak woodland on the south slope of Young Hill several years earlier as part of an oak restoration project. The fire was ignited in part to reduce fuel accumulations resulting from the thinning. In addition, the park is monitoring the other ecological benefits from reintroducing fire into the ecosystem, which was heavily influenced by fire before European settlement.

The park is bordered mostly by privately-owned lands, although Washington State Department of Natural Resources land borders the southeast portion of English Camp and the eastern boundary of American Camp. There is presently a Memorandum of Understanding with San Juan County Fire District #3 to provide fire suppression support in the event of a wildland fire.

VEGETATION RESTORATION PROJECTS

In the past, vegetation management goals focused on restoring the landscape at both camps to replicate the historic military encampment period. However, current goals call for restoring the native vegetation without compromising the historic landscape, realizing that native vegetation is critical for hydrologic features and ecosystem health. Two major projects fall under this management goal: restoring the grasslands to native vegetation at American Camp, and restoring the health of Garry oak woodlands at English Camp.

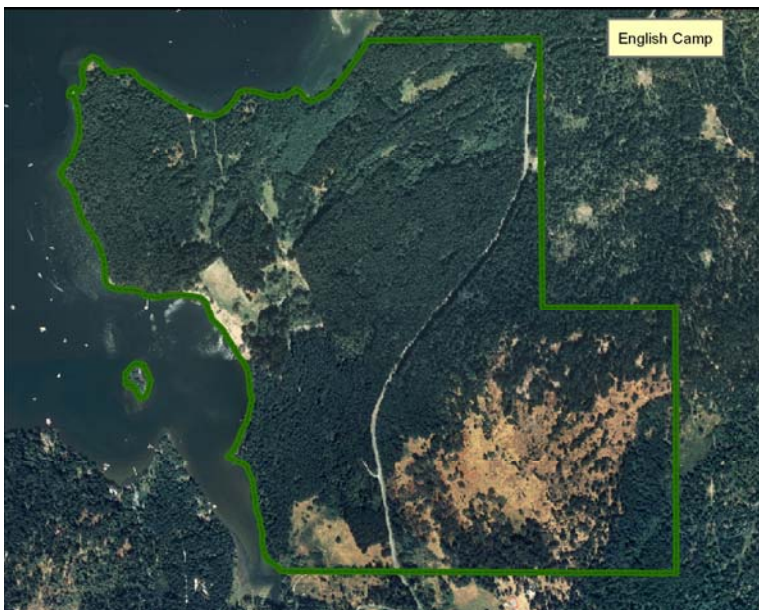
Approximately 600 acres of grasslands exist at American Camp (Rolph and Agee, 1993). These areas have been disturbed by fire, plant harvesting, farming, grazing, and invasive plant and animal species. Native people burned south facing slopes to promote the growth of camas, a bulb they harvested for food. The natural succession of encroaching trees and shrubs was likely reduced due to this practice (Stein, 2000). When the European settlers arrived, this area was used for livestock grazing as well as agricultural purposes. Because native plant species in this area were not hearty enough to tolerate heavy grazing, the establishment of



non-native species occurred. Some of these species were introduced through contamination of seed stock, and others were purposefully planted in order to withstand grazing. Today, a number of non-native and invasive plant species are found in the American Camp grasslands. These species are able to succeed at the expense of plants native to the area. The habits of the European rabbit, an invasive animal species, tend to favor non-native plants. As they burrow and dig out their warrens, the soil is exposed and compacted. Native plants generally are not adapted to establishing quickly at disturbed sites or growing in compacted soil. Non-native species are able to tolerate these conditions so they persist.

Currently, a graduate student is investigating the viability of prairie restoration methods as applied to the Northern Puget Trough Lowland Prairie (Lambert, 2003). Her research will investigate the effectiveness of burning and herbicide applications followed by planting native vegetation with a goal of “effectively minimizing long-term maintenance costs” (Lambert, 2003). Because the European rabbits intensify the problem with invasive plants, management practices would need to include the reduction of both invasive plant and animal species to successfully reestablish native grasses.

Garry oak woodlands, a once thriving and widespread ecosystem in the Puget Sound lowland region, are becoming rare due to urban growth, fire suppression, and the encroachment of Douglas fir trees. Dense understories of shrubs and young Douglas-fir trees do not allow enough light and space for new oak trees to germinate and grow. Healthy oak woodlands are



characterized by scattered trees among a prairie matrix. Native people in this region burned Garry oak woodlands as a hunting aid and to maintain an open prairie that would promote the growth of food plants (Erickson, 1993). Garry oaks are fire resistant, but pines, firs and shrubs are not (McLaughlin, 2001). Thus, fire favors the oaks over conifers and herbaceous vegetation over shrubs.

At English Camp, the park has initiated a prescribed burn regimen to clear out the thick underbrush that is encroaching

on the Garry oak woodland located on the southwest side of Young Hill. On July 1, 2003, the park conducted a prescribed burn of 25 acres in the oak woodland. The burn was successful with reports of young oak tree growth. Weather conditions did not allow for a second prescribed burn scheduled for late summer or early fall. Resource management staff from North Cascades National Park is assisting with monitoring post-burn vegetation response. It is desired that prescribed fire continue to be a tool used by the park to restore the Garry oak woodlands.

FIRE MANAGEMENT GOALS AND OBJECTIVES

NPS Wildland Fire Management Guidelines (DO-18) require that all parks with vegetation capable of sustaining fire develop a wildland fire management plan that will meet the specific resource management objectives for that park and to ensure that firefighter and public safety are not compromised. This guideline identifies fire as the most aggressive natural resource management tool employed by the NPS.

DO-18 identifies three paramount considerations for each park's fire management program. They are:

- Protect human life and property both within and adjacent to park areas;
- Perpetuate, restore, replace, or replicate natural resource processes to the greatest extent practicable; and
- Protect natural and cultural resources and intrinsic values from unacceptable impacts attributable to fire and fire management activities.

The overall goals of the San Juan Island National Historical Park FMP are the following:

- Ensure that firefighter and public safety is the highest priority for all fire management activities;
- Prevent fire spread to adjacent public and private lands by containing all fires within the park boundary;
- Maintain an active fire prevention program to reduce the incidence of human-caused wild fires;
- Ensure adequate suppression response capability to meet expected wildland fire complexity;
- Take special precautions to preserve historical and cultural landscapes;
- Quantify fire behavior and effects through monitoring and evaluations of all prescribed fires in order to refine prescriptions to achieve objectives;
- Continue to research the role of fire in various San Juan Island NHP ecosystems. This effort will include monitoring of ecological effects of prescribed fires, as well as acquisition of information on fuel accumulations, forest insects and diseases, vegetation dynamics and other topics important to fire management and planning;
- Implement a public information program that includes prevention, education, and interpretation, and ensures that socioeconomic considerations are included with ecological concerns when informing the public;
- Comply with air pollution control regulations and smoke management concerns as required by the Clean Air Act and in cooperation with the Washington State Department of Natural Resources, Resource Protection Division, Smoke Management;
- Take special precautions to preserve and perpetuate sensitive, rare, threatened, or endangered plant/animal species.

Specific goals and objectives in relation to the fire management program include:

- **Provide for firefighter and public safety during wildland fire and prescribed fire operations.**

Objective: All fire personnel will receive required training and be fully qualified for positions for which they hold during wildland fire operations. Personal protective equipment will be utilized as required during all fire management activities.

Objective: Public information and/or area closures will be used to ensure the safety of park visitors during every fire project.

- **Reduce the risk of wildland fire to private and public property.**

Objective: Within 80% of the park's developed zones, alter live and dead fuel accumulations and fuel continuity so that, by 2008, predicted flame lengths under extreme weather conditions will be less than four feet.

Objective: In cooperation with local fire protection agencies, complete a wildland fire risk analysis that rates fuels, terrain, access/egress, construction material, and emergency response times for properties adjacent to the park by 2006.

- **Use mechanical and manual treatments to reduce fuel accumulations that have accumulated naturally and as a result of human activities, including fire suppression, for the purpose of minimizing the chances of catastrophic wildfire.**

Objective: Reduce dead and down and ladder fuel accumulations by 40% on at least 50% of areas that are within 100 feet of structures and in areas where potential for fire ignition is considered high due to high visitor use and/or historical trends (i.e. picnic areas, road corridors). Work will be completed by 2009.

- **Recognize the role that fire has in vegetative communities within the park and manage fire as a resource management tool through the appropriate use of prescribed fire.**

Objective: Use prescribed fire to restore and maintain desired vegetation characteristics to at least 40% (approximately 40 acres) of the park's Garry oak woodlands, at least 20% (approximately 120 acres) of the park's grasslands, and at least 5% (approximately 25 acres) of mixed conifer forests by 2009.

- **Mitigate unacceptable environmental impacts on biotic communities.**

Objective: Within each project plan, identify and implement appropriate management responses and strategies for wildland fire activities that address site-specific resource management concerns such as exotic species control and erosion.

Objective: In each project plan, list the mitigation measures to protect rare and/or sensitive flora and fauna.

- **Preserve historic structures, landscapes, and archaeological resources from adverse effects from fire and fire management activities and use fire, where appropriate, to restore and maintain these cultural resources.**

Objective: Complete site-specific plans prior to conducting fuels management projects that will list mitigation measures that will minimize impacts and protect cultural resources.

Objective: Utilize fire and manual fuel treatments to restore and maintain the desired conditions of 80% of historical sites as specified in the General Management Plan by 2009.

- **Provide for the safe, aggressive and appropriate management response to all wildland fires.**

Objective: Maintain a fire management program during fire season that will contain 95% of all unwanted fires in the park within one operational period.

Objective: Identify roles and responsibilities for each park position. Review and update the fire management plan annually to ensure efficient distribution of workload.

- **Foster and maintain interagency fire management partnerships and contribute to the firefighting efforts at the local, state, and federal levels.**

Objective: On an annual basis, review, update, and initiate cooperative agreements to assure that interagency approaches to managing wildland fires are implemented.

Objective: On an annual basis, review treatment projects with adjacent agencies to facilitate cooperative, cross-boundary treatments where possible.

Objective: On an annual basis, review and revise the FMP as necessary.

- **Promote public understanding of fire management program and objectives.**

Objective: Revise and implement the “Public Fire Information Plan” and “Prevention Plan” as included in the fire management plan annually.

- **Refine management practices by improving knowledge and understanding of fire through research and monitoring.**

Objective: Update fire management program objectives and/or actions, based on the evaluations and results of fire effects and fuel treatment monitoring information, annually.

Objective: Solicit at least one high-priority fire research project every two years that supports the national planning process for fire management decision-making.

- **Identify information gaps that hamper science-based decision-making and solicit fire research to help fill these gaps.**

Objective: Consult and coordinate with American Indian groups to gather additional information regarding aboriginal burning and ethno-botanical resource use within the park.

Objective: Create ecological models of our systems to place our historical fire regime into the context of the park's fire and disturbance history, and in the process identify any gaps in our knowledge of this fire regime.

- **Park staff and visitors are protected from unhealthy levels of air pollution from management ignited fires.**

Objective: Public information and/or area closure will be used to limit public exposure of smoke generated from wildland and prescribed fires.

Objective: Line supervisors will minimize fire fighter exposure to smoke and heat by rotating crew personnel when working on wildland and prescribed fires.

RELATED LAWS, POLICIES, AND PLANNING DOCUMENTS

NATIONAL PARK SERVICE LAWS, POLICIES, AND PLANNING DOCUMENTS

The NPS is directed by the requirements of the 1916 Organic Act and other laws, such as the Clean Air Act, Clean Water Act, and Endangered Species Act. The authority for the conservation and management of the NPS is clearly stated in the Organic Act, which states the agency's purpose is "to promote and regulate the use of national parks in conformance with their fundamental purpose which is to conserve the scenery and the natural and historical objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as to leave them unimpaired for the enjoyment of future generations."

This authority was further clarified in the National Parks and Recreation Act of 1978: "Congress declares that...these areas, though distinct in character, are united...into one national park system... The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

San Juan Island NHP was established by Congress in 1966 "...for the purpose of interpreting and preserving the sites of American and English Camps on the island, and of commemorating the

historic events that occurred from 1853 to 1871 on the island in connection with the final settlement of the Oregon Territory boundary dispute, including the Pig War of 1859.” The cultural and natural objectives for the park include restoring and maintaining the historic scene that was present during the historic period. At San Juan Island NHP, this time period spans two decades beginning with the arrival of the British Hudson’s Bay Company (HBC) in the early 1850s, followed by the establishment of U.S. Army and British Royal Marine encampments in 1859 and 1860, respectively, and the subsequent 12-year-period of joint occupation and negotiation that ended with the withdrawal of both forces by 1874. The natural environment that existed during early contact is considered an important component of the “historic scene.”

NPS *Management Policies* (2001) require that all parks with vegetation capable of supporting fire develop a fire management plan. NPS *Guidelines for Fire Management*, RM-18, further define the Service wide goal of wildland fire management to achieve resource objectives of the park through the prevention of human-caused wildfire, to minimize the negative impacts on resources from all wildfires that occur, to protect cultural resources, and to perpetuate the natural resources and their associated natural processes.

The 1978 San Juan Island NHP General Management Plan established the overall framework for the management of the historical park. The alternative courses of action to be considered at this time are crafted to be consistent with the concepts established in the 1978 General Management Plan.

OTHER LAND USE DOCUMENTS AND RELATED PLANS

WASHINGTON STATE DOCUMENTS

Recommended Management Guidelines for San Juan Islands Trust Land

This document was published by the San Juan Islands Trust Land Advisory Committee in May 1985. In 1983, after growing concerns by the San Juan County Commissioners regarding DNR proposals in the county, the Commissioner of Public Lands established a committee to develop a long-range management plan for the Trust Lands in San Juan County. The purpose of the commission was to “provide a forum for discussion of issues and areas of concern regarding the wise and prudent multiple uses of DNR-managed lands.” The committee involved participation with state and local agencies, the general public, and committee members on “how to integrate DNR trust obligations for environmentally sound land management with educational and recreational opportunities and with the concerns of island and regional residents” (San Juan Island Trust Land Advisory Committee, 1985).

There are two DNR properties adjacent to San Juan Island NHP: Mitchell Hill, which shares a portion of its northern border with English Camp; and Cattle Point NRCA, which shares its western border with American Camp.

SAN JUAN COUNTY DOCUMENTS

Open Space Atlas, San Juan County Open Space and Conservation Plan

The Atlas was prepared by Jones and Jones, Architects and Landscape Architects, Seattle, Washington, for San Juan County in May 1991. It is a summary of the open space resources documented in *the Open Space and Conservation Plan*.

Parks, Recreation, and Preserved Lands Plan for San Juan County, 1999-2004

This plan was prepared by Future Directions, Inc. for San Juan County and adopted by the county in May 1999. The plan provides a six-year direction to San Juan County Parks, Public Works, and the Land Bank “for the identification, development and management of parks, recreation, and reserved lands for 1999-2004” (p.3). The document’s goal was to inventory existing parks, road ends, and preserved lands, analyze demand and need, and develop an action plan.

The San Juan County Land Bank was established by voters in 1990 to identify and preserve the important conservation lands in the county through property acquisition. This program is funded through a one- percent real estate transfer tax paid by purchasers of property in the county. Since January 2003, the Land Bank has acquired a total of 413 acres in fee acquisition (purchase price \$6,135,861) on San Juan Island and other 243 acres in conservation easements (purchase price \$579,659) (source: Land Bank website). In 2000, in partnership with the DNR, the Land Bank purchased a significant 19-acre day-use hiking area, called the Third Lagoon Preserve, on Mount Finlayson adjacent to American Camp and the Cattle Point Natural Resources Conservation Area.

The Public Land Inventory for San Juan County lists 26 parcels of public land managed by San Juan County, Washington Department of Natural Resources, Port of Friday Harbor, Washington State Parks, Town of Friday Harbor, and the NPS. The Town of Friday Harbor manages 10 parcels within the town limits (p.25-27).

In the Master Plan of Strategies by Year—1999, the NPS is listed as participating with the county in developing a comprehensive trail survey that would assist with local prioritization of resources, as new trails are desired by the community (p.79).

San Juan County Comprehensive Plan

The comprehensive plan was adopted by San Juan County in December 1998 and revised December 2001. It contains the land use plan and regulations for the county which are based on a performance standards system of regulation which allows for a wide variety of land uses assuming that certain regulations are met. The land use designations are based on the geographic character and qualities of an area.

The plan establishes four principal land use classes for the county, each class permitting a different level of activity. The four land use classes are Growth Areas, Activity Centers, Rural Lands, and Resource Lands. There are districts within each class which are individual land use categories. In addition, there is a special district class within the rural district called the Rural Land Use Subclass. Its purpose is to “protect, conserve, and manage existing natural conditions,

resources, and valuable historic, cultural, educational, or scientific research areas and to preserve indigenous plant and animal species and ecosystems in a natural state for the benefit of existing and future generations without precluding compatible human uses.” There are two districts within this class, Conservancy Lands and Natural Lands. San Juan Island NHP is zoned under the Conservancy Land district.

San Juan County Open Space and Conservation Plan

The Open Space and Conservation Plan was prepared for the Board of County Commissioners by the San Juan County Planning Department and the Open Space and Conservation Committee in May 1991.

In 1990, with help from the San Juan Preservation Trust, San Juan County initiated an open space and conservation planning process. The Board of County Commissioners appointed an Open Space and Conservation Committee to develop a plan to identify and protect open spaces, vistas, and view corridors that substantially contributed to the rural quality of the landscape. In addition, the committee was to address important natural resources whether they contributed to the visual quality or not. The plan addressed identification methods, noted any degrading factors and the effectiveness of existing conservation tools, and presented recommendations for actions to conserve open space resources.

The analyses show which open space resources are significant to the community and how sensitive those resources are to adverse change. In the San Juan District, San Juan Island was divided into 27 units (areas) based on topography, vegetation, and cultural patterns. Each unit was analyzed using the nine following criteria: pastoral landscapes, water/mountain view landscapes, prominent geographic features, rural development pattern, diversity, landscape contrast, uniqueness, visual accessibility, and contributing to existing resource conservation areas. Each criterion for each unit was ranked. The units were then scored and ranged from highest to lowest. American Camp scored the highest and English Camp fifth highest. The score weighting reflects the general importance of the resource to the community.

San Juan County Shoreline Master Program

The Shoreline Master Program was adopted in 1976 (revised in 1996) in accordance with the Washington State Shoreline Management Act of 1971. The plan applies to all shorelines in the county except those in federal ownership. Shoreline extent was defined as 200 feet landward from the line of ordinary high tide and 200 feet seaward of that line. It is the intent of this program to manage the use and development of the shorelines giving preference to water-dependent uses and to encourage development in harmony with natural conditions.

In response to the public’s demand for greater marine habitat protection, a shoreline designation termed “environment” was recently added to the Shoreline Master Program. The purpose of this new Marine Habitat Management Area Environment is to “preserve and restore critical marine habitat areas” and ensure that critical marine habitats are considered in planning and managing of impacts from development and land and water use.

All NPS plans need to meet federal requirements under the Coastal Zone Management Act. This fire management plan will be reviewed by the Federal Consistency Coordinator for the

Washington State Department of Ecology. The plan must meet the Washington State Coastal Zone Program to the maximum extent possible.

San Juan County Unified Development Code

This code is the tool for implementing the goals and policies of the San Juan County Comprehensive Plan in conformance with the Washington's State Growth Management Act, Shoreline Management Act, Subdivisions Code, and State Environment Policy Act. Development regulations, or county zoning, are contained within this document. Zoning adjacent to the park is discussed in the "Land Use" section of this document.

Westcott-Garrison Bay Marine Habitat Management Area

This document is a marine habitat management and watershed plan for Westcott and Garrison bays, published in July 2001 by the San Juan County Planning Department. One of several critical marine habitat areas on San Juan Island, the Westcott Bay-Garrison Bay marine complex was selected by the Board of County Commissioners as the first critical marine habitat area to be considered under the new Marine Habitat Management Area Environment in the county's Shoreline Master Program. The purpose of the report is to establish and present San Juan County's goals, policies and programs for the stewardship of the marine environment of Westcott and Garrison bays. The plan serves to coordinate various county department actions into a comprehensive program to protect the marine resources. It provides background information about resources, the regulatory context, and potential development.

There are future plans to establish a Marine Habitat Management Area stewardship committee. As a land manager within the watershed, NPS has an opportunity for involvement.

Westcott-Garrison Bay Watershed Assessment Report

This assessment was prepared by San Juan County Planning Department, San Juan County, Washington, in January 1999. It describes the physical environment, land uses within the watershed, resources and water quality, and the potential impacts to these resources.

San Juan Island NHP is mentioned as being located in the center of the watershed. A description of the recreational use, facilities, and infrastructure of the NHP are discussed.

SCOPING ISSUES AND IMPACT TOPICS

SCOPING BACKGROUND

Scoping occurred between April 1 and May 1, 2004. A total of 195 scoping letters were sent to individuals, organizations, and agencies requesting feedback on the fire management program. Along with letters, an attachment outlining the fire history of the area and the fire management plan process was provided.

Two individuals, one federal government agency (Bureau of Land Management), and representatives of the San Juan County Emergency Management Department, the Cattle Point Water District Commissioners, and the Lummi Nation responded with scoping comments.

SCOPING ISSUES

Wildlife Habitat

Debris Piles: One individual requested that the NPS consider keeping small debris (<3' high; 6' long) in the park to create wildlife habitat for salamanders and birds.

Interagency Coordination

Burn Ban: The individual representing the County Emergency Management Department requested the NPS consider the role of the "burn ban" in the use of the fire pits at South Beach. In particular, noting the value of the ban in avoiding human-caused fires during the dry season, and specifying who is responsible (what agency) for declaring the burn ban.

District 3: The individual representing the County Emergency Management Department requested the NPS standard operating procedures if District 3 resources are overwhelmed by a fire situation in the park, whether it is following District 3 or NPS protocols.

Cooperation with the Bureau of Land Management (BLM): The BLM requested that there may be opportunities for future project work and cooperation between the agencies for fire planning and restoration projects.

Water Use: The Cattle Point Water District Commissioners requested prior notification for any prescribed fire activities proximate to their water system to ensure protection of their water supply.

Cultural Resources

Minimize Impacts to Cultural Resources: The Lummi Nation requested that the NPS interdisciplinary team review the plan in the context that any type of fire management principles (either preventative or responsive) should minimize the impacts to cultural resources.

Potential Impacts to Archeological Resources: The Lummi Nation identified that stump removal and fire line trenches could impact archeological deposits and should be planned for accordingly.

IMPACT TOPICS CONSIDERED AND ANALYZED

Soils

Soils can potentially be adversely affected by intense fires as well as by suppression activities, therefore, impacts to soils are analyzed in this analysis.

Water Resources

NPS policies require protection of water resources consistent with the Federal Clean Water Act. Both wildland and prescribed fire activities can affect water resources by exposing soils, which leads to erosion during storm events and subsequent suspended solids and turbidity in downstream surface water. Due to a fairly limited water supply on the island, water use in support of fire activities may affect water supply to local communities. Therefore, impacts to water resources are analyzed in this analysis.

Wetlands

Presidential Executive Orders mandate the protection of wetlands. Wetlands and floodplains at American and English camps have been surveyed and mapped by both the U. S. Fish and Wildlife Service (National Wetlands Inventory) and San Juan County. Three documented wetland sites exist at English Camp and are located in the mature forest just south of the northern boundary. At American Camp, the closest wetlands to the proposed prescribed fire locations are in the drainage ditches on either side of American Camp road just north of the visitor center. Fire suppression and prescribed fire activities can influence wetlands, and therefore impacts are analyzed in this analysis.

Vegetation

Since the plant associations in the park are heavily influenced by fire regimes, this EA considers the impacts of the proposed FMP alternatives on the park's vegetation.

Wildlife

There are resident populations of various species of reptiles, amphibians, birds, mammals, and invertebrates in the park; impacts of the FMP alternatives on wildlife are evaluated in this analysis.

Threatened, Endangered and Sensitive Species

The Federal Endangered Species Act prohibits harm to any species of fauna or flora listed by the U.S. Fish and Wildlife Service (USFWS) as being threatened or endangered. Such harm includes not only direct injury or mortality, but also disrupting the habitat on which these species depend. There are several threatened, endangered, or sensitive species that reside within or near the park, including the bald eagle, island marble butterfly, and golden paint brush.

There are an estimated 100 pairs of bald eagles in the San Juan Island with several nest sites within the park itself. Bald eagles can be observed frequently and have productive nest sites at American Camp.

The Washington State Department of Natural Resources has a reintroduction plan for golden paint brush. In the Natural Heritage Report 2004-01, golden paint brush is identified as being found on several sites on San Juan Island, including False Bay. No golden paint brush has been observed within the park to date.

A two-year survey was conducted for marbled murrelets. During this survey, one detection of a murrelet occurred. No nest sites have been found within the park although suitable habitat exists in the park.

This impact topic is included in this analysis.

Soundscape

Noise is defined as unwanted or unnatural sound. Fuels reduction, prescribed burns, and fire suppression efforts can all involve the use of noise-generating mechanical tools and devices with engines, such as chain saws, trucks, helicopters, and airplanes. Each of these devices, in

particular helicopters and chain saws at close range, are quite loud. Therefore, this impact topic is included in this analysis.

Air Quality

The Federal 1970 Clean Air Act stipulates that Federal agencies have an affirmative responsibility to protect a park's air quality from adverse air pollution impacts. San Juan Island is designated as a Class II area. All types of fires generate smoke and particulate matter, which can impact air quality within the park and surrounding region to some extent. Both the viewsheds of the park and the night sky could be impacted by smoke and particulate matter. All of these considerations warrant the inclusion of impacts to air quality in this analysis.

Visitor Use and Experience (Recreation and Visual Resources)

The 1916 NPS Organic Act directs the Service to provide for public enjoyment of the scenery, wildlife, and natural and historic resources of national parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Fire management activities can result in the temporary closure of certain areas and/or result in visual impacts that may affect visitor use of and experience at the park. Therefore, the potential impacts of the proposed FMP on visitor use and experience are addressed in this analysis.

Land Use

Fire management activities may affect land use within and adjacent to the park. Therefore, impacts to land use will be addressed in this analysis.

Human Health and Safety

Fires can be extremely hazardous, even life-threatening, to humans, and current federal fire management policies emphasize that firefighter and public safety is the first priority; all FMP's must reflect this commitment (NIFC, 1998). Therefore, impacts to human health and safety are addressed in this analysis.

Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 provides the framework for federal review and protection of cultural resources, and ensures that they are considered during federal project planning and execution. The park contains many cultural resource sites. These cultural resources can be affected both by fire itself and fire suppression activities, thus potential impacts to cultural resources are addressed in this analysis.

Park Operations/Interagency Cooperation

Severe fires can potentially affect operations at national parks, especially in more developed sites such as visitor centers, campgrounds, administrative and maintenance facilities. These impacts can occur directly from the threat to facilities of an approaching fire, and more indirectly from smoke and the diversion of personnel to firefighting. NPS and interagency personnel are required for the success of the fire program. Thus, the potential effects of the FMP alternatives on park operations will be considered in this analysis.

IMPACT TOPICS CONSIDERED BUT DISMISSED FROM FURTHER CONSIDERATION

The following topics are not further addressed in this document because there are no potential effects to these resources, which are not in the project area:

- Wilderness
- Designated ecologically significant or critical areas
- Wild or scenic rivers
- Floodplains
- Designated coastal zones
- Indian Trust Resources
- Prime and unique agriculture lands
- Sites listed on US Department of Interior's National Registry of Natural Landmarks
- Sole or principal drinking water aquifers

In addition, there are no potential conflicts between the project and land use plans, policies, or controls (including state, local, or Native American) for the project area.

Neither the no action alternative nor the proposed action would appreciably affect local businesses outside San Juan Island NHP; therefore, a discussion on the socioeconomic environment was dismissed as an impact topic.

Regarding energy requirements and conservation potential, fire management activities would require the increased use of energy for transporting personnel and materials. However, total energy from petroleum products required to implement action alternatives would be insubstantial when viewed in light of production costs and the effect on the national and worldwide petroleum reserves.

There are no potential effects to local or regional employment, occupation, income changes, or tax base as a result of this project. The project area of effect is not populated and, per EO 12898 on Environmental Justice, there are no potential effects on minorities, Native Americans, women, or the civil liberties (associated with age, race, creed, color, national origin, or sex) of any American citizen. No disproportionate high or adverse effects to minority populations or low-income populations are expected to occur as a result of implementing any alternative. NEPA and the CEQ Regulations direct agencies to "avoid useless bulk...and concentrate effort and attention on important issues" (40 CFR 1502.15). Certain impact topics that are sometimes addressed in NEPA documents on other kinds of proposed actions or projects have been judged to not be substantively affected by any of the alternatives considered in this EA. These topics are listed and briefly described below, along with the rationale for dropping them from further analysis.

Waste Management

None of the alternatives would generate noteworthy quantities of either hazardous or solid waste that need to be disposed of in hazardous waste or general sanitary landfills. Therefore this impact topic is dropped from additional consideration.

Transportation

None of the alternatives would substantially affect road, railroad, water-based, or aerial transportation in and around the park. One exception to this general rule would be the temporary closure of nearby roads during fire suppression activities or from heavy smoke emanating from wildland fires or prescribed burns. Over the long term, such closures would be very infrequent and would not significantly impinge on local transportation. Therefore, this topic is dismissed from any further analysis.

Utilities

Generally, some kinds of projects, especially those involving construction, may temporarily impact above and below-ground telephone, electrical, natural gas, water, and sewer lines and cables, potentially disrupting service to customers. Other proposed actions may exert a substantial, long-term demand on telephone, electrical, natural gas, water, and sewage infrastructure, sources, and service, thereby compromising existing service levels or causing a need for new facilities to be constructed. None of the alternatives will cause any of these effects to any extent, and therefore utilities are eliminated from any additional analysis.

Prime and Unique Agricultural Lands

Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land is available for farming uses. Lands within San Juan Island NHP are not available for farming and, therefore, do not meet these definitions. This impact topic is not evaluated further in this EA.

Indian Trust Resources

Indian trust assets are owned by Native Americans but held in trust by the United States. Indian trust assets do not occur within San Juan Island NHP and, therefore, are not evaluated further in this EA.

Resource Conservation, Including Energy, and Pollution Prevention

The NPS's *Guiding Principles of Sustainable Design* provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used such as resource conservation and recycling. Proposed project actions would not minimize or add to resource conservation or pollution prevention within San Juan Island NHP and, therefore, this impact topic is not evaluated further in this EA.

Table 1 Impact Topics Retained for Further Evaluation for San Juan Island National Historical Park FMP Environmental Assessment

Impact Topic	Retained for Further Evaluation	Relevant Regulations or Policies
Soils	Retained	NPS <i>Management Policies 2001</i>
Water Resources	Retained	Clean Water Act; Executive Order 12088; NPS <i>Management Policies</i>
Wetlands	Retained	Executive Order 11988; Executive Order 11990; Rivers and Harbors Act; Clean Water Act; NPS <i>Management Policies</i>
Vegetation	Retained	NPS <i>Management Policies</i>
Wildlife	Retained	NPS <i>Management Policies</i>
Threatened, Endangered, and Sensitive Species	Retained	Endangered Species Act; NPS <i>Management Policies</i>
Soundscape	Retained	NPS <i>Management Policies</i>
Air Quality	Retained	Federal Clean Air Act (CAA); CAA Amendments of 1990; NPS <i>Management Policies</i>
Visitor Use and Experience (Recreation and Visual Resources)	Retained	NPS <i>Management Policies</i>
Land Use	Retained	NPS <i>Management Policies</i>
Human Health and Safety	Retained	NPS <i>Management Policies</i>
Cultural Resources	Retained	Section 106; National Historic Preservation Act; 36 CFR 800; NEPA; Executive Order 13007; Director's Order #28; NPS <i>Management Policies</i>
Park Operations/Interagency Cooperation	Retained	NPS <i>Management Policies</i>

Table 2 Impact Topics Dismissed from Further Evaluation for San Juan Island National Historical Park FMP Environmental Assessment

Impact Topic	Dismissed from Further Evaluation	Relevant Regulations or Policies
Socioeconomics	Dismissed	40 CFR Regulations for Implementing NEPA; NPS <i>Management Policies</i>
Environmental Justice	Dismissed	Executive Order 12898
Wilderness	Dismissed	The Wilderness Act; Director's Order #41; NPS <i>Management Policies</i>
Coastal Zone Management	Dismissed	Coastal Zone Management Act; NPS <i>Management Policies</i>
Waste Management	Dismissed	NPS <i>Management Policies</i>
Transportation	Dismissed	NPS <i>Management Policies</i>
Utilities	Dismissed	NPS <i>Management Policies</i>
Prime and Unique Agriculture Lands	Dismissed	Council on Environmental Quality 1980 memorandum on prime and unique farmlands
Indian Trust Resources	Dismissed	Department of the Interior Secretarial Orders No. 3206 and No. 3175
Resource Conservation, Including Energy, and Pollution Prevention	Dismissed	NEPA; NPS <i>Guiding Principles of Sustainable Design</i> ; NPS <i>Management Policies</i>

CHAPTER 2 – ALTERNATIVES

This chapter describes the range of alternatives formulated to address the purpose of and need for the proposed plan. These alternatives were developed through evaluation of the comments provided by individuals, organizations, governmental agencies, and the park's fire management planning interdisciplinary team (IDT).

ALTERNATIVES CONSIDERED AND ANALYZED

ALTERNATIVE 1 – (No Action) Continue with current program of Wildland Fire Suppression with Mechanical/Manual Fuel Reduction, and limited Prescribed Fire.

This “no action” alternative would be a continuation of the current 1998 fire management plan with wildland fire suppression, mechanical/manual fuel reduction and prescribed fire. All wildland fires would be suppressed immediately upon detection. Mechanical/manual fuel reduction would be used to reduce the risk of wildland fire to life and property and help restore natural vegetative conditions. Prescribed fire would be used to reduce fuel accumulations and help restore natural vegetative conditions in the following areas:

- American Camp Grasslands – Prescribed fire would be limited to research burns designed to collect data on burning the grassland to control invading weed species, increase biodiversity among native plants, and reduce accumulations of ground fuels.
- English Camp Oak Woodland – The Garry Oak woodland would be restored using a combination of manual cutting of invading Douglas fir and prescribed fire. The oak woodland would be burned periodically to remove any regenerating Douglas fir seedlings that will compete with oak reestablishment.
- Mature Mixed Conifer Forests at Both Camps – The mature mixed conifer stands at both camps would be selectively burned to regulate the amount of woody fuel accumulations on the forest floor, promote species diversity, improve wildlife habitat by encouraging growth of plant and shrubs, maintain insect and disease populations at local normal levels, and provide ashy nutrients to the forest.

Firefighter and public safety is provided through a program that uses a combination of fire suppression, mechanical/manual fuel reduction projects, and prescribed fire to reduce the risk of catastrophic wildland fire.

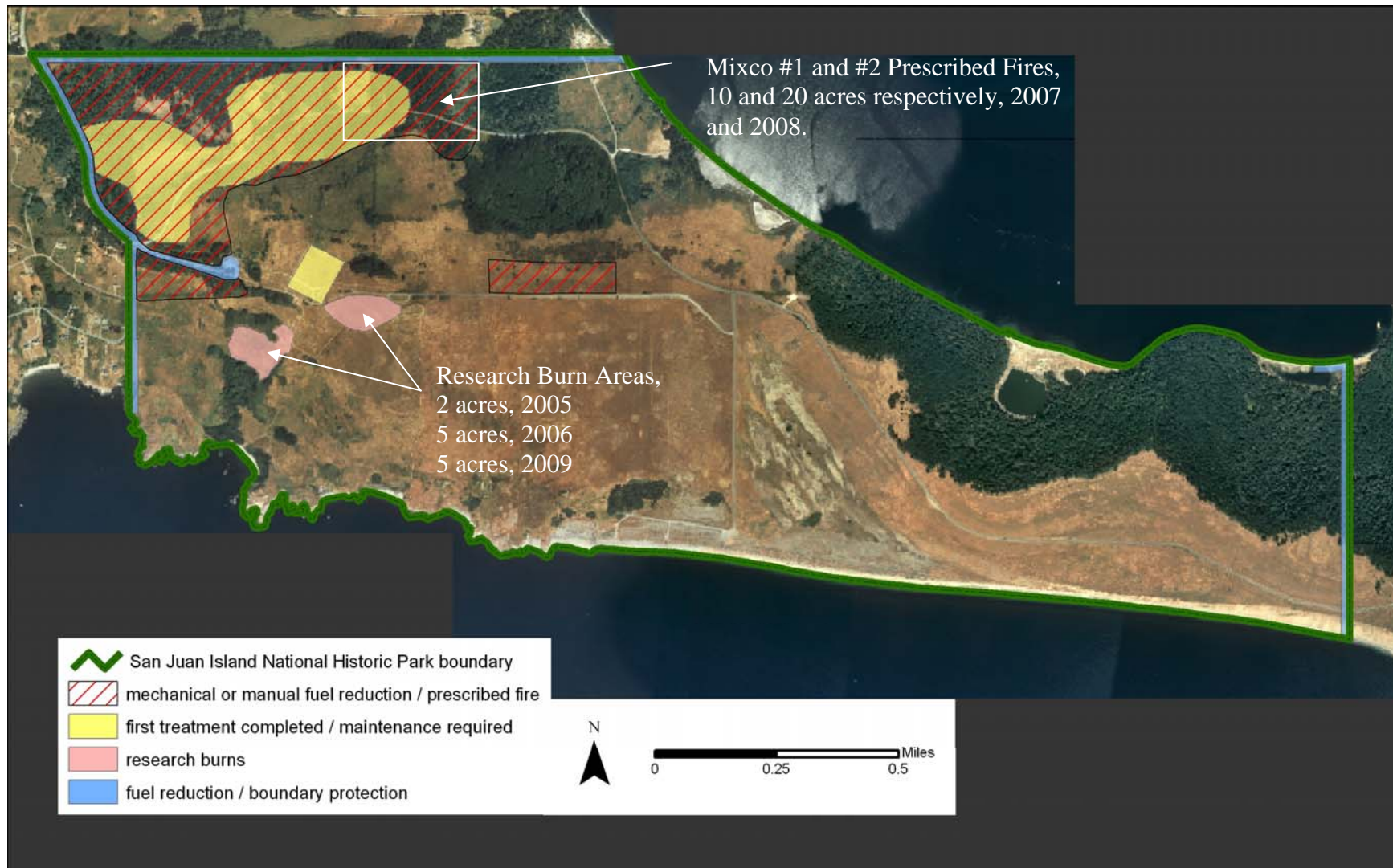
This alternative differs from Alternative 3 in that prescribed fire in grassland areas would be limited to small scale research burns.

Table 3 Alternative 1 – Five Year Project Plan for American Camp

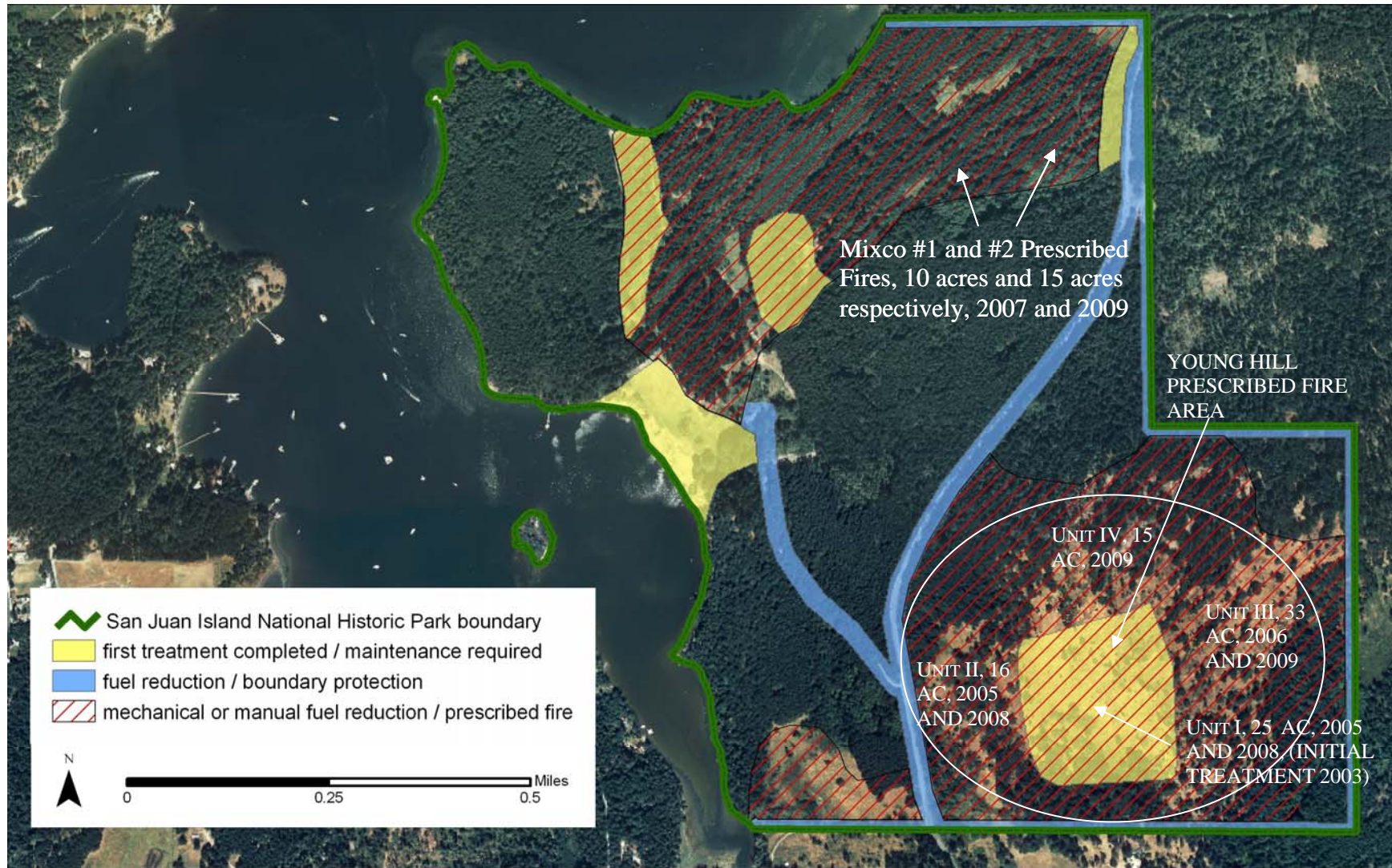
American Camp					
Fiscal Year	Project Name	Activity Class (Mechanical/manual, prescribed fire)	Treatment Type (Hand piling, Broadcast burn, etc.)	Projected Acres	Comments
2005	Boundary Fuel Reduction	Manual	Hand piling	10	Estimated 100 piles will be generated and burned.
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	Prairie Research Burn	Prescribed fire	Broadcast	2	Burn for prairie restoration study.
2006	American Camp Handpiling	Manual	Handpile	10	Estimated 150 piles will be generated; Second treatment of mixed conifer regeneration areas
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	Prairie Research Burn	Prescribed Fire	Broadcast	5	Grassland restoration
2007	American Camp Mixco #1	Prescribed Fire	Broadcast	10	Initial treatment of a mixed conifer, mature forest to reduce fuel accumulations
	Pile Burn	Prescribed Fire	Piles	10	Estimated 150 piles from 2006 thinning project
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
2008	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	American Camp Mixco #2	Prescribed Fire	Broadcast	20	Initial treatment of a mixed conifer, mature forest to reduce fuel accumulations
	Hazard Fuel Reduction	Manual	Handpile	20	Retreatment of mixed conifer regeneration areas
2009	Prairie Research Burn	Prescribed Fire	Broadcast	5	Grassland restoration
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.

Table 4 Alternative 1 – Five Year Project Plan for English Camp

English Camp					
Fiscal Year	Project Name	Activity Class (Mechanical/manual, prescribed fire)	Treatment Type (Hand piling, Broadcast burn, etc.)	Projected Acres	Comments
2005	British Camp #2	Manual	Hand piling	5	Estimated 50 piles will be generated and burned.
	Young Hill Unit I	Prescribed fire	Broadcast	25	2 nd treatment
	Young Hill Unit II	Prescribed fire	Broadcast	16	Initial treatment
	Young Hill Unit III	Manual	Lop and scatter	33	Initial treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2006	British Camp #3	Manual	Handpile	10	Estimated 100 piles will be generated
	Young Hill Unit III	Prescribed Fire	Broadcast	33	Initial fire treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2007	British Camp Mixco #1	Prescribed Fire	Broadcast	10	Initial treatment to mixed conifer, mature forest to reduce fuel accumulations
	Young Hill Unit IV	Manual	Lop and Scatter/Pile	15	Thinning to prepare for prescribed fire treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2008	Boundary Project	Manual	Handpile	5	Hazard fuel reduction
	Young Hill Unit I	Prescribed fire	Broadcast	25	3 rd treatment
	Young Hill Unit II	Prescribed fire	Broadcast	16	2 nd treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2009	Young Hill Unit IV	Prescribed Fire	Broadcast	15	Initial fire treatment
	Young Hill Unit III	Prescribed Fire	Broadcast	33	2 nd treatment
	British Camp Mixco #2	Prescribed Fire	Broadcast	15	Initial fire treatment to mixed conifer, mature forest
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape



American Camp Alternative 1



English Camp Alternative 1

ALTERNATIVE 2 – Wildland Fire Suppression with Mechanical/Manual Fuel Reduction; No Prescribed Fire Activities.

This alternative would provide an updated fire management plan that allows for wildland fire suppression and mechanical/manual fuel reduction treatments. Prescribed fire would not be used as a resource management tool. All wildland fires would be suppressed immediately upon detection. Mechanical/manual fuel reduction projects would be used to reduce fuel accumulations in and around developed areas, near cultural sites, and, to a limited extent, to maintain historical landscapes such as Garry oak woodlands. Firefighter and public safety is provided through fire suppression actions and hazard fuel reduction projects.

The five year hazard fuels reduction plan under this alternative would be focused on reducing fuel accumulations in and around developed areas and cultural sites to protect them from wildland fire. Fuel reduction and/or silvicultural projects designed to reduce the risk of wildland fire while restoring historical landscapes would be a lesser priority.

Table 5 Alternative 2 – Five Year Project Plan for American Camp

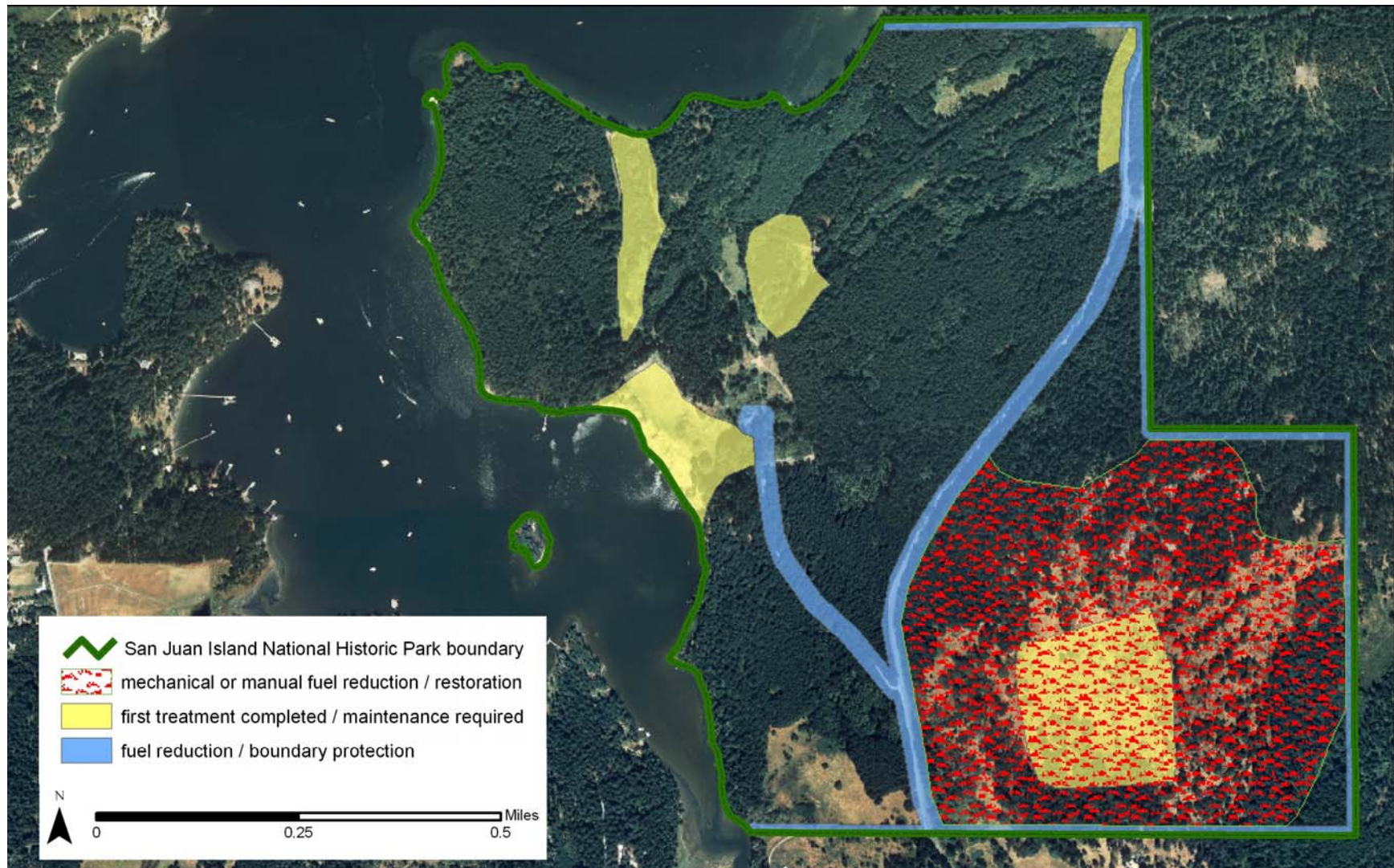
American Camp					
Fiscal Year	Project Name	Activity Class (Mechanical/manual, prescribed fire)	Treatment Type (Hand piling, Broadcast burn, etc.)	Projected Acres	Comments
2005	Boundary Fuel Reduction	Manual	Lop and scatter	10	Debris will be disposed of by lop and scattering or removing from site.
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
2006	American Camp Hazard Fuels Reduction	Manual	Lop and scatter	10	Debris will be disposed of by lop and scattering or removing from site.
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
2007	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
2008	Hazard Fuel Reduction	Manual	Lop and scatter	20	Retreatment of mixed conifer regeneration areas
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
2009	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.

Table 6 Alternative 2 – Five Year Project Plan for English Camp

English Camp					
Fiscal Year	Project Name	Activity Class (Mechanical/manual, prescribed fire)	Treatment Type (Hand piling, Broadcast burn, etc.)	Projected Acres	Comments
2005	British Camp #2	Manual	Lop and scatter	5	Debris will be disposed of by lop and scattering or removing from site.
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2006	British Camp #3	Manual	Lop and scatter	10	Debris will be disposed of by lop and scattering or removing from site.
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2007	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2008	Boundary Project	Manual	Lop and scatter	5	Hazard fuel reduction
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2009	British Camp #3	Manual	Lop and scatter	10	Debris will be disposed of by lop and scattering or removing from site.
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape



American Camp Alternative 2



English Camp Alternative 2

ALTERNATIVE 3 – Wildland Fire Suppression with Mechanical/Manual Fuel Reduction and Prescribed Fire (Management Preferred Alternative)

This alternative provides an updated fire management plan that allows the fullest range of management options. All wildland fires would be suppressed immediately upon detection. Mechanical/manual fuel reduction would be used to reduce the risk of wildland fire to life and property and help restore natural vegetative conditions. Prescribed fire would be used in conjunction with manual fuel treatments to reduce fuel accumulations, restore and maintain historical landscapes/view sheds, and manage exotic vegetation.

Under this alternative, the fire management program would maintain an organization that would contain 95% of all wildland fires in the park within one operational period. Mechanical/manual fuel reduction would be used to reduce the risk of wildland fire to life and property and help restore natural vegetative conditions. Prescribed fire would be used to reduce fuel accumulations and help restore natural vegetative conditions in the following areas:

- American Camp Grasslands – Prescribed fire would be used to restore the grasslands currently dominated by non-native annual grasses and forbs and some sections being invaded by Douglas fir seedlings. Periodic burning will help control invading weed species, increase biodiversity among native plants, and reduce accumulations of ground fuels. Under this alternative, at least 20% (approximately 120 acres) of the park's grasslands would be treated using prescribed fire by 2009.
- English Camp Oak Woodland – The Garry Oak woodland would be restored using a combination of manual cutting of invading Douglas fir and prescribed fire. The oak woodland will be burned periodically to remove any regenerating Douglas fir seedlings that will compete with oak reestablishment. Under this alternative, at least 40% (approximately 40 acres) of the park's Garry oak woodlands would be treated by prescribed fire by 2009.
- Mature Forests at Both Camps – The mature mixed conifer stands at both camps will be burned to regulate the amount of woody fuel accumulations on the forest floor, promote species diversity, improve wildlife habitat by encouraging growth of plant and shrubs, maintain insect and disease populations at local normal levels, and provide ashy nutrients to the forest. Under this alternative, at least 5% (approximately 25 acres) of the mature mixed conifer forests would be treated by prescribed fire by 2009.

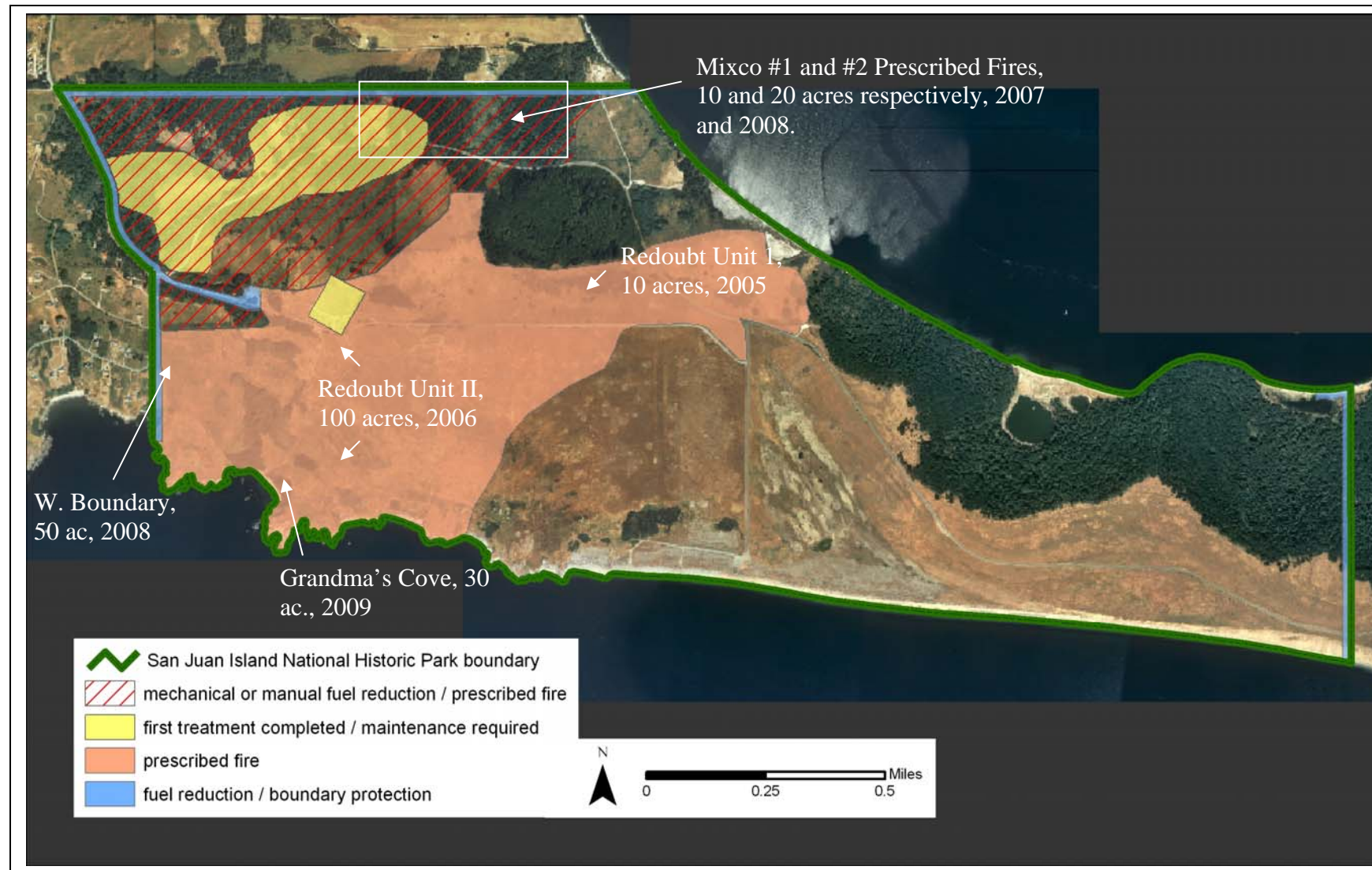
Up to 600 acres will be treated over a five year period under this alternative compared to approximately 400 acres over a five year period under Alternative 1. These acreage totals include retreatments of various units.

Table 7 Alternative 3 – Five Year Project Plan for American Camp

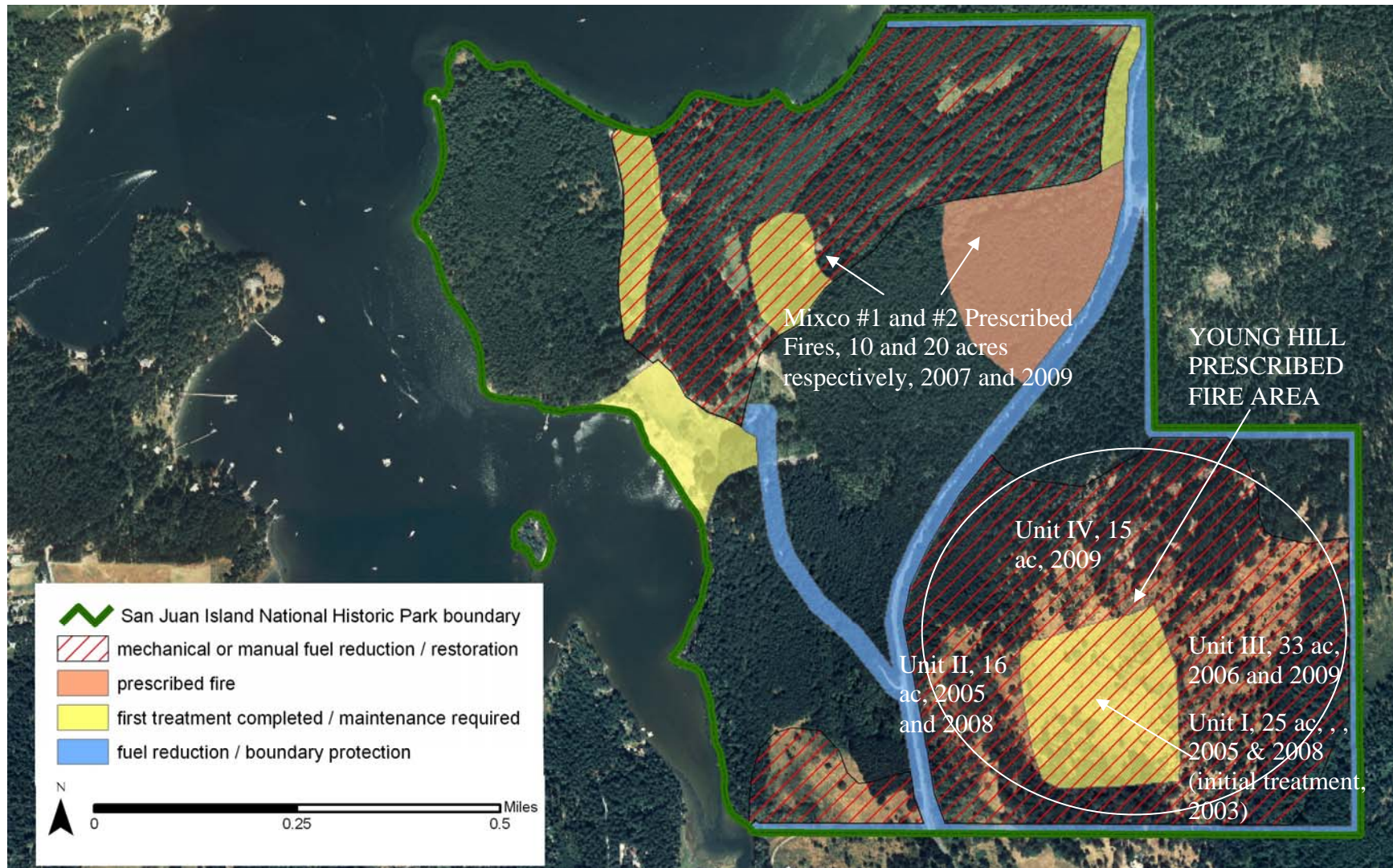
American Camp					
Fiscal Year	Project Name	Activity Class (Mechanical/manual, prescribed fire)	Treatment Type (Hand piling, Broadcast burn, etc.)	Projected acres	Comments
2005	Boundary Fuel Reduction	Manual	Hand piling	10	Estimated 100 piles will be generated and burned.
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	Redoubt Unit 1	Prescribed fire	Broadcast burn	10	Burn for prairie restoration study.
2006	American Camp Handpiling	Manual	Handpile	10	Estimated 150 piles will be generated; Second treatment of mixed conifer regeneration areas
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	Redoubt Unit II	Prescribed Fire	Broadcast	100	Grassland restoration
2007	American Camp Mixco #1	Prescribed Fire	Broadcast	10	Initial treatment of a mixed conifer, mature forest to reduce fuel accumulations
	Pile Burn	Prescribed Fire	Piles	10	Estimated 150 piles from 2006 thinning project
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	American Camp Handpiling	Manual/Prescribed Fire	Handpile	5	Retreatment of mixed conifer regeneration areas
2008	West Boundary	Prescribed	Broadcast	50	Initial treatment to grasslands adjacent to the west boundary for fuel reduction and exotic plant control.
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	American Camp Mixco #2	Prescribed Fire	Broadcast	20	Initial treatment of a mixed conifer, mature forest to reduce fuel accumulations
	American Camp Handpiling	Manual/Prescribed Fire	Handpile	5	Retreatment of mixed conifer regeneration areas
2009	Hazard Fuel Reduction	Manual	Handpile	20	Retreatment of mixed conifer regeneration areas
	Grandma's Cove Rx	Prescribed Fire	Broadcast	30	Grassland restoration
	Parade Grounds/Visitor Center	Mechanical	Mowing	6	Landscape maintenance to protect structures/maintain cultural landscape.
	American Camp Handpiling	Manual/Prescribed Fire	Handpile	5	Retreatment of mixed conifer regeneration areas

Table 8 Alternative 3 – Five Year Project Plan for English Camp

English Camp					
Fiscal Year	Project Name	Activity Class (Mechanical/manual, prescribed fire)	Treatment Type	Projected acres	Comments
2005	British Camp #2	Manual/Prescribed Fire	Hand piling	5	Estimated 50 piles will be generated and burned.
	Young Hill Unit I	Prescribed fire	Broadcast	25	2 nd treatment
	Young Hill Unit II	Prescribed fire	Broadcast	16	Initial treatment
	Young Hill Unit III	Manual	Lop and scatter	33	Initial treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2006	British Camp #3	Manual/Prescribed Fire	Handpile	10	Estimated 100 piles will be generated and burned
	Young Hill Unit III	Prescribed Fire	Broadcast	33	Initial fire treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2007	British Camp Mixco #1	Prescribed Fire	Broadcast	10	Initial treatment to mixed conifer, mature forest to reduce fuel accumulations
	Young Hill Unit IV	Manual	Lop and Scatter/Pile	15	Thinning to prepare for prescribed fire treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2008	Boundary Project	Manual/Prescribed Fire	Handpile	5	Hazard fuel reduction and burn piles
	Young Hill Unit I	Prescribed fire	Broadcast	25	3 rd treatment
	Young Hill Unit II	Prescribed fire	Broadcast	16	2 nd treatment
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape
2009	Boundary Project	Manual/Prescribed Fire	Handpile	5	Hazard fuel reduction and burn piles
	Young Hill Unit IV	Prescribed Fire	Broadcast	15	Initial fire treatment
	Young Hill Unit III	Prescribed Fire	Broadcast	33	2 nd treatment
	British Camp Mixco #2	Prescribed Fire	Broadcast	15	Initial fire treatment to mixed conifer, mature forest
	English Structures	Mechanical	Mowing	5	Landscape maintenance to protect structures/maintain cultural landscape



American Camp Alternative 3



English Camp Alternative 3

ALTERNATIVES CONSIDERED BUT NOT ANALYZED FURTHER

WILDLAND FIRE USE FOR RESOURCE BENEFIT

Under this alternative, the plan would allow for naturally ignited fires within the park to be managed for resource benefit. The park did not consider this alternative due to the relatively small area that the park encompasses and close proximity to residential areas and private property. Safety concerns with this alternative could not be mitigated and risk factors outweigh the benefits that this alternative would provide.

NO SUPPRESSION OF WILDLAND FIRES

Under this alternative, the plan would require that all wildland fires be allowed to burn unchecked. In addition, prescribed fire would be permitted. This alternative recognizes the beneficial role that fire can play in ecosystems.

The park did not consider this alternative for several reasons. Failure to suppress wildland fires would conflict with the *DO-18 Wildland Fire Management Guidelines* and the park's General Management Plan. Both documents identify the protection of human life, property, and designated resources from unacceptable impacts attributable to fire and fire management activities as key objectives. Unchecked wildland fires would pose an unacceptable threat to human health and safety, property, cultural resources, air quality, and other environmental resources.

In addition, wildland fires left to burn could result in inappropriate fire behavior and effects within the park and could cross administrative boundaries into neighboring land management areas. Wildland fires that burn into neighboring areas would pose an unacceptable threat to human health and safety and property.

FULL WILDLAND FIRE SUPPRESSION WITH NO HAZARD FUEL REDUCTION OR PRESCRIBED FIRE

Full wildland fire suppression with no hazard fuel reduction or prescribed fire was not considered due to the increased potential for catastrophic wildland fire over time. No mechanism would be in place to reduce forest fuel accumulations and over time, suppression of wildland fires would become more difficult. This alternative would conflict with the *DO-18 Wildland Fire Management Guidelines* and the park's General Management Plan. Both documents identify the protection of human life, property, and designated resources from unacceptable impacts attributable to fire and fire management activities as key objectives. This alternative does not provide a proactive fire management program designed to protect human life, property, and park resources; therefore, it will not be considered further in this document.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The NPS is required to identify the environmentally preferred alternative(s) for any of its proposed plans. That alternative is the alternative that will promote the national environmental policy expressed in NEPA (Section 101 (b)). This includes alternatives that:

- 1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- 2) Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- 3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- 4) Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- 5) Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- 6) Enhance the quality of renewable resources and approach the maximum attainable recycling of non-renewable resources.

In essence, the environmentally preferred alternative would be the one(s) that “causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (DOI, 2001a).

In this case, Alternative 3 is the environmentally preferred alternative for San Juan Island NHP since it meets goals 1, 2, 3, and 4. It fulfills the NPS responsibility as a trustee of the environment by preserving park resources through wildland fire suppression and restoring the cultural landscapes with prescribed fire. Alternative 3 ensures a safe environment by reducing the risk of fire from the accumulation of hazardous fuel, and helps restore natural ecological processes, including native vegetation function and structure, and ensures the cultural landscape is maintained. Alternative 3 helps protect park resources, the public and adjacent lands from the threat of wildfires. Finally, the alternative would provide an updated management document that best protects and helps preserve the historic, cultural, and natural resources in the park for current and future generations.

Alternative 1, the no action alternative, would be a continuation of the current fire program, which includes mechanical/manual fuel reduction and limited prescribed fire. This alternative would reduce the risks associated with wildland fire to the public and park resources by allowing mechanical and manual fuel reduction. Restoring and protecting the cultural resources of the park would be accomplished to a lesser degree as in Alternative 3 because prescribed fire would be limited to research burning in the grassland areas.

Alternative 2 would reduce the risks associated with wildland fire to the public and park resources by allowing mechanical and manual fuel reduction. There would be no prescribed fire activities. This alternative meets the goals for protecting park resources, public safety, and adjacent lands from the threat of wildfires. However, due to the staff time needed to support this alternative, the protection and restoration of historic landscapes would be a lesser priority. Therefore, it is not the alternative that would best protect and preserve the historic and cultural resources of the park.

MITIGATION MEASURES AND MONITORING

San Juan Island NHP follows the methods outlined in the NPS National Fire Monitoring Handbook (2003) to acquire standardized information on fire behavior and the effects of fire on park resources, especially vegetation. This allows the park to document basic information, to detect trends, and to ensure that fire and resource management objectives are being met in areas that are subject to manual treatment or prescribed fire. This monitoring program is reviewed annually by the park's fire program staff.

Each fire management project would be monitored at the appropriate level, and each mitigation measure listed below would be evaluated to determine if it was implemented as stated and if it was effective at mitigating impacts to the resource it was designed to protect.

Mitigation measures are prescribed to prevent and/or mitigate adverse environmental impacts that may occur from fire management activities. The following mitigation measures are common to all three alternatives.

FIRE MANAGEMENT ACTIVITIES

- Whenever consistent with safe, effective suppression techniques, the use of natural or human-made barriers would be used as extensively as possible;
- Fire retardant agents must be on an approved list for use by the NPS;
- Heavy earth-moving equipment such as tractors, graders, bulldozers or other tracked vehicles would generally not be used for fire suppression. The superintendent can authorize the use of heavy earth-moving equipment in extreme circumstances in the face of loss of human life and/or property;
- When handline construction is required, construction standards would be issued requiring the handlines to be built to Minimum Impact Suppression Tactic (MIST) standards. No handlines exposing mineral soil would be allowed through cultural sites, and all handlines would be rehabilitated. Erosion control methods would be used on slopes exceeding 10% where handline construction takes place;
- All sites where improvements are made or obstructions removed would be rehabilitated to pre-fire conditions, to the extent practicable;
- Educational/informational materials would be developed and distributed to park visitors on what to expect during fire management activities including potential noise from chainsaws during line construction, smoke dispersion, safety, and information on where and when these activities would occur;

- A rehabilitation plan as required by NPS-18, with the use of a Burned Area Emergency Rehabilitation (BAER) Team, would be formulated and implemented in advance of demobilization from major fire events.

SOIL AND WATER RESOURCES (INCLUDING WETLANDS)

- Riparian areas, which have been burned, may be seeded with native seed from native genotypes, as specified in a Burned Area Emergency Rehabilitation (BAER) plan;
- Fire lines would be located outside of highly erosive areas, steep slopes, and other sensitive areas;
- Fire control strategies would be sensitive to wetland values, and firelines would not "tie" into wetland or bog margins except when relying on those areas to naturally retard the fire without constructed line;
- Foams and retardants would not be used within 300 feet of surface waters, except in the event of a life threatening situation;
- Heavy earth-moving equipment would not be used in any "fragile environment;"
- Crews would implement Minimum Impact Suppression Techniques (MIST) fire suppression guidelines to minimize and/or eliminate adverse soil impacts resulting from ground crew activities;
- Mechanical equipment would use multiple entry and exit points within a treated area to minimize concentrated soil compaction or soil disturbance impacts resulting from continued use of a single entrance and/or exit;
- Crews would implement MIST fire suppression guidelines to minimize and/or eliminate adverse impacts to surface water resources.

AIR QUALITY

For prescribed fires, there are three principle strategies to manage smoke and reduce air quality impacts. They include:

- Avoidance – This strategy relies on monitoring meteorological conditions when scheduling prescribed fires to prevent smoke from drifting into sensitive receptors, or suspending burning until favorable weather conditions.
- Dilution – This strategy ensures proper smoke dispersion in smoke-sensitive areas by controlling the rate of smoke emissions or scheduling prescribed fires when weather systems are unstable, not under conditions when a stable high-pressure area is forming with an associated subsidence inversion. An inversion would trap smoke near the ground.
- Emission Reduction – This strategy utilizes techniques to minimize the smoke output per unit area treated. Smoke emission is affected by the number of acres burned at one time, pre-burn fuel loadings, fuel consumption, and the emission factor. Reducing the number of acres that are burned at one time would reduce the amount of emissions generated by that burn. Reducing fuel beforehand, i.e. removing wood for utilization purposes reduces the amount of fuel available. Emission factors can be reduced by pile burning or by using certain firing techniques. If weather conditions changed unexpectedly during a prescribed fire, and there was a potential for violating air quality standards or for adverse smoke

impacts on sensitive receptors, the park would cease burn operations at an appropriate and safe location to avoid further smoke impacts.

VISITOR EXPERIENCE AND USE

- Fire management activities (excluding fire suppression) would not be conducted on holidays;
- Public information in the form of pamphlets, signs, and/or information stations would be used to inform park visitors of project activities and purpose;
- Area closures due to safety concerns would be implemented for the least amount of time possible.

WILDLIFE AND PLANTS

- If threatened, endangered, or sensitive wildlife are found in or adjacent to a treatment area, in park biologists would be consulted with respect to designating buffer zones and/or scheduling of the project so as to minimize impacts to the wildland from noise, smoke, or change in habitat structure;
- If threatened, endangered, or sensitive plant species are found in a treatment unit, a buffer surrounding the plants would be imposed that prohibits physical damage to the identified population;
- Park staff would survey for noxious weeds in treatment units prior to ignition of prescribed fires and provide mitigation measures deemed necessary by exotic vegetation management specialists.

CULTURAL RESOURCES

- Prior to all fire management activities, cultural resources in treatment areas would be surveyed, identified and avoided;
- Fire retardant use would be prohibited within 100 feet of any historic structure, unless there is imminent threat from wildfire to the historic structure;
- The park cultural resources manager or a designated representative would conduct an inspection and develop a plan to protect any existing or new cultural resources identified before and after prescribed fires.

COMPARISON OF ALTERNATIVES

Table 9 compares the fire management activities employed under the three alternatives, while Tables 10 and 11 briefly summarize the environmental effects of the various alternatives. The tables provide a quick comparison of how well the alternatives respond to the project need, objectives and key resources. Chapter 4 discusses the environmental consequences of the proposed alternatives in detail.

Table 9 Comparison of Fire Management Activities

	Fire Suppression	Prescribed Fire	Manual Thinning	Mechanical Thinning	Fire Effects Monitoring	Research
Alt. 1	X	X	X	X	X	X
Alt. 2	X		X	X		
Alt. 3	X	X	X	X	X	X

Table 10 Comparison of Alternatives given Project Need and Goals

	Alt. 1 – No Action	Alt. 2 – Suppression, Manual Fuel Reduction	Alt. 3 – Suppression, Manual Fuel Reduction, Prescribed Fire
Project Need			
Reduces hazardous fuel accumulations.	Yes. Manual fuel reduction would occur in and around the developed areas and in areas with heavy fuel accumulations by 2008. Prescribed fire would be used to restore and maintain oak woodlands. Research burns would be conducted in grasslands and mature mixed conifer forests. This alternative provides the second highest level of hazard fuel reduction.	Yes. Manual fuel reduction would occur in and around 80% of the developed areas by 2006 and 50% of areas with heavy fuel accumulations by 2008. This alternative provides the least hazard fuel reduction.	Yes. Manual fuel reduction would occur in and around 80% of the developed areas by 2006 and 50% of areas with heavy fuel accumulations by 2008. Prescribed fire would be used to restore and maintain at least 40% of oak woodlands, 20% of grasslands, and 10% of mature mixed conifer forests. This alternative provides the most hazard fuel reduction.
Restore and maintain cultural and natural landscapes.	Yes. Manual and, to a lesser extent than alternative 3, prescribed fire treatments would be used across the landscape to protect, restore, and maintain cultural and natural landscapes.	Yes. Manual fuel treatments would be used to reduce fuel around developed areas and in areas with heavy fuel accumulations.	Yes. Manual and prescribed fire treatments would be used across the landscape to protect, restore, and maintain cultural and natural landscapes.

Goals			
Protect human life and property both within and adjacent to the park.	Yes. All wildland fires would be suppressed as soon as detected. Manual and prescribed fire fuel reduction projects would be used to reduce wildland fire potential.	Yes. All wildland fires would be suppressed as soon as detected. Manual fuel reduction projects would be used to reduce wildland fire potential near developed areas and in areas with heavy fuel accumulations.	Yes. All wildland fires would be suppressed as soon as detected. Manual and prescribed fire fuel reduction projects would be used to reduce wildland fire potential near developed areas and in areas with heavy fuel accumulations.
Perpetuate, restore, replace, or replicate natural processes to the greatest extent practicable.	Yes. Manual and prescribed fire treatments would be used to restore and maintain natural processes in specified areas.	No. Manual fuel treatments may be used to replicate natural processes but no prescribed fire would be used to restore natural processes.	Yes. Manual and prescribed fire treatments would be used to restore and maintain natural processes in specified areas.
Protect natural and cultural resources and intrinsic values from unacceptable impacts attributable to fire and fire management activities.	Yes. Fire management activities would have mitigation measures in place that would help avoid or minimize impacts from fire suppression activities.	Yes. Fire management activities would have mitigation measures in place that would help avoid or minimize impacts from fire suppression and manual fuel reduction activities.	Yes. Fire management activities would have mitigation measures in place that would help avoid or minimize impacts from fire suppression, prescribed fire, and manual fuel reduction activities.

Table 11 Comparison of Alternatives given Impact Topics

	Alt. 1 – No Action	Alt. 2 – Suppression, Manual Fuel Reduction	Alt. 3 – Suppression, Manual Fuel Reduction, Prescribed Fire
Impact Topics			
Soils	<p>Suppression would cause short-term erosion and soil compaction if heavy equipment is used or vehicles are driven off roadways.</p> <p>Minor short-term erosion and compaction would result from manual fuel reduction and prescribed fire projects. Benefits to soil development and nitrification would result from prescribe fires.</p>	<p>Minor short-term erosion and compaction would result from manual fuel reduction projects and suppression activities if heavy equipment is used or vehicles are driven off roadways.</p>	<p>Suppression would cause short-term erosion and soil compaction if heavy equipment is used or vehicles are driven off roadways.</p> <p>Minor short-term erosion and compaction would result from manual fuel reduction and prescribed fire projects. Benefits to soil development and nitrification would result from prescribe fires.</p>

	Alt. 1 – No Action	Alt. 2 – Suppression, Manual Fuel Reduction	Alt. 3 – Suppression, Manual Fuel Reduction, Prescribed Fire
Impact Topics			
Water Resources (Including Wetlands)	<p>Fire suppression activities such as foam use and retardant may have impacts on surface water. However very little surface water supplies exist in the park.</p> <p>Water usage for suppression activities may stress local water supplies during the summer season.</p>	<p>Fire suppression activities such as foam use and retardant may have impacts on surface water. However very little surface water supplies exist in the park.</p> <p>Manual fuel reduction projects would not impact water resources.</p> <p>Water usage for suppression activities may stress local water supplies during the summer season.</p>	<p>Fire suppression activities such as foam use and retardant may have impacts on surface water. However very little surface water supplies exist in the park.</p> <p>Water usage for suppression activities may stress local water supplies during the summer season.</p> <p>Manual fuel reduction projects would not impact water resources.</p> <p>Prescribed fire activities would not take place near surface water areas. Water usage to support prescribed fires would be planned to avoid water use issues.</p>
Vegetation	<p>Minor short-term impacts would result from suppression activities.</p> <p>Plant habitat and diversity improved, native plant and fire-tolerant species favored by this alternative. Noxious weed species may increase in the short term but would be reduced over time.</p>	<p>Minor short-term impacts would result from suppression activities.</p> <p>Manual fuel reduction treatments would promote plant habitat and diversity. Noxious weed species would continue to increase.</p>	<p>Minor short-term impacts would result from suppression activities.</p> <p>Plant habitat and diversity improved, native plant and fire-tolerant species favored by this alternative. Noxious weed species may increase in the short term but would be reduced over time.</p>
Wildlife	<p>Manual fuel reduction and prescribed fire activities would temporarily displace some wildlife species. Wildlife habitat would improve in the long-term with restoration of natural landscapes and the reduced potential for catastrophic fire.</p>	<p>Manual fuel reduction activities would temporarily displace some wildlife species. Fire suppression activities could cause short term, minor impacts to wildlife.</p>	<p>Manual fuel reduction and prescribed fire activities would temporarily displace some wildlife species. Wildlife habitat would improve in the long-term with restoration of natural landscapes and the reduced potential for catastrophic fire. Fire suppression activities could cause short term, minor impacts to wildlife</p>

	Alt. 1 – No Action	Alt. 2 – Suppression, Manual Fuel Reduction	Alt. 3 – Suppression, Manual Fuel Reduction, Prescribed Fire
Impact Topics			
Threatened, Endangered and Sensitive Species	Minor short-term impacts on T&E species habitat from fire suppression, prescribed fire, and hazard fuel reduction activities. Wildlife habitat and T&E habitat would improve in the long-term with restoration of natural landscapes and the reduced potential for catastrophic fire.	Minor short-term impacts on T&E species habitat from fire suppression and hazard fuel reduction activities.	Minor short-term impacts on T&E species habitat from fire suppression, prescribed fire, and hazard fuel reduction activities. Wildlife habitat and T&E habitat would improve in the long-term with restoration of natural landscapes and the reduced potential for catastrophic fire.
Soundscape	Minor short-term impacts from short duration fire suppression activities. Manual fuel reduction and prescribed fire activities would generate noise from chainsaws, pumps and vehicles.	Minor short-term impacts from short duration fire suppression activities. Manual fuel reduction activities would generate noise from chainsaws and vehicles.	Minor short-term impacts from short duration fire suppression activities. Manual fuel reduction and prescribed fire activities would generate noise from chainsaws, pumps and vehicles.
Air Quality	<p>Impacts from management-ignited burns would occur resulting in minor to moderate, short-term adverse impacts to area air quality, during the duration of the burn. The use of vehicles and mechanized equipment could generate fumes in the form of smoke and exhaust from use of fossil fuels, and generate dust and particulate matter.</p> <p>This would affect air quality in the immediate area around the suppression activities on a short-term basis, creating minor temporary impacts.</p>	<p>The use of vehicles and mechanized equipment could generate fumes in the form of smoke and exhaust from use of fossil fuels, and generate dust and particulate matter.</p> <p>Under this alternative there is a higher potential over time for increased fuel loads and potential for larger and longer duration suppression fires, resulting in minor to moderate short-term impacts to air quality from smoke.</p>	<p>Impacts from management-ignited burns would occur resulting in minor to moderate, short-term adverse impacts to area air quality, during the duration of the burn. The use of vehicles and mechanized equipment could generate fumes in the form of smoke and exhaust from use of fossil fuels, and generate dust and particulate matter.</p> <p>This would affect air quality in the immediate area around the suppression activities on a short-term basis, creating minor temporary impacts.</p>

	Alt. 1 – No Action	Alt. 2 – Suppression, Manual Fuel Reduction	Alt. 3 – Suppression, Manual Fuel Reduction, Prescribed Fire
Impact Topics			
Visitor Use and Experience (Recreational and Visual Resources)	Visitors would continue to face temporary closures due to management activities related to these alternatives, resulting in minor to major, short term adverse impacts.	Visitors would continue to face temporary closures due to management activities related to these alternatives, resulting in minor to major, short term adverse impacts.	Visitors would continue to face temporary closures due to management activities related to these alternatives, resulting in minor to major, short term adverse impacts.
Land Use	Work adjacent to park boundaries could have negligible to minor, short-term impacts on adjacent land owners from the presence of work crews, the use of fire, and visual impacts from smoke and manual fuel reduction activities. In the long-term, ecological conditions would improve in these areas as restoration goals are accomplished. Fuel reduction activities would result in reduced risk of wildland fire to adjacent lands.	Same as Alternative 1.	Same as Alternative 1.
Human Health and Safety	Fire fighter and public safety is the primary objective of all fire activities. A proactive fire management program would provide for the protection of life and property by using hazard fuel reduction and prescribed fire to reduce the threat of wildland fire.	Fire fighter and public safety is the primary objective of all fire activities. A proactive fire management program would provide for the protection of life and property by using hazard fuel reduction to reduce the threat of wildland fire.	Fire fighter and public safety is the primary objective of all fire activities. A proactive fire management program would provide for the protection of life and property by using hazard fuel reduction and prescribed fire to reduce the threat of wildland fire.

	Alt. 1 – No Action	Alt. 2 – Suppression, Manual Fuel Reduction	Alt. 3 – Suppression, Manual Fuel Reduction, Prescribed Fire
Impact Topics			
Cultural Resources	Sites would be avoided and/or protected during project activities. The alternative would allow for a proactive program that could plan manual fuel reduction and prescribed fire treatments in and around cultural resource sites to reduce the potential for wildland fire thus protecting the sites during suppression activities.	Sites would be avoided and/or protected during project activities. The alternative would allow for a proactive program that could plan manual fuel reduction treatments in and around cultural resource sites to reduce the potential for wildland fire thus protecting the sites during suppression activities.	Sites would be avoided and/or protected during project activities. The alternative would allow for a proactive program that could plan manual fuel reduction and prescribed fire treatments in and around cultural resource sites to reduce the potential for wildland fire thus protecting the sites during suppression activities.
Park Operations/ Interagency Cooperation	Park operations would be affected during large suppression fire incidents requiring area closure and/or evacuations. Interagency cooperation would be critical to provide closest resource for initial attack on suppression fires and support on prescribed fires. NPS personnel would be available to respond to significant incidents that require multiple operational periods so not to strain or overextend the local firefighting resources.	Park operations would be affected during large suppression fire incidents requiring area closure and/or evacuations. Interagency cooperation would be critical to provide closest resource for initial attack on suppression fires. NPS personnel would be available to respond to significant incidents that require multiple operational periods so not to strain or overextend the local firefighting resources.	Park operations would be affected during large suppression fire incidents requiring area closure and/or evacuations. Interagency cooperation would be critical to provide closest resource for initial attack on suppression fires and support on prescribed fires. NPS personnel would be available to respond to significant incidents that require multiple operational periods so not to strain or overextend the local firefighting resources.

CHAPTER 3 – AFFECTED ENVIRONMENT

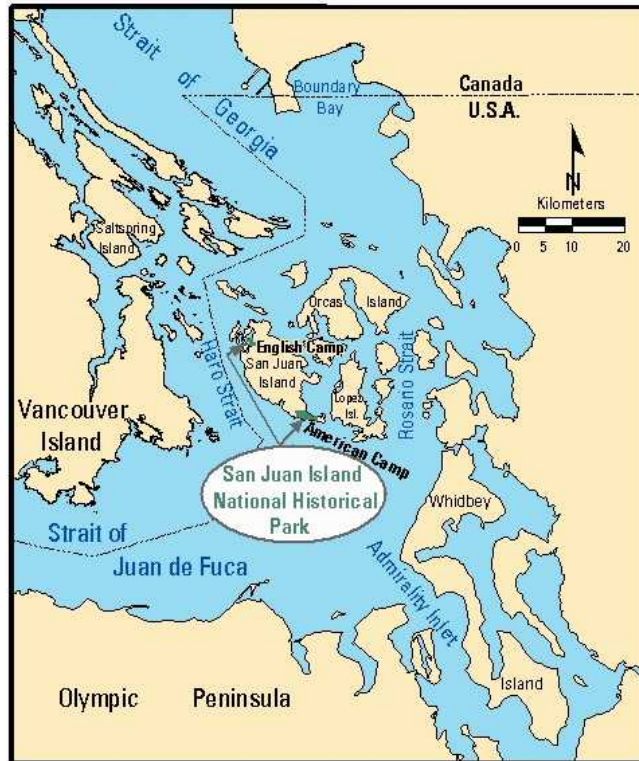
GENERAL INFORMATION

San Juan Island NHP is located in northwestern Washington, approximately 80 miles north of Seattle and 18 water miles west of Anacortes, Washington.

At low tide, San Juan County contains more than 700 islands, reefs and rocks, of which 172 or so have names. In San Juan County about 20 islands have year-round residents, with the majority living on the four islands served by the state ferry system (Future Directions, Inc., 1999).

The San Juan Islands are bordered on the west by Vancouver Island and separated from that island by Haro Strait. To the east, Rosario Strait separates the islands from the Washington mainland. The Canadian Gulf Islands lie to the northwest and, to the north, the Gulf of Georgia and mainland British Columbia. The Strait of Juan de Fuca separates the islands from the Olympic Peninsula to the south.

The park is located on San Juan Island, the second largest of the islands at 55.3 square miles. The other principal islands serviced by the ferries are Orcas, Lopez, and Shaw.



CULTURAL ENVIRONMENT

PREHISTORY AND HISTORY

San Juan Island NHP is the site of one of the last chapters in the drama of American continental expansion. In the mid-19th century, there remained a lingering dispute over which channel between Vancouver Island and the mainland had been designated by the Oregon Treaty of 1846 as the boundary between British holdings to the north or American holdings to the south. If the treaty negotiators had intended the boundary to follow the Rosario Strait, the islands would be British possessions; if they intended the Haro Strait to the west, then they belonged to the U.S. Territory of Washington.

Competing claims between the British and American settlers and officials ultimately led to a brief confrontation between British and American forces in 1859 that is known as the “Pig War.”

The war was followed by 12 years of joint British-American military occupation of the island while the international dispute was addressed and slowly resolved through mediation by the Emperor of Germany. American Camp at the southeastern end of the island, and English Camp in the northwest corner on Garrison Bay, provide the backdrop for interpreting the story of the boundary dispute and its resolution by diplomatic negotiation.

OCCUPATION OF THE SAN JUAN ISLANDS BY NATIVE PEOPLES

The prehistory and early history of native peoples of the islands has been derived from the evidence obtained through archeological investigations. Additional information has been gathered through documents on initial Euro-American contact with indigenous populations and more than a century of ethnographic research by anthropologists who have worked with members of United States tribes and Canadian First Nations (Boxberger 1989, 1994, Suttles 1951, 1990, 2003).

The landmass known as San Juan Island began to emerge from the glacial ice approximately 16,000 years ago (Riedel 2003). At this time, the Vashon glacier, the last glacier known to have affected the San Juan archipelago, began its retreat back to the Fraser River valley. At the height of glaciation, the islands and all of Puget Sound were covered with almost a mile thick river of ice. The ice extended south from the Fraser River valley to the Nisqually delta just south of Tacoma. When the glacier began retreating, it exposed bare ground compressed from the constant weight of the ice upon it. Over thousands of years after the glacier receded, the ground would “rebound” as it was freed from the tremendous weight. Evidence of the rebound on San Juan can be seen on the south slope of Mount Finlayson, where beach erosion lines, called benches, can be seen. These were formed by marine waters cutting into the land as it emerged after the glacier had retreated. The Cattle Point Road, where it crosses the side of Mount Finlayson, was built on one of the benches.

Slowly the glacier melted and retreated northward. At San Juan, American Camp’s South Beach was the first to appear, and then finally, after hundreds of years, the entire island emerged from the ice. Native people already present on the North American continent began moving northward, following the retreating glaciers and hunting woolly mammoths, mastodons, and other large animals that grazed on the grassy slopes watered by the melting ice.

These people are referred to by archaeologists as the Paleo-Indians. They hunted in the post-glacial period until about 9,500 years ago when most of the prey was no longer available. The oldest archeological site found within the park is at American Camp. There, spear points called Cascade points were found by Dr. Arden King (Tulane University) in 1948. These points were used by native peoples from about 9,000 to 7,000 years ago, and were used to hunt. As no shelters that can be associated with the Cascade people have been discovered in the Northwest, archeologists have surmised that these people were still concentrating their search for food of terrestrial animals and rarely stopped to erect more than temporary shelters.

About 4,500 years ago, the western red cedar began its appearance in the islands offering an excellent wood for the production of tools and shelter. Sometime after 2,500 years ago, salmon began running from the Pacific down the straits, turning almost in front of South Beach to either

head north up to the Fraser River or south to the rivers on the Olympic peninsula and those draining into Puget Sound.

Archeologists suggest that between 4,500 and 2,500 years ago, moderating climate and changes in plant and animal communities were associated with a flowering of native arts and technology and an increase in human organizational structure. Tool making and other craft industries made it easier to procure resources. The native people began to build more permanent shelters and moved from a hunting and gathering lifestyle to more permanent living arrangements. Besides hunting the terrestrial animals, they began exploiting more resources such as shellfish, birds, fish, berries and harvesting edible plants like camas, bracken fern, and nettle.

Sometime between 2,500 and 1,500 years ago, the number of people living on the islands increased. People from the mainland moved to occupy the islands year-round, whereas before they had visited only seasonally to fish, dig camas and collect berries. Archaeologists have determined the population boom by the carbon 14 dating of shell middens and other sites discovered on the islands. These were the people that produced the art, tools and carvings that we now associate with the Northwest Native American culture. They also began to design and construct long-houses—the traditional homes of the northwest people and those first seen by Europeans in the early 16th century.

By early historic times, the indigenous people of the San Juan Islands and nearby mainland areas were primarily members of six Central Coast Salish tribes who spoke the Northern Straits language. Another Central Coast Salish tribe that entered the Northern Straits country spoke the closely related Klallam (or Clallam) language. In addition to sharing closely related languages, the Central Coast Salish tribes shared a culture and way of life through which they used a wide range of marine, riverine, and terrestrial resources. They followed patterns of seasonal movement between islands and the mainland and from large winter villages to smaller resource collection camps occupied in the other seasons. A distinctive feature of the subsistence strategy was the use of underwater reef nets to catch migrating salmon.

Throughout the southern Gulf and San Juan Islands generally, Northern Straits speaking tribal groups known as the Lummi, Saanich, Samish and Songhees had winter villages in the mid-eighteenth century. However, Suttles notes that epidemics caused the abandonment of village sites (2003).

The numerous localized family and tribal groups of the Central Coast Salish continued to be highly mobile within the region in the mid-nineteenth century. The native population responded to the initial presence of British and American armed forces, as well as increasing non-native settlement, by changing patterns of seasonal travel, residential occupation and resource procurement. Treaties with two governments then directly led to the relocation of most indigenous people from the islands to reserves in Canada and reservations in the US.

Three settlements or village sites were located in northern San Juan Island in a cove just to the west of Lonesome Cove, at Mitchell Bay, and within the English Camp unit of San Juan Island NHP at Garrison Bay. West of San Juan Island there may have been a fourth village located at Open Bay on nearby Henry Island. Central Coast Salish tribes said to be residents of these sites

included a group known as the Klalakamish (variously claimed as ancestors by Songhees, Lummi and Saanich) the Lummi, the Saanich and the Songhees. In addition to larger settlements or villages, four smaller camps were noted on an 1853 to 1854 U.S. Coast Survey map that were probably associated with one or more of the ten reef net locations along the western shore of the Island (Suttles 1998).

In addition to those who occupied San Juan Island villages and used certain reef net locations, others tribes made use of resources on the island or in the immediate vicinity. While the Klallam traditionally occupied the northern slope of the Olympic Peninsula on the south side of the Strait of Juan de Fuca, some of them established winter villages in former Sooke territory on the Vancouver side of the strait after Fort Victoria was built in 1843 (Suttles 2003). Like the Samish, the Klallam and the Swinomish also used the popular fishery south of Cattle Point.

Treaty relationships with native people of the San Juan Islands were shaped by the on-going competition between Britain and the United States over control of the region. Between 1850 and 1852, Governor James Douglas negotiated a series of British treaties wherein the Saanich and Songhees peoples accepted reserves on the Saanich Peninsula and elsewhere on southeastern Vancouver Island and ceded other lands. In 1855, Governor Isaac Stevens of Washington Territory held a series of treaty councils with Indians of the territory. Representatives of the Lummi, the Swinomish, and, it is claimed, the Samish, signed an early draft of the Point Elliot Treaty of 1855. These treaties obligated native peoples to leave the San Juan Islands and take up residence on the reserves and reservations. However, a small number of individuals and extended families remained in the islands during the early reservation period and their descendents continued to be part of the island communities of the present.

EUROPEAN AND AMERICAN EXPLORATION AND SETTLEMENT OF THE SAN JUAN ISLANDS, 1790-1859

The first Europeans known to have explored the San Juan Islands were the Spanish. In 1790 Manuel Quimper explored both shores of the Strait of Juan de Fuca and may have reached as far as the southwestern corner of the islands. The following year Francisco Eliza sailed into this region and is generally credited with giving these islands the name "San Juan."

The English explorer George Vancouver systematically explored the Strait of Juan de Fuca in 1792 but did not actually investigate the San Juan Islands. In 1841, Charles Wilkes led the United States Exploring Expedition in a reconnaissance of the Puget Sound but spent little time actually exploring the islands.

Euro-American exploitation of the islands may have begun as early as 1840 with some timber harvesting operations. Between 1850 and 1851, the Hudson's Bay Company, operating out of their post at Fort Victoria on Vancouver Island, set up their first seasonal fishing station on San Juan Island. In late 1853, the company dispatched Charles Griffin to San Juan Island to establish a permanent agricultural station. Situated on the southeastern end of the island, within the present boundaries of American Camp, Bellevue Farm was a substantial operation supporting a herd of 4,000 sheep. In addition to houses, barns, and outbuildings, there were fenced pastures and more

than 100 acres in cultivation. The foundations and other features of the Bellevue Farm operation comprise an archeological site on the slope below the redoubt at American Camp.

The signing of the Oregon Treaty of 1846, establishing the 49th North Parallel as the boundary between British and American possessions, left unresolved the question of the final boundary line along the main channel dividing the islands from the mainland. By the mid-1850s, the non-native population of the San Juan Islands has been estimated at 200. Spurred by the discovery of gold on the Fraser River in 1857, this population began to increase at the end of the decade and included both American adventurers and small subsistence farmers. Most of these farms were preemption claims of 160 acres clustered on the southeast end of the island near Bellevue Farm. Their proximity to the Company operations, whose officials regarded the Americans as squatters, set the stage for confrontation.

The designation of the military confrontation as the Pig War stems from an incident on June 15, 1859, in which an American settler shot a black boar foraging in his potato patch. The boar belonged to Bellevue Farm and the subsequent disagreements over compensation, and exaggerated accounts of the event, led to the American settlers on the island petitioning the government for protection. On July 28, 1859, American troops landed on San Juan Island near Bellevue Farm and established a military encampment. The site of this initial encampment is within the present-day boundaries of American Camp. A redoubt overlooking Griffin Bay, constructed under the direction of Second Lieutenant Henry Martyn Robert, remains as a symbol of the high tensions of the initial confrontation.

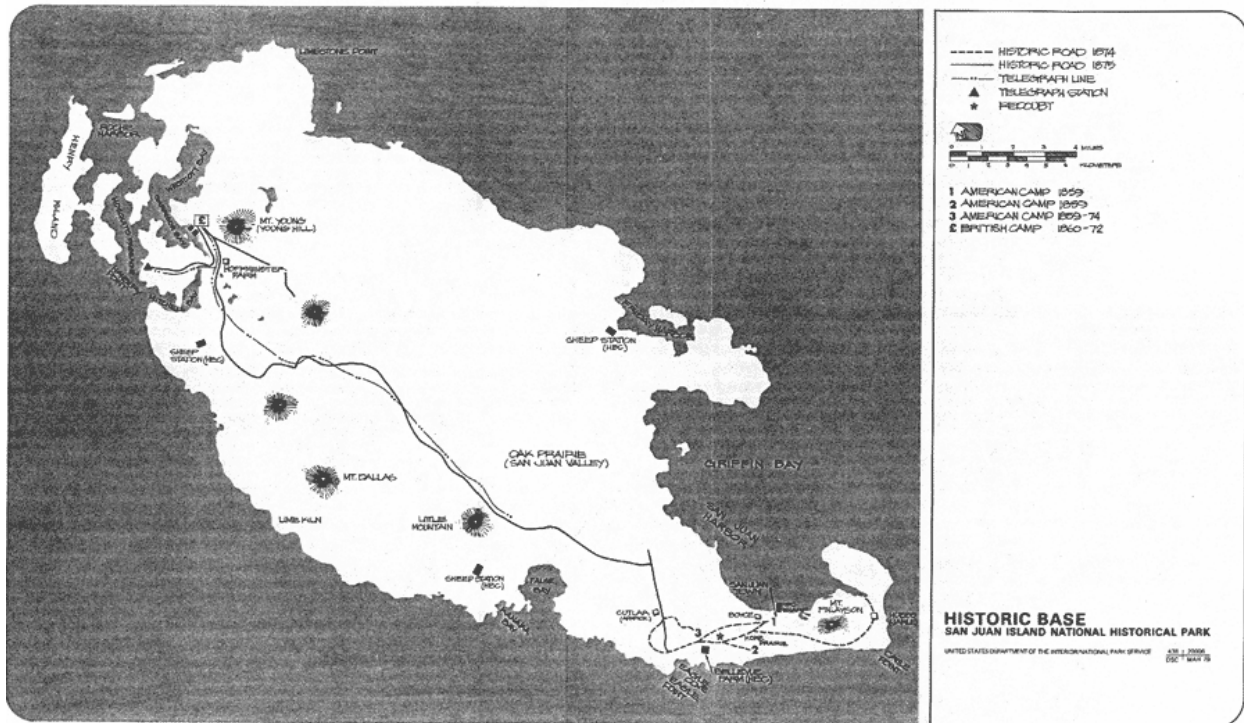
In response to the arrival of American troops, the British government sent three vessels of the Royal Navy to Griffin Bay. An uneasy peace ensued while negotiations between senior officials representing British and American interests continued. In October of 1859, Great Britain and the United States agreed to joint military occupation of San Juan until the boundary dispute could be settled, thus bringing the confrontation to a peaceful diplomatic conclusion.

BRITISH-AMERICAN MILITARY OCCUPATION OF SAN JUAN ISLAND, 1859-1874

In March of 1860, British Royal Marines were dispatched to the north end of the island with supplies and provisions for construction of a British encampment. American troops, after relocating their encampment on the southeastern end of the island three times within the first three months of their arrival, ultimately settled on a permanent camp on a prairie that sloped gently to the south and provided a commanding view of Griffin Bay.

The joint military occupation of San Juan Island continued for twelve years. Troops stationed at American Camp operated under the command of the Department of Oregon, U.S. Army, headquartered in Vancouver, Washington (now part of Vancouver National Historical Reserve). The Royal Marines were attached to the Royal Navy's Pacific Station command, headquartered at Esquimalt on Vancouver Island. Both military outposts evolved into substantial structural complexes with officers' quarters and barracks, parade grounds, hospitals and service buildings, fortifications, gardens, cemeteries, and circulation systems. Access by boat and wagon road was established by the two camps and over time a cordial communication system existed between the military personnel. The American Civil War prevented a speedy resolution of the boundary issue

until 1872, when the San Juan Islands were finally awarded through arbitration to the United States.



SAN JUAN TOWN, 1859-1890

Despite the efforts of the military commanders who were placed in charge of civil affairs on the island, the presence of the two camps and the lack of direct civil authority attracted a number of outlaws, scoundrels, and others interested in profiting from the sale of liquor and other items to both the military personnel and local Indians. The village of San Juan sprang up around the Hudson's Bay Company wharf following the arrival of American forces in 1859. Located within the present day boundaries of American Camp, the village consisted of approximately 14 rude structures. Following the withdrawal of the military and the establishment of Friday Harbor as the county seat, the town was slowly abandoned and finally burned to the ground in 1890.

LATE SETTLEMENT AND AGRICULTURAL ACTIVITY ON SAN JUAN ISLAND, 1873-PRESENT

In 1880, six years after the conclusion of the military occupation in 1874, the U.S. Census Report listed an island population of 536 individuals: 302 men and 234 women. They were farmers, fishermen, or laborers. Among the Euro-Americans, a high percentage was European born. By 1900, Friday Harbor was a thriving village with a population of 300 to 400, a salmon cannery, wharves and warehouses, and a telephone system. At Roche Harbor, north of English Camp, a lime manufacturing plant was operating. Steamers connected the islands to the mainland.

The Indian population was primarily composed of reef net fishermen who traveled to the island from various locations, as well as a full-time residential population. Several families formed the core of this resident “metis” community and came to be known as two separate groups: the San Juan Tribe of Indians and the Mitchell Bay Band. Those who remained on the island also engaged in farming and early commercial fishing.

After the military departed, both camps were sold to private individuals. At American Camp, land was thrown open to settlement by presidential proclamation. The military buildings were probably sold at auction and most were removed from the site. Homesteaders made use of the site for farming and grazing, gradually altering the historic landscape of the camp. In 1951, the Washington State Parks and Recreation Commission acquired five acres of the historic camp site thus preserving it from further alteration in the presence of development pressure from increased tourism.

At English Camp, the land and many of the structures were acquired by the William Crook family in 1875. For the next 92 years, the Crook family worked and shaped the landscape around the cove at Garrison Bay. Though some of the original camp structures had been sold at auction and removed in 1875, Crook retained and made practical use of many of them. The family also erected new structures, including a substantial barn and house. An orchard was planted on the old parade ground. In 1963, the Crooks transferred ownership of 100 acres of the farm including the historic camp site to the Washington State Parks and Recreation Commission. In 1968, with the creation of the San Juan Island NHP, both the English and American Camp sites were transferred from Washington State Parks to the NPS.

HISTORIC PROPERTIES ELIGIBLE FOR OR LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES

The cultural resources of San Juan Island NHP have been surveyed, evaluated, and documented through a series of studies prepared primarily by historians, anthropologist, archeologists, cultural landscape architects, and historical architects working for the NPS as staff or contractors. The two camps were designated as National Historic Landmarks (NHL) in 1966—just prior to establishment of the NHP. The National Register of Historic Places listing for the NHL has not been updated since the original designation; it encompasses an area of more than 12,000 acres and is not limited to the present park boundaries. It also does not specifically mention many of the cultural resources now recognized as important in the park.

The most recent National Register of Historic Places documentation is a multiple property document (MPD) entitled “Cultural Resources of San Juan Island NHP, Prehistory through 1945.” Using the MPD, the park has developed a list of sites considered eligible for listing for the National Register of Historic Places. A nomination is needed for the prehistoric archeological sites as they were not included in the 1999 MPD.

NATURAL ENVIRONMENT

GEOLOGY

Located in the Puget Sound basin, the San Juan Island Archipelago consists of 473 islands at low tide with a wide variety of rock types and formations. Two key geologic processes are responsible for the rugged landscape the islands are known for today—accretion of small continents to the mainland and several glaciations. The oldest rocks date to the Devonian Period with a minimum age of 360 million years and include a complex of diorites, amphibolites, gneisses and gabbros. These ancient crystalline rocks are overlain by chert, shale, limestone, greywacke sandstone, and volcanic rocks (Easterbrook and Rahm, 1970).

Over 80 million years ago, plate tectonics set the stage for the complex geologic structure of bedrock underlying the region. Small landmasses moving eastward along the Juan de Fuca plate collided with the coastline in a relatively short period of time. Due to the intense pressure created by the collisions, the smaller landmasses were forced upward against the continental plate producing an intricate system of thrust faults along the tectonic plates and lenses (Brandon et al., 1988). Many fractures and joints in the varied bedrock are associated with this thrust system.

Later, during the Pleistocene Epoch, commonly referred to as the Ice Age, at least four glaciations occurred with alternating warmer periods. As the glaciers advanced from north to south around 18,000 years ago, they accumulated and transported eroded rock material of all kinds that varied from the size of clay to gigantic boulders (McKee, 1972). These materials aided in scraping and scouring the bedrock. Glaciers carved bays, channels, and other waterways. They shaped and rounded more resistant rock material. Striations, or gouges in the rock, are still visible today. Good examples of glacially grooved bedrock occur along the southern tip of San Juan Island at Cattle Point (McKee, 1972).

As the edges of the ice below, in front of, and along the sides of the glacier melted, accumulations of debris were deposited creating glacial moraines. Mt. Finlayson, located at American Camp, is a moraine formed from glacial outwash sand (McKee, 1972). When the glaciers began retreating around 13,500 years ago, the lowland areas were covered with unconsolidated deposits of glacial till including clay, silt, gravel, and boulders (Easterbrook & Rahm, 1970).

When compared to deposits on the mainland, glacial and interglacial deposits on the islands are relatively thin. In fact, most of San Juan Island has less than 20 feet of sediment cover. Some of the thickest deposits are associated with the southern portion of the island. Nearly all deposits at American Camp measure roughly 100 feet deep, while sediment cover at English Camp is 20 feet or less (White, 1994).

Since the end of the Ice Age, the primary geomorphic agent has been water in the form of rain, runoff, and ocean currents and tides. Because the park manages 6.67 miles of shoreline that have been greatly affected by these processes, it is important to understand how they interact. The development of beaches requires an input of loose sand and gravel along the shoreline (Downing, 1983). Coastal bluffs supply this material as they erode, and the sediment

accumulates below to form beaches. Loose sand and gravel is moved in and out with the rising and falling of the tide and along the shoreline with longshore currents. Eventually, most of it is transferred to form sand bars, spits, and small capes in shallow water (Terich, 1987). Bluff erosion is critical for the natural maintenance of these shorelines because beaches will begin to narrow or erode if this sediment supply is reduced or stopped (Terich, 1987).

TOPOGRAPHY

Most of San Juan Island is less than 400 feet in elevation. However, occasional steep slopes and rock bluffs occur throughout the gently rolling landscape. Located half way in between American and English camps, the highest point on the island is Mount Dallas at 1,036 feet.

The landscapes of the two park units are quite different. Located on the southeastern tip of the island, American Camp is characterized by a rolling, windswept prairie with the highest point atop Mt. Finlayson at 295 feet. The unit is open to Haro Strait to the west, the Strait of Juan de Fuca to the south, and Griffin Bay is located to the north. Along the southern shoreline, long gravel beaches are broken up by rock outcroppings and protected sandy coves. The northern shoreline also exhibits long gravel beaches with three temperate, marine lagoons occurring on Griffin Bay (NPS, San Juan Island NHP, Statement for Management, 1997).

In contrast, English Camp, located on the northwest corner of the island, is settled along the tree-sheltered cove of Garrison Bay. Bell Point divides Garrison Bay to the south from Westcott Bay to the north. Much of the camp itself and part of Bell Point are somewhat level with a gradual rise from the shoreline. East of the camp, Young Hill rises abruptly to 650 feet. Rocky outcrops rise sharply along Bell Point on Westcott Bay before leveling out into woodlands. Short gravel/mud beaches occur at this unit.

SOILS

Soil is an environment for the exchange of water, nutrients, energy, and air, thus, providing several essential functions. First, it supports plant growth by providing a medium for plant roots and supplying essential nutrients to plants (Brady and Weil, 2000). Soil also regulates the distribution and storage of water, recycles nutrients and organic wastes, acts as a filter for air and water, and provides habitat for organisms. It also supports physical structures and protects archeological objects (U.S. Department of Agriculture, 2001).

Soil throughout San Juan County is derived largely from glacial sediments. Many of the soil types feature a cemented or densic horizon of glaciolacustrine (glacial lake) sediment, which serves to restrict root and water penetration through the soil profile. These soils tend to have management limitations due to seasonally high water tables and susceptibility to soil quality degradation. Other soil types throughout the county have formed in coarser grained glacial sediments of from weathered bedrock. Typically, these soils are found associated with landforms of greater local relief and have historically remained forested due to steep slopes or non-suitability for agriculture.

Both English and American camps encompass soil of both general soil types. At American Camp, most soils are at least 15 feet deep with depths greater than 50 feet in the dune area north of South Beach (U.S. Department of Agriculture, 1962). Very shallow soils and bedrock occur along the coastline. Soils associated with the prairie and slopes of Mt. Finlayson are gravelly to cobbly and are somewhat excessively drained. Depending on slope gradient, runoff can be very low to low. Native vegetation is critical for preventing excessive erosion. Soils north of the Redoubt tend to have a seasonally high water table because of the presence of a densic horizon.

In general, the soils at English Camp are shallow to moderately deep extending down to bedrock or densic material. The entire unit is characterized by scattered rock outcroppings and gentle to steep topographic relief. As with American Camp, there are soils with seasonally high water tables perched on a densic horizon. Generally, these soils occur on low slope gradient areas and have historically been utilized for agricultural and cultural practices. At the top of Young Hill, runoff is high due to the prevailing exposed bedrock. Between the outcrops are patches of gravelly soil that is well drained. Forested soils on the side slopes and base of Young Hill are gravelly to cobbled and well drained. On the north side of Young Hill, forested soils tend to have a component of volcanic ash from the eruption of Crater Lake mixed with glacial sediments. South of Young Hill, soils typically have a dark surface horizon indicative of an historic grassland or an open overstory plant community. Maintaining a native vegetative cover is crucial to preventing excessive erosion where runoff is significant.

CLIMATE

The climate of the San Juan Islands is affected by its geographical location. With the Olympic Mountains situated to the southwest and Vancouver Island, British Columbia, to the west northwest, the “rain shadow” effect produces less rainfall in the islands than the rest of the northern Puget Sound region (Heater et al., 2000). Prevailing westerly winds shed much of their moisture prior to reaching the islands.

On San Juan Island, precipitation varies significantly. Moving from south to north, the effect of the rain shadow subsides and precipitation increases. Rainfall also increases with elevation gain. The average annual precipitation in the vicinity of American Camp on the south end of the island is 19 inches. While ten miles to the north, English Camp’s upper slopes receive 29 inches average annual precipitation (Cannon, 1997).

The maritime air surrounding the islands also affects the climate by moderating the temperature. Compared with other northern Puget Sound locations, the summers on San Juan Island are short and cool with very little precipitation, and the winters are mild and moderately dry. Snowfall may occur, but most winter precipitation falls as soaking rain (Flora and Sharrow, 1992). At the weather station at Olga, Washington on Orcas Island, the average annual maximum temperature recorded is 57° Fahrenheit and the minimum is approximately 42° Fahrenheit.

Table 12 Monthly and Annual Average for Temperature and Precipitation

Month	Maximum Temp (°F)	Minimum Temp (°F)	Precipitation (inches)
March	51.0	37.6	2.38
June	66.3	47.9	1.35
September	65.2	48.1	1.69
December	45.5	36.2	4.44
Annual Average	57.0	42.4	28.94

In general, the prevailing wind patterns are south to southeast in the winter and west to northwest in the summer (Washington State University and U.S. Department of Agriculture, 1966). Occasionally in the winter months, freezing temperatures and strong northeasterly winds occur when low pressure systems off the coast mix with outbreaks of cold air moving down through British Columbia's Fraser River Valley (Garland, 1996).

Weather Station

A fire weather station operated at American Camp from the spring of 1983 through 1998. It was utilized for obtaining weather readings pertaining to fires and fire hazards. It functioned each year from June 1 until September 20. Current technology does not require a permanent fire weather station. Portable devices are now used when fire weather is needed for park activities. The nearest NFDRS weather station is located on Whidbey Island at the naval air station. This station is used to obtain indices when planning for staffing levels and prescribed fire projects.

AIR QUALITY

Air quality in the Pacific Northwest region is very good compared with other areas of the United States (Eilers, Rose, and Sullivan, 1994). Principal air masses for the region are derived from the atmosphere over the Pacific Ocean where the air is clean and moist. Occurring on a regular basis, wind-driven mixing through the Strait of Juan de Fuca effectively disperses air pollution (Puget Sound Clean Air Agency, 2003). As a consequence, air pollutant loads are relatively low.

Sources of air pollutants on the islands are few, predominately from occasional outdoor burning, wood burning stoves, and vehicle emissions. Only two sources of air contaminants in the county have been listed in the state emission inventory. These sources are the Friday Harbor Incinerator and Friday Harbor Sand and Gravel, both of which are now closed (Garland, 1996). It is assumed that all air pollution sources and emissions in the county are in compliance with state general emissions standards because nearby monitoring stations at Oak Harbor, Anacortes, and Mt. Vernon show no danger of exceeding ambient air quality standards (Axel, 2003). Because the islands are located in an airshed between Bellingham, WA and Vancouver, BC, the biggest concern is movement of air pollutants between these two larger urban locations (Brown, 2003).

The park has been designated a Class II² area for purposes of controlling increases in air pollution under the 1997 Clean Air Act. From late November 2001 through 2003, the park operated a visibility camera at American Camp. The camera took three pictures daily of a fixed

² The 1997 Clean Air Act amendments designated all national parks over 6,000 acres and wilderness areas over 5,000 acres as Class I. This classification affords the most protection from new major emitting sources. All other areas that meet the National Ambient A

vista of the Olympic Mountains to the southwest in order to establish baseline visibility data and to detect air pollution that may travel through the Strait of Juan de Fuca (Air Resource Specialists, Inc., 2001). During its period of operation, it was the only active air quality monitoring station in San Juan County. Beginning in June 2004, the park has operated two passive ozone monitoring stations, one at each park unit. Monitoring will be conducted for a 5-month period (May through September) every year.

WATER RESOURCES

Hydrology

Runoff, evapotranspiration, and groundwater recharge are three key components of the region's hydrologic cycle, and they affect the yield and distribution of water within a watershed. Runoff is water that flows from the land surface to a water body with no filtering process, and it can carry pollutants, loose soil, and debris into the body of water in which it drains. It is affected by topography, vegetation, soil type and depth, and precipitation. The runoff on San Juan Island is proportionately high due to exposed bedrock and impervious soil layers. During the winter months, runoff is more prevalent due to heavy rainfall and saturated soils. Of the average annual rainfall, 11 to 45% results in runoff (Heater et al., 2000). This figure is dependent upon variations in precipitation and the effect of evapotranspiration.

Accounting for the greatest annual water loss, evapotranspiration is the cycling of water to the atmosphere from surface water, soils, and plant surfaces. The amount of water lost to evapotranspiration varies with land cover and relief. An estimated 45 to 49 % of the annual average rainfall is lost to evapotranspiration (Heater et al., 2000). However, depending on the characteristics of the watershed, the loss can be much greater. On the island, evapotranspiration is greater than precipitation during the summer months because rainfall is minimal and plants are actively respiring.

When the final melting of the glaciers occurred, all fractures, cracks, and loose glacial outwash material underlying the region were supercharged with freshwater. Today, groundwater recharge is supplied in the form of local rainfall. Water available for groundwater recharge is the remainder of the total annual precipitation that is not lost to runoff or evapotranspiration. Recharge almost exclusively occurs from October through April when precipitation is high and evapotranspiration is low. The recharge rate is site specific because geology, soil type, topography and vegetation influence the rate and amount of water infiltration (Orr et al., 2003). Wetlands increase infiltration by providing a water storage site. The water is filtered as it slowly seeps into the aquifer.

Groundwater

In the region, fresh groundwater occurs as a lens floating atop the denser saltwater in two major aquifer types (Johns, 1997). Fractured bedrock aquifers provide little filtration and water yield is typically low. Glacial outwash aquifers can provide better filtration because the water occurs in the spaces between loose sand and gravel. The yield from these aquifers is generally greater than fractured bedrock, but they tend to be more susceptible to saltwater intrusion. This occurs when fresh water is removed from an aquifer faster than it is replenished (Flora & Sharrow, 1992).

Given the complex geology underlying the island, it is difficult to determine the amount of water available.

Groundwater is the only sizable source of fresh water in the park. It supplies domestic needs, it contributes to the park's wetlands and springs, and it is necessary for wildlife habitat and proper ecological function. Both aquifer types occur at American Camp, but only one well is in operation drawing from a fractured bedrock aquifer. Located on the western boundary of the unit, this well supplies the needs of the temporary visitor center. At English Camp, groundwater occurs in unconsolidated beach deposits, which are highly susceptible to saltwater intrusion, and in fractured bedrock aquifers. Water is drawn from bedrock aquifers by means of two wells with low yields at this unit. This water supplies the maintenance facility, the Volunteers in the Park (VIP) trailer pads, the Oregon Museum of Science and Industry (OMSI) summer camp site, and a drinking fountain in the parking lot. Low yielding wells (one-quarter to a few gallons per minute) are indicative of the water supply at English Camp (Werrell, 1994).

Water Uses and Rights

Groundwater is the source of domestic water supply for the majority of the island including both park units. Fresh groundwater supply is also necessary to support wildlife habitat and proper ecological function. Shortages often occur during summer months when rainfall is minimal and visitation is at a peak. Maintaining a balance between the domestic, biological, and physical water supply needs is a goal at the park. In order to properly meet each of these requirements, the park must balance three main water rights issues; water rights for administrative purposes, water rights for the protection of park resources, and responding to requests for the exportation of water to adjacent developments from wells within the park (Flora and Sharrow, 1992).

Local agreements recognize both units as separate water utilities. This provides the NPS authority to review and accept or reject any action on park boundaries that may affect the water resources within the park (NPS, San Juan Island NHP, Statement for Management, 1997). In accordance with NPS policy, the park has consistently denied requests from adjacent developments to access water from within park boundaries due to the possibilities of exhaustion of park freshwater supplies and detrimental effects on water-dependent resources. In addition, a shared water system, generally, is in conflict with NPS policy and laws (Johns, 1997). Water rights and supply issues vary between the two units.

At American Camp, with below average annual rainfall and increasing development adjacent to park boundaries, there is a great concern for water quality and availability. The well supplying water to the temporary visitor center maintains a certified water right to pump 3.5 gallons per minute or 5,000 gallons per day. This supply is sufficient for current needs, but the water tests high in total suspended solids and chloride rendering it undesirable as drinking water. It is located within close proximity of several private wells, and all of them are situated within one-half mile of the ocean (Johns, 1997). If all wells are in use simultaneously, the potential for salt water intrusion is high.

Another concern at American Camp is aquifer drawdown as a result of adjacent developments withdrawing groundwater from a glacial drift aquifer that extends across the boundary of the park. If occurring, this may have an impact on the unit's water quality and water-dependent

resources including wetlands, seeps, and the three marine lagoons along Griffin Bay. As stated previously, it is difficult to determine groundwater availability given the complex regional geology. Most of the recharge area for this aquifer also lies within the park boundary. Jackle's and Third lagoons are located just north of the aquifer's perimeter. The hypothesis that the aquifer discharges freshwater into the lagoons has not been thoroughly researched, therefore, quantity and timing of discharge are unknown (Johns, 1997). No certified water rights are associated with the lagoons or wetlands.

There is little documentation of the water rights associated with English Camp where two wells and a cistern are used to supply fresh water to the unit. The cistern collects water that is utilized for watering the formal garden. In 2000, a well was drilled to supply the needs of the maintenance facility including a low-water washing machine, two sinks, and one toilet. The water is not potable. This well replaced two low yielding wells that were constructed by the previous landowner on private property just east of the maintenance facility. A second well supplies water to the drinking fountain in the parking lot, two VIP trailer pads, and the OMSI summer camp site. It appears that both wells meet the exemption conditions set forth by the DOE, therefore, obtaining a certified water right is not required. Documentation of beneficial use establishes the priority of an exempt well. Exempt rights receive the same protection as certified rights. Ensuring the proper protection of the water supply is essential due to low yielding wells coupled with increasing subdivision and development taking place on the adjacent shorelines.

Surface Water and Wetlands

While no large bodies of fresh surface water occur within the park, significant wetland areas are present at both units. These wetlands support wildlife populations, and serve as key water filters and storage sites. Many are only small seeps and springs, but a variety of small mammals, reptiles, amphibians, and birds have been observed in and around these wetland sites (Holmes, 1998). Fresh water wetlands are critically important for wildlife on an island with very few fresh surface water features.

In 1998, the wetlands of the NHP were inventoried and mapped. A total of 35 wetland areas comprising 91.9 acres (5% of total park area) were identified (Holmes, 1998). At English Camp, nine wetlands were documented. Several of the sites have been invaded by non-wetland plants, presumably, due to the drought conditions in the early 1990s (Holmes, 1998). Twenty-six wetlands are scattered throughout the American Camp unit. Many are small seeps and springs, but larger wetland sites occur on the northern side of Mt. Finlayson. Located near the end of Pickett's Lane on South Beach is the site of an historic spring that played a role in selecting the site of the first American Camp.

The three temperate marine lagoons (First, Jakle's, and Third lagoons) located along the shore of Griffin Bay are also designated as wetland areas. Because they are rare to the Pacific Northwest coast, these features are valuable ecological resources (Flora and Sharrow, 1992). Jakle's Lagoon, the largest body of surface water in the park, has been designated as an Environmental Study Area, and the University of Washington Friday Harbor Labs has conducted ecological research of marine life at this location (Flora and Sharrow, 1992). Studies show that regular circulation occurs with the bay, but salinity in the lagoon is lower than salinity of the sea water. This may indicate a groundwater inflow from the aquifer underlying Mt. Finlayson.

Water Quality

Overall, water quality in the region of the NHP is relatively high. Marine waters surrounding the islands are typically of high water quality and are rated class AA (Garland, 1996). Located at the intersection of the Strait of Juan de Fuca and the Strait of Georgia, these waters are well flushed by the strong tidal currents. However, little mixing occurs with enclosed inlets and bays making them susceptible to bacterial and nutrient loading particularly when anthropogenic inputs are a factor. Westcott and Garrison bays are protected bays that are poorly flushed. In 2000, the DOE and the San Juan County Department of Health and Community Services conducted a water quality survey including a site located in Garrison Bay off the shore of the parade ground at English Camp. The site met Class AA standards for fecal coliform and pH, and Class A standards for temperature and dissolved oxygen (Wiseman, 2000).

By far, saltwater intrusion is the primary source of groundwater quality degradation in this region, and high chloride levels are used as an indicator. Recovery to a suitable water source is a slow process once sea water has contaminated an aquifer. Acting to prevent saltwater intrusion is of utmost concern for the park, particularly at American Camp, in order to maintain an adequate fresh water supply.

Little work has been conducted regarding surface water quality in the park. Salinity and conductivity were recorded during the 1998 wetland inventory, but no other water quality parameters were tested. Even though relatively few surface water sources occur in the park, up to date surface water quality data would be very useful information for determining resource management decisions.

Watersheds

English Camp is located in the approximate center of the 3,609 acre Westcott-Garrison Bay watershed (Larkin, 1999). A series of intermittent lakes, wetlands, and streams drain into Garrison Bay while two significant creeks and one small drainage flow into Westcott Bay. This watershed was ranked third in the San Juan County Watershed Ranking Report of 1988. It was given priority because the calm, protected waters of these bays exhibit unique intertidal and marine habitats. The moderate to low wave action has allowed for the formation of extensive mudflats. These conditions are required for the growth of large eelgrass beds, which are important habitat for forage fish. The bays are also very productive sites for shellfish, and they are the primary shellfish harvest location on the island. Additionally, they are popular locations for boaters, and overnight mooring occurs here often.

Land and water use can impact the quality of water in the watershed. Forested lands, which help reduce runoff, dominate the watershed with small agricultural plots scattered throughout. Primarily, these 10 to 20 acre farms raise livestock, and the animals have direct access to streams and adjacent riparian land. The average lot along the shoreline of Westcott Bay and the western edge of Garrison Bay is one-half to two acres in size, and the development potential has nearly been reached (Larkin, 1999). Several failing septic systems have been identified in the watershed, and a program has been established for their repair (Heater et al., 2000).

In 1997 and 1998, water quality testing of sites within the watershed indicate that runoff events are the likely cause of bacterial pollution entering creeks and the bays (Heater et al., 2000).

Areas with little vegetative diversity, primarily occurring on agricultural lands, as well as the upper reaches of the watershed have a high potential for erosion and runoff. However, wetlands occur throughout the watershed where the soil is inadequately drained, and they help mitigate the effects of runoff by collecting and filtering water.

The land and water resources protected at English Camp are important for the quality of water and habitat found in this watershed. Wetlands and saltwater marshes are preserved, and development will not occur along the shoreline. However, the heavy boating associated with the bays is, in part, related to park usage. Another form of protection within the capabilities of the NHP is to provide information regarding the value of the bays and water quality in the watershed.

A watershed has not been defined at American Camp. However, water tends to flow radially from higher elevations toward the coastline. This premise can be applied to the slopes of Mt. Finlayson. Problems associated with runoff are not as great at American Camp for two main reasons. The slopes of Mt. Finlayson are not as steep as Young Hill, and the geology and soils occurring along the southern portion of the island allow for greater water infiltration. However, runoff is escalated due to the presence of invasive species. (Refer to “Invasive Species” section.)

VEGETATION

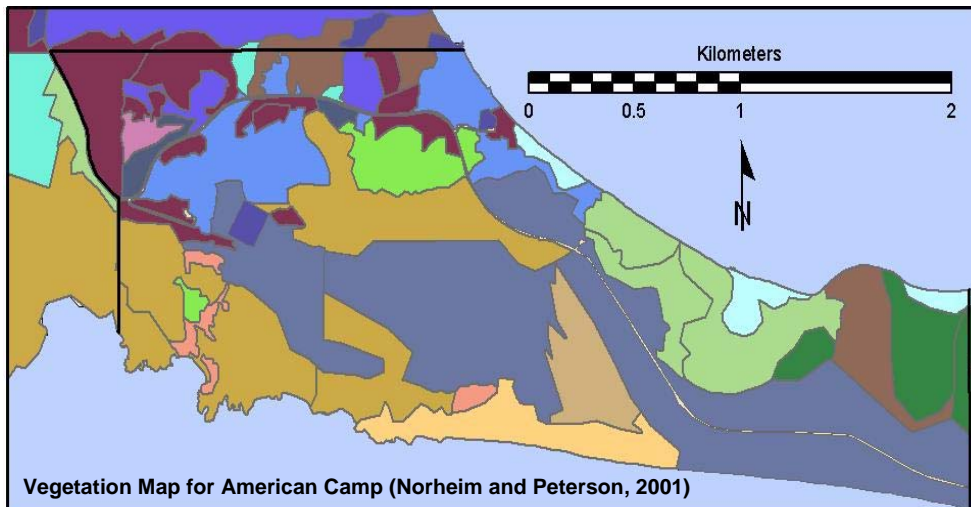
During the summers of 2000, 2001, 2002, and 2004, a plant inventory was conducted at the park. Prior to the study, the park had a record of 163 documented plant species. Results of the inventory have built this record to an estimated 371 species. Out of this total, approximately 120 species are not native.

Land Cover

Prairie is the predominant cover at American Camp spanning nearly half of the unit’s acreage from the bluffs along the southern boundary to the south facing slopes of Mt. Finlayson. Non-native species have infested the prairie, but patches of native grasses and wildflowers still exist. Red fescue (*Festuca rubra ssp*), Roemer’s fescue (*Festuca idahoensis var. roemerii*), many-flowered wood-rush (*luzula multiflora*), great camas (*Camassia leichtlinii*), field chickweed (*Cerastium arvense*), and western buttercup (*Ranunculus occidentalis*) are some of the dominant species (Lambert, 2003). Non-native grasses and invasive species, including Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and Himalayan blackberry (*Rubus discolor*) are abundant in these areas. These species tend to form monocultures, thus, decreasing the biodiversity of the prairie.

On the northern slopes of Mt. Finlayson, the dominant species are Douglas fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) with western red cedar (*Thuja plicata*), grand fir (*Abies grandis*), and lodge pole pine (*Pinus contorta*) interspersed. The understory includes evergreen salal (*Gaultheria shallon*) and western sword fern (*Polystichum munitum*).

South-facing slopes are drier, thus, forest species composition is different. Douglas-fir is still dominant, but the shrubby understory is much thinner. Other trees associated with this forest type include big leaf maple (*Acer macrophyllum*), pacific madrone (*Arbutus menziesii*), and pacific yew (*Taxus brevifolia*).

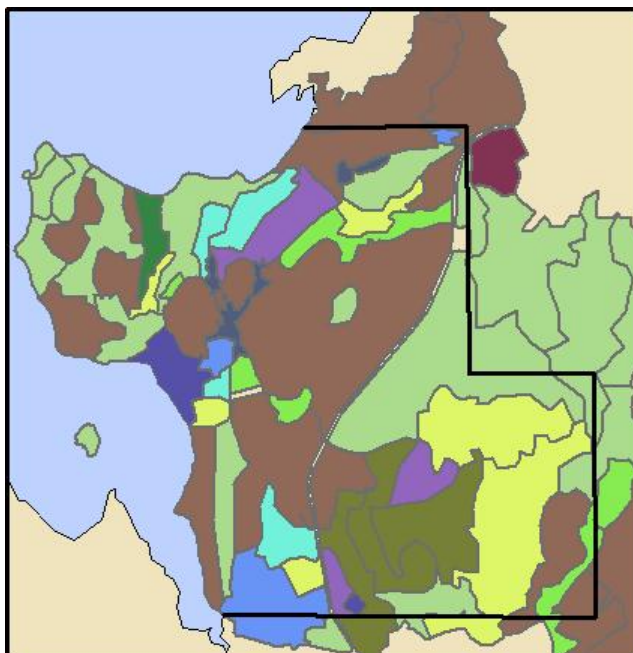


Young, dense Douglas fir stands have become established on the abandoned agricultural fields north of the redoubt and south of the Visitor Center along the western boundary. Overlapping tree crowns and dense,

impenetrable thickets are signs of a weak forest ecosystem. The trees are susceptible to wind throw, insect infestations, fire, and disease.

English Camp is dominated by mature Douglas fir (*Pseudotsuga menziesii*) mixed with grand fir (*Abies granis*), big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), pacific madrone (*Arbutus menziesii*), and a few western red cedars (*Thuja plicata*) and pacific yews (*Taxus brevifolia*). Immature cedars and other

shade tolerant species form a dense understory in some areas while in other areas there is almost no understory. Much of the cover in the southwest region



Vegetation Map for English Camp (Norheim and Peterson, 2001)

of English Camp is dense, impenetrable Douglas fir with a closed canopy. The trees age from 20 to 40 years and they are prone to windthrow due to the height of the trees, the shallowness of the rooting zone, and the wet, poorly drained soil (Rolph and Agee, 1993).

Vegetation Map Key

Dominant Community	
	Red alder-cottonwood/salmonberry
	Douglas-fir-grand fir-western hemlock/sword fern
	Douglas-fir-grand fir-western hemlock/salal-ocean spray
	Douglas-fir-Pacific madrone/ocean spray-snowberry
	Douglas-fir-lodgepole pine/ocean spray-snowberry
	Red alder-Douglas-fir/snowberry
	Douglas-fir-bigleaf maple/grass
	Douglas-fir-garry oak-Pacific madrone/grass
	Douglas-fir/grass
	Xeric Grassland
	Xeric Grassland with Shrub Islands
	Sparsely vegetated sand flats
	Mesic Grassland
	Mesic Grassland w/ shrubs
	Mesic Grassland w/ tree regeneration
	Mesic Grassland w/ shrubs and tree regeneration
	Cold-deciduous shrubland
	Intertidal salt marsh
	Temperate grassland-planted/cultivated
	Sparsely vegetated sand dunes
	Park Boundary

A remnant stand of open Garry oak (*Quercus garryana*) woodlands that once stretched from Vancouver Island to southern Oregon dominates the south side of Young Hill. Encroaching shrubs and young Douglas fir trees have prompted the park to take actions to preserve the open oak woodland. These actions are discussed next under the “Vegetation Restoration Projects” section. The Hoffmeister Orchard is also located on Young Hill. Approximately twenty fruit trees of about five different species date to 19th century varieties. One of the pear varieties is likely the oldest in the National Park System. This site is also facing shrubbery encroachment problems, and a management plan is being developed.

WILDLIFE

San Juan Island’s land and water ecosystems are varied and unique with the ability to sustain a range of wildlife including large, marine mammals, terrestrial mammals, bats, insects, reptiles, amphibians, and hundreds of bird, fish, and marine invertebrate species. There are no large predators on the island. Bear, wolves, and elk inhabited the island prior to Euro-American settlement. These populations were quickly over-hunted and extirpated as the Euro-American population increased.

Mammals

In the spring and summer, it is common to see resident orcas whales (*Orcinus orca*), minke whales (*Balaenoptera acuturostrata*), and Dall’s porpoises (*Phocoenoides dalli*) off the shore of South Beach. They congregate off the western and southern shores to feed on salmon migrating to fresh water streams for spawning (Washington Department of Fish and Wildlife, 1999). Approximately 79 whales comprise the three southern resident orca pods. This number has dropped from 99 whales in 1995 (Orca Conservancy, 2002). However, the National Marine Fisheries Service has decided to not list the whales as threatened or endangered because they declared the pods “not a significant population” relative to the world population of orca whales (Orca Network, 2002). Many organizations are petitioning the decision and urging for state protection.

Eighteen native and five non-native terrestrial mammals live, breed, or migrate throughout the park. The most common seen species include the Columbia black-tailed deer (*Odocoileus hemionus ssp. Columbianus*), the European rabbit (*Oryctolagus cuniculus*), and the red fox (*Vulpes vulpes*). The latter two species are non-native, and the rabbits have negatively impacted the prairie ecosystem associated with American Camp.

Seven bat species are known to frequent the park. These include:

1. Silver-haired bat (*Lasionycteris noctivagans*) – Migratory
2. Big brown bat (*Eptesicus fuscus*) – on WA State Priority-Habitats and Species List – Resident
3. Yuma myotis bat (*Myotis yumamensis*) – Federal Species of Concern – Resident
4. California myotis bat (*Myotis californicus*)
5. Little brown myotis bat (*Myotis lucifugus*)
6. Long-legged myotis bat (*Myotis volans*) – Federal Species of Concern
7. Western small-footed myotis bat (*Myotis ciliolabrum*) – Federal Species of Concern

Birds

Approximately 160 species of birds are recorded on the park's species list. While several are assumed to be found in the NHP, the presence of 93 species has been confirmed. These include a variety of songbirds, shorebirds, seabirds, and waterfowl. Some only breed in the park, others are seasonal residents, and several reside in the park year round. In addition, the San Juan Islands are located along the Pacific Flyway migration route, and the park provides a critical resting stop for several species. Birds of prey that occur in the park include red-tailed hawks (*Buteo jamaicensis*), osprey (*Pandion haliaetus*), and bald eagles (*Haliaeetus leucocephalus*).

Reptiles and Amphibians

Two amphibian and one reptile species have been documented, and an additional four species of each are presumed to be found in the park. The Pacific chorus frog (*Pseudacris regilla*), the red-legged frog (*Rana Aurora*), and the northwestern garter snake (*Thamnophis ordinoides*) were observed during an amphibian study conducted in 2002.

Invertebrates

There are over one million known insect species. Because park funding is limited, a comprehensive insect inventory has not been conducted at the park. However, a butterfly inventory was conducted in 2003. Twenty-five butterfly and four moth species have been documented.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Of the listed species provided in the April 8, 2004 species list from the U.S. Fish and Wildlife Service, no federally listed endangered species are associated with the park. There are two threatened species known to occur in the park, and one candidate species.

Bald eagles are known to occur within San Juan Island NHP and are commonly observed in the park. An estimated 40 to 50 breeding pairs of bald eagles reside in the San Juan islands year-round. This is the largest population in the lower 48 contiguous states. Several nests are located in the park, and the eagles utilize the terrestrial and marine habitat for hunting and rearing their young.

Bull trout (*Salvelinus confluentus*) and foraging marbled murrelets (*Brachyramphus mamoratus*), also federally threatened, occur in marine waters adjacent to the park (U.S. Fish and Wildlife Service, 2003). A two-year survey for marbled murrelets, conducted in accordance with the Pacific Seabird Group Inland Survey protocol, was completed in 2002. During this survey, one detection of a murrelet occurred which was determined to be from a bird on the water. No other murrelets were detected. No nest sites have found within the park, though four stands of suitable habitat (between 2.3 and 19 acres in size) exist within SAJH. These stands are considered marginal habitat because the moss is not prevalent, and where it does exist, it is not thick. In addition, these habitat patches are quite small and fragmented.

The large island marble butterfly (*Euchloe ausonides insulanus*), a rare species thought to be extinct, was recently found on the island. The island marble butterfly is not yet listed on the endangered species list. In December 2002, several conservation groups filed a petition with the

U.S. Fish and Wildlife Service to protect the island marble butterfly under the Endangered Species Act (ESA). Protection under ESA requires a recovery plan to be developed for the species, and federal agencies must act to save endangered species by protecting “critical habitat.” (Center for Biological Diversity, 2003).

Along with the island marble butterfly, the Puget Sound/Strait of Georgia Coho salmon are currently candidate species for federal listing. Eighteen state species of concern occur in the park or in adjacent marine waters, and fourteen candidates, including the Southern Resident orca whales, are being reviewed for state protection in 2003.

No federally threatened or endangered plant species occur in the park. However, golden paintbrush (*Catilleja levisecta*), a federally threatened and state endangered species, occurs in areas adjacent to the park. The park contains habitat suitable for this plant.

Invasive Species

Invasive species are plant and animal species whose introduction into a non-native habitat may lead to economic and/or environmental harm or harm to human health (National Invasive Species Council, 1999). Because invasive species, generally, are not native to the area in which they are invading, they often have few predators or diseases to control their proliferation. Native populations are negatively impacted by invasive species through a variety of means including predation, competition, introduction of deadly pathogens or parasites, reduction of genetic diversity, and disruption of available nutrients (Ecological Society of America, 2003). Invasive species can also impact the entire ecosystem by altering habitat, species composition, hydrology, and the timing and severity of disturbances (such as fires, floods, and disease).

According to Executive Order 13112 signed in 1999, the NPS is responsible for managing invasive species populations. Invasive species management practices include preventing the introduction of such species, detecting and controlling invasive populations, restoring native species and habitat conditions, promoting public education and awareness about the effects of invasive species, and to conduct research and develop technologies to reduce introduction and distribution (National Invasive Species Council, 1999).

Plants

According to state and county Noxious Weed lists, seven Class B species and six Class C species occur in the park (Washington State and San Juan County Noxious Weed Control Boards, 2003). Additionally, the San Juan County Noxious Weed List names five non-listed species that are particularly invasive in the county. All five occur in the park. At present, thirteen exotic and invasive plant species are managed and monitored. Only seven of these plants are listed as noxious weeds. Both park units have infestations of invasive species. However, the distribution and effects are much greater at American Camp.

To date, only manual methods have been utilized to manage these plants, however, other options are being explored. Manual removal methods can be successful for many species especially when the population is small and contained in one location. It appears that scotch broom (*Cytisus scoparius*) has been eradicated from the park, while tansy ragwort (*Senecio jacobaea*), and small patches of herb Robert (*Geranium robertianum*) and spotted knapweed (*Centaurea maculosa*)

have been reduced in size. Removal efforts will need to continue to effectively reduce these populations. Other species are prolific and continue to spread, making management difficult. The species causing the most concern include Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and Himalayan blackberries (*Rubus discolor*). In some locations, dense monocultures are forming as they out compete all other vegetation.

Animals

The European rabbit (*Oryctolagus cuniculus*) was introduced onto the island in the late 1800s. By the late 1920s and early 1930s, the population was abundant. Because the rabbits favor open habitat over forest, the main rabbit population on the island occurs in the open grasslands at American Camp (Stevens, 1975). The population crashed in the early 1980s, and researchers postulate that a failure in reproduction and/or survival of offspring was the cause of the decline (Taber, 1982). Over the past twenty years, the population has regained momentum. The current population is estimated around 2,500 rabbits and trending upward.

European rabbits are invasive species that compound the problem with invasive plants in the grasslands at American Camp. In fact, the habits of the European rabbit favor the distribution of invasive plant species. Within its home range, a rabbit will eat almost any available vegetation (Stevens, 1975). This has likely impacted the natural succession of forest invasion on the grasslands because small trees are regularly grazed. In addition, over-grazing may result in exposed soil, a likely place for the establishment of invasive plants. As rabbits colonize an area, they create shelter by digging warrens, which are “complex underground burrow systems” (Stevens, 1975). Several large, well-developed warrens exist at American Camp. The digging and excessive use churns and compacts the soil. This impacts the soil-water relationship as infiltration is reduced and runoff is increased with soil compaction. It also disrupts the texture of the surface soil by bringing subsurface soil and gravel to the surface (Biggam, 2003). Again, the exposed soil allows for the spread of invasive plants. Thistles and blackberry patches provide rabbits with protection from predators, and rabbits eat thistles near the end of summer when the grasses are dry. Together, these invasive plant and animal species maintain a mutually beneficial relationship that is negatively impacting the prairie ecosystem at American Camp.

Another invasive species that is of potential concern to the park is the European green crab (*Carcinus maenas*). From 2000 to 2002, park staff monitored the intertidal zone of Griffin Bay and Garrison Bay with no detections of this species. However, green crabs are present in Willapa Bay and Grays Harbor on the coast of Washington and on Vancouver Island, British Columbia (WDFW, 2000). A native of Europe, the green crab likely arrived in ship ballast or in seaweed used as packing material for bait. This species is an aggressive predator that feeds on a variety of organisms including bivalve mollusks, polychaetes, and small crustaceans (WDFW, 2000). It disrupts and negatively impacts the ecosystem by outcompeting the Dungeness crab (*Cancer magister*) and other native crab species and by heavily feeding on clams and oysters. Additionally, it is a host to a parasitic worm that may impact the health of local shore birds.

HABITAT

Wetland Habitat

Twenty-six wetland sites are scattered throughout the American Camp unit. Common emergent vegetation includes Hooker's willow (*Salix hookeriana*), pacific crabapple (*Malus fusca*), nootka rose (*Rosa nutkana*), salmonberry (*Rubus spectabilis*), and a variety of sedges and rushes. There are several small seeps and springs located along the southern boundary where river otter (*Lutra canadensis*) tracks and/or scat was observed (Holmes, 1998). Red-tailed hawk (*Buteo jamaicensis*) and bald eagle (*Haliaeetus leucocephalus*) nests were noted at other sites with larger trees.

Important feeding and nesting grounds are located around the three temperate marine lagoons on Griffin Bay. These lagoons are sites where fresh and salt water mix. The salinity in the lagoons is often lower than that in the bay. Vegetation associated with the lagoons and surrounding salt marshes include sharpfruited peppergrass (*Lepidium oxycarpum*), Nuttall's quillwort (*Isoetes nuttallii*), and erect pygmy-weed (*Crassula connata*), which are listed by the state as sensitive species (WNHP, 2003). Other unique plants include saltgrass (*Distichlis spicata*) and pickleweed (*Salicornia virginica*). The ecology of these wetlands is linked to the eelgrass and microorganism communities in the bay, which are fundamental to the marine food web (Heater et al., 2000). Specialized algae, bacteria, snails, and anemones are just a few of the organisms contributing to this ecology (Kozloff, 1993).

At English Camp, nine wetland sites have been identified and recorded, and the primary emergent vegetation is red alder (*Alnus rubra*). These sites provide significant feeding, resting, and breeding grounds for a variety of resident and migratory birds including the black brant (*Branta nigricans*), great blue heron (*Ardea herodias*), and osprey (*Pandion haliaetus*) (Larkin, 1998). The red-legged frog (*Rana aurora*) and the pacific treefrog (*Hyla regilla*) have been observed at a significantly wet site in the northern portion of the unit (Holmes, 1998). Marshes and tidal mudflats occurring along the shore are important to the ecology of the bays.

Terrestrial Habitat

The upland habitat in the park can be categorized into four habitat types: dry forests, wet forests, open Garry oak woodlands, and grasslands. Physical conditions including temperature, precipitation, sun exposure, wind, and soil type are factors that determine the type of vegetation growing at a particular location. Because the island is in the rain shadow of the Olympic Mountains, the drier moderate climate allows for dry habitats that are not common in the Puget Sound Lowland region.

At American Camp, grasslands are the predominant habitat. This site receives little rainfall, and it is directly exposed to wind and sun leaving this area very dry. Because non-native and invasive species are rampant in the prairie, the habitat value is compromised. Other non-native animal species inhabiting the prairie include the red fox (*Vulpes vulpes*) and feral cats. Northwestern garter snakes (*Thamnophis ordinoides*) and Townsend's vole (*Microtus townsendii*) occupy these grasslands, and a variety of birds utilize this area for foraging.

The transitional open Garry oak woodland at English Camp is also considered a dry site. The soil is thin and has low moisture holding capacity. However, slightly more moisture is required to sustain a Garry oak woodland than a prairie. Garry oak woodlands are comprised of trees including Garry oaks (*Quercus garryana*), Pacific madrones (*Arbutus menziesii*), and Rocky Mountain juniper (*Juniperus scopulorum*) scattered throughout a prairie landscape with a variety of wildflowers present in the open understory. These woodlands are often in the transition zone between open prairie and coniferous forest landscapes, and they are susceptible to invasion by Douglas fir. Historically, fire has played a role in maintaining these open stands by burning young Douglas fir and thick shrubbery. Garry oak woodlands are known for their biological diversity and are host to butterfly and insect species, amphibians, reptiles, and a wide variety of birds. Because they have significantly declined in extent, Garry oak woodlands (larger than one acre) are considered state priority habitats.

Wet and dry coniferous forests occur in both park units. Dry coniferous forests are more common to the island due to its geographical location. These forests are dominated by Douglas fir (*Pseudotsuga menziesii*) with a sparse understory of shrubs. They tend to occur on southerly slopes, including Mt. Finlayson, where exposure to sun and wind occurs. Wet coniferous forests are also dominated by Douglas fir (*Pseudotsuga menziesii*) with a mix of western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*). Thickets of salal (*Gaultheria shallon*) and sword fern (*Polystichum munitum*) are common to the understory, and mosses and lichens cover trees, rocks, and soil. These closed canopy forests are common to northern slopes, including Mt. Young and Mt. Finlayson, where the environment is cool and moist. The habitat value of both forest types is substantial.

NATURAL QUIET AND NIGHT SKY

The NPS mission emphasizes the preservation and restoration of park natural resources, including natural sounds, referred to as soundscape. Due to the park's rural nature and island setting, the natural ambient sound is generally quiet at the NHP. Heard from many of the trails, natural quiet sounds include bird calls, wildlife rustling in the underbrush, and the movement of wind in the trees and grasses. Louder natural sounds such as the crashing of waves are associated with the bluffs and beaches. The natural quiet preserved at the park appeals to many visitors, and it contributes to the purpose of their visit. Air traffic is the number one source of sound pollution in the park. Other noises include vehicles, boating activities in Garrison Bay, and routine ground maintenance.

Dark night skies are also considered an intrinsic natural resource protected by management policies in the NPS. Due to the absence of artificial light, portions of the park are good places to view the night sky. Park programs highlight interpretation and education of the values derived from a dark night sky. Although park hours include day use only, one annual program invites visitors to walk to the Redoubt from the American Camp visitor center at night to view the dark sky after a talk introducing the fundamentals of astronomy. However, night light pollution from Victoria, British Columbia, is considerable and increasing. This pollution impairs views in the western quadrant of the sky.

INTERPRETATION

Interpretation and resource education is an important component at San Juan Island NHP. The cultural and natural resources are integral to the program. During fire management activities, fire specialists are available and utilized to assist with public education.

VISITOR USE

VISITOR USE PATTERNS

The NPS Cooperative Park Studies Unit in Moscow, Idaho conducted a Visitor Services Project at San Juan Island NHP in 1994. This is the standard NPS method for obtaining information about park visitors and visitation patterns. It took place during the period August 10-16, 1994. Of 518 questionnaires distributed, 406 were returned.

Results showed that visitors were often in family groups with the most common visitor ages between 36 to 50 years old and 15 years or younger. Most were first-time visitors to the park. Common activities for visitors were sightseeing, walking/hiking on trails, taking photographs and viewing wildlife. The most visited sites in the park were the historical camp at English Camp, the American Camp visitor center, the historical camp at American Camp, and the Redoubt/earthen fort.

According to statistics reported by the park to Washington DC, visitation has been generally trending upward. The most reliable traffic counter is at English Camp, where counts have increased 69% over the past ten years.

Table 13 English Camp Visitation

Year	Total Visitation	English Camp
1993	228,817	73,966
1994	200,258	76,133
1995	205,003	84,235
1996	225,957	80,766
1997	225,629	80,438
1998	250,285	105,094
1999	270,671	125,480
2000	267,718	121,969
2001	301,066	132,526
2002	255,212	125,015

June, July, and August are the months of highest visitation at the park (about 40,000 per month). There is substantial visitation in the shoulder seasons as well (March through May, and September through October). During the slower winter months of November through February, the park typically receives about one-quarter the monthly visitation of summer.

The San Juan County Public Works Department did a traffic estimate on Cattle Point and American Camp roads in 2000. Their sampling estimated that approximately 253,000 cars travel

the road on an annual basis. About 100,000 of those cars go solely to park locations and 153,000 travel as far as the Cape San Juan residential area. These counts suggest that the park may be somewhat underestimating visits to American Camp.

SOCIOECONOMIC FACTORS , ZONING, AND ADJACENT LAND USE

Though somewhat remote and difficult to reach, San Juan County is one of the fastest growing counties in the Washington State. Natural beauty, solitude, and pleasant weather have attracted many to move to the island for recreation or retirement. This interest has prompted an active real estate market promoting purchases of waterfront and view property. The result has been increased subdivision of farms. Conversion to non-rural use is one of the greatest impacts to the open space resources of the county.

PARK MANAGEMENT ZONING

All lands within the boundary of San Juan Island NHP were park-zoned by the NPS for management purposes in the 1979 *San Juan Island National Historic Park General Management Plan*. Both English and American camps are zoned Historic, thus protecting the historical integrity of these sites. Peripheral areas of the park units are zoned Park Development for administrative and secondary recreational uses. To maintain the sanctuary qualities of the area for eagles, deer, and marine life, an area in the northeast portion of American Camp is zoned Natural, Environmental Protection Subzone.

ADJACENT LOCAL GOVERNMENT ZONING

Park Headquarters

Since February 1984, the headquarters for the park have been located in a building (leased space) within the town limits of Friday Harbor, the main commercial center for the islands. The park's administrative function is located here in proximity to other government agencies and organizations. Land use is governed by the town's zoning code and includes primarily retail shops, accommodations, and businesses catering to tourists and the local community.

English Camp

English Camp, encompassing 529 acres, is situated on Garrison Bay in the northwest section of the island. Lands adjacent to the boundary of English Camp are used for ranching, shellfish farming, timber production, recreation, and retirement homes. The park is located in the center of the Westcott-Garrison Bay watershed.

According to the Westcott-Garrison Bay Watershed Assessment Report, San Juan Island NHP is recognized by San Juan County under a land use classification entitled Special Districts under the Conservancy designation. This class of lands was developed to "protect, conserve, and manage existing natural conditions, resource, and valuable historic, scenic, education, or scientific research areas for the benefit of existing and future generations without precluding compatible human uses" (San Juan County, *Westcott-Garrison Bay Watershed Assessment Report*, 1999: p.20).

The majority of the watershed is classified as Rural Land under two land use designations: Rural Farm Forest and Rural Residential. The Rural Farm Forest Land designation is designed to provide landowners with the opportunity for small-scale farming and forestry practices while maintaining the rural character of the land. The Rural Residential designation allows for varying densities of residential development. The 200-foot shoreline areas both north and east of the park allow for one residential unit every one-half acre. To the north of the park, the non-shore adjacent land is zoned one residential unit for five acres; to the east and south, one unit for ten acres.

Other surrounding county land use categories within the watershed include a Master Planned Resort classification for Roche Harbor Resort, a 2200-acre resort to the north of the park. The resort is a mixed-use development incorporating commercial (a marina), light industrial, resort accommodations, and residential uses. The allowable densities are one unit per 1.0 and 0.65 acres. Outlying contiguous resort properties are zoned as Rural Residential and Rural Farm with density levels of either one unit per five acres or one unit per ten acres.

Mitchell Hill Trust Land

The drainage basin also includes designated Resource Lands. One of these tracts, a 320-acre property on Mitchell Hill contiguous to the southern boundary of English Camp, is managed by the Washington State Department of Natural Resources (DNR) and is designated as Forest Resource Land. These lands are designated to “protect and conserve forest lands of long-term commercial significance for sustainable forest productivity and provide for uses which are compatible with forestry activities while maintaining water quality, and fish and wildlife habitat” (San Juan County, *Westcott-Garrison Bay Watershed Assessment Report*, 1999: p.24).

Washington State Department of Natural Resources manages the site as one of the “Common School Trust Lands” for the benefit of public schools. Much of this site is forested with trees ranging from seedlings to 120 years old. Grazing occurred in the past and timber was harvested in the 1940s and 1990s. A portion of the historic Old Military Road from English Camp bisects the northern edge of property (San Juan Islands Trust Land Advisory Committee, 1985).

In 1983 the San Juan Islands Trust Land Advisory Committee, established by the Commissioner of Public Lands, considered alternatives for this site. One alternative recommended adding it to San Juan Island National Historic Park. This option, however, was rejected at the time due to a lack of explicit benefits to the park, and a lack of Congressional authority to expand the park. The recommended alternative suggested multiple-use forest management, including rehabilitation and reclamation. Other compatible activities mentioned that could occur would be passive recreation, establishment of wilderness cabin sites, and a walk-in or bicycle campground. There was interest expressed from the county and local residents to convert the Old Military Road to a general hiking trail connecting to other off-site trails.

American Camp

American Camp totals 1,223 acres and is located on the southeastern tip of the island. Adjacent lands are used for watershed and natural resource protection, recreation, residential, and retirement housing.

On the eastern boundary of the park unit are four publicly owned parcels, described in more detail in the next section. One is jointly owned by the San Juan County Land Bank and the Washington Department of Natural Resources. Two others are owned by the DNR. The fourth parcel is owned by the Bureau of Land Management (BLM).

To the east and north of the DNR properties are the Cattle Point Estates and Cape San Juan subdivisions. There are approximately 150 potential lots with about half developed. Lot sizes vary from half an acre to nearly six acres, the larger lots being located in Cattle Point Estates. The subdivisions are served by several community wells and a desalinization plant. Each home has an individual septic system. Past water availability problems and saltwater intrusion issues have caused development to be limited to five units per phase in order to monitor the effect of water use on already developed adjacent properties. The current county zoning in Cattle Point Estates is R-3, Rural Residential, which allows an average density of one unit per three acres. Cape San Juan is zoned at one unit per half acre.

On the western boundary of the park are the Eagle Cove and Eagle Cove Estates subdivisions. Both subdivisions total 43 single-family lots, averaging approximately one acre in size. Over one-half of the lots have been developed. County zoning is Rural Residential, which allows an average density of one unit per five acres. Both were platted before enactment of the county zoning ordinance.

Under the current zoning ordinance, which is based on performance standards, industrial and commercial uses are permitted only as a conditional use subject to approval by the San Juan County Commissioners. County adherence to recent Growth Management legislation is expected to retain a rural status for lands surrounding both English and American camps.

Effects on San Juan Island NHP include the increasing visual impact of homes along the western boundary of American Camp, particularly viewed from the redoubt, portions of the trail system and from Bellevue Farm. Visual impacts of housing are also increasing on the east side of American Camp, although the view lines are more limited. Increased residential development in the area has also resulted in increased vehicular traffic along Cattle Point Road.

Cattle Point Public Lands

The DNR manages three parcels at Cattle Point. One is a ten-acre site (the Cattle Point Interpretive Area) with 1,265 feet of waterfront, located on the eastern edge of the Cape of San Juan. It consists of a former Marconi Station now converted to a picnic shelter with trails leading to the beach. The second parcel is 85 acres and is contiguous to American Camp. The parcel has 1,430 feet of beach on the Strait of San de Fuca on its southern boundary. It was originally school trust land, but was transferred (or more accurately, purchased and divested) out of that program and is now managed as a DNR Natural Resource Conservation Area (NRCA). The third, 79 acre parcel (Third Lagoon Preserve) is jointly owned and managed by DNR and the San Juan County Land Bank. It was acquired in 2000 using county and Interagency Committee (IAC) funds. It includes upland forest and 1,100 feet of shoreline.

A fourth parcel at Cattle Point is owned by the BLM. The DNR has a non-monetary Recreation and Public Purpose lease on the property and manages it similarly to its neighboring parcels.

This 27-acre property has about 1,500 feet of shoreline and a Coast Guard navigation aide station (not technically a lighthouse, though it is often called that).

The forested NPS and DNR lands on Mt. Finlayson represent, in the words of the San Juan Island Trust Advisory Committee, the “largest expanse of natural forest land on the southern part of San Juan Island.” The stabilized sand dunes on the southern portion of the site are part of a fragile ecosystem and “should be considered as a possible Natural Area Preserve.” The committee stated that there is a strong ecological and spatial relationship of this ecosystem with adjacent NPS lands. Certain DNR parcels were identified as having “special biological values or natural undisturbed features that represent San Juan County before human disturbance,” and should be preserved. Cattle Point, due to its grasslands and shoreline, was identified as having “Preserve potential” (San Juan Islands Advisory Committee, 1983: p.xv). Those recommendations led to the transfer of the school trust parcel into the NRCA program and eventually to acquisition of the Third Lagoon parcel, whose land was cited as an “outstanding example of a freshwater marsh with a high priority for acquisition” in The Nature Conservancy’s 1977 inventory (San Juan Islands Advisory Committee, 1983: p.113). Because of legal obstacles, The Nature Conservancy opted not to purchase the property, which was later bought by the Land Bank and DNR.

An easement exists with Cape San Juan Associates (the community to the east of the DNR parcel) for a water pipeline right-of-way from DNR to the San Juan community. The right-of-way includes the pipeline route, well, and storage tank. The well has been the only water source for part of the community and is located in an aquifer recharged by rainwater. Maintaining the quantity and quality of the water supply was stated as a concern of the community. The Cattle Point Water District owns a 2.36-acre parcel sandwiched between the Third Lagoon property and the 79-acre DNR holding. The water district maintains a desalinization plant there, along with a pipeline to salt water and an easement across the Third Lagoon property for that pipeline.

One alternative recommended by the San Juan Islands Trust Land Advisory Committee in 1983 was for DNR to donate its land to the NPS. This alternative acknowledged that a trade would have to be initiated by DNR and that the NPS may not want to acquire land with an encumbrance such as the Cape San Juan well. When Third Lagoon was acquired in 2000, the county’s stated intent was to transfer it in time to the NPS.

CONTEMPORARY TRIBAL COMMUNITIES

Contemporary tribal communities descendent from indigenous populations of San Juan Island include residents of American Indian reservations; a federally recognized tribe without a reservation; First Nation reserves in Canada; and a small number of families still living in the San Juan Islands who are not federally recognized as tribes. In the United States, the Lummi and Swinomish Nations have reservations that are closest to San Juan Island. The Lummi reservation is 35 miles northeast on the mainland, north of Bellingham. The Swinomish reservation is about 25 miles east on Fidalgo Island, south of Anacortes and west of La Conner.

The Samish Nation is affiliated with the San Juan Islands. Tribal headquarters are in Anacortes, but the tribe does not have a reservation. There are three separate Klallam (also known as

Clallam and S'Klallam) reservations in their primary historic homeland in the United States on the south side of the Strait of Juan de Fuca. There are several First Nation reserves north of San Juan Island where descendents of Songhees and Saanich tribes live. In British Columbia, Canada, west of Victoria, the Songhees reside on two reserves at Esquimalt. North of Victoria, there are Saanich living on four reserves on the Sannich Peninsula. Their ancestors are among those individuals in two federally non-recognized tribes that still reside on San Juan Island, the Mitchell Bay Band and the San Juan Tribe of Indians.

LEGAL AGREEMENTS

The following are legal agreements between the park and others to help with the management of fire:

- 1994 Memorandum of Understanding between the San Juan County Fire District #3 and the San Juan NHP for fire management.
- Memorandum of Understanding (MOU) between NPS and San Juan County regarding American Camp road vacation.
- 2002 General Agreement between the San Juan County Sheriff's Office and San Juan NHP for law enforcement and mutual aid.

RECREATIONAL RESOURCES

The San Juan Islands offer a wide variety of recreational activities. Water-based recreation includes whale watching excursions, sea kayaking, scuba diving, sailing and powerboating, freshwater and saltwater fishing, windsurfing and clamming.

At San Juan Island NHP, beachcombing, picnicking, bird watching, viewing and photographing wildlife, hiking, fitness and pet walking, general sightseeing and attending park interpretive programs are popular activities. A small number of residents engage in horseback riding at American Camp.

On Garrison Bay, public shellfishing is permitted on roughly 900 feet of shoreline within the park. A 94-foot dingy dock is available for access to the park from the water.

The park is a day-use only area. Campgrounds are not available at either American or English camps. Hunting is not allowed in the park though it is permitted on private lands by written permission of the landowner. Off-road travel by car, truck, motorcycle, or bicycle, is not allowed in the park. Pets are permitted when under physical control.

SCENIC RESOURCES

The San Juan Islands are the tops of a submerged mountain range. As such, there are varying elevations of topography ranging from sea level plains to gently rolling hilltops. The combination of water, rocky outcrops, forested hills and plains create stunning scenery. The islands are well known for their beauty, rural landscape character, and, since harder to reach, slower pace of life than the mainland.

Friday Harbor is a small town located above a sheltered harbor. The daily ferry traffic determines the amount of car and pedestrian activity. As the county's main transportation and commerce center, the majority of businesses, government offices, and organizations are located here. Visitors and residents mix together. Views are of early 20th century small town structures, ferry terminal, surrounding islands and residences, and water.

English Camp is located on the northern and wetter portion of the island. Here the trees grow taller and denser. Deciduous trees mix with evergreens. Once outside the forest, there are views of the parade ground, the historic buildings and reconstructed formal garden and out across the bay to Guss Island. Remains of sun-bleached clam shells, some ancient, lie scattered on the beach. Bird life is abundant and the occasional deer can be seen. The only reminders of modern life are the residences lining the bay and boats anchored in the water.

English Camp cemetery is reached by walking up the slope of Young Hill through the tree lined trail. Situated on a former clearing are the headstones of seven graves within a picket fence enclosure. It is quiet and contemplative with views out onto adjacent property. Further up, the trail ends on a rocky granite outcrop with views over Haro Strait, Vancouver Island, numerous islands, and adjacent forests and farmland. The peak of Young Hill is 650 feet in elevation.

EXISTING PARK DEVELOPMENT AND PROGRAMS

San Juan Island NHP is located on San Juan Island in Washington and totals 1,752 acres. It is comprised of three units: the park headquarters in the town of Friday Harbor on the east side of the island; English Camp totaling 529 acres on the northwest section of the island; and American Camp totaling 1,223 acres on the southern tip of the island.

ROADS AND PARKING

Paved Roads

San Juan NHP has approximately four and one-half miles of paved road surfaces inside the park boundary. At American Camp, the NPS maintains a nearly 1.7-mile stretch of road along Cattle Point Road from the park's entrance to the intersection at Picketts Lane. San Juan County maintains 1.5 miles of the Cattle Point Road from Picketts Lane to the eastern boundary. In addition, the county maintains the 0.5-mile Picketts Lane, extending from its intersection with Cattle Point Road to South Beach. The NPS maintains the 16,000 square foot parking area at South Beach. A 1,400 linear foot paved road leads from Cattle Point Road to the American Camp visitor center and ends in an 8,000 square foot parking lot.

At English Camp, the county maintains 1.5 miles of the West Valley Road, the main road connecting Roche Harbor with the west side of the island.

Gravel Roads

There are approximately 3 miles of gravel road surfaces in the park. At Cattle Point Road, a 600 linear foot road leads to the 4th of July Beach picnic area. This road splits off to the north as an 800 linear foot spur to a horse trailer parking area. The road beginning from the parking area at

South Beach paralleling the beach, known as Salmon Banks Road, is 1,520 feet long. It has two spurs, each 120 feet long, leading to beachside picnic areas. The Redoubt Road from Pickett Land to the redoubt is 4,100 feet long. The service road which runs through the woods on the north side of Mount Finlayson area is 1.5 miles long, but only foot traffic, park, and emergency vehicles are allowed on it.

The entrance to English Camp is a gravel road 1,790 linear feet with a 21,165 square foot parking area at the end. The service road from the maintenance facility to the north end of the parade ground is 2,670 feet long and serves the VIP trailer pads, the OMSI summer camp, the Crook House, the back side of the parade ground and the English Camp well house.

TRAILS

There are approximately nine miles of dirt and gravel trails in the park. At American Camp, five miles are available and mapped for general hiking. English Camp has four miles of trails.

BUILDINGS, FACILITIES, AND UTILITIES

HEADQUARTERS

The park's administrative office is located within the city limits of Friday Harbor, in a leased building space. Four permanent employees work in the administration office.

AMERICAN CAMP

Visitor Center

The park's primary and year-round visitor center is located at American Camp. The visitor center is 1400 square feet and consists of two modular units constructed in 1979. Three employees work in the offices year-round with as many as six employees in the summer. Separate sex restrooms are connected to the building by a deck and are 40 square feet each.

Fire Cache

The Fire cache was acquired with a 4.2-acre tract of land in 1968. It is a wood framed building with plywood siding and an asphalt shingle roof that is used for administrative equipment storage, natural resource supplies and tools, and fire fighting equipment. It is 550 square feet in size and is located off the American Camp entrance road.

Of the original 28 buildings constructed by the American military only two remain, the Officers Quarters and the Laundress Quarters:

Officers Quarters HS 11

The Officers Quarters was built around 1860. It is a one-story building with 1,221 square feet of living space and 540 square feet of covered porch. It is a wood framed building with horizontal lap wood siding and a cedar shake roof. It is not open to the public and is presently used for storage.

Laundress' Quarters HS 6

The Laundress' Quarters was built in 1860 and is 351 square feet. It is a one-story wood framed building with board and batten siding and cedar shake roof. It is not open to the public.

ENGLISH CAMP

Maintenance Facility

The maintenance facility was built in 1985 and contains a shop and office building 3800 square feet in size. Adjacent is a 290 square foot metal shed with a 300 gallon above ground storage tank for storing diesel and gasoline.

Of the original thirty primary buildings constructed by the Royal Marines only four remain. Another historic building, the Crook House, was built after the encampment period:

Blockhouse HS 1

The blockhouse is a two-story log structure measuring 250 square feet each level. It was built in 1860. The upper level is set diagonally across the lower room. The lower floor is open for viewing from May to September.

Barracks Building HS 2

The barracks is a one-story rectangular building. It consists of two rooms and is 1600 square feet. It was built in 1860. Open from May until September, it serves as the English Camp public contact station and is staffed by park volunteers.

The Commissary HS 3

The commissary building is a one-story, one room, gabled structure measuring 800 square feet built in 1860. It is not open to the public and is used for storage.

Hospital HS 18

The hospital is a one-story, rectangular building with a gable style roof measuring 480 square feet. Built in 1860, it has three rooms. It is not open to the public.

Crook House

The Crook House is situated on a slope above the military historic structures. It was built between 1900 and 1903. The two-story, wood frame structure has a second story covered porch on the west side. Though not from the period the park commemorates (1853 to 1871) it is of local historical significance as an example of an early San Juan Island farm house. It has been infested with a maternal colony of bats. No one is allowed inside the house due to possible histoplasmosis infection. It was determined eligible for the National Register of Historic Places in 1984.

Dingy Dock

The Dingy Dock, located on Garrison Bay, was donated by a Canadian organization in 1984. It was completed and dedicated in 1986 and is used by many boat people who use the bay for anchorage. The dock has 4 sections measuring 6 feet wide by 20 feet long and 2 sections measuring 8 feet side by 16 feet long for a total length of 112 feet. The park staff maintains it.

Formal Garden

The restored formal garden, a key visitor site and of historical significance, is approximately 3850 square feet in area, circular in design and sectioned by low box hedges in to 8 larger outer and 4 smaller inner flower beds. The water source is a hand dug well on the Young Hill trail.

English Camp Cemetery

The English Camp cemetery is located on the slope of Young Hill above English Camp is a small plot surrounded by a white picket fence. Head stones in fair condition mark seven graves. A Royal Canadian Navy marker designating the site was installed in 1964.

Vault Toilets

There are four vault toilet comfort stations located in the park. One is located at American Camp at South Beach and another at 4th of July picnic area. At English Camp, there is one at the visitor parking lot and another sited at the north end of the English Camp parade ground.

UTILITIES

Electricity and Telephone

Electricity to the park is supplied to the park units by Orcas Power and Light Cooperative. Century Tel provides telephone service.

Water

At American Camp, water is supplied by one well. There is also one well at English Camp. The system at American Camp consists of a drilled well, submersible pump, continuous chlorination and a contained air hydropneumatic tank. This system serves two Volunteer-in the-Park (VIP) trailer pads, restrooms at the visitor center, and a drinking fountain.

At English Camp, the system is served by a low-yield drilled well, hypochlorinator, a submersible pump that pumps chlorinated water to an above ground polyethylene chlorine contact tank. A high service pump takes the water from the contact tank to hydropneumatic storage for distribution. This system serves two VIP trailer pads, a summer youth camp and a drinking fountain.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

METHODOLOGY

The environmental consequences section analyzes both beneficial and adverse impacts that could result from the three alternatives. Impacts are evaluated based on context, duration, intensity, and whether they are direct, indirect, or cumulative impacts.

ASSUMPTIONS FOR IMPACT ANALYSIS

This section contains the environmental impacts, including direct and indirect effects and their significance to the alternatives. The analysis is based on the assumption that the mitigation identified in the *Mitigation and Monitoring* section of this EA would be implemented under any of the applicable alternatives, as identified in each mitigation criteria.

Impacts are evaluated based on the most current and comprehensive scientific and social data available. All the information was not generated at San Juan Island NHP and Olympic NP, but certain information from other areas can be used to determine potential impacts within the historical park. Considerable information was available on the effects of fire and fire suppression. Much of the information found was generated by either the San Juan Island NHP or Olympic NP biologists, resource management specialists, archaeologists, and prescribed fire specialists. Follow-up contacts with these specialists were made to assist with interpreting the information, and to provide additional information related to impacts from fire and suppression activities on natural resources and the visitor experience. In the absence of quantitative data, best professional judgment prevailed.

Certain impacts, such as long-term impacts to ecosystems from fire, are difficult to determine. Criteria have been developed through research and monitoring of prescribed fire effects on vegetative communities conducted over the last decade by numerous land management agencies.

There are several terms used within the environmental consequences section to assess the impacts of each alternative on each impact topic. Unless otherwise stated, the standard definitions for these terms are:

Negligible - the impact is at the lower level of detection; no measurable change would occur.

Minor - the impact is slight, but detectable; a small change would occur over the life of the plan.

Moderate - the impact is readily apparent; a measurable change would occur and could result in a small but permanent change.

Major - the impact is severe; a permanent measurable change of at least 15 percent over the life of the plan would occur.

Impairment - the impact would harm the entire integrity of the resource or value, whose conservation is key to the cultural or natural integrity of the historical park, or is a resource or value needed to fulfill a specific purpose identified in the park's enabling legislation.

Localized Impact - the impact occurs in a specific site or area, individual wildlife, or the wildlife group. When comparing changes to existing conditions, the impacts are only detectable in the localized area.

Short-term - the impact occurs only during or immediately after the actual management activity.

Long-term - the impact could occur for an extended period of time after the management activity has been completed. The impact could take several years or more and could be beneficial or adverse.

IMPAIRMENT ANALYSIS

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies* (2001) requires the analysis of potential effects to determine if actions would impair park resources. The fundamental purpose of the national park system, established by the *Organic Act* and reaffirmed by the *General Authorities Act*, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts on park and monument resources and values.

However, the laws do give NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS management discretion to allow certain impacts within parks, that discretion is limited by statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent that it affects a resource or value whose conservation is:

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

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. In this "Environmental Consequences" section, a determination on impairment is made in the conclusion statement of the appropriate impact topics for each alternative. The NPS does not

analyze recreational values/visitor experience (unless impacts are resource based), land use, or park operations for impairment.

CRITERIA AND THRESHOLDS FOR IMPACT ANALYSIS

IMPACT DEFINITIONS

This section provides a description of the related laws, regulations, and policies for each impact topic, and the methodology and thresholds used in the impact analysis. The same methodology and general criteria were used for each impact topic. Certain impacts, such as visitor experience, are difficult to determine, and criteria have been developed through the visitor use and carrying capacity surveys that have been conducted within the historical park.

SOILS AND VEGETATION

Related Laws, Regulations, and Policies

The NPS *Organic Act* directs the park to conserve the scenery and the natural objects unimpaired for future generations. Soil resources will be protected by preventing or minimizing adverse potentially irreversible impacts on soils, in accordance with NPS *Management Policies*.

NPS-77 specified objectives for each management zone for soil resources management. These management objectives are defined as: (1) natural zone - preserve natural soils and the processes of soil genesis in a condition undisturbed by humans; (2) cultural zone - conserve soil resources to the extent possible consistent with maintenance of the historic and cultural scene and prevent soil erosion wherever possible; (3) park development zone - ensure that developments and their management are consistent with soil limitations and soil conservation practices; and, (4) special use zone - minimize soil loss and disturbance caused by special use activities, and ensure that soils retain their productivity and potential for reclamation.

NPS *Management Policies* defines the general principles for managing biological resources as maintaining all native plants and animals as part of the natural ecosystem. When NPS management actions cause native vegetation to be removed, then the NPS will seek to ensure that such removals will not cause unacceptable impacts to native resource, natural process, or other park resources.

Non-native species, also referred to as non-native or alien, are not a natural component of the ecosystem. They are managed, up to and including eradication, under the criteria specified in *Management Policies* and NPS-77.

Impact Indicators, Criteria, and Methodology

Negligible: Impacts have no measurable or perceptible changes in soil structure and occur in a relatively small area. Impacts have no measurable or perceptible changes in plant community size, integrity, or continuity.

Minor: Impacts are measurable or perceptible but localized in a relatively small area. The overall soil structure would not be affected. Impacts are measurable or perceptible and localized within a

relatively small area. The overall viability of the plant community would not be affected and, if left alone, would recover.

Moderate: Impacts would be localized and small in size, but would cause a permanent change in the soil structure in that particular area. Impacts would cause a change in the plant community (e.g. abundance, distribution, quantity, or quality); however, the impact would remain localized.

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

Impairment: For this analysis, impairment is considered a permanent change in a large portion of the overall acreage of the park, affecting the resource to the point that the park's purpose could not be fulfilled and the resource would be degraded precluding the enjoyment of future generations.

When these criteria were not applicable, and in the absence of quantitative data, best professional judgment prevailed.

WATER RESOURCES (INCLUDING WETLANDS)

Related Laws, Regulations, and Policies

NPS policies require protection of water resources consistent with the *Clean Water Act*. Increased erosion following a fire event, planned or unplanned, may affect water quality within and outside of the historical park; therefore, it is considered a relevant impact topic. Water supply within the park, or the lack thereof, is also analyzed as an impact topic. Included in the analysis is potential flood run-off and the availability of water to suppress a fire event.

Further guidance for the protection of water quality is included in *Management Policies* (4.6) which directs the NPS to work with appropriate government bodies to obtain the highest possible standards available under the *Clean Water Act* for the protection for park resources, and to take the necessary actions to maintain or restore the quality of surface and ground waters within the parks consistent with the *Clean Water Act* and all other applicable federal, state, and local laws and regulations.

WILDLIFE

Related Laws, Regulations, and Policies

The NPS *Organic Act*, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the NPS to mean native animal life should be protected and perpetuated as part of the historical park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible. The restoration of native species is a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity and ecological integrity of plants and animals.

Impact Indicators, Criteria, and Methodology

The following are standards used by the NPS in interpreting the level of impact to wildlife:

Negligible impacts: No species of concern is present; no impacts or impacts with only temporary effects are expected.

Minor impacts: Non-breeding animals of concern are present, but only in low numbers. Habitat is not critical for survival; other habitat is available nearby. Occasional flight responses by wildlife are expected, but without interference with feeding, reproduction or other activities necessary for survival.

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

Major impacts: Breeding animals are present in relatively high numbers, and/or wildlife is present during particularly vulnerable life stages. Habitat targeted by actions has a history of use by wildlife during critical periods, but there is suitable habitat for use nearby. Few incidents of mortality could occur, but the continued survival of the species is not at risk.

Impairment: The impact would contribute substantially to the deterioration of natural resources to the extent that the park's wildlife and habitat would no longer function as a natural system. Wildlife and its habitat would be affected over the long-term to the point that the park's purpose (Enabling Legislation, *General Management Plan*) could not be fulfilled and resource could not be experienced and enjoyed by future generations.

When these criteria were not applicable, standard definitions for degree of change related to existing conditions were used. In the absence of quantitative data, best professional judgment prevailed.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Related Laws, Regulations, and Policies

Section 7 of the *Endangered Species Act*, as amended, mandates all federal agencies to determine how to use their existing authorities to further the purposes of the Act to aid in recovering listed species, and to address existing and potential conservation issues. Section 7(a)(2) states that each federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Management Policies directs the parks to survey for, protect, and strive to recover all species native to National Park System units that are listed under the *Endangered Species Act* (4.4.2.3). It sets the direction to meet the obligations of the Act. *Management Policies* also directs the NPS to inventory, monitor, and manage state and locally listed species, and other native species that are of special management concern to the parks, to maintain their natural distribution and abundance.

Impact Indicators, Criteria, and Methodology

The *Endangered Species Act* defines the terminology used to assess impacts to listed species as follows:

No effect: The appropriate conclusion when the action agency determines that its proposed action would not affect a listed species or designated critical habitat.

Is not likely to adversely affect: The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Based on the best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

Is likely to adversely affect: The appropriate finding if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial. In the effect the overall effect of the proposed action is beneficial to the listed species, but is also likely to cause some adverse effects, then the proposed action “is likely to adversely affect” the listed species. If incidental take is anticipated to occur as a result of the proposed action, an “is likely to adversely affect” determination should be made.

Is likely to jeopardize proposed species/adversely modify proposed critical habitat – (Impairment): The appropriate conclusion when the action agency or the U.S. Fish and Wildlife Service identify situations in which the proposed action is likely to jeopardize the continued existence of a proposed species or adversely modify the proposed critical habitat.

AIR QUALITY

Related Laws, Regulations, and Policies

San Juan Island NHP is designated as a Class II Air Quality area under the *Clean Air Act*. The main purpose of this act is to protect and enhance the nation’s air quality to promote the public health and welfare. The act establishes specific programs to provide protection for air resources and values, including the program to prevent significant deterioration of air quality in clean air regions of the country. Although San Juan Island NHP is designated as a Class II Air Quality area, the park strives to maintain the highest air quality standards, and project work within the historical park is completed in accordance with regional standards. However, the historical park does not possess sufficient autonomous authority to address issues of air quality improvements when air pollution originates outside the boundaries. NPS *Management Policies* direct parks to seek to perpetuate the best possible air quality to preserve natural and cultural resources, sustain visitor enjoyment, human health, and preserve scenic vistas (4.7). Parks are directed to comply with all federal, state, and local air quality regulations and permitting requirements.

Impact Indicators, Criteria, and Methodology

The impact categories are relevant to air quality issues related to fire management activities. Each category is discussed below relative to potential airborne pollution impacts from the alternatives on park resources and human health.

Negligible impacts: There is no visible smoke.

Minor impacts: Smoke is visible during brief periods of time. Dust from the use of dirt roads is visible during brief periods. Mitigation is able to alleviate the impacts.

Moderate impacts: Smoke is visible during extended periods. Dust from the use of dirt roads is visible for an extended area. Mitigation is able to alleviate the impacts.

Major impacts: Smoke is easily detectable for extended periods of time in a large area. Dust from the use of dirt roads and equipment is visible for an extended period for an extended amount of time, and mitigation is unable to alleviate the conditions.

Impairment: Air emissions contribute to continued violation of national standards. In addition, impacts have a major effect on park resources and values; contribute to the deterioration to the extent that the park's purpose can not be fulfilled as established in its enabling legislation; affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or affect the resource whose conservation is identified as a goal in the park's general management plan or other park planning document.

VISITOR USE AND EXPERIENCE (RECREATIONAL AND VISUAL RESOURCES)

Related Laws, Regulations, and Policies

Visitor use in parks is authorized in the NPS *Organic Act* and managed under the NPS *Management Policies* under Chapter 8, "Use of Parks" that includes commercial as well as public use.

The enabling legislation of San Juan Island NHP specifically addresses the preservation of the scenic features of the area. The NPS manages the natural resources of the park, including highly valued associated characteristics such as scenic views, to maintain them in an unimpaired condition for future generations (*Management Policies* 4).

Since impacts on scenic quality are difficult to assess, best professional judgment prevailed in the evaluation of impacts.

Impact Indicators, Criteria, and Methodology

Negligible impacts: No impact to the visitor experience or only temporary effects are expected. Little noticeable change in visitor experience or in the defined indicators of visitor satisfaction or behavior.

Minor impacts: Desired visitor experience is changed, but without appreciably limiting or enhancing critical characteristics of the experience. Visitor satisfaction would remain stable.

Moderate impacts: Critical characteristics of the desired experience are changed or the number of participants engaging in an activity is altered. Visitor satisfaction would begin to decline.

Major impacts: Eliminates, detracts from, or greatly enhances multiple critical characteristics of the desired experience or greatly reduces or increases participation. Visitor satisfaction would decline substantially.

CULTURAL RESOURCES

Related Laws, Regulations, and Policies:

Nearly all fire management projects qualify as undertakings as defined in 36 CFR §800.2,

[A]ny project, activity, or program that can result in changes in the character or use of historic properties, if any such properties are located in the area of potential effects. The project, activity, or program must be under the direct or indirect jurisdiction of a federal agency or licensed or assisted by a federal agency.

Thus, each is subject to consideration under Section 106 of the *National Historic Preservation Act of 1966, as amended*. Recently, several attempts have been launched to develop programmatic approaches to prescribed fire compliance. Since 1999, the NPS, in conjunction with other DOI agencies and the USFS, has been developing a nationwide programmatic agreement between the national and state offices of historic preservation and the Advisory Council on Historic Preservation (ACHP). Completion of this document, which is intended to be augmented with specific compliance needs of a particular unit, resource area or forest, has been delayed due to the complexity and diversity of fire programs throughout the United States.

Numerous legislative acts, regulations, and NPS policies provide direction for the protection, preservation, and management of cultural resources on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan regardless of the final Alternative chosen. Applicable laws and regulations include the NPS *Organic Act* (1916), the *Antiquities Act of 1906*, the *National Historic Preservation Act of 1966* (1992, as amended), the *National Environmental Policy Act* (1969), the *National Parks and Recreation Act of 1978*, the *Archeological Resources Protection Act of 1979*, the *Native American Graves Protection and Repatriation Act of 1990*, and the *Curation of Federally Owned and Administered Archeological Collections* (1991).

Consultation with Native American groups is required under Executive Memorandum of April 29, 1994, Government to Government Relations with Native American Tribal Governments; Executive Order 13007 of May 24, 1996, Indian Sacred Sites; and, Executive Order of May 14, 1998, Consultation and Coordination with Indian Tribal Governments.

Applicable agency policies relevant to cultural resources include Chapter 5 of NPS *Management Policies*, and the *Cultural Resource Management Guideline* (DO-28), as well as other related policy directives such as the NPS *Museum Handbook*, the NPS *Manual for Museums*, and *Interpretation and Visitor Services Guidelines* (NPS-26).

NPS *Management Policies* (2001) Section 5.3.1.2: Fire Detection, Suppression, and Post-fire Rehabilitation and Protection states that the NPS will take action to prevent or minimize the impact of wildland, prescribed, and structural fires on cultural resources, including the impact of suppression and rehabilitation activities. Park and local fire personnel will be advised of the locations and characteristics of cultural resources threatened by fire, and of any priorities for protecting them during any planned or unplanned fire incident. At parks with cultural resources, park fire personnel will receive cultural resource protection training.

Impact Indicators, Criteria, and Methodology

NEPA recognizes three types of impacts—direct, indirect, and cumulative. Direct impacts are those that are caused at the same time and place as the action, indirect impacts occur later in time and at a distance, while cumulative impacts are additive. In regard to cultural resources, direct, operational and indirect effect categories are utilized. Direct effects are those where the fire itself is the cause of the impacts, operational effects occur as a result of associated operations like line construction or staging.

Indirect effects are those where fire and/or associated operations result in changes to local context such that cultural resources will 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. Effects also vary in terms of intensity and duration, and can be adverse or beneficial.

Beneficial Effects

Beneficial effects to fire management actions will also be evaluated in the environmental consequences section. Beneficial effects relate to the application of fire and mechanical treatments to reduce threats from catastrophic wildfire to archeological sites, historic structures, and cultural landscapes. Ethnographic resources can also benefit from the use of fire management practices.

Intensity and Duration of Impacts

It is also necessary to take into the account the intensity and duration of direct, operational and indirect effects to resources of interest. The following measures of impact intensity are used, along with examples of resources of interest most vulnerable to those impacts and/or scenarios where a particular intensity of impact might occur:

Negligible: No or barely perceptible changes to the significant characteristics of a resource of interest.

Minor: Perceptible and measurable changes to the significant characteristics of a resource of interest, but those changes do not inhibit interpretive potential and/or a minor percentage of the significant characteristics will be affected.

Moderate: Perceptible and measurable changes to the significant characteristics of a resource of interest, but those changes do not inhibit interpretive potential and/or a moderate percentage of the significant characteristics will be affected. Resources prone to impacts in this category might

include archeological sites containing a moderate percentage of resources of interest with low vulnerability to direct effects and/or possessing subsurface components.

Major: Perceptible changes to the significant characteristics of a resource of interest, and those changes inhibit interpretive potential of a major percentage of the significant characteristics. Resources prone to impacts in this category might include archeological sites containing a large percentage of resources of interest with high vulnerability to direct effects.

The duration of direct effect impacts are defined as follows:

Short-Term: Temporary loss of data potential in the significant characteristics of a resource of interest. This condition is reversible within a foreseeable timeframe (e.g., loss of significant grass and shrub vegetation in a cultural landscape).

Long-Term: Temporary loss of data potential in the significant characteristics of a resource of interest. This condition is reversible, but after an uncertain or excessively long period of time (e.g., sooting on artifacts).

Permanent: Permanent loss of data potential in the significant characteristics of a resource of interest. Permanent direct effects usually occur immediately following the fire event (e.g., total consumption of a wooden feature).

PARK OPERATIONS, PUBLIC HEALTH, AND SAFETY

Related Laws, Regulations, and Policies: *The Federal Wildland Fire Management Policy Review*, 2001, provides fire policies related to safety. The guiding principles are fundamental and establish firefighter and public safety as the first priority in every fire management activity. Public safety and the safety of all personnel engaged in a fire event is the primary concern of park managers.

Impact Indicators, Criteria, and Methodology

Negligible Impacts: The impact to personnel and visitor safety is not measurable or perceptible.

Minor Impacts: The impact to personnel and visitor safety is slight and temporary, but not sufficient to cause a permanent change in accident rates and can be immediately controlled by management actions in a timely manner.

Moderate Impacts: The impact to personnel and visitor is slight and temporary, but could create a slight permanent increase in accident rates. The safety of park personnel and visitors can not be controlled immediately by park management, but control would occur within 24 hours.

Major Impacts: The impact to personnel and visitor safety is sufficient to cause a permanent change in accident rates at existing low accident locations.

CUMULATIVE IMPACTS

Cumulative impacts were analyzed for the alternatives and the environmentally preferred alternative. Cumulative impacts are the incremental impacts on the environment resulting from adding the alternatives to other past, present, and reasonably foreseeable future actions. This includes potential actions within and outside the historical park boundary.

This information was considered when developing the cumulative impacts of each alternative. However, this information may be inexact at this time. Major sources of impacts have been assessed as accurately and completely as possible, using all available data. If additional data becomes available, more detailed analysis would be performed during the completion of individual prescribed fire plans for each site.

Cumulative effects are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such action. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

The Council on Environmental Quality regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined 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 nonfederal) or person undertakes such other actions (40 CFR 1508.7).

Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable projects at SAJH and, as applicable, in the surrounding areas adjacent to the park. Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

Projects that Make Up the Cumulative Impact Scenario

To determine potential cumulative impacts, projects in areas surrounding San Juan Island NHP were identified. The areas include privately owned lands and lands administered by the Washington state DNR, BLM, and San Juan Island County. Projects were determined by meetings and telephone calls with county and town governments and state land managers. Potential projects identified as cumulative actions included any planning or development activity that had occurred in the past, are currently being implemented, or that would be implemented in the reasonably foreseeable future.

These cumulative actions are evaluated in the cumulative impact analysis in conjunction with the impacts of each alternative to determine if they would have any additive effects on a particular natural resource, park operation, or visitor use. Because some of these cumulative actions are in the early planning stages, the evaluation of cumulative effects was based on a general description of the project.

Past Actions

Past actions that could contribute to cumulative effects include:

- Agricultural practices and logging of park lands prior to the designation of the park as a NPS unit;
- Development and logging on adjacent lands managed by local, state, and federal agencies, as well as private citizens;
- Land use activities including grazing on lands adjacent to the park.

Current and Future Actions

Current actions and those projected for the future could also contribute to cumulative effects. These include:

- Relocation of the eroding portion of Cattle Point Road;
- Logging and development on adjacent lands managed by local, state, and federal agencies, as well as private citizens;
- Control or eradication of the European rabbit (*Oryctolagus cuniculus*) population and exotic plant populations.

IMPACTS OF ALTERNATIVES

SOILS

Soil impacts were quantitatively assessed using soil characteristics, literature reviews, and mitigation measures. Under all alternatives, mechanical treatment (mowing) and manual reduction activities would have no or negligible effects to soil resources.

Soils in pile burn areas may be impacted by the fire if they burn too hot or for a long duration. These burns could result in short-term damage to the soil layers. However, these areas would receive rehabilitation soon after burning by turning under the soils, adding organic matter from adjacent areas, and may be seeded with sterile wheat grasses or native plant species. A maximum of 250 piles per year could be burned. On an average year, approximately 150 piles will be burned. Piles average 4 feet by 4 feet in size making the area impacted by pile burning less than 0.5 acre total area, in an average year. Therefore, pile burning would result in short-term, negligible to minor impacts on soil resources.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Proposed activities of Alternative 1 that have potential to impact soils include building fire lines, and prescribed fire activities. Up to 400 acres (including retreatments of project areas) would be treated over five years using low to moderate intensity prescribed fire or mechanical/manual fuel reduction treatments. Project areas are generally 10 to 20 acres in size with a few that are up to 35 acres (see Table 3 and 4, page 21-22). Fire line construction would result in soil disturbance and could lead to increased erosion, especially in areas of steep slopes. Mitigation measures would include using existing trails or locating fire lines away from steep slopes and other sensitive areas. Following fire suppression and prescribed fire activities, fire lines may be re-

contoured, water barred, and possibly seeded with native plant species. Minimal impact tactics would be used to reduce potential soil impacts.

Prescribed fires of low to moderate severity would release nutrients into the soil and the fertilization effects of ash would provide an important source of nutrients for vegetation in the park. In addition to increasing nitrification of the soils and increasing minerals and salt concentrations in the soil, the ash and charcoal residue resulting from incomplete combustion aids in soil buildup and soil enrichment by being added as organic matter to the soil profile. The added material works in combination with dead and dying root systems to make the soil more porous, better able to retain water, and less compact while increasing needed sites and surface areas for essential microorganisms, mycorrhizae, and roots (Wright and Bailey, 1980).

Alternative 1 – Soils Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	27	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	5	33
2007	Mechanical/Manual	11	15
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	25	36
2009	Mechanical/Manual	11	0
	Prescribed Fire	5	63
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Prescribed fires that burn too hot may result in the organic layer of the soil being consumed and the soils becoming hydrophobic. Prescribed fire prescriptions are adjusted to maintain fire effects within acceptable limits. If a prescribed fire is burning out of the prescription range, it may be terminated at an appropriate location to avoid adverse impacts to natural resources, including soils.

Specific Consequences to Soils from Project Activities under Alternative 1

American Camp

Prairie Research Burn (2005, 2006, 2009)

The three burns during conducted over a period of five years would result in an impact to 12 acres of grassland soils. Grass fires generally burn with low to moderate intensity, resulting in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This area is comprised of gentle slopes and would revegetated quickly, so no soil erosion would occur from the resulting burn effects.

American Camp Mixco#1 (2007, 2008)

The two projects would burn 30 acres over a period of two years in mixed conifer habitat. These burns would be low to moderate intensity burns due to the type of fuels in the area. Therefore, the burns would result in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This entire burn area consists of gentle topography and is mostly flat. Within the burn area, mainly dead and down fuels would be consumed with minimal decrease in vegetative cover. Therefore, soil erosion would not occur from these projects.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

These projects would burn 64 acres over a period of five years for initial treatment and 99 acres of retreatment activities.

This area is comprised of a Garry oak woodland and grass savannah. The burns would be of low to moderate intensity due to the type of fuels in the area. Retreatment burns would result in low intensity burns. Therefore the burns would result in beneficial effects to the soils in the areas from the release of nutrients and the fertilization of ash.

These burn areas vary from 10% to 45% slopes; units I and IV are the most steep. Based on the Unit I prescribed burn in 2003, even those areas with steep slopes had no signs of erosion and the area recovered rapidly (Rankin pers. comm.). Rehabilitation would occur on all firelines and on the steep slopes. Therefore, the burns in these units are expected to result in minimal erosion.

British Camp Mixco #1 (2007)

This project would burn 10 acres in one year in mixed conifer habitat. This burn would be of low to moderate intensity due to the type of fuels in the area. Therefore, the burn would result in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This entire burn area consists of gentle topography. Within the burn area, mainly dead and down fuels would be consumed with minimal decrease in vegetative cover. Therefore, soil erosion would not occur from these projects.

British Camp Mixco #2 (2009)

This project would burn 15 acres over one year in mixed conifer habitat. This burn would be of low to moderate intensity due to the type of fuels in the area. Therefore, the burn would result in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This entire burn area consists of gentle topography. Within the burn area, mainly dead and down fuels would be consumed with minimal decrease in vegetative cover. Therefore, soil erosion would not occur from these projects.

Cumulative Impacts

In the past, soils in the area of American Camp have received moderate to major, long-term impacts due to agricultural practices, logging, development, road construction, and European rabbit activity. English Camp has received negligible to minor, short term impacts due to past activities. Current and reasonably foreseeable future activities would cause negligible, short term impacts or, more likely, benefit soil resources, due to management activities and mitigation measures designed to protect and preserve the natural resources within the park.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Soil impacts from Alternative 2 would be similar to those described under Alternative 1; however, the benefits from prescribed fire on soil composition and nitrification would not occur as a result of this alternative.

Alternative 2 – Soils Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	15
2006	Mechanical/Manual	11	20
2007	Mechanical/Manual	11	0
2008	Mechanical/Manual	11	25
2009	Mechanical/Manual	11	10
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts would be similar to those described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Soil impacts from Alternative 3 would be similar to those described under Alternative 1 with the addition of larger broadcast burns in the grasslands at American Camp. Up to 600 acres (included retreatments of project areas) would be treated over five years using low to moderate intensity prescribed fire or mechanical/manual fuel reduction treatments.

Alternative 3 – Soils Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	35	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	100	33
2007	Mechanical/Manual	11	20
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	75	41
2009	Mechanical/Manual	11	20
	Prescribed Fire	30	73
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Specific Consequences to Soils from Project Activities under Alternative 3

American Camp

Redoubt Unit 1 (2005)

This project would burn 10 acres of grassland habitat. The burns would be of low to moderate intensity due to the types of fuels in the area. Therefore the burns would result in beneficial effects to the soils in the areas from the release of nutrients and the fertilization of ash.

This area is comprised of gentle slopes and would revegetated quickly, so no soil erosion would occur from the resulting burn effects.

Redoubt II (2006)

This project would burn 100 acres of grassland habitat. The burns would be of low to moderate intensity due to the types of fuels in the area. Therefore the burns would result in beneficial effects to the soils in the areas from the release of nutrients and the fertilization of ash.

This area is comprised of gentle slopes and would revegetated quickly, so no soil erosion would occur from the resulting burn effects.

American Camp Mixco #1 and #2 (2007, 2008)

These projects would burn 30 acres in mixed conifer habitat. The burns would be low to moderate intensity burns due to the type of fuels in the area. Therefore, the burns would result in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This entire burn area consists of gentle topography and is mostly flat. Within the burn area, mainly dead and down fuels would be consumed with minimal decrease in vegetative cover. Therefore, soil erosion would not occur from these projects.

West Boundary (2008)

This project would result in the burning of 50 acres of grassland habitat. The burn would be of low to moderate intensity due to the types of fuels in the area. Therefore the burn would result in beneficial effects to the soils in the areas from the release of nutrients and the fertilization of ash.

This area is comprised of gentle slopes and would revegetated quickly, so no soil erosion would occur from the resulting burn effects.

Grandma's Cove Rx (2009)

This project would burn 30 acres of grassland habitat. The burn would be of low to moderate intensity due to the types of fuels in the area. Therefore the burn would result in beneficial effects to the soils in the areas from the release of nutrients and the fertilization of ash.

This area is comprised of gentle slopes and would revegetated quickly, so no soil erosion would occur from the resulting burn effects.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

These projects would burn 64 acres over a period of five years for initial treatment and 99 acres of retreatment activities.

This area is comprised of a Garry oak woodland and grass savannah. The burns would be of low to moderate intensity due to the type of fuels in the area. Retreatment burns would result in low intensity burns. Therefore the burns would result in beneficial effects to the soils in the areas from the release of nutrients and the fertilization of ash.

These burn areas vary from 10% to 45% slopes; units I and IV are the most steep. Based on the Unit I prescribed burn in 2003, even those areas with steep slopes had no signs of erosion and the area recovered rapidly (Rankin pers. comm.). Rehabilitation would occur on all firelines and on the steep slopes. Therefore, the burns in these units are expected to result in minimal erosion.

British Camp Mixco #1 (2007)

This project would burn 10 acres in one year in mixed conifer habitat. This burn would be of low to moderate intensity due to the type of fuels in the area. Therefore, the burn would result in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This entire burn area consists of gentle topography. Within the burn area, mainly dead and down fuels would be consumed with minimal decrease in vegetative cover. Therefore, soil erosion would not occur from these projects.

British Camp Mixco #2 (2009)

This project would burn 15 acres over one year in mixed conifer habitat. This burn would be of low to moderate intensity due to the type of fuels in the area. Therefore, the burn would result in beneficial effects to the soils from the release of nutrients and the fertilization effects of ash.

This entire burn area consists of gentle topography. Within the burn area, mainly dead and down fuels would be consumed with minimal decrease in vegetative cover. Therefore, soil erosion would not occur from these projects.

Cumulative Impacts

Cumulative impacts would be the same as those described under Alternative 1.

Conclusion

Suppression could cause short-term erosion and soil compaction if heavy equipment is used or vehicles are driven off roadways. Minor short-term erosion and compaction would result from manual fuel reduction and prescribed fire projects. Benefits to soil development and nitrification would result from prescribed fires. Past activities occurring prior to the establishment of the park had moderate to major, short to long term impacts on soils, especially at American Camp. Current and reasonably foreseeable activities would not cause additional impacts to soils, but would help correct past impacts and ultimately benefit soil resources in the park. None of the alternatives would contribute to cumulative impacts on soil resources.

The implementation of any of the alternatives would not impair soil resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other NPS planning documents.

WATER RESOURCES (INCLUDING WETLANDS)

Water resource impacts were qualitatively assessed using presence/absence of surface water resources, literature reviews, and mitigation measures. General discussion of the impacts to water resources is followed by more project specific impacts discussion.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Fuel reduction and prescribed fire activities proposed in Alternative 1 would not occur in wetland areas and would not greatly increase the demand for fresh water. Water used in support of wildland and prescribed fires would result in negligible to minor impacts to local water supplies.

Mitigation measures would be in place for suppression actions to protect wetland areas in the case of wildland fire. The use of fire retardants or foams could potentially cause short and long-term impacts to water resources if misapplied or mishandled. Retardants contain ammonia and phosphate or sulfate ions, which can change the chemistry of surface water, thus making it lethal to fish and other aquatic organisms. Foams contain detergents that can interfere with the ability of fish gills to absorb oxygen. The degree of impact would depend on the volume of retardant/foam dropped into the surface water, the size of the body of water, and the volume of flow in the water.

Specific Consequences to Water Resources from Project Activities under Alternative 1

American Camp

Prairie Research Burn (2005, 2006, 2009)

There are no wetlands or water resources within the Redoubt prairie area of SAJH, where the research burns would occur. Therefore, there would be no impact on water resources from this project.

American Camp Mixco#1 (2007, 2008)

There are no wetlands or water resources within the project area, though there are wetlands within 500 feet from the project area. Since this area is flat and the burn would not lead to increased erosion or run-off, there would be no effect to the wetlands near the project area.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

There are no wetlands or water resources within the project area or at Young Hill. There would be no effects to wetlands or water resources under this alternative.

British Camp Mixco #1 (2007)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

British Camp Mixco #2 (2009)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

Cumulative Impacts

Impacts to water resources from past, present, and reasonably foreseeable future activities including agricultural practices, logging, and development in and adjacent to the park are negligible to minor. Past agricultural practices, including grazing and irrigation, most likely altered natural surface water patterns and/or disturbed wetland areas through trampling and/or the construction of irrigation ditches. Past, present, and future development adjacent to the park, has and will continue to increase the demand for fresh water, and has the potential to impact ground water resources by making aquifers becoming more susceptible to salt water infiltration. This would have negligible impacts on surface water resources in the park. Minor to moderate, long-term impacts would occur to ground water resources from which the park obtains fresh water.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Impacts to water resources from Alternative 2 would be the same as those described under Alternative 1.

Cumulative Impacts

Cumulative impacts would be the same as those described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

General impacts to water resources from Alternative 3 would be the same as those described under Alternative 1. Specific project effects are shown below.

Specific Consequences to Water Resources from Project Activities under Alternative 3

American Camp

Redoubt Unit I (2005)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

Redoubt II (2006)

Redoubt II is within 200 feet of the Strait of Juan de Fuca. The slope in this area is between 5 to 20%. Because the burn would not result in soil erosion or run-off (due to the mitigation measures and rehabilitation activities), there would be no impacts to water resources from this alternative.

American Camp Mixco #1 (2007)

There are no wetlands or water resources within the project area, though there are wetlands within 500 feet of the project area. Since this area is flat and the burn would not lead to increased erosion or run-off, there would be no effect to the wetlands near the project area.

West Boundary (2008)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

American Camp Mixco #2 (2008)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

Grandma's Cove Rx (2009)

The Grandma's Cove unit is adjacent to the shoreline of the Strait of Juan de Fuca. The area is fairly flat, with slopes between 5 and 15%, and rehabilitation would reduce the potential for erosion, therefore, there would be minimal effects to the water quality in the Strait from the project activities. There are no other water resources or wetlands in the project vicinity.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

There are no wetlands or water resources within the project area or at Young Hill. There would be no effects to wetlands or water resources under this alternative.

British Camp Mixco #1 (2007)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

British Camp Mixco #2 (2009)

There are no wetlands or water resources within the project area or nearby. There would be no effects to wetlands or water resources under this alternative.

Cumulative Impacts

Cumulative impacts would be the same as those described under Alternative 1.

Conclusion

Fire suppression activities such as foam use and retardant may have impacts on surface water. However, very little surface water exists in the park. Water usage for suppression activities may stress local water supplies during the summer season. Manual fuel reduction projects would not impact water resources. Prescribed fire activities would not take place near surface water areas. Water usage to support prescribed fires would be planned to avoid water use issues. Water used in support of wildland and prescribed fires would result in negligible to minor impacts to local water supplies.

The cumulative effects of past, present, and reasonably foreseeable future activities would have minor to moderate, long-term impacts to ground water resources. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative impacts to water resources would be negligible to minor and of short term duration.

The implementation of any of the alternatives would not impair water resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

VEGETATION

Vegetation impacts were qualitatively assessed using literature reviews and quantitatively assessed by acres impacted. General discussion on the impacts to vegetation is followed by more specific project impacts for Alternatives 1 and 2.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Proposed activities of Alternative 1 that have potential to impact vegetation include building fire lines, reducing live and dead forest fuel accumulations by thinning and hand piling, and prescribed fire. Up to 400 acres (including retreatments of project areas) would be treated over five years using low to moderate intensity prescribed fire or mechanical/manual fuel reduction treatments. Priority for treatments would be given to areas adjacent to developed areas as well as

to boundary areas. This would minimize the potential of wildland fires from entering or exiting the park and reduce risks to life and property.

Alternative 1 – Vegetation Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	27	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	5	33
2007	Mechanical/Manual	11	15
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	25	36
2009	Mechanical/Manual	11	0
	Prescribed Fire	5	63
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Fire line construction for both wildland fire suppression and prescribed fires would result in vegetation being cut and removed. Soil disturbance associated with fire line construction would also make these areas more susceptible to noxious weed infestation. Rehabilitation efforts and monitoring for exotic plants would mitigate these concerns. Minor and localized trampling of vegetation may occur during most fire management activities. Fuel reduction activities would focus on removing small understory trees and dead and down woody debris. Specific tree species would also be targeted for removal over others. For example, on Young Hill, Douglas fir has encroached upon the Garry oaks, overtopping many and threatening their existence. The Douglas fir in this case would be removed. Thinning the forests would also reduce tree densities and encourage new growth in the herbaceous layer.

The use of prescribed fire would have a beneficial effect on the park's vegetation. Woody debris accumulations in mixed conifer forests will be reduced and the forest surface opened up for succession. Garry oak woodlands will be restored and maintained with prescribed fire which will eliminate future Douglas fir encroachment. On the American Camp grassland, research burns will be conducted to determine, among other findings, how to use prescribed fire to reduce the number of exotic species and benefit the native species.

Specific Consequences to Vegetation from Project Activities under Alternative 1

American Camp

Prairie Research Burn (2005, 2006, 2009)

The three burns during conducted over a period of five years would result in an impact to 12 acres of grassland. These burns are research burns, so the outcome of the project is not known at this time. However, the goal of this project is to reduce the number of invasive exotics and promote the restoration of the native herbaceous species in the area. This project will be

continually monitored to determine if restoration goals are being met. If goals are not being met, the project will be reevaluated.

American Camp Mixco#1 (2007, 2008)

The two projects would burn 30 acres over a period of two years in mixed conifer habitat. This understory vegetation will be directly affected by burning activities and fireline construction. The overstory canopy will have minimal impact from the burning but the burn may result in isolated mortality in these species. Woody debris accumulations in mixed conifer forests would be reduced and the forest surface opened up for succession. The project would result in an increased diversity of herbaceous species in the project area. This burn would promote the regeneration of conifer species in the project area.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

These projects would burn 64 acres over a period of five years for initial treatment and 99 acres of retreatment activities. This area is comprised of a Garry oak woodland and grass savannah.

Garry oak woodlands would be restored and maintained with prescribed fire which will eliminate future Douglas fir encroachment. Garry oaks are generally adaptive to fire, therefore, there would be beneficial results from burning. Burning would reduce the amount of exotic species in the area, allowing the recovery of native vegetative species in the project area.

British Camp Mixco #1 (2007)

This project would burn 10 acres in one year in mixed conifer habitat. This understory vegetation will be directly affected by burning activities and fireline construction. The overstory canopy will have minimal impact from the burning but the burn may result in isolated mortality in these species. Woody debris accumulations in mixed conifer forests would be reduced and the forest surface opened up for succession. The project would result in an increased diversity of herbaceous species in the project area. This burn would promote the regeneration of conifer species in the project area.

British Camp Mixco #2 (2009)

This project would burn 15 acres over one year in mixed conifer habitat. This understory vegetation will be directly affected by burning activities and fireline construction. The overstory canopy will have minimal impact from the burning but the burn may result in isolated mortality in these species. Woody debris accumulations in mixed conifer forests would be reduced and the forest surface opened up for succession. The project would result in an increased diversity of herbaceous species in the project area. This burn would promote the regeneration of conifer species in the project area.

Cumulative Impacts

Impacts to vegetation from past, present, and reasonably foreseeable future activities including agricultural practices, logging, development and fire management activities in and adjacent to the park are minor to moderate, short to long term. Past agricultural practices, including grazing, logging and farming, greatly altered vegetation patterns in the park, primarily at American

Camp. Past, present and reasonably foreseeable future management activities are being designed to restore and maintain the desired vegetation conditions within the park. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from Alternative 1 and cumulative impacts to vegetation would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Impacts to vegetation from Alternative 2 would be similar as those described under the Alternative 1. With the absence of prescribed fire, more emphasis would be put on using mechanical and manual fuel treatment methods. This may lead to increased impacts due to more trampling of vegetation and soil disturbance that may encourage exotic weed establishment. The absence of prescribed fire would also eliminate the benefits to plant habitat and diversity that accrue from relatively frequent, low intensity fires. Noxious weeds and/or fire-intolerant plant species would continue to increase in number and out-compete the favorable native species.

Alternative 2 – Vegetation Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	15
2006	Mechanical/Manual	11	20
2007	Mechanical/Manual	11	0
2008	Mechanical/Manual	11	25
2009	Mechanical/Manual	11	10
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts associated with this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Impacts to vegetation from Alternative 3 would be the same as those described under the Alternative 1. However, up to 600 acres would be treated with low to moderate intensity prescribed fire or mechanical/manual fuel reduction methods. Moving from small research burns on the American Camp prairie to large area prescribed fires in the grasslands account for this increase.

Alternative 3 – Vegetation Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	35	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	100	33
2007	Mechanical/Manual	11	20
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	75	41
2009	Mechanical/Manual	11	20
	Prescribed Fire	30	73
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Specific Consequences to Vegetation from Project Activities under Alternative 3

American Camp

Redoubt Unit 1 (2005)

This project would burn 10 acres of grassland habitat. These burns are research burns, so the outcome of the project is not known at this time. However, the goal of this project is to reduce the number of invasive exotics and promote the restoration of the native herbaceous species in the area. This project will be continually monitored to determine if restoration goals are being met. If goals are not being met, the project will be reevaluated.

Redoubt II (2006)

This project would burn 100 acres of grassland habitat. This project would be initiated if Redoubt I project is found to be successful. Therefore, this project would result in a reduction of the number of invasive exotics and promote the restoration of native herbaceous species in the area.

American Camp Mixco #1 and #2 (2007, 2008)

These projects would burn 30 acres in mixed conifer habitat. This understory vegetation will be directly affected by burning activities and fireline construction. The overstory canopy will have minimal impact from the burning but the burn may result in isolated mortality in these species. Woody debris accumulations in mixed conifer forests would be reduced and the forest surface opened up for succession. The project would result in an increased diversity of herbaceous species in the project area. This burn would promote the regeneration of conifer species in the project area.

West Boundary (2008)

This project would result in the burning of 50 acres of grassland habitat. This project would result in a reduction of the number of invasive exotics and promote the restoration of native herbaceous species in the area.

Grandma's Cove Rx (2009)

This project would burn 30 acres of grassland habitat. This project would result in a reduction of the number of invasive exotics and promote the restoration of native herbaceous species in the area.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

These projects would burn 64 acres over a period of five years for initial treatment and 99 acres of retreatment activities. This area is comprised of a Garry oak woodland and grass savannah.

Garry oak woodlands would be restored and maintained with prescribed fire which will eliminate future Douglas fir encroachment. Garry oaks are generally adaptive to fire, therefore, there would be beneficial results from burning. Burning would reduce the amount of exotic species in the area, allowing the recovery of native vegetative species in the project area.

British Camp Mixco #1 (2007)

This project would burn 10 acres in one year in mixed conifer habitat. This understory vegetation will be directly affected by burning activities and fireline construction. The overstory canopy will have minimal impact from the burning but the burn may result in isolated mortality in these species. Woody debris accumulations in mixed conifer forests would be reduced and the forest surface opened up for succession. The project would result in an increased diversity of herbaceous species in the project area. This burn would promote the regeneration of conifer species in the project area.

British Camp Mixco #2 (2009)

This project would burn 15 acres over one year in mixed conifer habitat. This understory vegetation will be directly affected by burning activities and fireline construction. The overstory canopy will have minimal impact from the burning but the burn may result in isolated mortality in these species. Woody debris accumulations in mixed conifer forests would be reduced and the forest surface opened up for succession. The project would result in an increased diversity of herbaceous species in the project area. This burn would promote the regeneration of conifer species in the project area.

Cumulative Impacts

Cumulative impacts associated with this alternative would be the same as described under Alternative 1.

Conclusion

Minor short-term impacts would result from suppression activities. Plant habitat and diversity improved, native plant and fire-tolerant species favored by this alternative. Under Alternatives 1 and 3, noxious weed species may increase in the short term but would be reduced over time.

Past activities within the park that included logging, agriculture, farming, and fire suppression have had minor to moderate, short to long term impacts. Present and reasonably foreseeable future management activities are being designed as to restore and maintain the desired vegetation conditions within the park. The cumulative effects of past, present, and reasonably foreseeable future activities would have negligible to minor, short term impacts to vegetation resources. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative impacts to vegetation resources would be negligible to minor and short term.

The implementation of any of the alternatives would not impair vegetation or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

WILDLIFE

Wildlife impacts were qualitatively assessed using presence/absence determinations and mitigation measures.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Proposed actions with potential to impact wildlife include building fire lines, fire retardant use associated with suppression activities, hazard fuel reduction, and prescribed fires. Historically, fire suppression needs have been minimal with most years having no wildland fires requiring suppression action. Retardant has never been used in the park as a suppression tool.

Habitat conditions for many wildlife species that inhabit the park would improve with the restoration of desired vegetation conditions. The use of mechanical/manual fuel reduction along with prescribed fire would help restore and enhance the variety and diversity of native plant and wildlife habitats. Nutrients released to plants through the fertilization effects of ash would provide an important source of nutrition for wildlife in the park. While some trees would be killed from the effects of fire, these dead standing trees (snags) would be left as these provide important habitat for a variety of wildlife species. Snags that are deemed hazardous trees would be removed. Fuel reduction projects would include thinning dense thickets of conifer reproduction to open the forest stand, expedite succession and increase native browse species in the understory.

Alternative 1 – Wildlife Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	27	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	5	33
2007	Mechanical/Manual	11	15
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	25	36
2009	Mechanical/Manual	11	0
	Prescribed Fire	5	63
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

All the fire management activities could result in the temporary displacement of wildlife or individual mortality of wildlife species. However, the loss of individual species would not jeopardize the viability of the populations on and adjacent to the park.

Mitigation measures to avoid potential impacts would include scheduling projects to avoid sensitive wildlife time periods such as nesting times, writing prescribed fire prescriptions so smoke does not impact sensitive wildlife areas, and planning projects of fairly short duration to limit sustained impacts.

Specific Consequences to Wildlife from Project Activities under Alternative 1

American Camp

Prairie Research Burn (2005, 2006, 2009)

These burns would result in the burning of 12 acres of grassland habitat. The wildlife in this area includes foxes, European rabbit, grasshoppers, and birds. The project would have short-term impacts to wildlife from disturbance and fire. Most wildlife would move out of the project area. Individual mortality of those species that are unable to move could occur. However, in the long-term, if project goals are accomplished, they would result in the restoration of native forage and the reduction in invasive exotic vegetation, therefore improving the overall quality of wildlife habitat.

American Camp Mixco#1 (2007, 2008)

The two projects would burn 30 acres over a period of two years in mixed conifer habitat. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

These projects would burn 64 acres over a period of five years for initial treatment and 99 acres of retreatment activities. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

British Camp Mixco #1 (2007)

This project would burn 10 acres in one year in mixed conifer habitat. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

British Camp Mixco #2 (2009)

This project would burn 15 acres over one year in mixed conifer habitat. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

Cumulative Impacts

Impacts to wildlife from past, present, and reasonably foreseeable future activities including agricultural practices, logging, development, hunting practices, and fire management in and adjacent to the park are minor to moderate, short to long term. Past agricultural practices, including grazing, logging and farming, and hunting greatly altered natural conditions in the park. Historically, large animals on the island included bear, wolves, and elk. These populations were over-hunted during Euro-American settlement and were extirpated. Present and reasonably foreseeable future management activities are being designed as to restore and maintain the natural wildlife populations within the park. While there is no intent to reintroduce extirpated large mammal populations, there are plans to eradicate non-native species such as the European rabbit, which continues to negatively impact the open grasslands at American Camp by digging warrens. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from Alternative 1 and cumulative impacts to wildlife would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Impacts to wildlife from Alternative 2 would be similar as those described under Alternative 1. With the absence of prescribed fire, more emphasis would be put on using mechanical and manual fuel treatment methods. The absence of prescribed fire would eliminate the benefits to wildlife from increased fertilization of soils from ash. There would be less diversity in plant species for wildlife to browse. Noxious weeds and/or fire-intolerant plant species would continue to increase in number and out-compete the favorable native species thus impacting wildlife foraging opportunities.

Alternative 2 – Wildlife Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	15
2006	Mechanical/Manual	11	20
2007	Mechanical/Manual	11	0
2008	Mechanical/Manual	11	25
2009	Mechanical/Manual	11	10
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts associated with this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Impacts to wildlife from Alternative 3 would be similar to those described under Alternative 1 with increased prescribed fire use in grasslands at American Camp.

Alternative 3 – Wildlife Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	35	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	100	33
2007	Mechanical/Manual	11	20
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	75	41
2009	Mechanical/Manual	11	20
	Prescribed Fire	30	73
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Specific Consequences to Wildlife from Project Activities under Alternative 3

American Camp

Redoubt Unit 1 (2005)

This project would burn 10 acres of grassland habitat. The wildlife in this area includes foxes, European rabbit, grasshoppers, and birds. The project would have short-term impacts to wildlife from disturbance and fire. Most wildlife would move out of the project area. Individual mortality of those species that are unable to move could occur. However, in the long-term, if project goals are accomplished, they would result in the restoration of native forage and the reduction in invasive exotic vegetation, therefore improving the overall quality of wildlife habitat.

Redoubt II (2006)

This project would burn 100 acres of grassland habitat. The wildlife in this area includes foxes, European rabbit, grasshoppers, and birds. The project would have short-term impacts to wildlife from disturbance and fire. Most wildlife would move out of the project area. Individual mortality of those species that are unable to move could occur. However, in the long-term, if project goals are accomplished, they would result in the restoration of native forage and the reduction in invasive exotic vegetation, therefore improving the overall quality of wildlife habitat.

American Camp Mixco #1 and #2 (2007, 2008)

These projects would burn 30 acres in mixed conifer habitat. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

West Boundary (2008)

This project would result in the burning of 50 acres of grassland habitat. The wildlife in this area includes foxes, European rabbit, grasshoppers, and birds. The project would have short-term impacts to wildlife from disturbance and fire. Most wildlife would move out of the project area. Individual mortality of those species that are unable to move could occur. However, in the long-term, if project goals are accomplished, they would result in the restoration of native forage and the reduction in invasive exotic vegetation, therefore improving the overall quality of wildlife habitat.

Grandma's Cove Rx (2009)

This project would burn 30 acres of grassland habitat. The wildlife in this area includes foxes, European rabbit, grasshoppers, and birds. The project would have short-term impacts to wildlife from disturbance and fire. Most wildlife would move out of the project area. Individual mortality of those species that are unable to move could occur. However, in the long-term, if project goals are accomplished, they would result in the restoration of native forage and the

reduction in invasive exotic vegetation, therefore improving the overall quality of wildlife habitat.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

These projects would burn 64 acres over a period of five years for initial treatment and 99 acres of retreatment activities. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

British Camp Mixco #1 (2007)

This project would burn 10 acres in one year in mixed conifer habitat. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

British Camp Mixco #2 (2009)

This project would burn 15 acres over one year in mixed conifer habitat. The wildlife associated with the mixed conifer habitat includes Columbia black-tailed deer, red fox, small mammals, raptors and songbirds. The project would have short-term impacts on wildlife from disturbance from fire related activities. Most wildlife species would move away from the project area during the burn, however, there may be some unable to move away, resulting in the potential for direct mortality. In the long-term, improved forage for wildlife species would result from the project activities resulting in improved wildlife habitat.

Cumulative Impacts

Cumulative impacts associated with this alternative would be the same as described under Alternative 1.

Conclusion

Manual fuel reduction and prescribed fire activities would temporarily displace some wildlife species. Wildlife habitat would improve in the long term with restoration of natural landscapes and the reduced potential for catastrophic fire. Fire suppression activities could cause short term, minor impacts to wildlife.

Past activities within the park that included logging, agriculture, farming, hunting and fire management have had minor to major, short to long term impacts. Present and reasonably foreseeable future management activities are being designed as to restore and maintain the

natural wildlife populations within the park. The cumulative effects of past, present, and reasonably foreseeable future activities would have negligible to minor, short term impacts to wildlife resources. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative impacts to wildlife resources would be negligible to minor and short term.

The implementation of any of the alternatives would not impair wildlife resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

The only listed species that may be impacted by the project alternatives is the bald eagle. In addition, the sensitive island marble butterfly could occur in the project areas. Therefore, only these two species will be evaluated under the alternatives. The alternatives are qualitatively assessed using presence/absence determinations and with the implementation of the mitigation measures.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Under the no-action alternative, there would be no new activities that have potential to change the current status of listed species known to inhabit or frequent the areas in or adjacent to the park. Proposed actions with potential to impact threatened and endangered species include building fire lines, fire retardant use associated with suppression activities, hazard fuel reduction, and prescribed fires.

All proposed projects would be of short duration, timed so as to not interfere with breeding and nesting seasons and designed to preserve identified species, sensitive habitats, and resources. By following these precautions, impacts to listed species would be inconsequential. Large wildland suppression fires may pose longer duration impacts from smoke, noise, and use of aircraft and retardants. In the long term, restoration efforts of mature mixed conifer forests and native vegetation types through the use of hazard fuel reduction and prescribed fire would benefit sensitive species. The risk of catastrophic wildfire would also be reduced, thus protecting habitat over time.

Alternative 1 – T & E Species Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	27	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	5	33
2007	Mechanical/Manual	11	15
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	25	36
2009	Mechanical/Manual	11	0
	Prescribed Fire	5	63
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Currently, no federally listed endangered species are associated with the park. The bald eagle is the only federally threatened species occurring in the park. Bull trout and foraging marbled murrelets, also federally threatened, occur in marine waters adjacent to the park but will not be affected by project activities. The large island marble butterfly was discovered in 1997 and several conservation groups have petitioned to have it protected under the Endangered Species Act. The island marble butterfly is located within SAJH near Redoubt and slopes to the south, South Beach, Old Town Lagoon, and at the trailhead for Jakle's Lagoon. Golden paint brush is federally threatened, known to occur in areas adjacent to the park, but has not been observed within the park and does not occur in any of the project areas.

Proper planning of fire management projects would occur to minimize potential impacts to sensitive species. If threatened and endangered species are found in or adjacent to treatment areas, buffer zones and/or scheduling of the project would minimize impacts from noise, smoke, or change in habitat structure. Prescribed fire prescriptions would also be written to minimize smoke impacts to sensitive areas and limit the duration of noise.

The bald eagle is the only listed species known to occur in the project area. Nesting and wintering occur in the park. One known bald eagle nest is located in a tree at the San Juan visitor center parking lot. This eagle nest is one of the most productive nests on the island even though it is in an area of continuous disturbance with high human presence. The other known eagle nest is located at Mt. Finlayson, which is located in an area of moderate visitor use near existing trails, and well outside of any proposed project area.

With the mitigation measures imposed under this alternative, this alternative would result in a *may affect, likely to adversely affect* determination to the bald eagle based on disturbance from project activities. There would be no removal of the nest trees, and no direct removal of habitat. In the long term the projects would benefit the species by restoring wildlife habitat in the area.

Specific Consequences to Threatened and Endangered Species for Project Activities under Alternative 1

American Camp

Prairie Research Burn (2005, 2006, 2009)

One of these burns could be within 500 feet of the bald eagle nest at the visitor center. There is the potential for disturbance during project activities due smoke and the use of a gas powered pump. These projects are of short duration, generally less than 3 hours per project. However, since these eagles are used to human activities, it is unlikely that this project would cause nest abandonment and it would not result in direct mortality or long-term adverse impacts.

American Camp Mixco#1 (2007, 2008)

These projects will be approximately ½ mile away from the bald eagle nest at the visitor center. There could be indirect impacts from smoke if the wind direction is northeast which could cause temporary disturbance to the eagles at the nest site. This would result in short term impacts. Over the long-term, as habitat improves from project activities, bald eagles in the area could benefit from increased forage species.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

This project would not impact bald eagles or the island marble butterfly since they do not occur in the project area.

British Camp Mixco #1 (2007)

This project would not impact bald eagles or the island marble butterfly since they do not occur in the project area.

British Camp Mixco #2 (2009)

This project would not impact bald eagles or the island marble butterfly since they do not occur in the project area.

Cumulative Impacts

Impacts to threatened and endangered species from past, present, and reasonably foreseeable future activities including agricultural practices, logging, development, hunting practices, and fire management in and adjacent to the park are minor to moderate, short to long term. Present and reasonably foreseeable future management activities are being designed as to restore and maintain the desired vegetation and wildlife habitat within the park. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from Alternative 1 and cumulative impacts to wildlife would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Impacts to threatened and endangered species from Alternative 2 would be similar to those described under the Alternative 1. With the absence of prescribed fire, more emphasis would be put on using mechanical and manual fuel treatment methods. The absence of prescribed fire would eliminate the benefits to wildlife from increased fertilization of soils from ash. There would be less diversity in plant species for wildlife to browse. Noxious weeds and/or fire-intolerant plant species would continue to increase in number and out-compete the favorable native species thus impacting wildlife forage opportunities.

Alternative 2 – T & E Species Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	15
2006	Mechanical/Manual	11	20
2007	Mechanical/Manual	11	0
2008	Mechanical/Manual	11	25
2009	Mechanical/Manual	11	10
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

The bald eagle is the only listed species known to occur in the project area. Nesting and wintering occur in the park. With the mitigation measures imposed under this alternative, this alternative would result in a *may affect, but not likely to adversely affect* determination to the bald eagle. Implementing this alternative would result in fewer beneficial effects to bald eagle and other wildlife habitat.

Cumulative Impacts

Cumulative impacts associated with this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Impacts to threatened and endangered species from Alternative 3 would be similar to those described under the Alternative 1 with the exception of additional prescribed fire acres in the grasslands of American Camp.

The bald eagle is the only listed species known to occur in the project area. Nesting and wintering occur in the park. With the mitigation measures imposed under this alternative, this alternative would result in a *may affect, but not likely to adversely affect* determination to the bald eagle. There would be beneficial long-term results to habitat from the implementation of this alternative.

Alternative 3 – T & E Species Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	35	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	100	33
2007	Mechanical/Manual	11	20
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	75	41
2009	Mechanical/Manual	11	20
	Prescribed Fire	30	73
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Specific Consequences to Threatened and Endangered from Project Activities under Alternative 3

American Camp

Redoubt Unit 1 (2005)

This burn is located within ½ mile of the bald eagle nest at the visitor center. There is the potential for disturbance during project activities due smoke but project activities and mechanized equipment should not affect the eagles, since they are accustomed to noise and human presence. The project is of short duration, generally less than 4 hours per project. However, since the eagles in this are used to human activities, it is unlikely that this project would cause nest abandonment and it would not result in direct mortality or long-term adverse impacts.

The island marble butterfly does occur in the vicinity of the project area. Since the burns are limited in scale, they are unlikely to affect the population of island marble butterfly in and around the project area.

Redoubt II (2006)

This burn is located within ¼ mile of the bald eagle nest at the visitor center. There is the potential for disturbance during project activities due to smoke, human presence, and mechanized equipment. However, this should not affect the eagles, since they are accustomed to noise and human presence. This project would be accomplished within 8 hours, therefore, the impacts would be of short duration. Plus, since these eagles are used to human activities, it is unlikely that this project would cause nest abandonment and there would be no direct mortality or long-term adverse impacts.

The island marble butterfly does occur in the vicinity of the project area. Since the burns are limited in scale, they are unlikely to affect the population of island marble butterfly in and around the project area.

American Camp Mixco #1 and #2 (2007, 2008)

These projects will be approximately ½ mile away from the bald eagle nest at the visitor center. There could be indirect impacts from smoke if the wind direction is northeast which could cause temporary disturbance to the eagles at the nest site. This would result in short term impacts. Over the long-term, as habitat improves from project activities, bald eagles in the area could benefit from increased forage species.

The island marble butterfly does not occur in this project area, therefore there would be no effect from project activities to this species.

West Boundary (2008)

This project is located with 300 feet of the eagle nest at the visitor center. The burn would only be carried out if atmospheric conditions make smoke dispersal and transportation favorable, resulting in minimal impacts to the nest site from smoke. There is the potential for disturbance during project activities from mechanized equipment and human presence, however, noise and human presence should not affect the eagles, since they are accustomed to this at the visitor center parking lot.

The island marble butterfly does not occur in this project area, therefore there would be no effect from project activities to this species.

Grandma's Cove Rx (2009)

This burn is located within ¼ mile of the bald eagle nest at the visitor center. There is the potential for disturbance during project activities due to smoke, human presence, and mechanized equipment. However, this should not affect the eagles, since they are accustomed to noise and human presence. This project would be accomplished within 6 hours, therefore, the impacts would be of short duration. Plus, since these eagles are used to human activities, it is unlikely that this project would cause nest abandonment and there would be no direct mortality or long-term adverse impacts.

The island marble butterfly does not occur in this project area, therefore there would be no effect from project activities to this species.

English Camp

Young Hill Units I, II, III, IV (2005, 2006, 2007, 2008, 2009)

This project would not impact bald eagles or the island marble butterfly since they do not occur in the project area.

British Camp Mixco #1 (2007)

This project would not impact bald eagles or the island marble butterfly since they do not occur in the project area.

British Camp Mixco #2 (2009)

This project would not impact bald eagles or the island marble butterfly since they do not occur in the project area.

Cumulative Impacts

Cumulative impacts associated with this alternative would be the same as described under Alternative 1.

Conclusion

Minor short-term impacts on threatened and endangered species from fire suppression, prescribed fire, and hazard fuel reduction activities may occur under all alternatives. Habitat would improve in the long-term with restoration of desired landscapes and the reduced potential for catastrophic fire.

Implementation of any of the alternatives would result in a *may affect, but not likely to adversely affect* determination for the bald eagle. Mitigation would be in place to protect other sensitive resources, such as the island marble butterfly and golden paintbrush. Past activities within the park that included logging, agriculture, farming, hunting and fire management have had minor to major, short to long term impacts on wildlife populations. Present and reasonably foreseeable future management activities are being designed to restore and maintain the natural wildlife populations within the park. The cumulative effects of past, present, and reasonably foreseeable future activities are not likely to adversely affect listed species. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative impacts to threatened and endangered species would be negligible to minor and short term.

The implementation of any of the alternatives would not impair listed species or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

SOUNDSCAPE

Noise impacts were qualitatively assessed using proximity of sensitive receptor sites and presence/absence of resources with potential impacts.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Activities proposed in Alternative 1 that have potential to impact resources include vehicular traffic, engines, portable pumps, chainsaws, lawn mowers, and aircraft.

Alternative 1 – Soundscape Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	27	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	5	33
2007	Mechanical/Manual	11	15
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	25	36
2009	Mechanical/Manual	11	0
	Prescribed Fire	5	63
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Noise has the potential to impact both humans and wildlife. For humans, noise can affect recreational experiences and enjoyment of natural environments. For wildlife, noise may disrupt activities such as hunting, breeding, and nesting. This is of particular concern with sensitive, threatened and endangered species.

To minimize noise impacts, projects that may generate noise would not be scheduled on holidays and may be limited in duration near areas of high visitor use such as popular trails. Sensitive receptor sites such as bald eagle nests would have adequate buffer zones in which project work would be limited during nesting seasons. Aircraft use for fire management would be limited to wildland fire suppression fires that require aircraft support to control. This would be a very rare event.

Even with the mitigation measures, there could be minor to moderate, short-term impacts to the natural soundscape from the implementation of this alternative.

Cumulative Impacts

Noise impacts from past, present, and reasonably foreseeable future activities including agricultural practices, logging, development, hunting practices, and fire management in and adjacent to the park are negligible to minor and short term. There are no proposed or designated wilderness areas in or adjacent to the park and most of the island is developed with roads for vehicle traffic and there are frequent aircraft over flights at both camps. Motorized watercraft and mechanized equipment also add to ambient noise within the park. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts from noise would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Noise impacts would be the similar to those listed under Alternative 1 with the exception of no prescribed fire. This would lead to more chainsaw use to reduce fuels in and around developed areas thus increasing potential impacts from minor to moderate.

Alternative 2 – Soundscape Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	15
2006	Mechanical/Manual	11	20
2007	Mechanical/Manual	11	0
2008	Mechanical/Manual	11	25
2009	Mechanical/Manual	11	10
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Noise impacts would be the same as those listed under Alternative 1.

Alternative 3 – Soundscape Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	35	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	100	33
2007	Mechanical/Manual	11	20
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	75	41
2009	Mechanical/Manual	11	20
	Prescribed Fire	30	73
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Conclusion

Impacts to the natural soundscape would be minor to moderate, localized, and short-term during project activities. Manual fuel reduction and prescribed fire activities would generate noise from chainsaws, pumps and vehicles. Past, present, and reasonably foreseeable future management activities are being designed as to restore and maintain the natural and historical conditions

within the park. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative impacts from noise to human and wildlife would be negligible to minor, localized, and short term.

The implementation of any of the alternatives would not impair resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

AIR QUALITY

Air quality impacts were qualitatively assessed after review of NPS best management practices to reduce air emissions and the extent of proposed prescribed fire activities and wildland fire potential in each alternative.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Activities proposed under Alternative 1 with potential to impact air quality, both beneficially and negatively, include prescribed fire, hazard fuel reduction, and fire suppression. The use of vehicles and mechanized equipment such as chainsaws, could affect air quality in a localized area.

FOFEM Smoke Emission Modeling – Alternative 1			
▪ Grass Fuel Types - Modeled using Fescue Grassland defaults with typical loading, dry conditions			
Emissions - lbs/acre			
	Flaming	Smoldering	Total
PM 10	9	0	9
PM 2.5	7	0	7
CH 4	2	0	2
CO	18	0	18
CO 2	4994	0	4994
Consumption = 1.4 tons/ac Duration = 00:01:00 (hr/min/sec)			
Year	Planned Acres in Grass Fuel Types		Total tons/year
2005	27		37.8
2006	5		7
2007	0		0
2008	25		35
2009	5		7

■ Timber Fuel Types – Modeled using Int. Douglas-fir defaults, typical loading, dry conditions			
Emissions - lbs/acre			
	Flaming	Smoldering	Total
PM 10	7	454	461
PM 2.5	6	385	391
CH 4	2	234	236
CO	14	5125	5139
CO 2	3823	20860	24683
Consumption = 9.47 tons/ac Duration = 00:44:45 (hr/min/sec)			
Year	Planned Acres in Timber Fuel Types		Total tons/year
2005	16		151.52
2006	33		312.51
2007	30		284.1
2008	41		388.27
2009	73		691.31

Smoke consists of dispersed airborne solids and liquid particles (particulates) that could remain suspended in the atmosphere for a few days to several months. Particulates can reduce visibility and contribute to respiratory problems. Very small particulates can travel great distances and add to regional haze problems. Regional haze can sometimes result from multiple burn days and/or multiple owners burning within an airshed over too short a period of time to allow for dispersion.

The Washington State Department of Natural Resources Smoke Management office in Olympia, Washington provides smoke management guidance for Western Washington. Smoke permits are required when burning over 100 tons of vegetative debris per day. Most prescribed fires planned in the park are well under the 100 ton total fuel load per day. However, coordination with the DNR and local fire jurisdictions is crucial to minimizing impacts to air quality.

Strategies to manage smoke and reduce air quality impacts, as discussed in the mitigation section of this document, would be utilized for all fire activities. Thus, management-ignited fires would result in minor to moderate, short-term adverse impacts to air quality during burning activities.

The use of vehicles and mechanized equipment could generate fumes in the form of smoke and exhaust from use of fossil fuels, and generate dust and particulate matter. This would affect air quality in the immediate area around the suppression activities on a short-term basis, creating minor temporary impacts.

Cumulative Impacts

Air quality impacts from past, present, and reasonably foreseeable future activities including agricultural practices, development, and fire management in and adjacent to the park are negligible to minor and short term. There are no major emission sources within the park. Regional haze contributions originate from Victoria, British Columbia and the Puget Sound area of Washington, which produces smog emissions as a dense urban area. Paper mills located on the Olympic Peninsula can also contribute to smog. Occasional, small scale and short duration prescribed fires may cause negligible to minor, localized, short term air quality impacts.

Accepting short term impacts would reduce the potential of moderate to major impacts that can occur during significant wildland fire events. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts from noise would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

In the short term, Alternative 2 would have less potential for air quality impacts than Alternative 1 due to the absence of prescribed fire. The potential for wildfires to cause impacts to air quality would increase over time as fuel accumulations that would have been reduced by prescribed fire continue to increase and become available during a wildland fire. No smoke emission modeling was completed since no prescribed fire is included in this alternative.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Alternative 3 would have similar impacts to those described under Alternative 1 with the addition of prescribed fire acres within the grasslands at American Camp.

FOFEM Smoke Emission Modeling – Alternative 3			
■ Grass Fuel Types - Modeled using Fescue Grassland defaults with typical loading, dry conditions			
Emissions - lbs/acre			
	Flaming	Smoldering	Total
PM 10	9	0	9
PM 2.5	7	0	7
CH 4	2	0	2
CO	18	0	18
CO 2	4994	0	4994
Consumption = 1.4 tons/ac Duration = 00:01:00 (hr/min/sec)			
Year	Planned Acres in Grass Fuel Types		Total tons/year
2005	35		49
2006	100		140
2007	0		0
2008	75		105
2009	30		42

■ Timber Fuel Types – Modeled using Int. Douglas-fir defaults, typical loading, dry conditions			
Emissions - lbs/acre			
	Flaming	Smoldering	Total
PM 10	7	454	461
PM 2.5	6	385	391
CH 4	2	234	236
CO	14	5125	5139
CO 2	3823	20860	24683
Consumption = 9.47 tons/ac Duration = 00:44:45 (hr/min/sec)			
Year	Planned Acres in Timber Fuel Types		Total tons/year
2005	16		151.52
2006	33		312.51
2007	30		284.1
2008	41		388.27
2009	73		691.31

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Conclusion

There would be no new air quality impacts from Alternative 1, 2, or 3. However, impacts from management-ignited burns would occur under Alternatives 1 and 3, thus resulting in minor to moderate, short-term adverse impacts to area air quality during the duration of the burn. The use of vehicles and mechanized equipment could generate fumes in the form of smoke and exhaust from use of fossil fuels, and generate dust and particulate matter. This would affect air quality in the immediate area around the suppression activities on a short-term basis, creating minor temporary impacts.

When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative air quality impacts would be negligible to minor, localized, and short term.

The implementation of any of the alternatives would not impair air quality or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

VISITOR USE AND EXPERIENCE (RECREATION AND VISUAL RESOURCES)

Recreation impacts were qualitatively assessed in light of the intensity and duration of fuel treatment activities as they relate to visitor use and experience. Visual resource impacts were assessed in terms of scenic integrity, visual wholeness, and unity of the landscape.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

There would be some short-term reduction in scenic integrity and visitor use during and immediately following any thinning, prescribed fire, or wildland fire suppression activities associated with the presence of engines and fire crews. Short term reduction in scenic integrity would be minor because fire management activities would involve only short-term presence of vehicles and fire personnel, minimum impact tactics would be used in all activities, and smoke accumulations would be temporary since prescribed fires would be ignited under favorable conditions for smoke dispersion.

Prescribed fires would likely produce short-term smoke accumulations that impact local visual quality. Minimizing smoke emissions through best management practices and prohibiting prescribed fires during times of peak recreation use would reduce short-term impacts.

Visitor use could be temporarily affected under this alternative since access to locations where crews were conducting thinning, prescribed fire, and suppression activities could be restricted. Visitors may not be able to visit their preferred or planned area. Up to 5 closures per year would be used with most being less than one day in duration. Mitigation includes press releases, public notifications, and signs to notify visitors. The impact from closures could be minor to major, depending on the visitor's plans and flexibility, and the amount of open acreage available nearby for visitor use.

Associated interpretive programs that focus on prescribed fire would help educate park visitors about the historic role of fire in grassland and forest ecosystems. It is likely that visitors who might otherwise have their experience affected by the presence of fire management activities would perceive the impact to be less after exposure to interpretive information.

Cumulative Impacts

Impacts to visitor use and experience from past, present, and reasonably foreseeable future activities including agricultural practices, development, and fire management activities in and adjacent to the park are negligible to minor and short term. Occasional, small scale and short duration prescribed fires may require portions of the park to be temporarily closed for safety reasons. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts to visitor use and experience would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

General impacts to visitor use and experience would be similar to those described under Alternative 1, minus the short-term impacts of closures related to prescribed fire activities.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

General impacts to visitor use and experience would be the same as those described under Alternative 1.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Conclusion

There would be no new visitor use impacts from alternative 1, 2, or 3. Visitors would continue to face temporary closures due to management activities related to these alternatives, resulting in minor to major, short term adverse impacts. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative visitor use impacts would be negligible to minor, localized, and short term.

The implementation of any of the alternatives would not impair visitor use and recreation or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

LAND USE

Land use impacts were qualitatively assessed by evaluating park boundary issues and potential effects to neighboring land owners.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Though the fire management activities would not directly affect neighboring land use, adjacent land owners would be able to view fire management activities. Work adjacent to park boundaries could have negligible to minor, short-term impacts on adjacent land owners from the presence of work crews, the use of fire, and visual impacts from smoke and manual fuel reduction activities. Short term closures of recreational trails and access routes may be implemented for safety reasons. Up to 5 closures per year could be used with most being less than one day in duration. Public information would be provided to communicate the need for the closure and provide educational information on the fire project. However, in the long-term, ecological conditions would improve in these areas as restoration goals are accomplished. In addition, fuel reduction activities would result in reduced risk of wildland fire, which affords better protection to the adjacent lands.

Cumulative Impacts

Impacts to land use from past, present, and reasonably foreseeable future activities include agricultural practices, the establishment and development of the historical park, and past and future fire management activities in and adjacent to the park. These impacts, in particular the establishment of the park, have resulted in moderate to major, long term beneficial and adverse

impacts. The park is protected from private development. The park is managed under NPS laws, policies and guidelines. Adjacent land owners may view this as a beneficial or as an adverse effect. When considering past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts to land use would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

The impacts from this alternative would be similar to Alternative 1 minus the effects to adjacent land owners from prescribed fire activities.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

The impacts from this alternative would be the same as Alternative 1.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Conclusion

Work adjacent to park boundaries could have negligible to minor, short-term impacts on adjacent land owners from the presence of work crews, the use of fire, and visual impacts from smoke and manual fuel reduction activities. However, over the long-term, ecological conditions would improve in these areas as restoration goals are accomplished. In addition, fuel reduction activities would result in reduced risk of wildland fire, which affords better protection to the adjacent lands.

HUMAN HEALTH AND SAFETY

Human health and safety impacts were qualitatively assessed through determination of activities, equipment and conditions that could result in injury, literature review of type and extent of injury caused by equipment and conditions, and in light of mitigation measures and best management practices.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Factors most likely to adversely impact firefighter health and safety include activities associated with wildland fire suppression efforts (accidental spills, injuries from the use of fire-fighting equipment, smoke inhalation, and, in severe cases, injuries from wildland fires). Impacts to the public could include smoke inhalation, and in severe cases, injuries from wildland fires.

Accidental spills of fire retardants and foams are the most likely to adversely impact human health and safety. Fire retardants used in controlling or extinguishing fires contain about 85% water, 10% fertilizer, and 5% minor ingredients such as corrosion inhibitors and bactericides.

Fire suppressant foams are more than 99% water. The remaining 1% contains surfactants, foaming agents, corrosion inhibitors, and dispersants. These qualified and approved wildland fire chemicals have been tested and meet specific requirements with regard to mammalian toxicity as determined by acute oral and dermal toxicity testing as well as skin and eye irritation tests (USDA, 2001). However, they are strong detergents, and can be extremely drying to skin. All currently approved foam concentrates are irritating to the eyes as well. Application of a topical cream or lotion can alleviate the effects of a retardant, and protective goggles can prevent any injury to the eyes when using foams.

Fuel break construction can pose safety threats to firefighters. Injuries can occur from the use of equipment as well as from traveling overland to targeted areas for firefighting efforts during suppression efforts. While each of the crew is trained in the use of firefighting equipment, accidental injuries may occur from time to time. Strict adherence to guidelines concerning firefighter accreditation, and equipment and procedural safety guidelines would minimize accidents.

Smoke inhalation can also pose a threat to human health and safety. Smoke from wildland fires is composed of hundreds of chemicals in gaseous, liquid, and solid forms. The chief inhalation hazard appears to be carbon monoxide (CO), aldehydes, respirable particulate matter with a median diameter of 2.5 micrometers (PM_{2.5}), and total suspended particulate (TSP). Adverse health effects of smoke exposure begin with acute, instantaneous eye and respiratory irritation and shortness of breath, but can develop into headaches, dizziness, and nausea lasting up to several hours. Based on a recent study of firefighter smoke exposure, most smoke exposures were not considered hazardous, but a small percentage routinely exceeded recommended exposure limits for carbon monoxide and respiratory irritants (USDA, 2000b).

Use restrictions applied to areas of wildland fires or prescribed fires would minimize or eliminate public human health and safety concerns resulting from smoke exposure and fire injuries. When using prescribed fire, mitigation measures, such as construction of fire lines, the presence of engines, and strict adherence to prescribed fire plans, would minimize the potential for an out-of-prescription burn or escape. Elements of the prescribed fire plan that relate to ensuring a safe burn include such measures as fuel moisture, wind speed, rate of fire spread, and estimated flame lengths. While the potential for a fire escape will always exist when conducting prescribed fires, that potential is extremely small. Recent statistics summarized by the Boise Interagency Fire Center report that approximately 1% of prescribed fires on federal lands required suppression activities of some kind. In most cases these prescribed fires jumped a control line and suppression tactics were successfully used to control them. Out of the 1% of prescribed fires that required suppression, 90% were controlled without incident. Statistically, this result leaves about 0.1% of prescribed fires that required major suppression actions.

As a result of the potential risks associated with the implementation of Alternative 1, impacts to human health and safety would be adverse, minor to moderate, short to long-term.

Cumulative Impacts

Impacts to human health and safety from past, present, and reasonably foreseeable future activities including development and park management activities are negligible to minor and

short term. Potential impacts are easily mitigated through proper planning and by following established safety guidelines while engaged with fire operations or other park maintenance activities. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts to visitor use and experience would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

General impacts to visitor use and experience would be similar to those described under Alternative 1, minus the short-term impacts of prescribed fire.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

General impacts to visitor use and experience would be similar to those described under Alternative 1.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Conclusion

There would be no new impacts to human health and safety from Alternative 1, 2, or 3. Implementation of a sound fire management program that utilizes hazard fuel reduction along with prescribed fire would provide increased safety to human life and property in the long term. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative human health and safety impacts would be negligible to minor, localized, and short term.

CULTURAL RESOURCES

Cultural resource impacts were qualitatively assessed through a presence/absence determination of significant cultural resources and mitigation measures to be employed during wildfire suppression, thinning, and prescribed fire activities. Generally the entire park has been heavily impacted by past activities, including agricultural practices, grazing, and logging. Therefore the integrity of the resources has been impacted previously, and the implementation of the alternatives would not add to these effects.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Proposed activities with the potential to impact cultural resources include building fire lines, thinning, and prescribed fire.

Alternative 1 – Cultural Resources Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	27	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	5	33
2007	Mechanical/Manual	11	15
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	25	36
2009	Mechanical/Manual	11	0
	Prescribed Fire	5	63
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Known cultural sites that could be potentially affected during thinning, fire line construction and slash piling would be avoided to eliminate damage. Site boundaries would be clearly marked for avoidance, and sites would be monitored during and after completion of the activities. Because these sites would be avoided, there would be no effect to these cultural resource sites. Sites with combustible materials (i.e. exposed wood) that cannot be avoided during prescribed fires would be covered with fire resistant foam or fire shelters. If needed, a fire line would be built around the perimeter of these sites. Fuels would be removed from the interior of the sites and from the area surrounding the site to maintain low burn temperatures. Burning out may also take place around the site to reduce fuel accumulations. Particularly sensitive sites would be protected by pre-burn fuel reduction actions described above and/or deployment of on-site protection resources during the burn. Burning over chipped stone scatters does not require additional protective measures. Burning is considered to have no adverse effect on these cultural resource sites.

Cumulative Impacts

Impacts to cultural resources from past, present, and reasonably foreseeable future activities including agriculture, development, and park management activities are negligible to major, short to long term. Past agricultural practices had major, long term impacts on surface or near surface cultural resources due to ground disturbance from plowing, crop planting, and grazing. Present and reasonably foreseeable activities have negligible and short term impacts on these resources. Mitigation measures are in place to avoid further impacts to cultural resources. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts to cultural resources would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Proposed activities with the potential to impact cultural resources include building fire lines and thinning. Impacts to cultural resource sites from these activities are similar to those described under Alternative 1, minus the prescribed fire activities.

Alternative 2 – Cultural Resources Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	15
2006	Mechanical/Manual	11	20
2007	Mechanical/Manual	11	0
2008	Mechanical/Manual	11	25
2009	Mechanical/Manual	11	10
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Impacts to cultural resource sites from these activities are the same as those described under Alternative 1.

Alternative 3 – Cultural Resources Planned acres per year*		Planned Acres Grass Fuel Type	Planned Acres Timber Fuel Type
2005	Mechanical/Manual	11	48
	Prescribed Fire	35	16
2006	Mechanical/Manual	11	20
	Prescribed Fire	100	33
2007	Mechanical/Manual	11	20
	Prescribed Fire	0	30
2008	Mechanical/Manual	11	25
	Prescribed Fire	75	41
2009	Mechanical/Manual	11	20
	Prescribed Fire	30	73
*Funding and fire activity levels may dictate shifting projects to different years slightly altering the total yearly acres listed.			

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under alternative 1.

Conclusion

There would be no new impacts to cultural resources from Alternatives 1, 2, or 3. Sites would be avoided and/or protected during project activities. The alternatives would allow for a proactive program that could plan manual fuel reduction and prescribed fire treatments in and around cultural resource sites to reduce the potential for wildland fire, thus protecting the sites during suppression activities. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative cultural resource impacts would be negligible to minor, localized, and short term.

The implementation of any of the alternatives would not impair cultural resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the park, (2) key to the natural or cultural integrity of the park or opportunities for enjoyment of the park, and (3) identified as a goal in the park's general management plan or other Park Service planning documents.

PARK OPERATIONS/INTERAGENCY COOPERATION

Impacts to park operations and interagency cooperation were qualitatively assessed through determination of activities under each alternative that may affect park operations and the amount of support required from an interagency level.

Alternative 1 – (No Action) Continue with current program of wildland fire suppression with mechanical/manual fuel reduction and limited prescribed fire.

Proposed activities that have potential to impact park operations and interagency cooperation includes wildland fire suppression and prescribed fires. Hazard fuel reduction projects have minimal potential to impact park operations.

The park has a limited number of permanent and seasonal personnel with which to operate. The fire management support is provided as a collateral duty by Olympic National Park's fire management staff. There is a Memorandum of Understanding with the San Juan County Fire Department to provide fire suppression support for wildland fires within the park. Assistance from the county fire department is provided for prescribed fire support.

In the event of a significant wildland fire, fire personnel from Olympic National Park as well as personnel from the interagency community would be transported to the island to relieve or assist the county firefighting resources with suppression actions. Mitigation measures to reduce impacts to park operation would include proactive public education and information programs to provide park visitors information with information about fire management activities.

Cumulative Impacts

Impacts to park operations and interagency cooperation from past, present, and reasonably foreseeable future activities including are negligible and short term. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from this alternative and cumulative impacts to cultural resources would be negligible to minor and short term.

Alternative 2 – Wildland fire suppression with mechanical/manual fuel reduction; No prescribed fire.

Impacts to park operations and interagency cooperation would be the same as those described under Alternative 1.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Alternative 3 – Wildland fire suppression with mechanical/manual fuel reduction and prescribed fire.

Impacts to park operations and interagency cooperation would be the same as those described under Alternative 1.

Cumulative Impacts

Cumulative impacts from this alternative would be the same as described under Alternative 1.

Conclusion

There would be no new impacts to park operations or interagency cooperation from Alternative 1, 2, or 3. When viewed with past, present, and reasonably foreseeable future actions, there would be negligible cumulative contributions from all of the alternatives and cumulative park operations or interagency cooperation impacts would be negligible and short term.

CHAPTER 5 – CONSULTATION AND COORDINATION

Scoping occurred between April 1 and May 1, 2004. A total of 195 scoping letters were sent to individuals, organizations, and agencies on the park's mailing list, requesting feedback on the fire management program. Along with letters, an attachment outlining the fire history of the area and the fire management plan process was provided.

Two individuals, one federal government agency (Bureau of Land Management), and representatives of the County Emergency Management Department, the Cattle Point Water District Commissioners, and the Lummi Nation responded with scoping comments.

Agencies and organizations contacted for information that assisted in identifying issues, or that would be given an opportunity to review and comment on this environmental assessment include:

FEDERAL AGENCIES

Department of Agriculture
U.S. Forest Service
Olympic National Forest
Forest Supervisor
Pacific District Ranger

Department of the Interior
Fish and Wildlife Service, Western Washington Office

Department of Transportation
Federal Highway Administration, Western Federal Lands Highway Division

STATE AGENCIES

State of Washington
Department of Fish and Wildlife, Region 6
Department of Ecology
Department of Natural Resources
State Historic Preservation Office

NATIVE AMERICAN TRIBES

Lummi Nation

OTHER GROUPS AND INDIVIDUALS

All groups and individuals included on the official park mailing list.

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APPENDIX A – List of Acronyms

ACHP	Advisory Council on Historic Preservation
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DNR	Department of Natural Resources
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
FMP	Fire Management Plan
GMP	General Management Plan
HBC	Hudson’s Bay Company
IAC	Interagency Committee
IDT	Interdisciplinary Team
MIST	Minimum Impact Suppression Techniques
MOU	Memorandum of Understanding
MPD	Multiple Property Document
NEPA	National Environmental Policy Act of 1969
NHL	National Historic Landmark
NHP	National Historical Park
NP	National Park
NPS	National Park Service
NRCA	Natural Resource Conservation Area
OMSI	Oregon Museum of Science and Industry
TSP	Total Suspended Particulates
VIP	Volunteers in the Park
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

APPENDIX B – Glossary

Appropriate Management Response Specific actions taken in response to a wildland fire to implement protection and wildland fire use objectives.

Broadcast Burn Prescribed fire applied to wildland fuels scattered over an area (in contrast to “pile burns”, where the fuels are placed into piles.)

Confinement Confinement is the strategy employed in appropriate management responses where a fire perimeter is managed by a combination of direct and indirect actions and use of natural topographic features, fuel, and weather factors.

Crown Fire A fire spreading through the crowns of trees.

Cultural Resources These resources include archeological sites, ethnographic information, cultural landscapes and historic structures.

Debris Disposal Debris disposal is burning of wildland fuels deemed infeasible or impractical to mechanically remove, and must be in a non-wildland fuel environment (parking lot, boneyard, gravel pit, etc.) Any material being burned for debris disposal must be classified as permissible to burn under applicable Federal, State, and Local regulations.

Designated Areas are critical areas in Washington State designated by the Department of Ecology that are otherwise subject to air pollution from other sources. These currently are Port Angeles, Spokane, Grays Harbor, Raymond, and the I-5 corridor from Bellingham south to Vancouver.

Emergency Fire Rehabilitation/Burned Area Emergency Rehabilitation (EFR/BAER)

These are planned actions taken during and after a wildland fire to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire.

Emergency Spill Response This is the response to any amount of a regulated waste or hazardous material that is spilled to the environment (air, land, surface waters, ground waters) that may detrimentally affect health, the environment, or property.

Fire Resources Fire resources are the people and equipment needed to manage or suppress wildland fires. These resources include, but are not limited to: overhead teams, firefighters, resource advisors, engines, helicopters, and retardant aircraft.

Fire Regime A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability.

Fire Return Interval The number of years between two successive fire events in a given area.

Fire Suppression Activity Damage Emergency actions taken to repair or rehabilitate damage to lands, resources, and facilities directly attributable to the wildland fire suppression effort or activities.

Fireline Intensity This is the amount of heat released per unit time per unit length of fire line.

Hazard Fuels Excessive live and/or dead wildland fuel accumulations (either natural or created) having the potential to for the occurrence of uncharacteristically intense wildland fire.

Hazard Fuel Reduction Hazard fuel reduction projects remove excessive live or dead fuel to protect life and property, including communities at risk and municipal watersheds; natural resources, including critical native plant communities and their processes, and threatened and endangered species; and important cultural resources. These treatments, a variety of fire and non-fire techniques, include, but are not limited to, prescribed fire and wildland fire use, mechanical, chemical, biological, and manual methods.

Historic Value Structures Structures that are on the list of classified structures.

Holding Actions Planned actions required to achieve wildland and prescribed fire management objectives. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For fire suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries.

Initial Attack An aggressive fire suppression action consistent with firefighter and public safety and values to be protected.

List of Classified Structures (LCS) The LCS is a computerized, evaluated inventory of all historic and prehistoric structures with historical, architectural, or engineering significance in which NPS has or plans to acquire any legal interest. Included are structures that individually meet the criteria of the National Register or are contributing elements of sites and districts that meet the National Register criteria. Also included are other structures - moved, reconstructed, and commemorative structures and structures achieving significance within the last 50 years - that are managed as cultural resources because of decisions reached through the planning process. The LCS assists park managers in planning, programming, and recording decisions of appropriate treatment.

Mechanical/Manual Treatment Manual treatment is the use of hand-operated power tools and handtools to cut, clear or prune herbaceous and woody species. It is a method of reducing hazardous accumulations of wildland fuels, and is often used to create defensible space near structures. In the park, manual treatment would be used to remove excess woody debris from the ground; remove "ladder" fuels, such as low limbs and brush (which could carry fire from the forest floor into the crowns of trees); and thin dense stands of trees to reduce the horizontal continuity of fuels. Occasionally, larger mechanized equipment (a boom truck and front end loader, mower, or brush cutter) would be used to move large boles, maintain developed landscapes, or cut large areas of brush. Material cut or gathered through manual/ mechanical

treatment would usually be disposed of by piling and burning on site, or burning at an established burn pit. Other methods of disposal would include chipping and broadcast burning.

Minimum Impact Suppression Techniques (MIST) An alternative term for Minimum Impact Tactics.

Minimum Impact Tactics (MIT) Minimum Impact Tactics (also referred to as Minimum Impact Suppression Techniques) are guidelines that assist fire personnel in the choice of procedures, tools, and equipment used in fire suppression and post-fire rehabilitation. These techniques reduce soil disturbance, impact to water quality, noise disturbance, intrusions in the wilderness, and cutting or trampling of vegetation.

Natural Resources These resources include vegetation and wildlife (both terrestrial and aquatic), plus atmospheric, geologic and hydrologic features. The wilderness character of the park can be considered a natural resource or a social resource.

Pile Burning Burning of vegetative material that has been concentrated by manual or mechanical methods in a wildland fuels environment where fire may spread beyond the pile perimeter. A prescribed fire plan shall be written and approved prior to ignition for all pile burning.

Preparedness Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination.

Prescribed Fire Any fire ignited by management actions to meet specific objectives. The fuels to be burned are in either their natural or modified state under specified environmental conditions (e.g. weather and fuel moisture), confined to a predetermined area, and within a range of fire intensity and rate of spread that permits attainment of planned management objectives and is conducted in conformance with an approved prescribed fire plan meeting National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) requirements prior to ignition.

Prescribed Fire Plan A plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate agency administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals.

Prescription Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Silvicultural Burning Under the Washington Clean Air Act, silvicultural burning means burning of wood fiber on forest land consistent with the provisions of RCW 70.94.660.

Smoke Sensitive Areas are special areas in and near the park where elevated concentrations of pollutants from smoke may cause human health or environmental impacts. They include areas of heavy recreational use and population centers outside designated areas.

Unplanned and Unwanted Wildland Fires: An unplanned and unwanted fire is one burning outside the parameters as defined in land use plans and fire management plans for that location (including areas where the fire can be expected to spread) under current and expected conditions. Unplanned and unwanted fires includes fires burning in areas where fire is specifically excluded; fires that exhibit burning characteristics (intensity, frequency, and seasonality) that are outside prescribed ranges, specifically including fires expected to produce severe fire effects; unauthorized human caused fires (arson, escaped camp fires, equipment fires, etc.); and fires that occur during high fire dangers, or resource shortage, where the resources needed to manage the fire are needed for more critical fire management needs.

Wildland Fire Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Implementation Plan (WFIP) A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire use action. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e. wildland fire use actions will have two-three stages of the WFIP completed while some fires that receive a fire suppression response may only have a portion of Stage I completed). Under the preferred alternative, a suppression response is the only management option available.

Wildland Fire Management Program The full range of activities and functions necessary for planning, preparedness, emergency fire suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) The Wildland Fire Situation Analysis is a decision making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Suppression An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from a particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Wildland Fire Use The management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in predefined geographic areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan.

Wildland Fuels Combustible material that can be consumed by fire which includes naturally occurring live and dead vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees, and excessive buildups of these materials resulting from resource management and other land use activities, as well as from natural plant growth and succession.

Wildland-Urban Interface The Wildland-Urban Interface is the area where homes and structures meet the natural environment of forests and wildlands.