

**National Park Service
U.S. Department of the Interior**

**San Juan Island National Historical Park
Washington**



European Rabbit Management Environmental Assessment

July 2010



European rabbit soil and vegetation disturbance to the American Camp National Register-eligible Cultural Landscape with nonnative invasive plants, including Canada thistle (foreground) and bull thistle (center right).

Prepared by:

**National Park Service
San Juan Island National Historical Park**

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Summary

San Juan Island National Historical Park consists of two distinct units managed by the National Park Service: American Camp (494.9 hectares; 1,223 acres) at the south end of San Juan Island and English Camp (214.1 hectares; 529 acres) at the north end of the island, together encompassing 709.0 hectares (1,752 acres) of forested and grassland habitats. San Juan Island is part of the San Juan and Gulf Islands archipelago located off the northwest coast of Washington in the Strait of Georgia basin in San Juan County, Washington. The San Juan Islands are located within the rain shadow of the Olympic Mountains and therefore support relatively dry grassland habitats, rare in western Washington. The two units of the park differ significantly in amount of average annual rainfall, with American Camp receiving considerably less rainfall at 43.2-48.3 cm (17-19 inches) annually and supporting an expansive prairie ecosystem. Prior to European settlement, native prairie covered 317.1 ha (783.6 acres) of the American Camp unit. American Camp was the site of seasonal occupation by Native Americans for more than 7,000 years. European settlement of San Juan Island began in 1845 when the Hudson's Bay Company is said to have claimed the island by placing a wooden plaque on Mt. Finlayson at what is now American Camp. The period of significance of American Camp however, corresponds to the occupation by the U.S. Army from 1859 to 1874 during the Oregon Territory boundary dispute known as the Pig War. The National Park Service is tasked with managing the grassland ecosystem at American Camp and the National Register-eligible cultural landscape, including management of nonnative invasive European rabbits (*Oryctolagus cuniculus*).

This Environmental Assessment evaluates a range of alternatives and strategies for the management of European rabbits at American Camp to ensure the continued protection of cultural resources as provided for in the enabling legislation, and to ensure the protection and viability of natural resources as mandated by the Organic Act of 1916 [16 U.S.C. 1] per the purpose, mission, and goals of the park. Upon completion of this process in accordance with the National Environmental Policy Act, the National Park Service may either take no action and allow the European rabbit population to self-regulate, or take action to eradicate European rabbits from American Camp.

Through the removal of European rabbits from American Camp and preventing their future recolonization, the park seeks to eliminate and mitigate the adverse effects that rabbits are having on the natural and cultural resources of the park. European rabbits exclude native wildlife and destroy wildlife habitat, damage native plant communities, and confound efforts to restore native species. Through their burrowing, they also damage important cultural resources the park was established to protect.

BACKGROUND

San Juan Island National Historical Park was established by Congress in 1966 for the purpose of “interpreting and preserving the sites of the 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 so-called Pig War of 1859” [Public Law 89-565]. Sometime after this historic period, between 1875 and 1895, European rabbits were introduced to San Juan Island and have caused considerable damage to the natural and cultural resources within the American Camp unit of San Juan Island National Historical Park.

ALTERNATIVES CONSIDERED

This Environmental Assessment evaluates two alternatives concerning the management of nonnative European rabbits.

- Alternative A, the no action alternative, would continue the park’s current management and allow the European rabbit population at American Camp to self-regulate.
- Alternative B calls for the full removal of European rabbits from American Camp and preventing their future recolonization with continual monitoring and removal of new immigrants.

The preferred alternative and the environmentally preferred alternative is Alternative B. The park goals outlined in the 2008 General Management Plan are to 1) undertake mitigation measures to avoid or minimize harm to the park’s natural and cultural resources, and to visitors, 2) pursue strategies to protect cultural resources that would allow the integrity of the park’s cultural resources to be preserved unimpaired, 3) eliminate or control nonnative invasive plant species where feasible, and 4) restore a larger area of prairie at American Camp. Elimination of European rabbits from American Camp is crucial to accomplishing all four goals.

ENVIRONMENTAL CONSEQUENCES

Table A. Summary of the impact analysis for Alternative A (No Action Alternative) and Alternative B (Preferred Alternative).

Impact Topic	Alternative A (No Action Alternative): Continue with current management allowing European rabbit population to self-regulate	Alternative B (Preferred Alternative): Full removal and prevent future recolonization of European rabbits
Physical Resources		
Water Resources	<p>Minor long-term adverse effect on water resources at American Camp.</p> <p>Cumulative effects would be minor and long-term affecting springs and seeps along South Beach, exacerbated by predicted drier</p>	<p>Minor long-term beneficial effect on water resources at American Camp.</p> <p>Cumulative effects would be beneficial to spring and seeps along South Beach by increasing soil moisture retention.</p>

	summers due to climate change.	
Soils	<p>Major long-term adverse effect on soils at American Camp.</p> <p>Cumulative effects would be major and long-term with increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>Major long-term beneficial effect on soils at American Camp.</p> <p>Cumulative effects would be beneficial in rebuilding damaged soils over time and preventing erosion.</p>
Soundscape	<p>Moderate long-term adverse effect on the soundscape at American Camp.</p> <p>Cumulative effects would be moderate and long-term due to impacts on songbird habitat.</p>	<p>Moderate short-term adverse effect and a moderate long-term beneficial effect on the soundscape at American Camp.</p> <p>Cumulative effects would be moderate and short-term from gunshot, but moderately beneficial to songbird habitat over the long-term.</p>
Biological Resources		
Terrestrial Wildlife and Wildlife Habitat	<p>Major long-term adverse effect on terrestrial wildlife and wildlife habitat at American Camp.</p> <p>Cumulative effects would be major and long-term from soil and vegetation disturbance, compounded by invasive nonnative plants, with fluctuations in the rabbit population leading to trophic cascades.</p>	<p>Major long-term beneficial effect on terrestrial wildlife and wildlife habitat at American Camp.</p> <p>Cumulative effects would be beneficial with increased vegetation cover and composition, and more stable plant-herbivore and predator-prey relationships.</p>
Invasive Species	<p>Major long-term adverse effect from invasive species at American Camp.</p> <p>Cumulative effects would be major and long-term from soil and vegetation disturbance maintaining invasive nonnative plants, with the rabbit population supporting nonnative red fox.</p>	<p>Major short-term and long-term beneficial mitigating effect on invasive species at American Camp.</p> <p>Cumulative effects would be beneficial with removal of nonnative European rabbits and elimination of a disturbance regime that favors invasive nonnative plants; red fox numbers would diminish.</p>
Threatened, Endangered, and Sensitive Species		
Bald Eagle	<p>May affect, not likely to adversely affect bald eagles at American Camp.</p> <p>Cumulative effects include the proposed realignment of Cattle Point Road and restoration of Puget prairie habitat having a short-term negative and a long-term beneficial effect, respectively.</p>	<p>May affect, not likely to adversely affect bald eagles at American Camp.</p> <p>Cumulative effects include the proposed realignment of Cattle Point Road and restoration of Puget prairie habitat having a short-term negative and a long-term beneficial effect, respectively.</p>

Island Marble Butterfly	<p>May affect, likely to adversely affect island marble butterflies at American Camp.</p> <p>Cumulative effects from soil and vegetation disturbance and competition with invasive nonnative plants preventing establishment of nectar and larval host plants.</p>	<p>May affect, not likely to adversely affect island marble butterflies at American Camp.</p> <p>Cumulative effects include restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Golden Paintbrush	<p>May affect, likely to adversely affect golden paintbrush at American Camp.</p> <p>Cumulative effects from herbivory and soil and vegetation disturbance leading to dominance by invasive nonnative plants.</p>	<p>May affect, not likely to adversely affect golden paintbrush at American Camp.</p> <p>Cumulative effects include enhancement of the golden paintbrush population and restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Cultural Resources		
Archaeological Resources	<p>Adverse effect on archaeological resources at American Camp.</p> <p>Cumulative effects include increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>No adverse effect on archaeological resources at American Camp.</p> <p>Cumulative effects would be stabilizing in rebuilding damaged soils over time and preventing erosion.</p>
Historical Resources	<p>Adverse effect on historical resources at American Camp.</p> <p>Cumulative effects include increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>No adverse effect on historical resources at American Camp.</p> <p>Cumulative effects would be stabilizing in rebuilding damaged soils over time and preventing erosion.</p>
Cultural Landscape	<p>Adverse effect on the cultural landscape at American Camp.</p> <p>Cumulative effects from soil and vegetation disturbance leading to dominance by invasive nonnative plants and increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>No adverse effect on the cultural landscape at American Camp.</p> <p>Cumulative effects would be stabilizing in rebuilding damaged soils over time and preventing erosion and include restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Visitor Experience		
Visitor Experience	<p>Minor long-term adverse effect on visitor experience at American Camp.</p> <p>Cumulative effects would be moderate and long-term from soil and vegetation disturbance, compounded by invasive nonnative plants and increased soil erosion from predicted drier summers and</p>	<p>Minor short-term adverse effect and a minor long-term beneficial effect on visitor experience at American Camp.</p> <p>Cumulative effects would be minor and short-term from removal operations, but beneficial over the long-term with increased vegetation cover resembling the historic</p>

	wetter autumns and winters due to climate change.	landscape, and include restoration of Puget prairie habitat having a long-term beneficial effect.
Socioeconomic Environment		
Socioeconomic Environment	<p>Negligible long-term effect on the socioeconomic environment in San Juan County.</p> <p>Cumulative effects would be negligible and long-term.</p>	<p>Minor short-term beneficial effect and a negligible long-term effect on the socioeconomic environment in San Juan County.</p> <p>Cumulative effects would be minor and short-term during removal operations, but negligible over the long-term.</p>

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Chapter 1: Purpose and Need

1.1 INTRODUCTION

The National Park Service (NPS) proposes to remove and prevent the recolonization of introduced nonnative European rabbits (rabbits) within the American Camp unit of San Juan Island National Historical Park (park). The purpose of this project is to eliminate the negative effects that rabbits have on the natural and cultural resources of the park.

Nonnative plants and animals are species that occur outside their native ranges as a result of direct or indirect human actions. Introduced European rabbits in San Juan Island National Historical Park are prolific colonial breeders that disturb native plant communities, degrade wildlife habitat, disrupt ecosystem processes and functioning, disturb cultural resources, and through their digging of burrows (also called warrens) create safety hazards for NPS staff, researchers, and park visitors. At American Camp, nearly 60.7 hectares (150 acres) of prairie is inhabited by European rabbits (Fig. 1). This area is nearly exclusively dominated by early seral nonnative grasses and forbs and absent resident terrestrial wildlife (i.e., birds and mammals) (Fig. 2). Through the digging of warrens, gravelly soils from lower soil horizons are excavated burying the rich prairie topsoil and disrupting the natural hydrologic regime. The rabbits also disturb historic and archeological resources in the park, including Native American remains.

This chapter describes the scope of, purpose of, and need for the project. A summary of the history of European rabbits in the park and worldwide is also provided. This chapter is organized into the following sections:

- Project Background and History
- Scope of the Analysis
- Purpose for Taking Action
- Need for Taking Action
- Park Purpose and Significance
- History of Introduced European Rabbits
- Public Scoping
- Relationship to Other Plans, Policies, and Actions
- Issues and Impact Topics

A glossary is provided for terms used in this Environmental Assessment (EA).

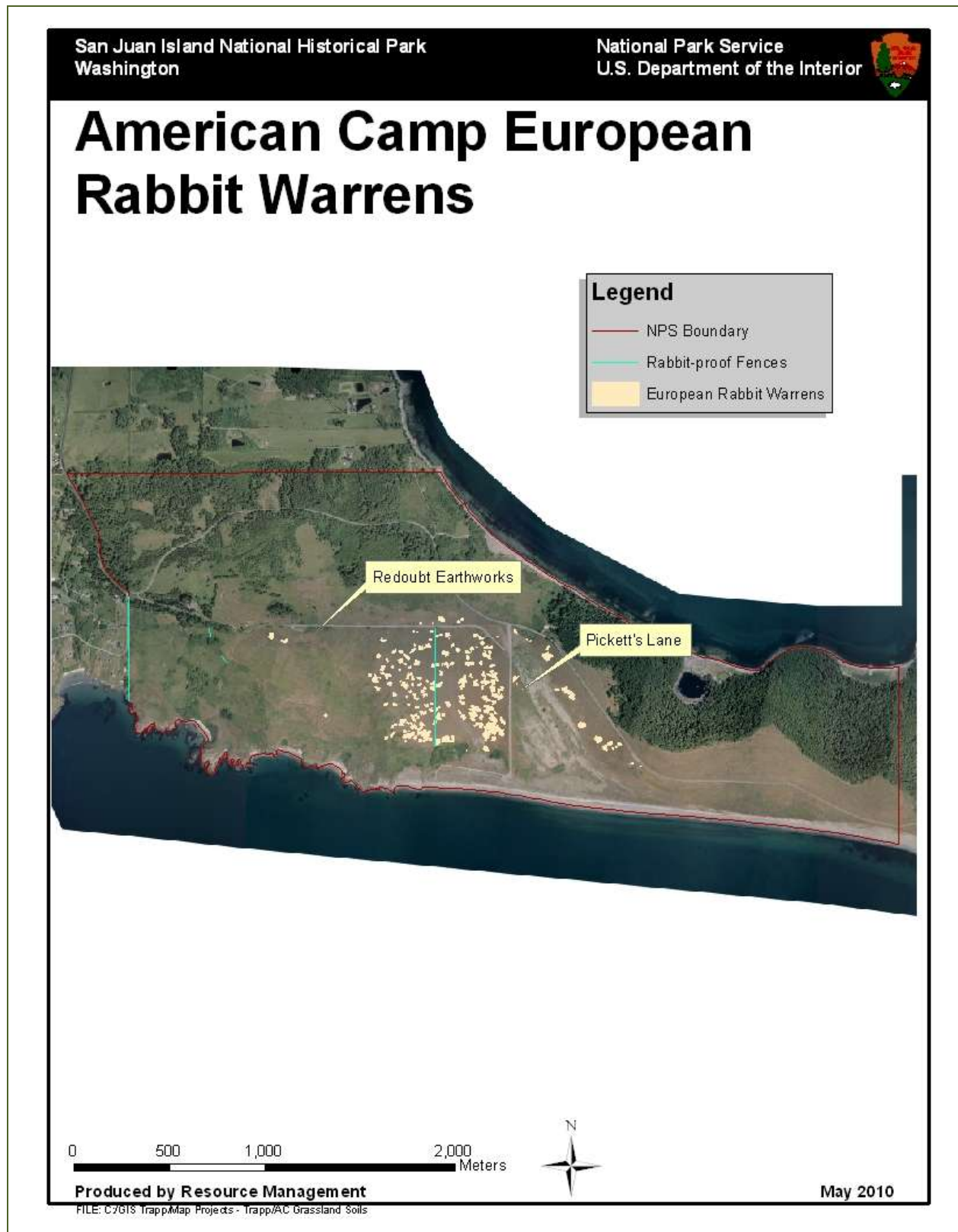


Figure 1. European rabbit warrens at American Camp mapped in March 2009.



Figure 2. European rabbit colony area viewed northeast toward the American Camp dunes, dominated nearly exclusively by early seral nonnative vegetation.

1.2 PROJECT BACKGROUND AND HISTORY

San Juan Island National Historical Park is planning a comprehensive project to restore the native prairie within the American Camp unit of the park at the southern end of San Juan Island, including enhancing habitat for the rare island marble butterfly (*Euchloe ausonides insulanus*), a Federal species of concern, and reintroduction of Federally threatened golden paintbrush (*Castilleja levisecta*). The current extent of grassland habitat at American Camp covers 290.5 hectares (717.8 acres) consisting of residual patches of native prairie and large expanses of introduced nonnative grasses and forbs. A recent soil survey of the park confirms that more than 303.5 hectares (750 acres) of soils at American Camp formed under grassland vegetation (Natural Resources Conservation Service and National Park Service 2005; Fig. 3).

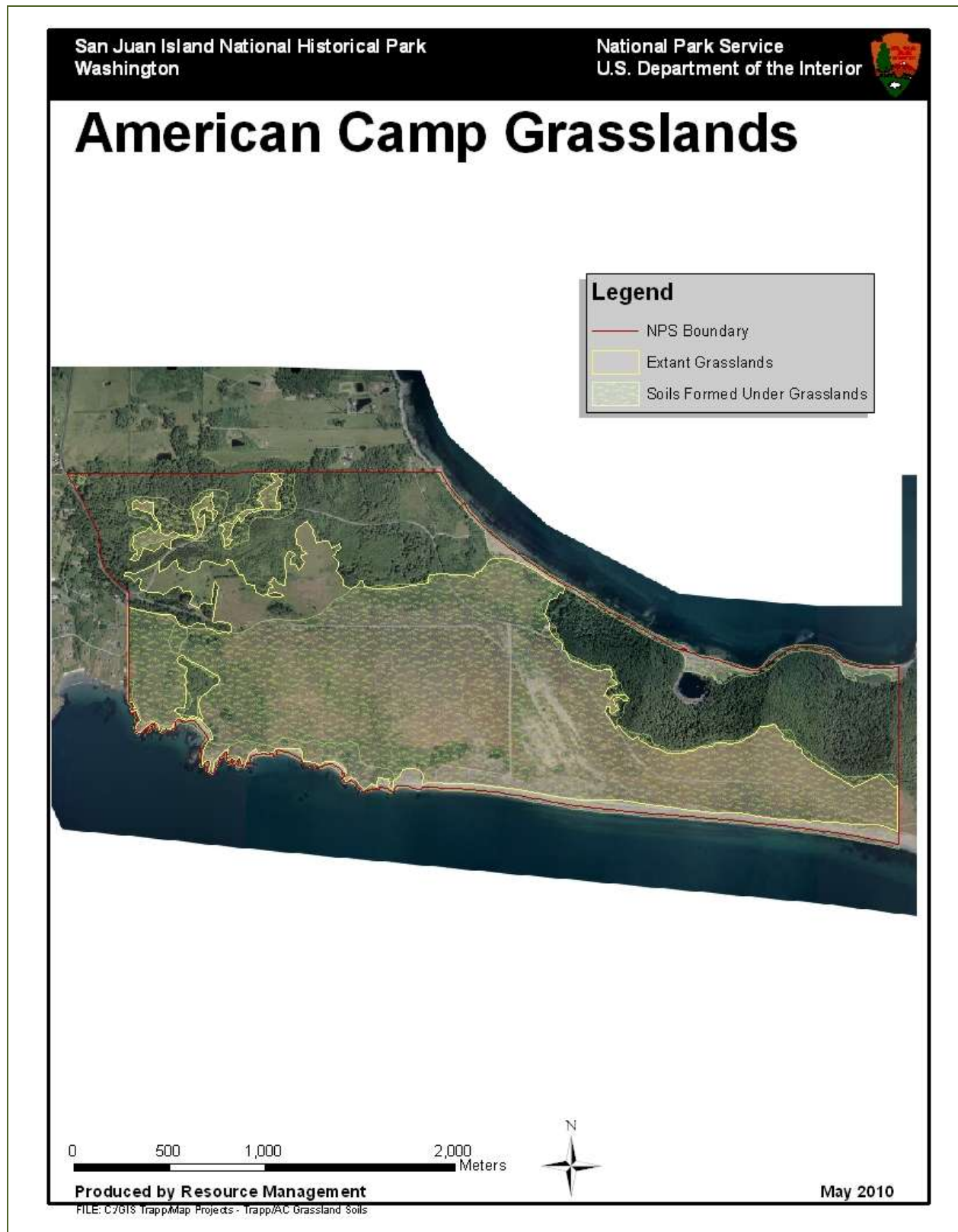


Figure 3. Soils formed under grasslands and extant grasslands at American Camp.

Introduced European rabbits currently inhabit nearly 60.7 hectares (150 acres) of the prairie at American Camp and represent one of the largest obstacles for restoration of the natural and cultural landscape. Efforts to control rabbits by the park include construction of a rabbit-proof barrier fence in 2003 along the western boundary of American Camp adjacent to the Eagle Cove subdivision to prevent colonization into the park. In 2004, two north-south barrier fences were erected west of the Grandma's Cove trail to prevent rabbits from colonizing the western portion of the prairie from the main rabbit colony area. In 2005, the park constructed a north-south barrier fence through the center of the core rabbit colony area, with the eventual goal of dividing that area into smaller management zones (Fig. 1). Completion would have required additional fencing, but was put on hold in order for the park to complete this Environmental Assessment for rabbit control. The rabbit-proof fence along the western boundary and the two fence sections west of Grandma's Cove trail appear to be effective at preventing rabbit colonization of the western portion of the prairie.

The NPS began monitoring trends of the European rabbit population in 1985. In 1996, researchers and students in the College of Forest Resources at the University of Washington continued the monitoring effort as part of a class exercise. During that time, the rabbit population at American Camp has fluctuated between an estimated high of 1,818 in 2005 to a low population estimate of 177 (± 95 -330) rabbits in 2009. The current population estimate for 2010 is 470 (± 414 -884) rabbits (West 2010; Fig. 4).

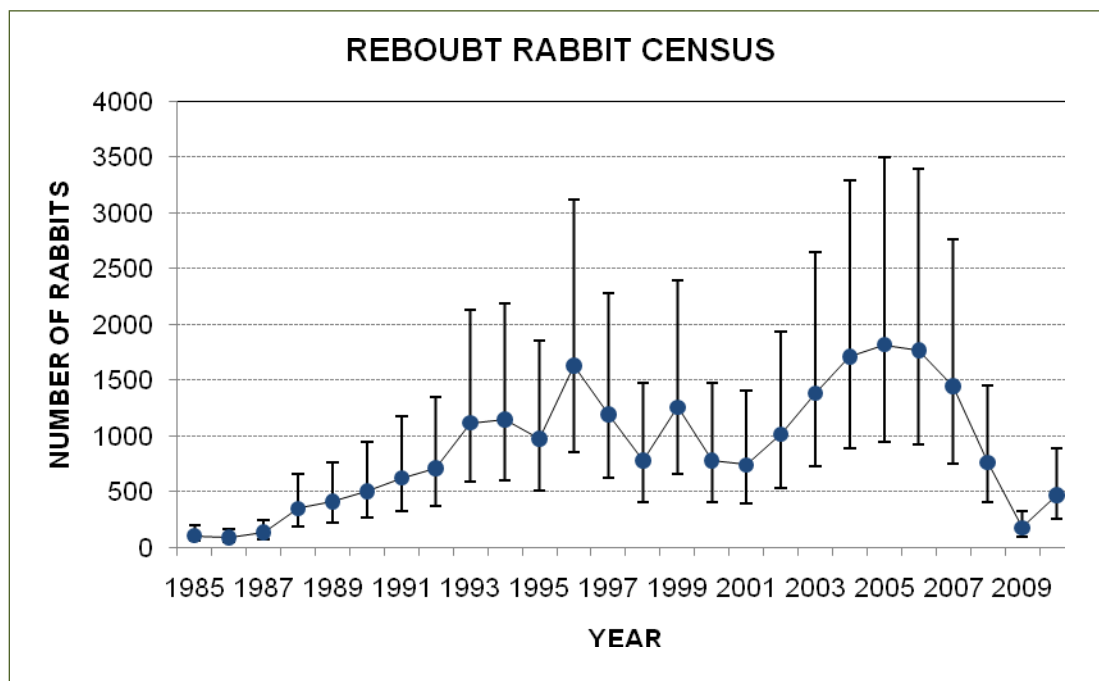


Figure 4. European rabbit population estimate from 1985-2010 with 95% confidence intervals at American Camp (West 2010).

In 2006, the park contracted with Island Conservation, a non-profit organization with extensive experience in removal of invasive exotic animals from protected natural areas, to conduct a

feasibility assessment for rabbit removal and colonization control at American Camp. Their conclusion was that rabbit removal is feasible using a combination of methods, and that colonization can be monitored and controlled over the long term to achieve the desired goal of protecting park resources from rabbit damage.

1.3 SCOPE OF THE ANALYSIS

The scope of this Environmental Assessment is to develop a long-term strategy that will mitigate and eliminate on-going impacts to park resources caused by introduced European rabbits at American Camp. The proposed action and its alternatives focus on two main areas,

- activities that are necessary to remove rabbits from American Camp, and
- activities that are necessary to prevent the recolonization of rabbits at American Camp.

This analysis does not concern rabbits elsewhere on San Juan Island outside the American Camp unit of the park. Other ecosystem management activities such as prescribed fire, planting of native species, forest thinning, or the use of herbicides are separate management actions and are or will be evaluated under separate planning documents and are not the primary focus of this EA.

1.4 PURPOSE FOR TAKING ACTION

The park seeks to eliminate and mitigate the deterioration of natural and cultural resources by European rabbits. European rabbits exclude native wildlife and destroy wildlife habitat, damage native plant communities, and confound efforts to restore native species. Through their burrowing, they also damage important cultural resources the park was established to protect.

1.5 NEED FOR TAKING ACTION

European rabbits were introduced to San Juan Island as they have been introduced to many locations around the globe. In part, owing to their ability to produce up to three litters of young per year, these introduced populations often increase very rapidly, resulting in widespread agricultural and ecological damage (Stevens 1975). The best known example of this is in Australia, where huge efforts have been undertaken and large sums of money spent trying to control introduced European rabbits and reduce their impacts (Burley 1986).

European rabbits in San Juan Island National Historical Park are considered highly invasive exotics. They exclude native wildlife and destroy wildlife habitat, damage native plant communities, and stymie efforts to restore native species. Through their burrowing, they also damage important cultural resources the park was established to protect (see section 1.7.2 for a summary of rabbit impacts to park natural and cultural resources).

The recently completed Final General Management Plan and Environmental Impact Statement (GMP) for San Juan Island National Historical Park lays out the vision and direction for park management for the next 15 to 20 years (National Park Service 2008). The GMP states that invasive plant and animal species will be eliminated where feasible and otherwise controlled to ensure the long-term survival of the native ecosystem. National Park Service *Management Policies 2006* (National Park Service 2006) provides similar guidance, as does Executive Order 13112, *Invasive Species*. Although the rabbit population in the park has decreased for several years, it has always recovered from past lows. Experts in the field of exotic animal control say the time to act is when numbers are low, increasing the likelihood of success.

1.6 PARK PURPOSE AND SIGNIFICANCE

The National Park Service was authorized by the Act of August 25, 1916 [39 Stat. 535] and amendments thereto, commonly known as the National Park Service Organic Act. Congress created the National Park Service within the Department of the Interior expressly to:

... promote and regulate the use of the Federal areas known as national parks, monuments, and reservations... by such means and measures as conform to the fundamental purposes of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. [16 U.S.C. 1]

In 1966, Congress established San Juan Island National Historical Park for the purpose of “interpreting and preserving the sites of the 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 so-called Pig War of 1859” [Public Law 89-565]. The park commemorates the final settlement and arbitration of the Oregon Territory boundary dispute and celebrates the peaceful relationship between the United States and Canada that has existed for generations.

San Juan Island National Historical Park consists of two distinct units, American Camp (494.9 hectares; 1,223 acres) and English Camp (214.1 hectares; 529 acres), which together comprise 709.0 hectares (1,752 acres) (Fig. 5). The boundary of English Camp includes an offshore island known as Guss Island. The marine ecosystems surrounding these units and the more than 10 km (6 miles) of publicly accessible shoreline in the park are renowned for their scenery. The natural assets and historical significance of the park attract more than 250,000 visitors each year, mostly during the summer months and on weekends.



Figure 5. San Juan Island National Historical Park.

American Camp contains 290.5 hectares (717.8 acres) of grassland habitat, rare in western Washington, representing one of the largest expanses of prairie in the San Juan and Gulf Islands archipelago in the Strait of Georgia basin supporting unique biodiversity. In the spring of 1998, John Fleckenstein, while conducting butterfly surveys for the Washington Department of Natural Resources, visited American Camp and collected specimens of a butterfly heretofore thought to be extinct in 1908, the only known specimens having occupied Vancouver Island and adjacent smaller islands in British Columbia (Fleckenstein and Potter 1999). The butterfly was formally described as *Euchloe ausonides insulanus*, the island marble, by Guppy and Shepard (2001) and is currently considered a Federal species of concern. Other plant and animal species whose historical range included American Camp, though now extirpated, include, Federally threatened golden paintbrush (reintroduced to American Camp in January 2010), Washington State endangered (and Federal candidate for listing as threatened or endangered) streaked horned lark

(*Eremophila alpestris strigata*), and State endangered/Federal candidate Taylor's checkerspot (*Euphydryas editha taylori*) butterfly.

Protecting and conserving these significant cultural and natural resources and ensuring their perpetuation for the enjoyment of future generations is paramount to the purpose and mission of the park. The Organic Act instructs the Secretary of the Interior that “he [she] may also provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any of said parks, monuments, or reservations” [16 U.S.C. § 3]. The 1978 Redwood amendment to the General Authorities Act of 1970 reiterates this mandate by stating that the National Park Service must conduct its actions in a manner that will ensure that “the protection, management, and administration of these areas be conducted in light of the high public value and integrity of the National Park System and 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” [16 U.S.C. § 1a-1]. National Park Service *Management Policies 2006* (National Park Service 2006) interpreting the obligation of the NPS to conserve and provide for the enjoyment of park resources and values states that “Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant.”

1.7 HISTORY OF INTRODUCED EUROPEAN RABBITS

1.7.1 European Rabbits on San Juan Island

The European rabbit (*Oryctolagus cuniculus*) is a nonnative burrowing lagomorph common on San Juan Island, primarily in non-forested open habitats, but is most abundant on the island at American Camp in San Juan Island National Historical Park. European rabbits were first documented on San Juan Island in 1929, but are thought to have been introduced much earlier between 1875 and 1895 (Couch 1929; Stevens 1975). The favorable climatic conditions and relatively few predators of the Puget prairie ecosystem at American Camp, with its succulent vegetation and well-drained soils, have been conducive to rabbit reproduction and survival (Hall 1977; West and Agee 2009).

Stevens (1975) estimated a low winter population of European rabbits in 1973 to be 8,400 rabbits at 25 rabbits per hectare occupying 335 hectares (827.8 acres) of prime habitat, and an estimated 1,700 rabbits at 10 rabbits per hectare inhabiting the remaining 168 hectares (415.1 acres) at American Camp. West and Agee (2009) estimated a spring population of 1,818 rabbits in 2005 occupying the 70 hectares (173.0 acres) of prime habitat at American Camp (Figs. 1 and 4).

1.7.2 Summary of Ongoing Impacts

Introduced European rabbits at American Camp have major impacts on the prairie ecosystem, affecting soils, hydrology, vegetation, terrestrial wildlife and wildlife habitat, and predator-prey relationships. They also significantly impact cultural resources and affect visitor experience.

European rabbits construct extensive systems of subterranean burrows known as warrens consisting of multiple entrances, tunnels, and chambers. Stevens (1975) measured one warren at American Camp with 92 m (301.8 feet) of subterranean tunnels, and recorded that warrens ranged from 0 to 56 entrances with an average of 9.35 entrances per warren. In 2006, there were 3,440 active burrows at American Camp in the core colony area (West and Agee 2009). One partially collapsed burrow observed by park staff near the dunes in 2009 was nearly three feet in diameter and five feet deep. Excavated tailings from lower soil horizons are piled at entrances to burrows burying the rich prairie topsoil. These extensive systems of warrens also significantly alter the hydrologic regime at American Camp by altering absorption, runoff, retention, and evaporation rates of rainwater, as well as greatly exacerbating soil susceptibility to wind and water erosion.

Rabbits at American Camp have major impacts on the vegetation as well. In some years, they may consume up to 75% of the available spring production of above-ground biomass (Stevens 1975). This reduction in vegetation cover in turn leads to damaging topsoil erosion and negatively impacts native wildlife species that depend on vegetation for food and cover (Fig. 2). The combination of soil disturbance and reduction in vegetation cover favors weedy, early seral plant species and nonnative invasive plants.

The core rabbit colony area spans more than 44.5 hectares (110 acres) of the prairie habitat at American Camp (Fig. 1). This area is dominated by two nonnative annual grasses (silver hairgrass [*Aira caryophyllea*] and brome fescue [*Vulpia bromoides*]) and one nonnative perennial grass (colonial bentgrass [*Agrostis capillaris*]). Nonnative invasive annuals, biennials, and perennials dominate the forb component of the area (e.g., barestem teasdalia [*Teesdalia nudicaulis*], common mullein [*Verbascum thapsus*], bull thistle [*Cirsium vulgare*], Canada thistle [*Cirsium arvense*], and hairy cat's ear [*Hypochaeris radicata*]). The area provides little cover habitat for grassland nesting birds such as the Oregon vesper sparrow (*Pooecetes gramineus affinis*) and western meadowlark (*Sturnella neglecta*), and small mammals such as Townsend's vole (*Microtus townsendii*). Native perennials such as hookedspur violet (*Viola adunca* var. *adunca*), an important host plant for the valley silverspot butterfly (*Speyeria zerene bremnerii*), a Federal species of concern (Pyle 2004), are mostly absent.

European rabbits at American Camp help sustain the San Juan Island population of introduced nonnative red fox (*Vulpes vulpes*). Red fox in turn prey opportunistically on native small mammals, grassland birds, and invertebrates further impacting these communities, especially during periods of low rabbit abundance. Rodents are the primary diet for grassland raptors such as the northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), and barn owl (*Tyto alba*). Population fluctuations of rabbits have cascading effects throughout the American Camp prairie ecosystem affecting predator-prey relationships and plant-herbivore interactions resulting in trophic cascades (Lees and Bell 2008).

Rabbits displace and damage the historical and cultural resources that the park was established to protect, destroying buried artifacts or redistributing them, removing them from context, and disturbing building foundations through their burrowing. Rabbits at American Camp have also disturbed Native American remains. The reduction in vegetation cover and extensive system of warrens that are visible from most vantage points at American Camp creates a visual impact on the cultural landscape, negatively impacting the interpretive and scenic resources of the park. The entire San Juan Island National Historical Park is listed as a National Historic Landmark and the American Camp unit west of Pickett's Lane (Fig. 6) is eligible for listing as a cultural landscape on the National Register of Historic Places (National Park Service 2004). In addition to creating a visual intrusion, the numerous, and often large, rabbit warren entrances pose a safety hazard for visitors, visiting researchers, and park staff traversing the prairie who may trip or fall into holes.

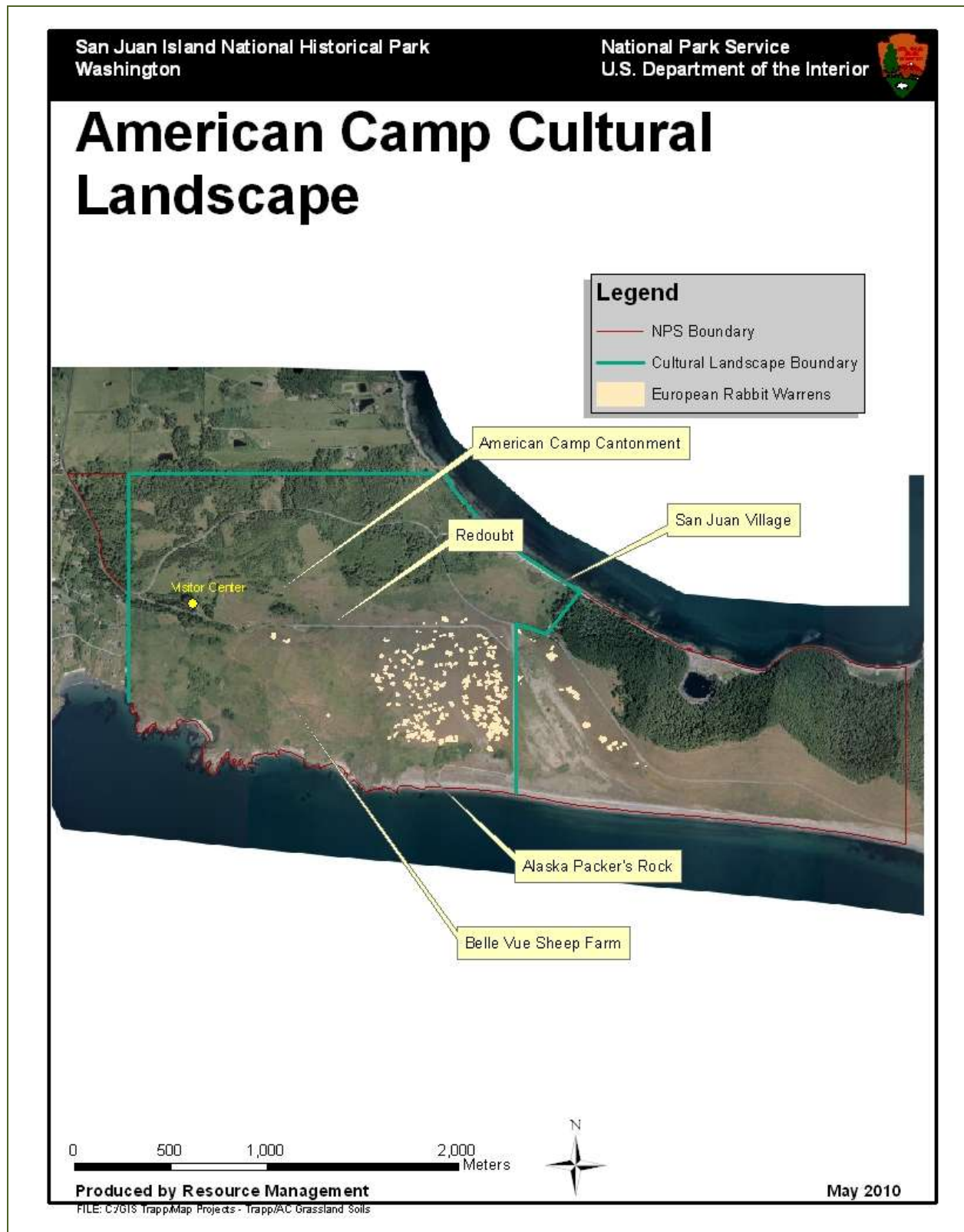


Figure 6. The western half of American Camp is eligible for listing as a cultural landscape on the National Register of Historic Places.

1.7.3 Introduced Rabbits Worldwide

The origin of the European rabbit is in southwestern Europe, where until the Middle Ages, its natural range was restricted to the Iberian Peninsula and southern France (Branco et al. 2002). Today, the European rabbit is found on every continent except Antarctica and has been introduced to over 800 islands worldwide (Flux and Fullagar 1992).

Rabbits are often intentionally introduced to islands as a human food resource (Micol and Jouventin 2002, Torr 2002). Rabbits are generalist herbivores (MacDonald 1984) with a tolerance for a wide variety of plant types, including those containing certain toxic compounds (Freeland and Janzen 1974). A short gestation period, large litter sizes (Tomich 1986), and the ability to produce multiple litters in one season (Woodhouse 1979) allow rabbit populations to expand rapidly when environmental conditions are favorable (Gilbert et al. 1987). Their aggressive herbivory and ability to reach high population densities can cause severe damage to ecosystems that have not evolved to withstand such pressures.

1.8 PUBLIC SCOPING

A preliminary public scoping meeting for this environmental assessment was held at the Mullis Community Senior Center in Friday Harbor, Washington on March 23, 2009. Written public comment was accepted for a 30 day period ending 10 April, 2009.

During the General Management planning process, a number of issues were identified related to future management of non-native species, including rabbits, and 5 comments were received specifically about future rabbit management.

Issues identified during internal, external, and public scoping are summarized in sections 1.10.1 and 1.10.2 and addressed throughout this environmental assessment. A detailed account of the public scoping process and public input received during the planning process for the park is provided in the “Public Involvement” chapter (5.1) of this draft EA.

1.9 RELATIONSHIP TO OTHER PLANS, POLICIES, ACTIONS, AND LAWS

This section describes the relationship of the European Rabbit Management Environmental Assessment to other park plans and projects, to National Park Service policies and actions, and to Federal Laws.

1.9.1 National Park Service Plans, Policies, and Actions

Final General Management Plan and Environmental Impact Statement

The park recently wrote a new General Management Plan (National Park Service 2008). This plan provides the “vision” for park management for the next 15-20 years, and defines priority actions for management of the park. As part of the GMP process, the planning team outlined the desired future conditions for the park. Relative to the cultural and natural resources, these desired goals are that

- cultural landscapes are preserved and adverse effects avoided,
- characteristics of cultural landscapes are managed in a balance with the natural landscape,
- historic and prehistoric resources are protected,
- native plant communities are managed to protect and restore native species and provide habitat for native wildlife,
- prairie communities are restored and managed as significant resources for both the natural and cultural landscape,
- special status species, especially those listed by the U.S. Fish and Wildlife Service (USFWS), make progress toward recovery,
- park habitat supports a diverse range of native wildlife species and gives the public high-quality opportunities for wildlife viewing,
- habitat in the park is available for resident and migratory bird and butterfly species containing the components essential for supporting healthy populations,
- the park prevents or limits the spread of noxious weeds through an integrated pest management (IPM) approach perpetuating the natural condition and/or historic vegetative cover,
- threats to surface water quality are sufficiently mitigated,
- the visual integrity of American Camp, including vistas and viewsheds, are maintained and restored where appropriate, and
- the public has opportunities to understand and appreciate the park’s natural and cultural resources through interpretation of natural and cultural history.

In order to accomplish these desired future conditions, the plan addresses key actions to guide resource management activities, which specify that

- the park will pursue strategies to protect its cultural resources that will allow the integrity of the park’s cultural resources to be preserved unimpaired,
- archeological sites will be preserved and protected,
- invasive plant and animal species will be eliminated where feasible and otherwise controlled to ensure the long-term survival of the native ecosystem,
- nonnative animal species identified as pests will be managed in accordance with the applicable NPS management policies,

- the historic prairie will be restored within the cultural landscape to improve the native species composition, ecological function, and visual quality of the prairie as it existed during the encampment period, and on a larger scale,
- the park will develop revegetation plans for disturbed areas using genetically appropriate native species,
- the park will manage habitat for broader ecological restoration of special status species, and
- the park will implement a noxious weed control program.

National Park Service Management Policies 2006

National Park Service *Management Policies 2006* provides the principles and policies that guide management of the National Park Service and complies with current laws, regulations, and executive orders. Specific guidance for management of exotic species is outlined.

Removal of Exotic Species Already Present

All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species

- ◆ interferes with natural processes and the perpetuation of natural features, native species or natural habitats, or
- ◆ disrupts the genetic integrity of native species, or
- ◆ disrupts the accurate presentation of a cultural landscape, or
- ◆ damages cultural resources, or
- ◆ significantly hampers the management of park or adjacent lands, or
- ◆ poses a public health hazard as advised by the U.S. Public Health Service (which includes the Centers for Disease Control and the NPS public health program), or
- ◆ creates a hazard to public safety.

High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controlled. Lower priority will be given to exotic species that have almost no impact on park resources or that probably cannot be successfully controlled. Where an exotic species cannot be successfully eliminated, managers will seek to contain the exotic species to prevent further spread or resource damage. [§ 4.4.4.2]

Additional guidance is provided by Executive Order 13112 of February 3, 1999, *Invasive Species*.

Sec. 2. Federal Agency Duties. (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law,

- (1) identify such actions;
- (2) subject to the availability of appropriations, and within Administration

budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them...

National Register of Historic Places

The National Register of Historic Places (National Register) is the official list of the Nation's historic places worthy of preservation, authorized by the National Historic Preservation Act of 1966 (NHPA). The National Register lists districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture. National Historic Landmarks (NHLs) are a separate designation, but upon designation, NHLs are listed in the National Register of Historic Places if not already listed.

American Camp is significant as the location of a United States Army camp from 1859 to 1874 during the joint occupation of San Juan Island by British and American troops during the Oregon Territory boundary dispute and military standoff known as the Pig War. The objects, structures, and features associated with the camp are listed in the National Register. American Camp is also significant as the location of the Hudson's Bay Company Belle Vue Sheep Farm, the old San Juan Town site, and as a site of pre-European seasonal occupation by Native Americans. Eight tribes are culturally affiliated with the American Camp landscape. The western half of the American Camp unit is eligible for listing as a cultural landscape and encompasses the majority of the European rabbit infestation addressed in this EA (see Cultural Landscapes Inventory).

National Historic Landmarks Program

National Historic Landmarks are buildings, sites, districts, structures, and objects that have been determined by the Secretary of the Interior to be nationally significant in American history and culture. Both American and English Camps on San Juan Island, Washington (San Juan Island National Historical Park) are designated as National Historic Landmarks (November 5, 1961). As listed NHLs, the entire San Juan Island National Historical Park is subject to the provisions of the National Historic Preservation Act of 1966 (see Section 1.9.2).

Cultural Landscapes Inventory

The Cultural Landscapes Inventory is a comprehensive inventory of all historically significant landscapes within the National Park System. The inventory identifies, documents, and evaluates each landscape's location, physical development, significance, National Register of Historic Places eligibility, condition, and other information useful for park management. A Cultural Landscape Inventory of American Camp was completed in 2004 and concurred by the Washington State Historic Preservation Officer (National Park Service 2004). American Camp is

a historic site eligible for listing on the National Register as a cultural landscape due to its significance as the location of a United States Army camp from 1859 to 1874 during the joint occupation of San Juan Island by British and American troops during the Treaty of Oregon boundary dispute and military standoff known as the Pig War. Other contributing landscape characteristics include: natural systems and features, spatial organization, views and vistas, buildings and structures, archaeological sites, and vegetation. The western half of the American Camp unit is the culturally eligible landscape and must be preserved and maintained. The condition assessment is rated as *fair* indicating the landscape shows clear evidence of disturbance and deterioration requiring mitigation. Damage from European rabbits is mentioned as a continuing “major problem” in the landscape.

Historic Landscape Report

A historic landscape study of the park was completed in 1987. The purpose of the study was “to indentify significant historic features and landscape patterns at American Camp and British Camp” and “to develop a range of appropriate designs that protect significant historic landscape resources and enhance visitor understanding and access to those resources” (Gilbert 1987). The report of the study notes that damage to the historic landscape by European rabbits has been considerable.

Vegetation Management Plan

The most recent vegetation management plan for the park was completed in 1993 (Rolph and Agee 1993). The current GMP directs management of the cultural landscape at American Camp to be maintained and restored to the character of the landscape representative of the historic period from 1853 to 1871. As this historic period spans 18 years, and the vegetation was modified throughout that time, the vegetation management plan outlines a compromise between natural zones and cultural values of the historic landscape that are not incompatible. The vegetation management plan discusses the impacts of European rabbits as a continuous source of disturbance on the grassland vegetation, in altering nutrient and fire dynamics, and in creating bare soil leading to erosion and exotic plant invasion, and recommends their removal. The vegetation management plan is scheduled to be updated in 2011.

Conservation Agreement and Strategy for the Island Marble Butterfly

The island marble butterfly (*Euchloe ausonides insulanus*) is considered by the U.S. Fish and Wildlife Service as a species of concern for western Washington, which identifies it as a species with a high conservation priority. As the lead agency responsible for the conservation and recovery of priority species, Federal agencies are required to consult with the USFWS on any actions that will or may potentially affect these species. In 2006, San Juan Island National Historical Park entered into a conservation agreement with the USFWS, which “lays out general guidelines for a broad spectrum of activities at American Camp, including management and restoration of the grassland ecosystem there as a natural component of the cultural/historic landscape... consistent with the goal of conserving the Island Marble butterfly and minimizing potential negative effects to the Island Marble from National Park Service activities” (Pyle 2006). The agreement addresses European rabbits as an overall negative factor at high population

levels and that rabbit removal “should be a very good thing for the Island Marble in the mid- to long-term.”

1.9.2 Federal Laws

National Historic Preservation Act of 1966

The National Historic Preservation Act mandates the responsibilities of Federal agencies that have jurisdiction over “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource” [16 U.S.C. § 470w(5)], and that such listed or eligible properties “are managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values” [16 U.S.C. § 470h-2(a2B)]. The NHPA further describes the policy of the Federal Government for stewardship and preservation of these prehistoric and historic properties “for the inspiration and benefit of present and future generations” [16 U.S.C. § 470-1(3)]. All of San Juan Island National Historical Park is included on the National Register and the NPS is responsible for the sound management, preservation, and protection of the prehistoric and historic resources in the park and the eligible cultural landscape.

Bald and Golden Eagle Protection Act of 1940

The law as amended provides for the protection of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds “alive or dead, or any part, nest, or egg thereof.” The law authorizes the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations, such as protections under the Migratory Bird Treaty Act and the Endangered Species Act. In 2007, the bald eagle was delisted for most of the conterminous 48 states and removed from protection under the Endangered Species Act. Bald and golden eagles are also protected under the Migratory Bird Treaty Act of 1918.

Endangered Species Act of 1973

The Endangered Species Act provides a program for the conservation of threatened and endangered plants and animals and the ecosystems on which they depend. The law requires Federal agencies, in consultation with the U.S. Fish and Wildlife Service and/or the National Oceanic and Atmospheric Administration National Marine Fisheries Service, to ensure that any action they authorize, fund, or undertake is not likely to jeopardize the continued existence of any listed species or result in destruction or adverse modification of designated critical habitats for such species.

In January 2010, San Juan Island National Historical Park reintroduced Federally threatened golden paintbrush to American Camp within the historic range of the species. The park plans to

establish two stable populations of at least 1,000 individuals per the goals of the USFWS recovery plan (U.S. Fish and Wildlife Service 2000). There are no other listed species at American Camp. There are however, a number of species of concern, which include long-eared myotis (*Myotis evotis*), bald eagle, Peale's peregrine falcon (*Falco peregrinus pealei*), olive-sided flycatcher (*Contopus cooperi*), Oregon vesper sparrow, northern red-legged frog (*Rana aurora*), island marble butterfly, and valley silverspot butterfly. In addition, there are a couple species of concern that are probably present in the park, but have not been confirmed. These include long-legged myotis (*Myotis volans*) and western toad (*Anaxyrus boreas*). The California buttercup (*Ranunculus californicus*), Hall's aster (*Symphyotrichum hallii*), and sand pygmyweed (*Crassula connata*), present at American Camp, are listed as Washington state threatened species, but have no Federal status.

National Environmental Policy Act of 1969

The National Environmental Policy Act requires Federal agencies to integrate environmental values into their decision making process by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

1.10 ISSUES AND IMPACT TOPICS ADDRESSED IN THIS DOCUMENT

The European rabbit on San Juan Island has been the subject of considerable interest and debate since before the park was established in 1966. To some, the rabbits have been a source of food or income. To others, they are an object of affection or nostalgia for a time when the island was less developed. Area farmers have long considered them an agricultural pest and have developed methods for eradicating them from their fields. San Juan Island National Historical Park sponsored numerous research studies on rabbits, particularly during the 1970s when the population was very high, and again when numbers plummeted in the early 1980s. Since then, researchers have continued to monitor rabbit numbers within the park. During more than 40 years of experience with rabbits on San Juan Island, the NPS has been the recipient of many local rabbit stories, and the subject of more than one urban myth related to rabbits.

Issues were identified through discussions with NPS staff, an interdisciplinary team, cooperating agencies and park partners, interested non-profit organizations, and through public participation in a scoping meeting and open comment period. Only relevant substantive issues were carried forward for analysis in this Environmental Assessment.

1.10.1 Issues Addressed in this Document

This section summarizes issues analyzed in detail in this European Rabbit Management Environmental Assessment. These issues were identified during internal, external, and public scoping.

Feasibility

- European rabbits are spread over a large geographic area of American Camp and take refuge in complex underground warrens that make their detection and removal difficult.
- Because of roads and visitor use, it is not possible to completely and permanently exclude rabbits from the park.
- Safe and humane methods for removal need to be determined.

The technical challenges of removal, control, and long-term strategies for dealing with potential European rabbit colonization are addressed in this document.

Terrestrial Wildlife and Wildlife Habitat

- Natural processes at American Camp have long been influenced by human activities. European rabbits are only one of many disturbances.
- Restoring native species and natural processes will require the park to address related ecosystem factors as well. Predators, including red fox, depend on rabbits and will impact native wildlife populations if this prey source is eliminated, or disappears.

Mitigation measures and predator-prey relationships are addressed in this document.

Invasive Plants

- Invasive plant species are widespread in the park. Disturbed areas will likely see an increase in cover of invasive plants following rabbit removal.

Invasive plant response to European rabbit removal and subsequent mitigation measures are addressed in this document.

Bald Eagles

- Some members of the public expressed concern that bald eagles depend on European rabbits as a major prey source and will disappear from American Camp if rabbits are eliminated.

Bald eagle abundance, productivity, and food habitats are evaluated in this document.

Visitor Experience

- Visitors to the park enjoy viewing wildlife, sometimes including European rabbits and red fox.

Public concerns about this issue are addressed in this analysis.

1.10.2 Issues Dismissed from Further Analysis

The following issues were dismissed from further analysis because they were either not relevant or beyond the scope of this environmental assessment.

Prior European Rabbit Management

- There are perceptions in the San Juan Island community about past European rabbit management techniques, including harvesting for food, speculation about disease introduction, and personal theories about why rabbit populations have gone up or down. Vast natural fluctuations in the rabbit populations have added to this urban legend, that the NPS has actively reduced the European rabbit population. To date, the NPS has not implemented management techniques or, introduced disease to reduce the population of European Rabbits at American Camp.

For purposes of this analysis, only evidence that can be scientifically verified is evaluated.

Herbicide Use

- There is concern among the public regarding herbicide use by the park at American Camp.

Herbicide use is beyond the scope of this Environmental Assessment and this issue is eliminated from further analysis.

1.10.3 Impact Topics Addressed in this Document

The following impact topics are discussed in Chapter 3 on the Affected Environment and analyzed for each alternative in Chapter 4 on Environmental Consequences. If no impacts are expected, an issue was dropped from further analysis. The impact topic categories identified are as follows:

- Physical Resources
- Biological Resources
- Threatened, Endangered, and Sensitive Species
- Cultural Resources
- Visitor Experience
- Socioeconomic Environment

1.10.4 Impact Topics Dismissed from Further Analysis

The following impact topics were eliminated from further analysis following completion of the Environmental Screening Form (National Park Service 2001; Appendix B). These topics either would not be affected or impacts would be below the level of detection.

- Air Quality. Air quality is not expected to be affected by any of the alternatives and is not currently monitored in the park.
- Floodplains. There are only small, intermittent seasonal streams at American Camp. There are no floodplains. Wetlands are discussed under water resources in this Environmental Assessment (see sections 3.3.1 and 4.3.1.1).
- Prime and Unique Farmland. No conversion to non-agricultural use is proposed.
- Compliance with Federal Accessibility Laws. The Americans with Disabilities Act of 1990 as amended [Public Law 110-325] provides “a clear and comprehensive national mandate for the elimination of discrimination against individuals with disabilities.” No alternatives will disproportionately or adversely affect individuals who are physically challenged.
- Environmental Justice. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs each Federal agency to identify and address whether its actions will have disproportionately high and adverse human health or environmental effects on minority and low-income populations. No alternatives will disproportionately or adversely affect minority and low-income populations.

Chapter 2: Alternatives

2.1 INTRODUCTION

The National Environmental Policy Act requires all Federal agencies to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources” [42 U.S.C. § 4332(2E)]. This section describes a full range of alternatives, including the preferred alternative and alternatives considered, but eliminated from further analysis. The Council on Environmental Quality (CEQ), established under NEPA, defines reasonable alternatives as those that are technically and economically practical or feasible using common sense (Council on Environmental Quality 1981).

Alternatives carried forward for full analysis in this environmental assessment must meet project objectives to a large degree, and also resolve the need for action and fulfill the stated purpose in taking action. The proposed action and its alternatives were developed to focus on the issues identified by the park Interdisciplinary Team, NPS resource specialists, experts in European rabbit removal from island ecosystems, and the general public. This chapter is organized into the following sections:

- Range of Alternatives
- Alternative A (No Action Alternative): Continue with Current Management Allowing European Rabbit Population to Self-regulate
- Alternative B (Preferred Alternative): Full Removal and Prevent Future Recolonization of European Rabbits
- Alternatives Considered, but Eliminated from Further Analysis
- Environmentally Preferred Alternative

2.2 RANGE OF ALTERNATIVES

Nine alternatives were evaluated for the potential to fulfill the purpose and need described in Chapter 1. Of those, six were determined to not be reasonable alternatives (for a variety of reasons discussed in section 2.5) and were dismissed with rationale. A seventh alternative which outlined a staged removal of European rabbits, became obsolete during planning due to a rapid decline in the rabbit population at American Camp between 2006 and 2009 (West and Agee 2009). One alternative, the proposed action, was determined to be reasonable and was retained for consideration. To be retained, an alternative had to 1) have a reasonable likelihood of success, 2) have an acceptably low probability for adverse effects on non-target species and the environment, and 3) be permitted under existing laws, NPS policies, park mandates, and park management objectives. The CEQ guidelines for implementing NEPA [40 CFR 1502.14] also

require the consideration of a “no action” alternative, which sets a baseline of existing impact continued into the future against which to compare impacts of action alternatives.

2.3 ALTERNATIVE A (NO ACTION ALTERNATIVE): CONTINUE WITH CURRENT MANAGEMENT ALLOWING EUROPEAN RABBIT POPULATION TO SELF-REGULATE

Under the no action alternative, the park’s current management of European rabbits at American Camp would continue. Despite being a nonnative invasive species harmful to the cultural and natural resources of the park, rabbits at American Camp have by and large been allowed to subsist undisturbed since the park was established in 1966. The rabbit population at American Camp has been monitored fairly regularly since the 1970s and has undergone drastic fluctuations in abundance and distribution. Stevens (1975) conducted extensive research on the European rabbit population at American Camp and on San Juan Island during the early 1970s. In the early 1980s, the population collapsed. National Park Service biologist Douglas Houston began monitoring the population recovery in 1985, and continued his monitoring efforts until 1995. Since 1996, the monitoring has continued as part of a field exercise for an undergraduate class in Wildlife Research Techniques at the University of Washington. The rabbit population at American Camp has fluctuated following a 4-10 year cycle between highs and lows (Stevens 1975; West 2010).

In 2003, the park constructed a rabbit-proof barrier fence along the western boundary of American Camp adjacent to the Eagle Cove subdivision. During 2004, the park constructed two north-south fences west of the trail to Grandma’s Cove. Since that time, no rabbits have been observed and no warrens have been established in the western part of the prairie bounded by these fences and the dense vegetation that also serves as a barrier. In 2005, the park constructed a north-south fence through the center of the main rabbit population area, with the eventual goal of dividing that area into smaller management zones. The rest of that fence was never completed. This fence is not known to have any effect on rabbit movement and it would be removed under the no action alternative.

2.4 ALTERNATIVE B (PREFERRED ALTERNATIVE): FULL REMOVAL AND PREVENT FUTURE RECOLONIZATION OF EUROPEAN RABBITS

Under Alternative B, the preferred alternative, European rabbits would be removed from and prevented from recolonizing American Camp. The rabbit-proof barrier fences along the western boundary of American Camp and west of the Grandma’s Cove trail would be maintained. The park would monitor long-term to detect new rabbit warrens or other signs of rabbit presence in the park. Additional barrier fencing or follow-up control work would be undertaken based on monitoring results. Action would begin early to avoid reestablishment of significant rabbit numbers.

2.4.1 Rabbit Removal

European rabbits would be removed from American Camp using humane techniques that have proven effective and successful at removing rabbits from isolated areas (Donlan et al. 2002, Torr 2002, Island Conservation unpublished data). Rabbit removal activities could be conducted at any time of year, but the optimal time period for removal would be during the fall and winter seasons when rabbit numbers are typically lowest (Stevens 1975). This is also the time of year when visitor use is lowest.

Shooting

Shooting is generally considered one of the most effective techniques for rabbit removal and is the primary method recommended in the feasibility study conducted for the park by Island Conservation in 2006. To minimize potential conflicts with park users during daylight hours, shooting would be carried out primarily during nighttime hours. However, park facilities could be temporarily closed for public safety if control activities are required at dawn or dusk. All shooting operations would be conducted by trained professionals with experience in shooting for conservation purposes. Trained professionals are defined as individuals that have received training in firearms handling, are skilled in precision shooting, and are considered a marksman. Typically, shooting would be done with a small-caliber rifle, though other firearms could be used depending on circumstances. Lead-free ammunition would be used to eliminate risks to non-target species, such as raptors that may scavenge carcasses, as well as to avoid the general adverse environmental effects of lead.

Dogs

Dogs may be used for detecting rabbits at low densities. They are used in conjunction with other techniques such as shooting to maximize efficiency. Such dogs can be trained to be species-specific, therefore posing low risk to non-target species.

Live Traps

Live traps would be used to catch wary rabbits that may not be using warrens. Only soft-catch leg-hold traps would be employed. Traps would be set in the evening and checked prior to the park opening to the public in the morning. Trapped animals would be euthanized (American Veterinary Medical Association 2007). Non-target animals would be released.

Warren Filling

Warren filling can be used in conjunction with fumigation or used independently to determine which burrows are active and where animals remain. Fill used would be the same soil excavated by the rabbits. Only soil from within the park would be used to limit the risks of transporting alien plant seed. This method also eliminates refuge for animals moving into previously cleared areas, placing them at risk from predators and exposing them to other control activities.

Fumigants

Fumigants (carbon monoxide canisters) would greatly increase the efficiency of the operation and are considered a humane removal method when correctly employed. To minimize risks to non-target species only active burrows with rabbit sign would be fumigated in conjunction with warren filling. Carbon monoxide canisters are not currently labeled for use on European rabbits, so permission for experimental use would need to be obtained from the Washington State Department of Agriculture.

2.4.2 Exclosure Fencing

The current rabbit exclusion fence along the western boundary of American Camp adjacent to the Eagle Cove subdivision and west of the Grandma's Cove trail would be maintained as long as there is a risk of European rabbits immigrating to the park from neighboring areas. Additional rabbit-proof barrier fencing could be constructed in other areas if monitoring indicates a need, for example along the forested western boundary adjacent to Cattle Point Road, along the forested northern boundary of American Camp, or along road edges near the east or west boundaries of American Camp.

2.4.3 Monitoring

Since 1996, annual European rabbit monitoring at American Camp has been conducted by the University of Washington, Department of Environmental Science and Resource Management as part of a field exercise for a class in Wildlife Research Techniques (West and Agee 2009). Following the initial removal of rabbits from American Camp, the park will also implement periodic monitoring of its own to ensure early detection and removal of any subsequent recolonization of parkland by rabbits.

2.5 ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM FURTHER ANALYSIS

A number of other alternative methods to control nonnative European rabbits at American Camp were considered during the planning process, but were determined to be not practical or feasible from a technical or economic standpoint, inconsistent with park mandates or stated purpose and significance, would have severe environmental impacts, or not meet the project objectives, and were thus dismissed from further consideration. Driving factors, including the humane treatment of animals, 100% removal of European rabbits and preventing recolonizing at American Camp, were used to eliminate the below alternatives from consideration. A summary of alternatives considered, but eliminated from further analysis follows.

2.5.1 Warren Destruction using Ripping and Explosives

Under this alternative, rabbit warrens would be destroyed through mechanical ripping or explosives. This alternative would result in severe disturbance to soils, to sensitive archeological sites and historic structures, and to the cultural landscape. This is in direct conflict with the park's stated purpose and significance, NPS policies, and various laws promulgated to protect historic resources (e.g., Archaeological Resources Protection Act of 1979 and Native American Graves Protection and Repatriation Act of 1990). Further, this action would not meet the project objectives and would be inhumane.

2.5.2 Live Trapping with Translocation or Neuter/Release

European rabbits at American Camp are feral and not all animals would readily enter traps, requiring increasingly greater effort and expense to capture trap-shy individuals. Live trapping and translocation of nonnative European rabbits outside the park would violate an array of state and Federal laws regarding the introduction of exotic species, including laws and regulations designed to prevent the spread of disease to both wild and domestic animal populations. Translocation would also simply transfer the rabbit problem somewhere else. Capturing, neutering, and releasing rabbits back to American Camp prairies would be extremely expensive. The lack of certainty that all rabbits could be caught and sterilized renders this method unable to meet the stated purpose. This alternative was therefore determined to be neither practical nor feasible.

2.5.3 Toxic Baits

Under this alternative, European rabbits at American Camp would be poisoned using toxic baits. Although rabbit poisons have been used effectively elsewhere outside the United States (Burley 1986), no toxic bait for controlling European rabbits is registered with the U.S. Environmental Protection Agency for use in non-agricultural areas. Toxic baits also pose a risk to non-target native wildlife. This alternative was thus dismissed from further consideration.

2.5.4 Predator Introduction

The use of predators to control the European rabbit population was considered for purposes of this Environmental Assessment. Introducing a nonnative predator to the park is prohibited under NPS management policies (National Park Service 2006). Large predators that may have existed on the island prior to European settlement are not suitable for reintroduction under current conditions because of the highly settled nature of the island and limited habitat. Mink already live on the island, but are not known to have any significant effect on rabbit numbers, likely

because they hunt primarily in or near water. Several species of avian predators feed on rabbits at American Camp. Introducing additional raptor species cannot be expected to achieve control of rabbit numbers, although the use of raptor perches may be an effective tool to reduce rabbit colonization. Both nonnative red fox and domestic ferret (*Mustela putorius furo*) have been introduced to San Juan Island on multiple occasions to control rabbits. In spite of this, European rabbits at American Camp have persisted, sometimes in large numbers (West and Agee 2009). Predator introductions can also have unintended negative consequences to the ecosystem (Howarth 1991). Furthermore, predator introductions almost never result in the removal of 100 percent of a target species. It is neither feasible nor practical to introduce new predators to American Camp, and such introductions would be unlikely to meet project objectives. Therefore, this alternative was eliminated from further analysis.

2.5.5 Disease Introduction

Diseases available for rabbit control are not considered safe and humane and were dismissed from further analysis.

2.5.6 Immunocontraception

Immunocontraception is an emerging technology for vertebrate pest control that relies on generating an antigenic response in the target organism, where the antigen is introduced somehow into the target's bloodstream. The delivery system is either through baits or self-spreading micro- or macroparasites, namely non-disseminating and disseminating or vectored, respectively (Barlow 2000). The potential benefits of immunocontraception are, as Barlow states, "in providing a broad-scale, cheap, humane and potentially species-specific way of controlling vertebrates that represent major economic and conservation problems." On the other hand, immunocontraception is genetic engineering that remains controversial. Immunocontraception is also irreversible in the case of vectored delivery. While this new technology may hold future potential, it is still experimental and beyond the scope of this project. This alternative was therefore deemed unfeasible and dismissed from further analysis.

2.5.7 Staged Removal

Multiple species of nonnative invasive plants are present at American Camp, providing significant potential for aggressive invasive species to flourish where there has been disturbance. This was a particular management concern around 2006 as discussions began about European rabbit removal. At that time, the rabbit population was much higher over a larger area than at present. It was unknown whether the park had the capacity to deal with invasive plants if rabbits were removed from the entire area in a short period. An adaptive management approach was proposed, which included a staged rabbit removal, combined with enclosure fencing that would

allow the park to control invasive plants and establish native plant cover in areas where rabbits were eliminated. To help inform decisions about restoration regimes, experimental exclosures 1 m² were placed in areas of high rabbit densities at American Camp. While vegetation biomass increased within the enclosures, the composition remained relatively unchanged (NPS unpublished data). During this period, the rabbit population at American Camp was estimated to be around 1,800 individuals. Rabbit numbers have declined and the population was estimated in spring 2010 to be 470 with a 95% confidence interval of 414-884 rabbits. The vegetation has since rebounded throughout the area previously occupied by high densities of rabbits without the expected proliferation and invasion of new nonnative plant species. As the European rabbit population at American Camp has declined on its own without the expected increase in nonnative plant species, a staged removal is no longer relevant or applicable. This alternative was therefore eliminated from any further analysis.

2.6 ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order 12, *Conservation Planning, Environmental Impact Analysis, and Decision-making*, NPS environmental analysis must identify an environmentally preferred alternative. As stated in DO-12, "The environmentally preferred alternative is the alternative that will promote the national environmental policy expressed in NEPA (Sec. 101 (b))." This includes alternatives that

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations,
- assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings,
- attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences,
- preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice,
- achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities, and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources [42 U.S.C. § 4331(b)].

This is generally the alternative that causes the least damage to the biological and physical environment and which best protects, preserves, and enhances historic, cultural, and natural resources (Council on Environmental Quality 1981).

Based on these criteria, Alternative B, the Preferred Alternative, to fully remove and prevent future recolonization of European rabbits at American Camp is the environmentally preferred alternative. This alternative would best provide for the protection of archeological and historical resources, enhance the American Camp cultural landscape, and improve the ecological integrity of the prairie.

Chapter 3: Affected Environment

3.1 INTRODUCTION

San Juan Island National Historical Park was established to commemorate the peaceful resolution of the Oregon Territory boundary dispute between the United States and Britain. The Hudson's Bay Company founded Belle Vue Sheep Farm within the American Camp unit of the park in 1853 establishing the British presence. American settlers soon followed after hearing of the rich agricultural lands to be found on the island. The shooting of a wayward company pig by American settler Lyman Cutlar on June 15, 1859 triggered the occupation of San Juan Island by British and American troops, whose countries both claimed the San Juan Islands as their territory. American Camp was the site of occupation by troops of the United States Army from 1859-1874.

Prior to European settlement, American Camp was used seasonally by Native Americans utilizing the bounty of the prairie, readily available freshwater from springs, and abundant marine resources found there. Eight tribes are culturally affiliated with the American Camp landscape.

American Camp is the site of both archeological and historical resources. The site, buildings, structures, features, and objects associated with 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 so-called Pig War of 1859, are listed on the National Register of Historic Places. The western half of the American Camp unit is eligible for listing on the National Register as a cultural landscape. American Camp is also a region of rich natural biodiversity and contains one of the largest remaining remnants of prairie grassland habitat in the northern Puget Sound and Strait of Georgia region.

This chapter describes the current condition of resources present within the project area that are expected to experience environmental impacts by the proposed alternatives. The project area consists of the extant prairie and grasslands at American Camp from the west boundary eastward (Fig. 3). The total project area is approximately 290.5 ha (717.8 acres). The analysis boundary, however, may change for each resource. For example, impacts to a breeding bird population may extend beyond the project boundary, while impacts to an ephemeral wetland or historic structure may be localized and confined to the project area. The "affected environment" therefore, means resources expected to experience environmental impacts and the geographic range of those impacts over time. The desired future conditions of affected resources are also discussed. The potential impacts to these resources are discussed and analyzed in Chapter 4 on Environmental Consequences in the same order. This chapter is organized into the following sections:

- Geographical Location, Topography, and Climate
- Physical Resources (including water resources, soils, and soundscape)

- Biological Resources (including terrestrial wildlife and wildlife habitat and invasive species)
- Threatened, Endangered, and Sensitive Species (including bald eagle, island marble butterfly, and golden paintbrush)
- Cultural Resources (including archaeological resources, historical resources, and cultural landscape)
- Visitor Experience
- Socioeconomic Environment

3.2 GEOGRAPHICAL LOCATION, TOPOGRAPHY, AND CLIMATE

San Juan Island is the second largest in a group of around 700 islands, islets, rocks, and reefs that make up the San Juan Islands off the northwest coast of Washington. The San Juan Islands in Washington and the Gulf Islands in British Columbia, Canada comprise a large archipelago in the Strait of Georgia basin between the mainland and Vancouver Island, British Columbia. The San Juan Islands are located in the rain shadow of the Olympic Mountains and the coastal mountains of Vancouver Island making them unusually dry for the region. Rainfall is nevertheless quite variable within the island archipelago itself. The project area at the southern end of San Juan Island within the American Camp unit of the park receives an average annual rainfall of 43.2-48.3 cm (17-19 inches), while the English Camp unit of the park at the north end of the island receives substantially more at 81.3-86.4 cm (32-34 inches) annually. More than half of the precipitation occurs from November through February. Precipitation at American Camp from late spring through the end of summer is sparse. Mean air temperatures vary seasonally from about 4.4-18.3° C (40-65° F) (Klinger et al. 2006).

The cold waters surrounding San Juan Island give it a cool maritime climate, characterized by cool dry summers and mild, moderately wet winters (Orr et al. 2002), with relatively high humidity compared to similarly dry climates within the mainland interior. The project area within the American Camp unit has a mostly southern aspect with slope gradients from 2-60 percent (Natural Resources Conservation Service and National Park Service 2005) that are exposed to frequent high winds off the Strait of Juan de Fuca, which have strongly influenced the development of soils, geomorphology, and subsequently vegetative patterns.

The relatively dry maritime climate, southerly aspect, and frequently windy conditions at American Camp have favored the development of grassland communities and sandy topsoils rich in organic matter and nutrients. The American Camp prairie is the largest remaining grassland habitat in the northern straits region. The geographical location of American Camp, mild climate, rich topsoils, adequate supply of freshwater, and abundant natural resources have long favored its human occupation. The American Camp prairie also supports a relatively high biodiversity and unique insular plant and animal populations.

3.3 PHYSICAL RESOURCES

Air, water, rock, and soils combine to create the physical environment, which is the foundation of all ecosystems and comprise the geochemical cycle. The physical environment is addressed in the following three sections: 1) water resources, 2) soils, and 3) soundscape. Environmental impacts to air quality are not expected under either alternative.

3.3.1 Water Resources

The southern end of San Juan Island, including American Camp, is one of the driest areas in the archipelago, averaging only 17 inches of precipitation annually, with most precipitation occurring during the winter months (Flora and Fradkin 2004). American Camp is underlain with deep glacial sediments approximately 100 feet thick, which, when saturated, can store large amounts of groundwater. Groundwater recharge rates are more closely related to area covered by glacial deposits than to actual precipitation rates (Klinger et al. 2006). Never-the-less, freshwater at American Camp is a finite resource. Surface water can be severely limited during summer drought conditions and groundwater can be depleted (Holmes 1998).

Fresh surface water at American Camp is limited to a few small springs and seeps, intermittent streams, and wetlands (Fig. 7). Holmes (1998) mapped 26 wetlands with an area of 32.1 ha (79.2 acres) at American Camp. Several small springs are located along the slopes of the southern beach terrace as evidenced by dense patches of willow. There are three coastal marine lagoons along the shore of Griffin Bay, a rare feature along the northwest Pacific coast. The remaining wetlands comprise intermittent streams, seeps, permanent and seasonally wet areas, and ephemeral pools.

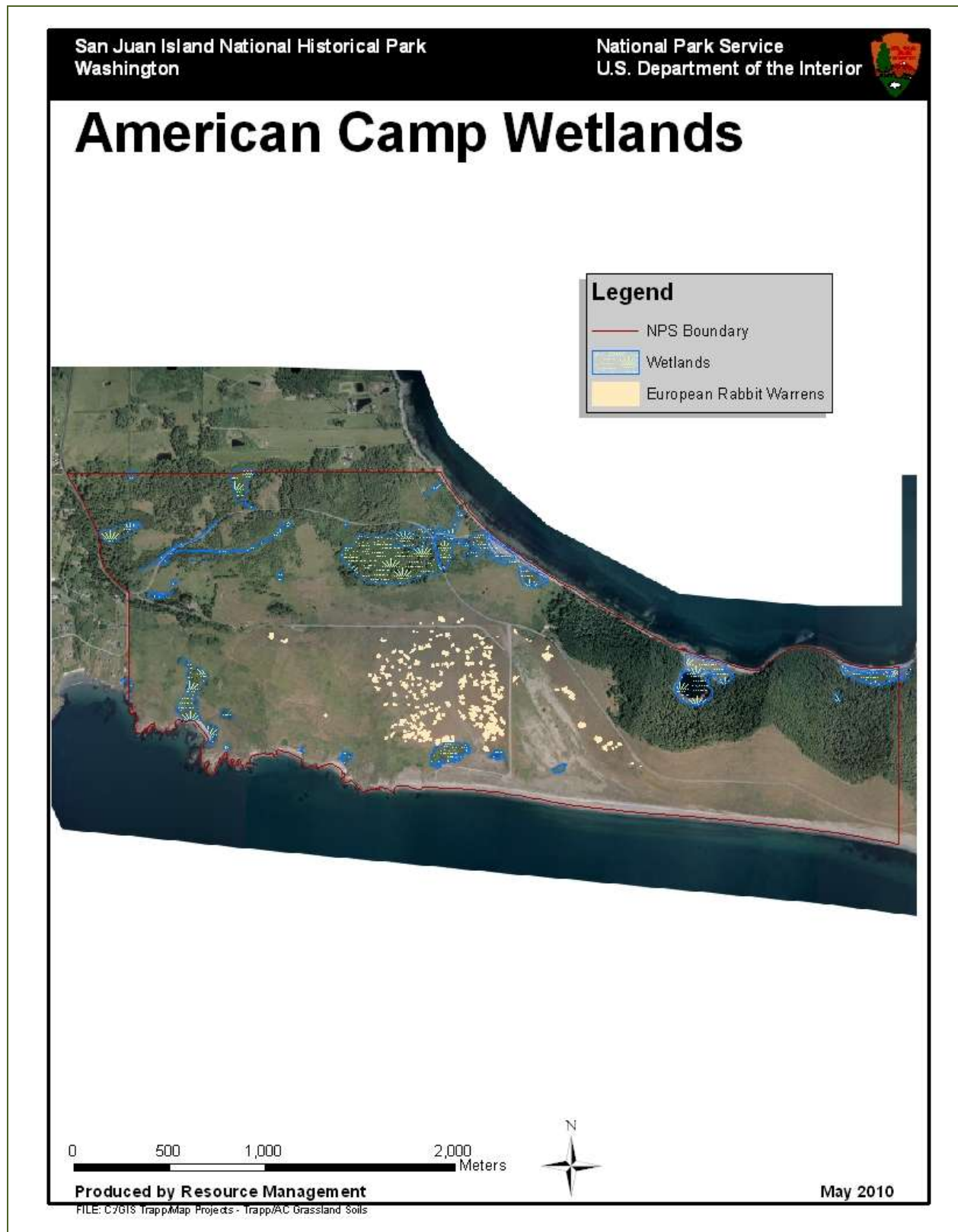


Figure 7. American Camp wetlands.

3.3.2 Soils

San Juan Island National Historical Park lies on the continent side of the subduction margin between the Juan de Fuca and North American plates and is part of the area known as the Pacific ring of fire that is both tectonically and volcanically active. Seven major Holocene earthquakes have occurred in the region in the last 4,000 years, the most recent in 1701, the full effects of which, on San Juan Island, are unknown, but may include crustal subsidence and tsunamis. The island was further impacted by the eruption of Mt. Mazama 8,000 years ago (now the site of Crater Lake, Oregon) as evidenced by a layer of ash (Natural Resources Conservation Service and National Park Service 2005).

During the most recent glaciation, the Cordilleran Ice Sheet covered San Juan Island between 18,200 and 13,300 years ago reaching a maximum thickness of 1,219.2 m (4,000 feet) 17,000 years ago. The ice sheet melted some 13,000 years ago, depressing the crust 91.4 to 121.9 m (300 to 400 feet). The crust has since rebounded leaving a series of stranded beach terraces on the south side of Cattle Point along the south slope of Mt. Finlayson. The ice sheet flowed south-southwest across the northern Puget Lowland from Canada leaving a glacial moraine northwest of Mt. Finlayson on which the historic Redoubt was built by the U.S. Army. Large erratic glacial boulders are also present on both sides of Cattle Point. From the moraine, a glacial outwash plain slopes gently to the south (Natural Resources Conservation Service and National Park Service 2005). Shells and other marine fossils can be found in the glacial sediments.

The marine environment, currents, and wind also combine to strongly influence the formation and deposition of parent material. The deposition of fine beach sands in a small dune complex on the east side of Picket's Lane lies in a northwesterly direction, evidence of the prevailing winds off the Strait of Juan de Fuca. The south shore of Cattle Point is pummeled by these winds creating a wide beach, back beach deposits piled with driftwood, and eroding bluffs. Surrounding the dunes is prairie grassland that extends from sea level at South Beach and Old Town Lagoon to the Redoubt and up the south facing slopes of 295-foot-high Mt. Finlayson. The north leeward side of Mt. Finlayson, in contrast, is forested with Douglas fir (*Pseudotsuga menziesii* var. *menziesii*), western red cedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*). Low-lying areas to the north of the American Camp Visitor Center are also forested with a mix of Douglas fir, lodgepole pine (*Pinus contorta* var. *latifolia*), and red alder (*Alnus rubra*). Gravel and sand spits are formed on the north side of Cattle Point by northwesterly longshore drift enclosing Old Town, Jakle's, and Third Lagoon.

The Natural Resources Conservation Service and the National Park Service conducted a comprehensive soil survey of the park in 2005 (Natural Resources Conservation Service and National Park Service 2005).

3.3.3 Soundscape

One of the enduring qualities of National Parks is their solitude and natural quietness. This is one of the values that visitors seek to find when they visit parks. Listening to natural sounds delivers both enjoyment and reduces stress. This is evidenced by the market for products that reproduce natural sounds, such as audio recordings and water fountains.

American Camp is located in a semi-rural setting, 14.5 km (9 miles) from the small urban community of Friday Harbor. The park unit is bounded on the west by the Eagle Cove subdivision and several large private landowners, and on the east by Washington Department of Natural Resources and Bureau of Land Management land, and by the Cattle Point subdivision. Cattle Point road bisects American Camp from west to east. Local vehicular traffic and vehicle traffic from visitors to the park and park staff creates significant disturbance to the natural quietness. The amplitude of this disturbance varies with the time of day and season, being most significant during early morning and late afternoon rush hour times and during the summer months. Vehicular traffic consists of bikes, mopeds, scooters, motorcycles, cars, trucks, shuttle buses, and heavy equipment. Local air traffic also contributes to the background noise increasing during the summer months. Air traffic from jets arriving and departing SeaTac International Airport south of Seattle can also be heard depending on wind and weather conditions. Likewise, motor vessels contribute to the unnatural noise as well, mainly from commercial fishing vessels during the Fraser River pink salmon season when boats fish the Salmon Flats off American Camp, and from whale watching tour boats during the spring and summer season when Orcas are in Haro Strait.

In addition to human activities that disrupt the natural quietness, some expected natural sounds are absent. Human and habitat disturbance combine to impact wildlife populations, and are both management concerns for the park. At least one bird species, the streaked horned lark, a Federal candidate species for listing as threatened or endangered, is presumed extirpated from the park, and many other grassland ground-nesting species are present in declining numbers, such as western meadowlark and Oregon vesper sparrow (Pearson and Altman 2005, Stinson 2005, Siegel et al. 2009). European rabbits are the most significant ongoing habitat disturbance agent at American Camp. The core rabbit colony area at American Camp is virtually devoid of grassland nesting birds and small mammals due to a lack of native vegetation and cover (Figs. 2 and 8) leaving a void in the natural soundscape.



Figure 8. Cover boards (2 x 4 feet) randomly located on the American Camp prairie in the European rabbit colony area (top) showing no small mammal use and in non-rabbit areas (bottom) with prominent Townsend's vole tunnels in March 2010.

3.4 BIOLOGICAL RESOURCES

The living components of an ecosystem comprise the biological resources and are composed of plants and animals. The biological environment is addressed in the following two sections: 1) terrestrial wildlife and wildlife habitat and 2) invasive species.

3.4.1 Terrestrial Wildlife and Wildlife Habitat

Puget Prairie Ecosystem

The rain shadow effect of the Olympic Mountains and the coastal mountains on Vancouver Island create relatively dry conditions in the San Juan Islands. American Camp at the southern

end of San Juan Island is one of the driest areas in the archipelago, receiving an average of 43.2 cm (17 inches) of precipitation annually, with most precipitation occurring during the winter months (Flora and Fradkin 2004). Summers are quite dry and semi-arid. Because of the sparse rainfall, American Camp supports a large expanse of prairie, the largest remaining prairie in the northern Puget Sound/Strait of Georgia region. The most recent soil survey of the park identifies nearly 317.1 ha (783.6 acres) of soil at American Camp formed under grasslands (Natural Resources Conservation Service and National Park Service 2005). Currently, 290.5 ha (717.8 acres) of American Camp are in grassland. A large area of extant grassland northwest of the Redoubt including the Officers' Quarters complex was originally forested, but subsequently cleared, while some of the original prairie elsewhere is slowly being encroached by Douglas fir and coastal erosion (Fig. 3).

Strong prevailing westerly winds off the Strait of Juan de Fuca help in maintaining American Camp grasslands (Fig. 9). Native Americans may have traditionally burned American Camp prairies as well, controlling Douglas fir encroachment. Unlike the prairies of the Great Plains, Puget prairies differ structurally in having a thick component of moss understory, owing to the humid maritime climate.



Figure 9. Krummholz Douglas fir at the top of Mt. Finlayson shaped by strong prevailing westerly winds off the Strait of Juan de Fuca.

Much of the prairie at American Camp was grazed or converted to pasture or cultivated for crops for nearly a century. The introduction of rhizomatous perennial pasture grasses and other introduced grasses and forbs has left the American Camp prairie dominated by a cover of nonnative introduced species (Rochefort and Bivin 2009). However, a number of native-dominated residual patches of prairie vegetation remain, scattered throughout the American Camp prairie (Fig. 10). Eighty-seven native prairie plant polygons totaling 34.2 ha (84.5 acres) or 12% of the total prairie area were mapped by Rochefort and Bivin (2009).

During the park vascular plant inventory, Rochefort and Bivin (2009) documented 111 species within the American Camp prairie community, of which 49 were nonnative species, 60 were native species, and two were only identified to genus so origin could not be determined. Seven species occurred in more than 50% of the plots sampled, and all were exotic species. They identified 12 vegetation communities of which five were dominated by native plant species. The native *Festuca roemerii* (Roemer's fescue) community was the most diverse of all the communities sampled. Parkwide, native species comprised 67% (266 species) of the total species present, with 70% of the species being perennial. In addition, they found approximately 17% of all native species to be annuals or biennials, while 57% of exotics fell into this category. Nonnative annuals tend to be aggressive colonizers of disturbed lands in the park, and the latter statistic is reflective of that. Nonvascular plants (i.e., mosses, liverworts, lichens, and fungi) have not been surveyed in the park.

North of the American Camp Visitor Center in low-lying areas, the prairie transitions to a mix of Douglas fir, lodgepole pine, and red alder forest with two enclosed prairie meadows. On the north facing slope of Mt. Finlayson, in contrast, the forest consists of Douglas fir, western red cedar, and western hemlock.

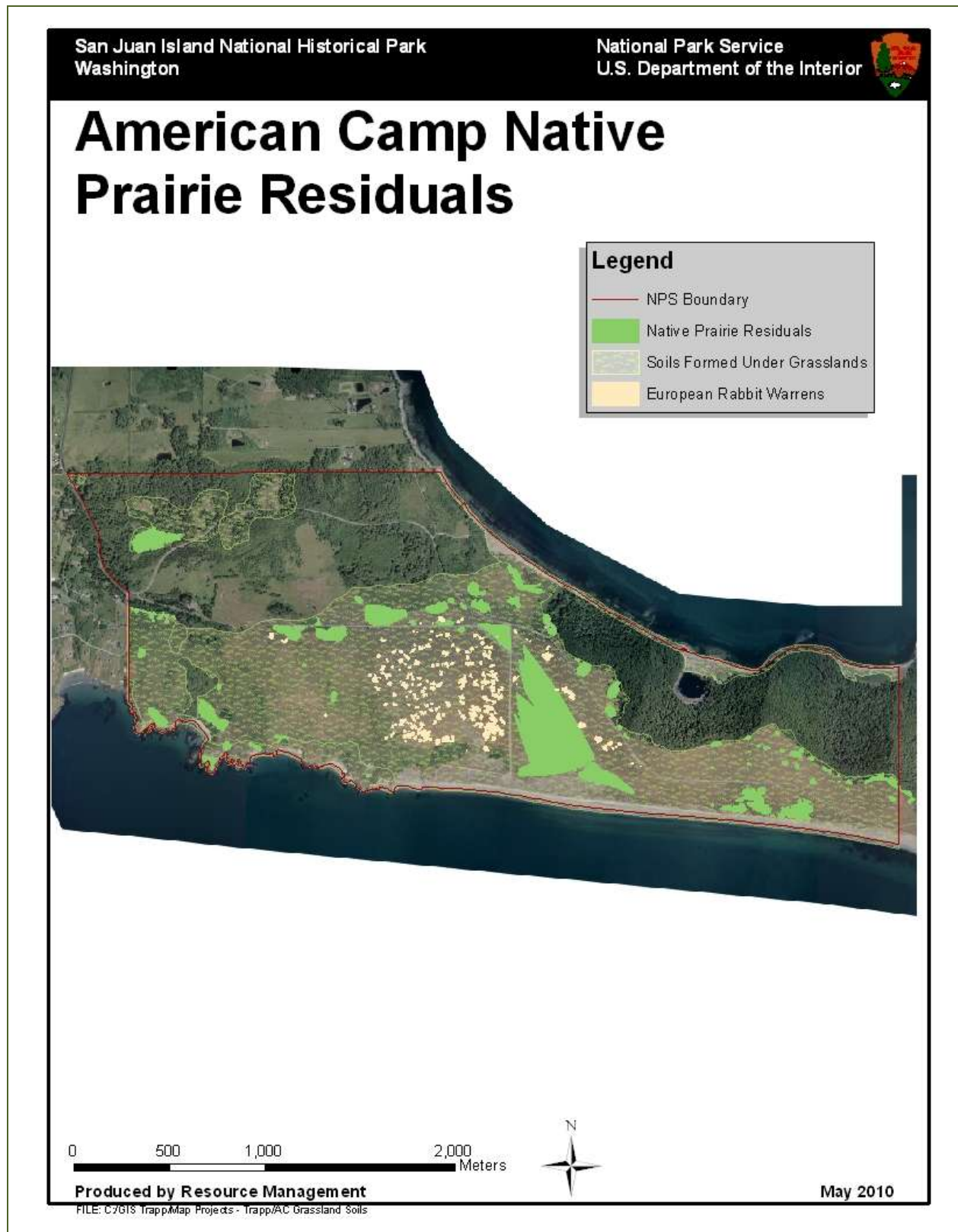


Figure 10. Isolated patches of residual native vegetation on the American Camp prairie remain.

Terrestrial Wildlife

Fifteen species of mammals are confirmed as present in the park, including three nonnative species, red fox, feral cat (*Felis silvestris*), and European rabbit. Mule deer (*Odocoileus hemionus*) is the most visible herbivore on the prairie, and the Townsend's vole is a significant grazer and cultivator of prairie soils. Nonnative red fox and feral cats are the most significant mammalian predators at American Camp. Black bear (*Ursus americanus*) and gray wolf may have historically occurred on San Juan Island. Four other mammal species are probably present in the park and four species, two native and two nonnative, are unconfirmed.

One hundred and seventy-five species of birds are listed as present or probably present in the park, of which only six are nonnative. Of the 115 species confirmed as present in the park, 34 are residents and 63 are breeders. Most of those documented as present in the park occur at American Camp, and American Camp contains suitable habitat for most of those listed as probably present. Four species are documented as historically occurring in the park and include, prairie falcon (*Falco mexicanus*), burrowing owl (*Athene cunicularia*), nonnative Eurasian skylark (*Alauda arvensis*), and streaked horned lark. All four are inhabitants of open country. American Camp also supports a rich assemblage of raptors, such as bald eagle, northern harrier, great horned owl (*Bubo virginianus*), and Midwestern barred owl (*Strix varia* ssp. *varia*).

One individual of a northern alligator lizard (*Elgaria coerulea*) was documented in the park at English Camp. Garter snakes (*Thamnophis* spp.) are present at American Camp. Two frog species are known to breed at American Camp, Pacific chorus frog (*Pseudacris regilla*) and northern red-legged frog (*Rana aurora*). The boreal toad is probably present in the park and the rough-skinned newt (*Taricha granulosa*) is present on San Juan Island, although suitable habitat (i.e., permanent ponds) is limited at American Camp.

There is no freshwater aquatic habitat suitable to support fish populations within the park and no freshwater fish have been documented. Three brackish lagoons at American Camp may provide suitable habitat for some saltwater species. Fourteen saltwater fish species are documented in the nearshore waters of the park, but there are undoubtedly more.

The park has not yet inventoried invertebrates, with the exception of butterflies. The park supports a rich assemblage of butterflies with 32 species or 84% of the known butterfly fauna on San Juan Island. The cabbage white (*Pieris rapae*) is the only nonnative butterfly species in the park and originates from Europe. Four species of diurnal moths are also documented in the park. The cinnabar moth (*Tyria jacobaeae*) is the only nonnative species and was introduced to San Juan Island to control invasive tansy ragwort (*Senecio jacobaea*).

A list of all park species and their status in the park is available online at <http://nrinfo/Species.mvc/Search>.

3.4.2 Invasive Species

European rabbits were introduced to San Juan Island in the late 1800s and were considered abundant by the early 1930s (Stevens 1975). Because rabbits favor open habitat over forest, the main population at American Camp occurs in the open grasslands, but subdominant individuals are pushed into fringe habitats when population levels are high. The rabbit population collapsed in the early 1980s and the park contracted with Biome Research Services, a private consultant, who worked in cooperation with researchers at the University of Washington School of Forest Resources, and University of Washington Department of Comparative Medicine, to determine a cause. They eliminated most probable causes including disease, parasites, climate, food, behavioral mechanisms, and predators, but determined that rabbits had gone into reproductive physiological dysfunction (i.e., a decline in production and/or survival of young) (Taber 1982). The most likely theory is that plant secondary compounds, produced as a defensive response to intense herbivory, caused direct or indirect effects on reproduction (Shutt 1976, Hanssen, et al. 1991). The rabbit population subsequently rebounded reaching a peak in 2005 before again collapsing. The population in 2009 reflected low levels last observed in the mid 1980s. New active warrens at American Camp in March 2010 indicate that rabbits are again on the rise (West 2010).

Nonnative red fox are present at American Camp as well, and were introduced to San Juan Island to control European rabbits. In addition to rabbits, they prey heavily on native small mammals and birds. Feral cats at American Camp also impact small mammals and birds.

Although a native breeder in the park, brown-headed cowbirds (*Molothrus ater*) are invasive in fragmented habitats and brood parasites, laying their eggs in the nests of other species. No trend data is available for the park. Nonnative European starlings (*Sturnus vulgaris*) are also common breeders in the park associated with fragmented habitats. They nest in cavities, often displacing other cavity nesters, and occasionally exhibit nest parasitism.

There are 120 species of nonnative plants documented in the park, with most present at American Camp. The core rabbit colony area is overwhelmingly dominated by invasive species and devoid of native plant communities (Fig. 8). Aggressive, nonnative, invasive plants present at American Camp are more successful in outcompeting and quickly colonizing areas disturbed by rabbits, as well as withstanding intense herbivory.

Invasive plants present in the park include, but are not limited to, spotted knapweed (*Centaurea biebersteinii*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), tansy ragwort (*Senecio jacobaea*), quackgrass (*Elymus repens*), Himalayan blackberry (*Rubus discolor*), cutleaf blackberry (*Rubus laciniatus*), common mullein (*Verbascum thapsus*), and winged elm (*Ulmus alata*).

3.5 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Plant and animal species whose populations are in serious decline or imperiled at the national, state, or local level, and which may be threatened with extinction are listed by the U.S. Fish and

Wildlife Service, National Oceanic and Atmospheric Administration Fisheries Service (NOAA), or the State of Washington as threatened or endangered.

Section 7 of the Endangered Species Act requires that Federal agencies review all actions authorized, funded, or carried out by them and insure that any action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species [16 U.S.C. § 1536(a)(2)].

Endangered: An endangered species is any species which is in danger of extinction throughout all or a significant portion of its range.

Threatened: A threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Candidate: A candidate species is any species where sufficient information exists to support listing as threatened or endangered.

Species of Concern: An unofficial status, where the species appears to be in jeopardy, but there is insufficient information to support listing.

Critical Habitat: Specific areas within the geographical range occupied by a species on which are found those physical and biological features that are considered essential to the conservation of the species and which may require special management consideration or protection can be designated as critical habitat.

Table 1 summarizes the Federal status, habitat requirements, and occurrence of species potentially occurring at American Camp. Additional State of Washington listed species are also summarized. Special status species of particular concern at American Camp are discussed in the following three sections: 1) bald eagle, 2) island marble butterfly, and 3) golden paintbrush.

Table 1. Summary of Federal and selected Washington State-listed threatened, endangered, and sensitive species potentially occurring at American Camp.

Federally-listed Threatened, Endangered, and Sensitive Species Potentially Occurring in the Project Area and Selected Washington State-listed Species				
Common Name	Scientific Name	Status ¹	Habitat Requirements ²	Occurrence in Project Area
Marine Mammals				
Southern resident killer whale	<i>Orcinus orca</i>	FE, MMPA	A small population (J, K, and L pods), range from Haida Gwaii (Queen Charlotte Islands) to central California. They spend much of the late spring, summer, and fall in inland waters near San Juan Island in the Strait of Georgia, Haro Strait, and the Strait of Juan de Fuca feeding primarily on Chinook	No. Marine waters adjacent to American Camp are outside the area of potential impacts.

			salmon.	
Steller sea lion	<i>Eumetopias jubatus</i>	FT, MMPA	Small numbers of the eastern population occur around the San Juan Islands and at haulout sites along the northern side of the Strait of Juan de Fuca primarily during fall, winter, and spring. There are no breeding rookeries in Washington.	No. No haulout sites within 1 km (0.6 miles) of American Camp.
Northern sea otter	<i>Enhydra lutris kenyoni</i>	SOC, MMPA	Reintroduced population occupies almost exclusively rocky habitat along the Olympic Peninsula coast and western Strait of Juan de Fuca. A few transient individuals have been seen around the San Juan Islands.	No. Marine waters adjacent to American Camp are outside the area of potential impacts.
Mammals				
Long-eared myotis	<i>Myotis evotis</i>	SOC	Usually associated with coniferous forests. Individuals roost under exfoliating tree bark, and in hollow trees, caves, cliff crevices, and rocky outcrops on the ground, and occasionally in buildings.	Potentially present at American Camp.
Long-legged myotis	<i>Myotis volans</i>	SOC	Primarily associated with coniferous forests. Uses abandoned buildings, cracks in the ground, cliff crevices, exfoliating tree bark, and hollow snags as summer day roosts, and caves during hibernation.	Potentially present at American Camp.
Pacific Townsend's big-eared bat	<i>Plecotus townsendii townsendii</i>	SOC	Associated with a wide variety of habitat types including coniferous forests, mixed forests, native prairie, and coastal habitats. Distribution is strongly correlated with availability of caves and cave-like roosting habitat, but also utilizes buildings, rock crevices, and hollow trees as roost sites.	Potentially present at American Camp.
Birds				
Yellow-billed loon	<i>Gavia adamsii</i>	FC, MBTA	Non-breeding and wintering birds occupy nearshore marine waters from Kodiak Island south to Puget Sound.	No. Marine waters adjacent to American Camp are outside the area of potential impacts.
Osprey	<i>Pandion haliaetus</i>	SOC, MBTA	Associated with aquatic habitats feeding exclusively on fish. Nests in live trees, snags, and on cliffs, utility poles, and man-made structures forming a platform. Present in Washington during the breeding season (March-October).	No.
Bald eagle	<i>Haliaeetus</i>	SOC,	Associated with aquatic habitats and	Yes.

	<i>leucocephalus</i>	BGEPA, MBTA	are opportunistic feeders with fish comprising much of their diet. They also eat waterfowl, shorebirds, colonial waterbirds, small mammals, marine invertebrates, and carrion (often along roads or at landfills). Typically nest in large super-dominant trees near aquatic habitats, but may nest on cliffs or on the ground in treeless areas, often returning to the same nest every year, but may use one or more alternate nests nearby. In winter, bald eagles typically congregate near open water in the vicinity of concentrated foods resources (Retfalvi 1970, Watson 2002).	See sections 3.6.1 and 4.3.4.2 for detailed discussion.
Northern goshawk	<i>Accipiter gentilis</i>	SOC, MBTA	Permanent resident associated with forested habitats. Typically nests in mature or old-growth forests and generally selects larger tracts of forest over smaller tracts. Opportunistic feeder, preying on a wide variety of vertebrates and occasionally insects.	No. No records for the park. Little suitable habitat at American Camp.
Peregrine falcon	<i>Falco peregrinus</i>	SOC, MBTA	Both migratory and resident populations; present in Washington year round. Nests on cliffs, large stick nests of other species, in tree hollows, and on man-made structures in open country, typically near water. Feeds primarily on birds, rarely, small mammals (e.g., bats, voles), lizards, fish, and insects (by young birds) may be taken.	Yes, rare. No breeding records for park. Little suitable nesting habitat at American Camp.
Marbled murrelet	<i>Brachyramphus marmoratus</i>	FT, MBTA	Found in coastal areas, mainly in saltwater within 2 km (1.2 miles) of shore, and mostly offshore of large tracts of old-growth coastal coniferous forest. Nests are typically in mature/old-growth coniferous forest near the coast on large mossy horizontal branches forming a platform.	No. No breeding records for park. Little suitable nesting habitat at American Camp, and marine waters are outside the area of potential impacts.
Olive-sided flycatcher	<i>Contopus cooperi</i>	SOC, MBTA	Neotropical migrant, nesting primarily in coniferous forest, especially in burned areas with standing dead trees, but also logged areas.	Yes.
Streaked horned lark	<i>Eremophila alpestris strigata</i>	FC, MBTA	Historically bred in prairie and open coastal habitats from the lower Fraser River Valley and southeastern Vancouver Island through the Puget trough and Willamette River Valley into the Rogue River Valley. Nests typically in sparsely vegetated habitat dominated by relatively short annual	No, historical.

			grasses and native bunch grasses (Pearson and Altman 2005).	
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>	SOC, MBTA	Breeds in prairie, weedy pastures, fields, and woodland clearings. Nests on the ground, often in a small depression near a clump of grass. Winters in the southern United States and Mexico.	Yes.
Fish				
Bull trout	<i>Salvelinus confluentus</i>	FT	Resident, migratory, and anadromous populations exist having more specific habitat requirements than other salmonids. They require cold water, stable stream channels, clear spawning and rearing gravel, complex and diverse cover, and unblocked migratory corridors. The coastal Puget Sound population spawns in rivers and streams, but rears young in the ocean. Prey includes invertebrates and small fish.	No. No stream habitat exists at American Camp, and marine waters are outside the area of potential impacts.
Amphibians				
Northern Pacific pond turtle	<i>Actinemys marmorata marmorata</i>	SOC	Habitat includes permanent and intermittent waters of rivers, creeks, small lakes and ponds, marshes, and irrigation ditches, and occasionally is found in brackish water.	No. No records from San Juan Island. Marginal habitat exists at American Camp.
Western toad	<i>Anaxyrus boreas</i>	SOC	Occupies a wide variety of aquatic habitats and ranges into various upland habitats around ponds, lakes, and slow-moving rivers and streams. Burrows in loose soil or uses small mammal burrows, or shelters under logs and rocks.	Potentially present at American Camp.
Northern red-legged frog	<i>Rana aurora</i>	SOC	Occupies habitats in the vicinity of quiet permanent water bodies including stream pools, marshes, and ponds, and seasonally near ephemeral pools. Regularly occurs in damp woods and meadows some distance from water, especially during wet weather. Estivation sites include small mammal burrows, moist leaf litter in riparian areas, and desiccation cracks in dry pond bottoms near water.	Yes.
Rough-skinned newt	<i>Taricha granulosa</i>	SOC	Found on land in the open or under rocks, logs, leaf litter, and the like in forests, woodlands, grasslands, open valleys, and ranchland, or in ponds, lakes, and slow-moving streams. Migrates to breeding sites during or	Potentially present at American Camp. Occurs on San

			after seasonal rains, breeding primarily from late December to July.	Juan Island. Little suitable breeding habitat (i.e., permanent ponds) at American Camp.
Insects				
Island marble butterfly	<i>Euchloe ausonides insulanus</i>	SOC	Extant population is restricted in distribution to San Juan and Lopez Islands in San Juan County, Washington. Currently known to utilize larval host plants in the Brassicaceae (mustard) family, native <i>Lepidium virginicum</i> var. <i>menziesii</i> (Menzies' pepperweed) and nonnative annual mustards <i>Brassica rapa</i> var. <i>rapa</i> (field mustard) and <i>Sisymbrium altissimum</i> (tall tumbled mustard), in three habitat types, which all occur at American Camp. The island marble is also known to use a number of native and nonnative plants for nectaring (Pyle 2004, Miskelly 2005, Peterson 2008, Lambert 2009).	Yes. See sections 3.6.2 and 4.3.4.3 for detailed discussion.
Valley silverspot	<i>Speyeria zerene bremnerii</i>	SOC	Found in coastal dunes and salt spray meadows, grasslands, shrublands, and open coniferous woods. Its larval host plant is <i>Viola adunca</i> var. <i>adunca</i> (early blue violet) (Pyle 2004).	Yes.
Taylor's checkerspot	<i>Euphydryas editha taylori</i>	FC	Occupies dry prairies or prairie-like native grasslands in the Puget trough and Willamette Valley portions of range, and maritime meadows within Garry oak ecosystems on southeastern Vancouver Island. Larval host plants include <i>Castilleja hispida</i> (harsh Indian paintbrush), <i>Plectritis congesta</i> (shortspur seablush), and nonnative <i>Plantago lanceolata</i> (narrowleaf plantain) (Stinson 2005).	No, historical. May be present within approximately 1.5 km (0.9 miles) of American Camp.
Plants				
Golden paintbrush	<i>Castilleja levisecta</i>	FT	Historically occurred in the Puget trough of Washington and lower Vancouver Island in British Columbia south to the Willamette Valley in Oregon. There are 11 known populations, 9 in Washington and 2 in British Columbia. Golden paintbrush inhabits generally flat grasslands in the Puget Sound lowlands, including the southern tip of Vancouver Island. Some sites have mounded topography, and others are on steep, grassy coastal	Yes, reintroduced. See sections 3.6.3 and 4.3.4.4 for detailed discussion.

			bluffs with a west or southwest aspect (U.S. Fish and Wildlife Service 2000).	
California buttercup	<i>Ranunculus californicus</i>	ST	Occurs from California to British Columbia on bluffs and in open grasslands along the coast at low elevations, including rocky slopes along the shore and in rocky wooded areas, in generally, relatively dry ecosystems. Disjunct populations in Washington and British Columbia.	Yes. Rare throughout the American Camp prairie.
Hall's aster	<i>Symphyotrichum hallii</i>	ST	Main population occurs in Oregon, and is rare and disjunct in Washington. Found at varying elevations in moist to dry areas of low to moderate disturbance.	Yes. Occurs at one local at American Camp.
Sand pygmyweed	<i>Crassula connata</i>	ST	Distribution in North America is from Washington, Oregon, and California, west to Arizona and Texas. Found only in San Juan County in Washington. Grows in dry areas that may be seasonally moist along the coast.	Yes. Occurs at one local at American Camp.

¹Status:

FE = Federally-listed Endangered under the Endangered Species Act of 1973

FT = Federally-listed Threatened under the Endangered Species Act of 1973

FC = Federal Candidate species for listing under the Endangered Species Act of 1973

SOC = Federal Species of Concern

MMPA = Protected under the Marine Mammal Protection Act of 1972

MBTA = Protected under the Migratory Bird Treaty Act of 1918

BGEPA = Protected under the Bald and Golden Eagle Protection Act of 1940

ST = Washington State Threatened

²Habitat requirements are relative to the San Juan Islands and, except as cited, are compiled from the National Park Service Inventory and Monitoring Program, North Coast and Cascades Network (<http://science.nature.nps.gov/im/units/nccn>), U.S. Fish and Wildlife Service Endangered Species Program (<http://www.fws.gov/endangered>), Washington Department of Fish and Wildlife (<http://wdfw.wa.gov>), Washington Department of Natural Resources Natural Heritage Program (<http://www1.dnr.wa.gov/nhp/refdesk/index.html>), NatureServe (<http://www.natureserve.org/explorer>), Western Bat Working Group (<http://www.wbwg.org>), and the Seattle Audubon Society BirdWeb (<http://www.birdweb.org>).

3.5.1 Bald Eagle

The bald eagle was first afforded protection with the passage of the Bald Eagle Protection Act in 1940. In 1962, it was amended to add the golden eagle and the law became the Bald and Golden Eagle Protection Act. The bald eagle was first listed in 1967 under the Endangered Species Preservation Act of 1966 for the southern United States south of the 40th parallel. Following the enactment of the Endangered Species Act of 1973, the bald eagle was listed as endangered throughout the lower 48 states, except in Michigan, Minnesota, Oregon, Washington, and Wisconsin where it was designated as threatened. In 1995, the bald eagle was down-listed to

threatened throughout all of the lower 48 states, and on June 28, 2007, the U.S. Fish and Wildlife Service announced the recovery of the species and removed it from the list of threatened and endangered species. The bald eagle is still protected under the Bald and Golden Eagle Protection Act, which prohibits anyone without a permit to take, possess, sell, purchase, or barter any bald eagle alive or dead, or any part, nest, or egg thereof. The bald eagle is still listed as a Federal species of concern in Washington and a Washington State sensitive species.

Bald eagles are associated with aquatic habitats and are opportunistic feeders with fish comprising much of their diet. They also eat waterfowl, shorebirds, colonial waterbirds, small mammals, marine invertebrates, and carrion (often along roads or at landfills). In addition to a good food base, bald eagles require suitable perching areas and roosting and nesting sites. Bald eagles nest widely among Pacific Northwest habitats along rivers, lakes, reservoirs, marine shorelines, and tidal bays (Watson 2002). They use large trees and other elevated sites, such as bluffs and cliffs, for spotting prey and roosting. Bald eagles mate for life and typically nest in large super-dominant trees near aquatic habitats, but may nest on cliffs or on the ground in treeless areas. They often return to the same nest every year, but may use one or more alternate nests nearby. In winter, bald eagles typically congregate near open water in the vicinity of concentrated food resources, such as fish spawning areas, areas with concentrations of waterfowl, and near sources of mammalian carrion, such as ungulate winter range. Reproductive success is directly related to food abundance and habitat quality (Hansen 1987).

In 2009, park resource management staff surveyed all known bald eagle nest territories at American Camp documented in the Washington Department of Fish and Wildlife bald eagle database (Jay Shepherd, Washington Department of Fish and Wildlife, unpublished data). Two new active bald eagle nests were documented at American Camp west of Pickett's lane. Three historic nest territories east of Pickett's lane were not active in 2009 and only one historic nest within those territories could be found. That nest was in disrepair and appeared to be falling out of the tree. One of the two new nests found was determined to be an alternate nest from the historic territory west of Pickett's Lane.

Bald eagle management zone buffers are designated to limit habitat alteration and restrict development around bald eagle nests, roosts, and foraging areas (U.S. Fish and Wildlife Service 2007, Stofel et al. 2008). The state has designated an 800 foot (243.8 m) shoreline buffer from Fourth of July Beach east along Griffin Bay to the Bureau of Land Management Cattle Point Lighthouse. The buffer continues from the lighthouse west along the bluffs of South Beach to the dunes. An 800 foot (243.8 m) buffer also encompasses Grandma's Cove and Eagle Cove along Haro Strait. A 1,320 foot (402.3 m) communal roost buffer includes the northwest corner of American Camp. A 400 and 800 foot (121.9 and 243.8 m) buffer zone is designated around each active and inactive nest site at American Camp. The U.S. Fish and Wildlife Service (2007) has also established national guidelines for management of habitat used by bald eagles, which supersede state regulations where more restrictive and apply to Federal lands.

In 2009, park biologists collected prey remains from beneath bald eagle nests in the park and in various habitats around San Juan Island. Prey items were collected below seven active nests and two inactive nests in six territories. Prey remains were identified to the lowest taxonomic classification possible and grouped by individuals. The minimum number of individuals

identifiable within a taxonomic group was counted. Birds comprised the highest percentage of prey items beneath most nests (Table 2). No European rabbit remains were found beneath any of the four nests examined at American Camp.

Table 2. Minimum number of individual prey items¹ (*n*) by percent taxa and minimum number of species by taxa found beneath bald eagle (*Haliaeetus leucocephalus*) nests (*n* = 8) on San Juan Island, Washington.

Nest Site	Date	<i>n</i>	Mollusk		Crustacean		Fish		Bird		Mammal		European Rabbit
			%	Species	%	Species	%	Species	%	Species	%	Species	%
Old Camp (VC Nest) ²	27 April, 2009	11	0	0	0	0	36.4	3	63.6	4	0	0	0
Well House ²	13 April, 2009	4	0	0	0	0	25	1	75	3	0	0	0
Redoubt ²	13 April, 2009	5	0	0	0	0	0	0	60	3	40	2	0
Sandwith Orchard ³	17 April, 2009	0	0	0	0	0	0	0	0	0	0	0	0

¹Prey items identified to lowest taxonomic classification include: chiton, limpet, Japanese littleneck clam, Pacific littleneck clam, Pacific oyster, Dungeness crab, unidentified crab, unidentified fish, Canada goose, American wigeon, great blue heron, mew gull, glaucous-winged gull, small gull, large gull, common murre, unidentified waterbird, barn owl, unidentified bird, unidentified egg, harbor seal, Columbian black-tailed deer, red fox, raccoon, domestic/feral cat, European rabbit, Townsend's vole, and other (steak bones and fishing lure).

²American Camp.

³English Camp.

3.5.2 Island Marble Butterfly

The island marble butterfly is a Federal species of concern and a Washington State candidate species. In November 2006, following a 12-month status review, the U.S. Fish and Wildlife Service concluded that the island marble did not warrant listing under the Endangered Species Act.

The island marble butterfly historically inhabited the open grasslands and Garry oak (*Quercus garryana*) woodlands on Vancouver Island and adjacent smaller islands in Canada. It was last recorded on Gabriola Island, Canada in 1908 and was believed to be extinct until a small population was rediscovered at American Camp in San Juan Island National Historical Park in 1997 (Fleckenstein and Potter 1999, Guppy and Shepard 2001).

Since the island marble's rediscovery in 1997, a great deal of research into its distribution, population ecology, and life history was initiated and is ongoing (Pyle 2004, Miskelly 2005, Peterson 2008, Lambert 2009). The island marble is restricted in distribution to San Juan and Lopez Islands in San Juan County, Washington. The island marble is currently known to utilize larval host plants in the Brassicaceae (mustard) family, native *Lepidium virginicum* var. *menziesii* (Menzies' pepperweed) and nonnative annual mustards *Brassica rapa* var. *rapa* (field mustard) and *Sisymbrium altissimum* (tall tumbled mustard), in three habitat types, which all occur at American Camp. The island marble is also known to use a number of native and nonnative plants for nectaring.

In 2006, San Juan Island National Historical Park entered into a conservation agreement with the USFWS, which “lays out general guidelines for a broad spectrum of activities at American Camp, including management and restoration of the grassland ecosystem there as a natural component of the cultural/historic landscape... consistent with the goal of conserving the Island Marble butterfly and minimizing potential negative effects to the Island Marble from National Park Service activities” (Pyle 2006). The agreement addresses European rabbits as an overall negative factor at high population levels and that rabbit removal “should be a very good thing for the Island Marble in the mid- to long-term.”

Resource management staff at the park conducted a mark-release-recapture study of the island marble at American Camp in 2008 and 2009 and is continuing annual monitoring in 2010. The park is also conducting research to identify other potential native host mustards. In 2010, the park will begin large-scale prairie restoration, which will include known native nectar species used by the island marble. If new native host plants are identified, they will be included in restoration plans as well.

3.5.3 Golden Paintbrush

Golden paintbrush was listed as Federally threatened on June 11, 1997 [62 FR 31740]. In January and February 2010, the park reintroduced golden paintbrush to American Camp as part of the recovery effort for the population (U.S. Fish and Wildlife Service 2000). Two sites were selected at American Camp, one in a prairie restoration site and one in a native prairie remnant. A total of 336 plants were planted during this initial effort.

Golden paintbrush historically occurred in the Puget trough of Washington and lower Vancouver Island in British Columbia south to the Willamette Valley in Oregon. There are 11 known populations, 9 in Washington and 2 in British Columbia. Of these populations, 5 are on public lands and 6 are on private property. These populations are small in terms of both number of individuals and total area occupied leaving them vulnerable to random stochastic events and human perturbations. Golden paintbrush inhabits generally flat grasslands in the Puget Sound lowlands, including the southern tip of Vancouver Island. Some sites have mounded topography, and others are on steep, grassy coastal bluffs with a west or southwest aspect (U.S. Fish and Wildlife Service 2000).

Much of the historically suitable habitat for golden paintbrush was converted or developed for commercial, residential, and agricultural use. Much of the remaining habitat is being encroached by native and nonnative vegetation that compete with golden paintbrush and create shade, which this species does not tolerate. Fire suppression over the last century has allowed encroachment by Douglas fir (U.S. Fish and Wildlife Service 2000).

While there are no historical records of golden paintbrush occurring at American Camp, the American Camp prairie fits well within the habitat parameters that golden paintbrush is known to occur or to have previously occurred. It is therefore extremely likely that golden paintbrush is historically native to American Camp. Much of the American Camp prairie was converted for agricultural uses prior to establishment of the park, European rabbits have occupied the prairie for more than a century, and fire suppression has allowed encroachment by Douglas fir and common snowberry. It is likely that all these factors contributed to the demise of golden paintbrush at American Camp, assuming its historical presence.

The introduction of rhizomatous, perennial pasture grasses and other introduced grasses and forbs has left the American Camp prairie dominated by a cover of nonnative introduced species (Rocheftort and Bivin 2009). However, a number of native-dominated prairie remnants remain, scattered throughout the American Camp prairie (Fig. 8). Eighty-seven native prairie plant polygons totaling 34.2 ha (84.5 acres) or 12% of the total prairie area were mapped by Rocheftort and Bivin (2009).

The park plans to continue prairie restoration in 2010 and beyond, which will benefit the golden paintbrush reintroduction effort and help assure the long-term success of the project. The park plans to establish at least two golden paintbrush populations at American Camp, which will help meet the recovery goals outlined by the U.S. Fish and Wildlife Service and help assure the long-term survival of the species.

3.6 CULTURAL RESOURCES

Cultural resources include archaeological resources, historic structures, cultural landscapes, ethnographic resources, and museum objects. Ethnographic resources include traditional use areas or traditional cultural properties, such as celebration and ceremonial sites, fishing camps, and plant-gathering areas. Museum resources will not be affected by either alternative and are not further discussed. Cultural resources in the park are discussed in the following three sections: 1) archaeological resources, 2) historical resources, and 3) cultural landscape. An in-depth description of the park prehistory and history is provided in the park 2008 General Management Plan (National Park Service 2008) available at <http://parkplanning.nps.gov/sajh>.

3.6.1 Archaeological Resources

Ethnographic History

The prehistory and early history of Native peoples of the islands is derived from evidence obtained through archaeological investigations, information gathered from documents of early European contact with indigenous populations, and from more than a century of ethnographic research by anthropologists. As the Cordilleran Ice Sheet retreated northward from San Juan Island, American Camp's South Beach was the first to appear. Paleo-Indians during the late Pleistocene followed the retreating glaciers northward in search of large game grazing the grassy slopes watered by the glaciers, until about 9,500 years ago when most of the prey was no longer available. To date, no Paleo-Indian archaeological sites containing Clovis spear points have been found on San Juan Island. The oldest archaeological site found in the park is on the bluff above South Beach at American Camp where Cascade points were found by Dr. Arden King of Tulane University in 1948. These points were used by Native peoples from about 9,000 to 7,000 years ago to hunt modern animals currently present in western Washington (National Park Service 2008).

Because of its early emergence from beneath the ice sheet, American Camp has a long history of Native American occupation. Grasslands developed on the glacial outwash plain developing rich prairie soils. Berries and bulbs were harvested, and plants such as camas were cultivated. Salmon migrating north up Haro Strait to the Frazer River in Canada and south into Puget Sound were plentiful. Salmon congregating in the shallow flats off South Beach were caught in reef nets. Shellfish were also plentiful along the tidal flats in Garrison Bay. Springs at American Camp provided an ample supply of freshwater. An ethnographic survey of American Camp is completed (National Park Service 2004).

Archaeology

A number of archaeological studies, beginning as early as 1890, have been conducted at American Camp focused on prehistoric and historic resources. Archaeological evidence in the park reveals human occupation of San Juan Island dating back 7,000 years or more (National Park Service 2008). American Camp was the site of seasonal occupation by Straits Salish peoples utilizing the bounty of the prairie, readily available freshwater from springs, and abundant marine resources found there. Eight tribes are culturally affiliated with the American Camp landscape. A cultural landscapes inventory is completed for American Camp (National Park Service 2004).

San Juan Island National Historical Park has 19 known archeological sites, some of which date from the historic period and document the joint military occupation of the island that the park commemorates. Many of the sites are prehistoric, dating back as much as 2,500 years before present. These are considered important for the information they provide about past occupation of the area by Native Americans and how they lived. Excavations have been undertaken over the past several decades of a number of the sites, both historic and prehistoric. Several of the shoreline shell midden sites are threatened by coastal erosion, as is the case in much of the Salish Sea region.

3.6.2 Historical Resources

The park commemorates the historic events that occurred on San Juan Island in connection with the final settlement of the Oregon Territory boundary dispute from 1853 to 1871. The historic period at American Camp interpreted by the park actually began with European settlement of San Juan Island in 1845, when it is said, the Hudson's Bay Company claimed San Juan Island by placing a wooden plaque on Mt. Finlayson on the southeast end of San Juan Island, and ended with the exodus of the U.S. Army in 1874. The period of significance of American Camp however, corresponds to the occupation by the U.S. Army from 1859 to 1874 (National Park Service 2004). American Camp was designated a National Historic Landmark on November 5, 1961. In 1966, American Camp was placed on the National Register of Historic Places as a historic district.

The Hudson's Bay Company established Belle Vue Sheep Farm in 1853 and settlers began arriving in 1859. The U.S. Army occupied American Camp from 1859 to 1874. A military road was constructed during the U.S. Army occupation. During the historic period (1853-1874), San Juan Village was established at the site of Old Town Lagoon and at its height consisted of a central throughway lined with twenty buildings that terminated at a wharf. Alaska Packer's Rock was the site of a salmon fishing operation from 1890 to 1930 (National Park Service 2004).

Following the disbandment of the U.S. Army camp in 1874, American Camp was dismantled and the buildings were auctioned off, with most either being destroyed or moved from the site. The Hudson's Bay Company followed suit and relinquished ownership of Belle Vue Sheep Farm in 1875. In 1890, San Juan Town burned to the ground.

Beginning in 1875, American Camp was turned over to private ownership and much of the prairie was grazed or farmed. In 1951, Washington State acquired just less than five acres of land encompassing the American Camp cantonment. In 1966, Congress established San Juan Island National Historical Park for the purpose of "interpreting and preserving the sites of the 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 so-called Pig War of 1859" (Public Law 89-565).

Two historic buildings remaining at American Camp, the officers' quarters and the laundress' quarters, are the most visible reminders of the historic period. The Adam Brown house, currently located in Friday Harbor, has been identified as a building that served as officers' quarters at American Camp during the joint military occupation and is slated to return to the park. The earthen Redoubt is considered "one of the finest examples of a pre-Civil War earthworks remaining in the United States" (National Park Service 2004). Remnants of other military buildings, Belle Vue Sheep Farm, and San Juan Town also remain (Fig. 11).

The park has 23 structures on the List of Classified Structures (the NPS inventory and database of important historic structures). Fourteen of those structures are currently classified as in good condition. The park's strategic goals state that from FY 2007 to FY 2011, the park will invest

staff time and base funding, and project funding where possible, to continue to maintain 14 of the 23 (or 61%) of park historic structures in good condition.



Figure 11. Existing conditions at American Camp.

3.6.3 Cultural Landscape

The park commemorates the historic events that occurred on San Juan Island in connection with the final settlement of the Oregon Territory boundary dispute from 1853 to 1871. American Camp is also significant as the site of seasonal occupation by Native Americans for more than 7,000 years (National Park Service 2004). American Camp was designated a National Historic Landmark on November 5, 1961. In 1966, American Camp was placed on the National Register

of Historic Places as a historic district. The cultural landscape boundary comprises the area west of Pickett's Lane and the Jakle's Lagoon trailhead (Fig. 6) and is eligible for inclusion on the National Register. The cultural landscapes inventory 2009 condition assessment update for American Camp is *fair*, indicating that the landscape shows clear evidence of disturbance and deterioration requiring corrective action within 3-5 years, without which, deterioration of many of the landscape characteristics will cause the landscape to degrade to a poor condition.

The sweeping views which characterize the landscape of American Camp retain integrity and contribute to the significance of the site. Glacial activity created an east-west running promontory ridge with a slightly raised knoll high above the beaches of the adjacent water bodies, a perfect location for the earthen fortification. This position commands the most expansive view throughout the site and provided clear visual access to any advancement by the British Royal Marines. The cantonment, located west of the redoubt at the natural forest-grassland ecotone, was also situated to fully appreciate the views out onto the two bays. Mt. Finlayson, east of the redoubt, is the highest point on the southern end of the island at 295 feet.

Two views which contribute to the significance of the site are

- the territorial views of the Strait of Juan de Fuca, Griffin Bay, the Cattle Point peninsula and surrounding islands from the redoubt, and
- views of the Strait of Juan de Fuca from the American Camp cantonment (National Park Service 2004).

Viewshed

The San Juan Islands are renowned for their scenic beauty and vistas, wildlife, rural and historic character, and slower pace of life. San Juan Island National Historical Park is the largest protected public land on San Juan Island and has 10.73 km (6.67 miles) of undeveloped marine shoreline. The American Camp unit encompasses 494.9 ha (1,223 acres) of forests, grasslands, wetlands, and saltwater shoreline. From American Camp, the Olympic Mountains are visible to the south across the Strait of Juan de Fuca, Mt. Rainier is visible to the southeast, and Mt. Baker is visible to the northeast. The Hudson's Bay Company established a sheep farm at American Camp in 1853, and named it Belle Vue, or "beautiful view." The American Camp prairie contains 290.5 ha (717.8 acres) of grasslands and is the largest remaining prairie habitat in the Strait of Georgia basin. During the summer months, Orca whales (*Orcinus orca*) can frequently be seen off the shore of American Camp in Haro Strait.

The objects, structures, and features associated with the historic period 1853 to 1874, including the Belle Vue Sheep Farm and U.S. Army camp, are listed in the National Register of Historic Places. American Camp was also the site of seasonal occupation by Native Americans and is culturally affiliated with eight tribes. The western half of American Camp is eligible for listing on the National Register as a cultural landscape.

Following the settlement of the Oregon Territory boundary dispute and departure of the Hudson's Bay Company and U.S. Army troops by 1874, American Camp was settled by homesteaders and farmers occupying many of the former military buildings. Other buildings

were sold and removed from the location. The rich prairie soils were farmed or converted to pasture lands. Beginning in 1951, the State of Washington began purchasing key historic sites at American Camp through the Washington State Parks and Recreation Commission. In 1961, the site was designated a National Historic landmark (Klinger et al. 2006). San Juan Island National Historical Park was established by Congress in 1966. Following the designation of the park, the National Park Service began the process of restoring the cultural landscape, removing noncontributing objects and structures not associated with the historic period, restoring and protecting historic features, and rehabilitating the landscape. More recently, the park has begun small-scale prairie habitat restoration, planting native grasses at a site south of the American Camp Visitor Center and near the Redoubt totaling less than 2 ha (5 acres).

Currently, the American Camp cultural landscape exists in a degraded condition. These past disturbances have all contributed to this condition. Fire suppression has also allowed the encroachment of Douglas fir into the grasslands. Nonnative vegetation dominates the prairie, although residual patches of native prairie vegetation persist (Fig. 10). The single greatest ongoing perturbation of the prairie is by European rabbits (Fig. 12).



Figure 12. European rabbit prairie disturbance at American Camp viewed northeast toward the American Camp dunes.

The park plans to continue restoring prairie over the next several years, controlling exotic plants and reestablishing the native vegetation over gradually larger areas as resources allow. The restored prairie will enhance both the cultural and natural landscape that existed during the historic period 1853-1874.

3.7 VISITOR EXPERIENCE

Visitor experience is defined by a variety of factors, which include not only the visitor's enjoyment of the park, but the message the park delivers and what the visitor takes away with them from their experience. Visitor experience includes

- delivery of the park's message,
- quality, flow, and convenience of visitor services,
- visitor comfort and safety,
- visitor education,
- increased awareness and appreciation of park resources,
- overall satisfaction and enjoyment of the park, and
- whether the experience met or exceeded the visitor's expectations.

Visitor experience is interpreted by visitor surveys, by public scoping for this environmental assessment, and through informal conversations with the general public by park staff. The University of Idaho Park Studies Unit, a branch of the National Park Service Social Science Program, conducts both in-depth visitor studies and annual visitor satisfaction surveys. These reports are available at <http://www.psu.uidaho.edu/>.

In an in-depth visitor study conducted August 10-16, 1994, 68% of visitors were visiting San Juan Island National Historical Park for the first time, and only 12% of visitors lived on San Juan Island either year round or for part of the year. Visitors said their reasons for visiting the park were to view scenery (87%) and to learn about history (64%). When visitors were asked what subjects they would most like to learn about in the future, 68% replied natural history, 64% said Native American inhabitants, and 63% replied the history of early settlers (Littlejohn 1995). In August 2009, 99% of visitors surveyed said they were satisfied overall with facilities, services, and recreational opportunities in the park. There were 274,646 visits to the park in 2009, including 204,324 visits to American Camp.

3.8 SOCIOECONOMIC ENVIRONMENT

Socioeconomics addresses the social and economic aspects of the human environment. It encompasses both social and economic factors that characterize the individual or group within the social fabric. Social and economic conditions are broadly defined and include a wide range of topics such as population, social structure, economy, taxes, health care, and education.

The socioeconomic environment for San Juan County is based on data compiled by the State of Washington available at <http://www.ofm.wa.gov/databook/county/>, and by an in-depth visitor study conducted in the park (Littlejohn 1995). The demographics of San Juan County have changed dramatically since World War II as the economy has shifted from agriculture and fishing to construction and tourism. The popularity of the county for retirement and vacation homes has led to gentrification, with a larger proportion of the population comprised of seniors and the affluent (Washington State Office of Financial Management 2010).

The park does have a significant effect on the socioeconomic environment of San Juan County, especially for the community of Friday Harbor on San Juan Island. Visitor services include lodging, restaurants and bars, grocery stores, gas stations, vehicle and bike rentals, taxi and shuttle services, sporting goods stores, guide services, whale watching tours, kayak rentals, souvenir shops, and niche industries, such as wineries. The economy is largely seasonal and San Juan Island National Historical Park is one of the main attractions on San Juan Island. The park is the primary destination for 20% of visitors to the park. Visitors to the park spent an average of \$51 per capita on travel, lodging, food, and other items during their visit (Littlejohn 1995).

Chapter 4: Environmental Consequences

4.1 INTRODUCTION

The National Environmental Policy Act requires that environmental documents disclose the environmental impact of the proposed Federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the preferred alternative be implemented. This chapter analyzes the impacts to the physical, biological, and human aspects of the environment that could be affected by the alternatives. The effects of project alternatives on each resource type are also described. This chapter is organized into the following sections:

- Methodology
- Impact Topics Considered and Analysis by Resource Type for Each Alternative

4.2 METHODOLOGY

This section describes the methodology used to predict impacts to resource types. Resource types were identified by the park interdisciplinary team on the results of internal scoping, through a feasibility study contracted by Island Conservation, and through input received during the public scoping process. The definition of an environmental impact is the predicted change in condition of a resource or the environment upon examination due to a proposed action or alternative. Impacts are analyzed by considering the action to the resource and the effect to the resource. The elements of impact analysis used in this chapter include the following factors:

- Context (temporal, geographical)
- Type (beneficial, adverse, direct, indirect, cumulative)
- Area (site-specific, local, regional)
- Intensity (negligible, minor, moderate, major, impairment)
- Duration (short-term, long-term)
- Mitigation (avoiding, minimizing, rectifying, reducing or eliminating, compensating)

The definitions in the following subsections apply to all impact topics, except as noted.

4.2.1 Context of Impact

Context: The context is the setting within which impacts are analyzed and may be temporal (i.e., occurring over a certain period of time after implementation of an action or at some point in the future) or more often geographical.

4.2.2 Type of Impact

Beneficial: The impact would improve the condition or appearance of the resource or the quality or quantity of the resource, or move the resource toward a desired condition.

Adverse: The impact would degrade the condition or appearance of the resource or the quality or quantity of the resource, or move the resource away from a desired condition.

Direct: The impact would be caused by and occur at the same time and place as the action.

Indirect: The impact would be caused by the action, but occur later in time or at another place or to another resource.

Cumulative: Additive impacts to the resource without regard to land ownership, including actions that occurred in the past, the present, and the reasonable foreseeable future.

4.2.3 Area of Impact

Site-specific: The action would affect areas within the American Camp unit boundary of the park.

Local: The action would affect areas within the American Camp unit boundary of the park and land adjacent (sharing a boundary) with American Camp.

Regional: The action would affect the park, land adjacent to the park, and surrounding communities, or northwestern Washington State.

4.2.4 Intensity of Impact

The following definitions apply to all impact topics except special status species and cultural resources, which are defined separately. Impact determinations for threatened, endangered, and sensitive species and cultural resources are formally determined under the Endangered Species Act (Section 7) and the National Historic Preservation Act (Section 106), respectively.

Negligible: Change would not be detectable or would be only slightly detectable, localized or at the lowest level of detection.

Minor: The action would not necessarily decrease or increase a measurable change. An action may affect the localized area but would not affect on a local or regional level.

Moderate: Effects on local level would be readily detectable. Mitigating measures, if needed to offset adverse effects, would be extensive and likely successful.

Major: Effects on local level would be obvious and would result in substantial consequences at a regional level. The change would result in a severely adverse or major beneficial impact, and possible permanent consequence. Extensive mitigating measures would be needed to offset any adverse effects and their success would not be guaranteed.

4.2.5 Duration of Impact

Short-term: The impact would be reversible and of short duration, occurring for a period of less than one to five years.

Long-term: The impact would be reversible, but persist over a longer period, generally more than five years.

4.2.6 Mitigation of Impact

The Council on Environmental Quality defines five degrees of mitigation.

- (a) “**Avoiding** the impact altogether by not taking a certain action or parts of an action.
- (b) **Minimizing** impacts by limiting the degree or magnitude of the action and its implementation.
- (c) **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.
- (d) **Reducing or eliminating** the impact over time by preservation and maintenance operations during the life of the action.
- (e) **Compensating** for the impact by replacing or providing substitute resources or environments” [CEQ § 1508.20].

4.2.7 Overview of Impairment Policies

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies 2006* (National Park Service 2006) and Director’s Order 12, *Conservation Planning, Environmental Impact Analysis, and Decision-making* (DO-12; National Park Service 2001) require analysis of potential effects to determine if actions would impair park resources. The

following sections from NPS *Management Policies* 2006 define impairment and highlight the difference between an impact and an impairment.

The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values

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. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. However, the laws do give the Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act. [§ 1.4.3]

The Prohibition on Impairment of Park Resources and Values

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment. [§ 1.4.4]

What Constitutes Impairment of Park Resources and Values

The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to 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, or
- ◆ key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- ◆ identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated. An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park. [§ 1.4.5]

What Constitutes Park Resources and Values

The “park resources and values” that are subject to the no-impairment standard include

- ◆ the park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;
- ◆ appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- ◆ the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and

- ◆ any additional attributes encompassed by the specific values and purposes for which the park was established. [§ 1.4.6]

Decision-making Requirements to Identify and Avoid Impairments

Before approving a proposed action that could lead to an impairment of park resources and values, an NPS decision-maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values. If there would be an impairment, the action must not be approved. [§ 1.4.7]

In this Environmental Assessment determinations of impairment are provided in the conclusion paragraph under each applicable resource topic for each alternative. Impairment determinations apply to physical and biological resources and are not made for visitor use, or socioeconomic resources.

4.3 IMPACT TOPICS CONSIDERED AND ANALYSIS BY RESOURCE TYPE FOR EACH ALTERNATIVE

This section discusses the impact analysis for each resource type under Alternative A, the No Action Alternative and under Alternative B, the Preferred Alternative. For each resource type, the *Methodology and Assumptions*, *Study Area*, and *Cumulative Impacts* are the same for each alternative, while the *Analysis* and *Conclusion* is discussed separately for each alternative. Under Alternative A (No Action Alternative), the status quo would be maintained allowing the European rabbit population at American Camp to self-regulate. Under Alternative B (Preferred Alternative), European rabbits would be removed and prevented from recolonizing American Camp. The following resources are analyzed for impacts in the same order as in Chapter 3 on the Affected Environment:

- Physical Resources (including water resources, soils, and soundscape)
- Biological Resources (including terrestrial wildlife and wildlife habitat and invasive species)
- Threatened, Endangered, and Sensitive Species (including bald eagle, island marble butterfly, and golden paintbrush)
- Cultural Resources (including archaeological resources, historical resources, and cultural landscape)
- Visitor Experience
- Socioeconomic Environment

Table 3 summarizes the impact analysis.

Table 3. Summary of the impact analysis for Alternative A (No Action Alternative) and Alternative B (Preferred Alternative).

Impact Topic	Alternative A (No Action Alternative): Continue with current management allowing European rabbit population to self-regulate	Alternative B (Preferred Alternative): Full removal and prevent future recolonization of European rabbits
Physical Resources		
Water Resources	<p>Minor long-term adverse effect on water resources at American Camp.</p> <p>Cumulative effects would be minor and long-term affecting springs and seeps along South Beach, exacerbated by predicted drier summers due to climate change.</p>	<p>Minor long-term beneficial effect on water resources at American Camp.</p> <p>Cumulative effects would be beneficial to spring and seeps along South Beach by increasing soil moisture retention.</p>
Soils	<p>Major long-term adverse effect on soils at American Camp.</p> <p>Cumulative effects would be major and long-term with increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>Major long-term beneficial effect on soils at American Camp.</p> <p>Cumulative effects would be beneficial in rebuilding damaged soils over time and preventing erosion.</p>
Soundscape	<p>Moderate long-term adverse effect on the soundscape at American Camp.</p> <p>Cumulative effects would be moderate and long-term due to impacts on songbird habitat.</p>	<p>Moderate short-term adverse effect and a moderate long-term beneficial effect on the soundscape at American Camp.</p> <p>Cumulative effects would be moderate and short-term from gunshot, but moderately beneficial to songbird habitat over the long-term.</p>
Biological Resources		
Terrestrial Wildlife and Wildlife Habitat	<p>Major long-term adverse effect on terrestrial wildlife and wildlife habitat at American Camp.</p> <p>Cumulative effects would be major and long-term from soil and vegetation disturbance, compounded by invasive nonnative plants, with fluctuations in the rabbit population leading to trophic cascades.</p>	<p>Major long-term beneficial effect on terrestrial wildlife and wildlife habitat at American Camp.</p> <p>Cumulative effects would be beneficial with increased vegetation cover and composition, and more stable plant-herbivore and predator-prey relationships.</p>
Invasive Species	<p>Major long-term adverse effect from invasive species at American Camp.</p> <p>Cumulative effects would be major and long-term from soil and vegetation disturbance maintaining invasive nonnative plants, with the rabbit population supporting nonnative red fox.</p>	<p>Major short-term and long-term beneficial mitigating effect on invasive species at American Camp.</p> <p>Cumulative effects would be beneficial with removal of nonnative European rabbits and elimination of a disturbance regime that favors invasive nonnative plants; red fox numbers would diminish.</p>
Threatened, Endangered, and Sensitive Species		

Bald Eagle	<p>May affect, not likely to adversely affect bald eagles at American Camp.</p> <p>Cumulative effects include the proposed realignment of Cattle Point Road and restoration of Puget prairie habitat having a short-term negative and a long-term beneficial effect, respectively.</p>	<p>May affect, not likely to adversely affect bald eagles at American Camp.</p> <p>Cumulative effects include the proposed realignment of Cattle Point Road and restoration of Puget prairie habitat having a short-term negative and a long-term beneficial effect, respectively.</p>
Island Marble Butterfly	<p>May affect, likely to adversely affect island marble butterflies at American Camp.</p> <p>Cumulative effects from soil and vegetation disturbance and competition with invasive nonnative plants preventing establishment of nectar and larval host plants.</p>	<p>May affect, not likely to adversely affect island marble butterflies at American Camp.</p> <p>Cumulative effects include restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Golden Paintbrush	<p>May affect, likely to adversely affect golden paintbrush at American Camp.</p> <p>Cumulative effects from herbivory and soil and vegetation disturbance leading to dominance by invasive nonnative plants.</p>	<p>May affect, not likely to adversely affect golden paintbrush at American Camp.</p> <p>Cumulative effects include enhancement of the golden paintbrush population and restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Cultural Resources		
Archaeological Resources	<p>Adverse effect on archaeological resources at American Camp.</p> <p>Cumulative effects include increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>No adverse effect on archaeological resources at American Camp.</p> <p>Cumulative effects would be stabilizing in rebuilding damaged soils over time and preventing erosion.</p>
Historical Resources	<p>Adverse effect on historical resources at American Camp.</p> <p>Cumulative effects include increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>No adverse effect on historical resources at American Camp.</p> <p>Cumulative effects would be stabilizing in rebuilding damaged soils over time and preventing erosion.</p>
Cultural Landscape	<p>Adverse effect on the cultural landscape at American Camp.</p> <p>Cumulative effects from soil and vegetation disturbance leading to dominance by invasive nonnative plants and increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>No adverse effect on the cultural landscape at American Camp.</p> <p>Cumulative effects would be stabilizing in rebuilding damaged soils over time and preventing erosion and include restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Visitor Experience		

Visitor Experience	<p>Minor long-term adverse effect on visitor experience at American Camp.</p> <p>Cumulative effects would be moderate and long-term from soil and vegetation disturbance, compounded by invasive nonnative plants and increased soil erosion from predicted drier summers and wetter autumns and winters due to climate change.</p>	<p>Minor short-term adverse effect and a minor long-term beneficial effect on visitor experience at American Camp.</p> <p>Cumulative effects would be minor and short-term from removal operations, but beneficial over the long-term with increased vegetation cover resembling the historic landscape, and include restoration of Puget prairie habitat having a long-term beneficial effect.</p>
Socioeconomic Environment		
Socioeconomic Environment	<p>Negligible long-term effect on the socioeconomic environment in San Juan County.</p> <p>Cumulative effects would be negligible and long-term.</p>	<p>Minor short-term beneficial effect and a negligible long-term effect on the socioeconomic environment in San Juan County.</p> <p>Cumulative effects would be minor and short-term during removal operations, but negligible over the long-term.</p>

4.3.1 Physical Resources

4.3.1.1 Water Resources

Methodology and Assumptions

Holmes (1998) mapped 26 wetlands with an area of 32.1 ha (79.2 acres) at American Camp consisting of coastal marine lagoons, intermittent streams, seeps, permanent and seasonally wet areas, and ephemeral pools. European rabbits avoid these areas as the saturated soils are not suitable for warren development.

Study Area

The analysis area for water resources is the American Camp unit of the park including tide lands and bordering communities and neighbors.

Analysis: Alternative A (No Action Alternative)

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). Because warrens cut through soil horizons, penetrate to rocky parent material, and remove vegetation that would absorb rainfall, their presence has negative impacts on the natural hydrologic regime.

At high population levels, European rabbits may consume up to 75% of the available spring production of above-ground biomass (Stevens 1975). This loss of vegetative cover leads to damaging topsoil erosion, increased runoff, elevated soil temperatures and increased evaporation, and favors nonnative invasive plants (Fig. 13). Increased erosion and runoff negatively impacts water quality of surface water resources. Increased runoff and evaporation likewise limits the available freshwater for groundwater replenishment and wetland maintenance.



Figure 13. European rabbit damage is exacerbated by wind and water erosion above the freshwater springs (shrub area in background) at South Beach.

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and allow vegetation to reestablish on barren areas browsed by rabbits, preventing wind and water erosion and increasing water retention. The overall hydrology of American Camp would improve to more natural conditions. As rabbits do not inhabit wetlands at American Camp, short-term impacts to wetlands from removal operations would not be expected.

Cumulative Impacts

The natural hydrologic regime at American Camp is altered by past agricultural practices, the introduction of pasture grasses and nonnative invasive plants, development, groundwater use by the park and neighboring communities, and climate change. Beginning in the mid-nineteenth century, American Camp grasslands were grazed and later converted to pasture or cultivated for crops ending with the establishment of the park in 1966. Nonnative pasture grasses and other invasive species were introduced and are now the dominant vegetation (Rochefort and Bivin 2009). Remnant agricultural ditches are still visible on the prairie landscape west of Pickett's Lane. Development inside the park, primarily from construction of roads and parking lots, and to a lesser degree from construction of trails and buildings, impacts surface water drainage, absorption, and runoff patterns. Climate change models for western Washington based on current trends project higher temperatures during all seasons with the greatest increases in summer, enhanced seasonal precipitation (+1 to +2% averaged over all models) with a trend toward wetter autumns and winters and drier summers, and rising sea level (Climate Impacts Group 2009).

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing minor adverse effect on water resources at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have a minor long-term beneficial effect on water resources at American Camp and there would be no impairment.

4.3.1.2 Soils

Methodology and Assumptions

The Natural Resources Conservation Service, National Park Service, and San Juan County Conservation District conducted a cooperative, comprehensive soil survey of the park in 2005 (Natural Resources Conservation Service and National Park Service 2005). European rabbits primarily occupy prairie habitat at American Camp on glacial outwash plains with San Juan sandy loam soils (Natural Resources Conservation Service and National Park Service 2005), but move into less favorable and marginal habitats at high population densities (Fig. 14).

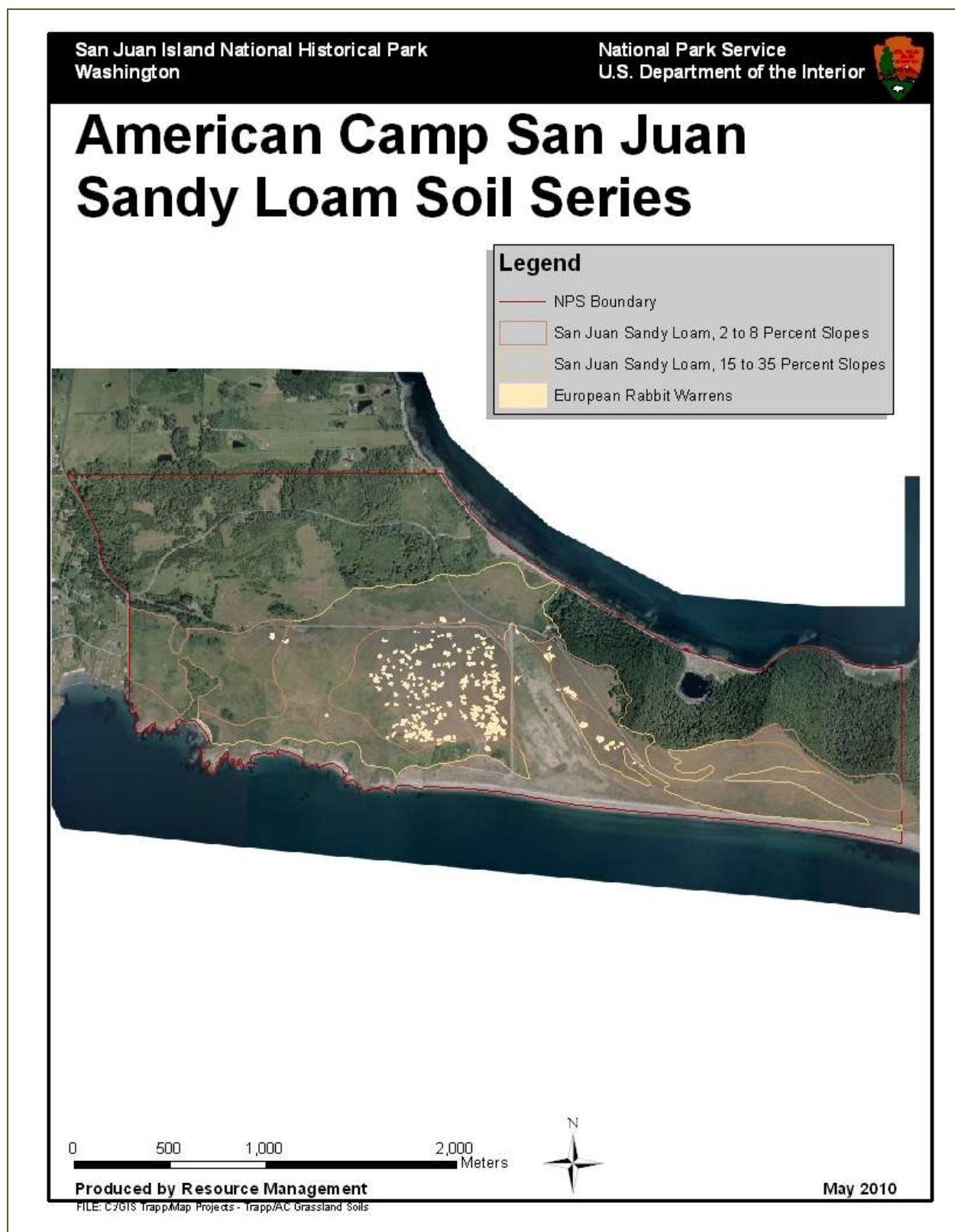


Figure 14. European rabbits at American Camp prefer habitat in the San Juan sandy loam soil series on generally flat terrain, but move into less favorable habitats at high population densities.

Study Area

The analysis area for soils is the American Camp unit of the park.

Analysis: Alternative A (No Action Alternative)

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). In the process of excavating warrens, rabbits disturb and redistribute the soil horizons digging through the organic, topsoil, and subsoil layers into the parent material (Fig. 15). This mix of material is brought to the surface and piled at the entrance to the warren on top of the organic and topsoil layers.

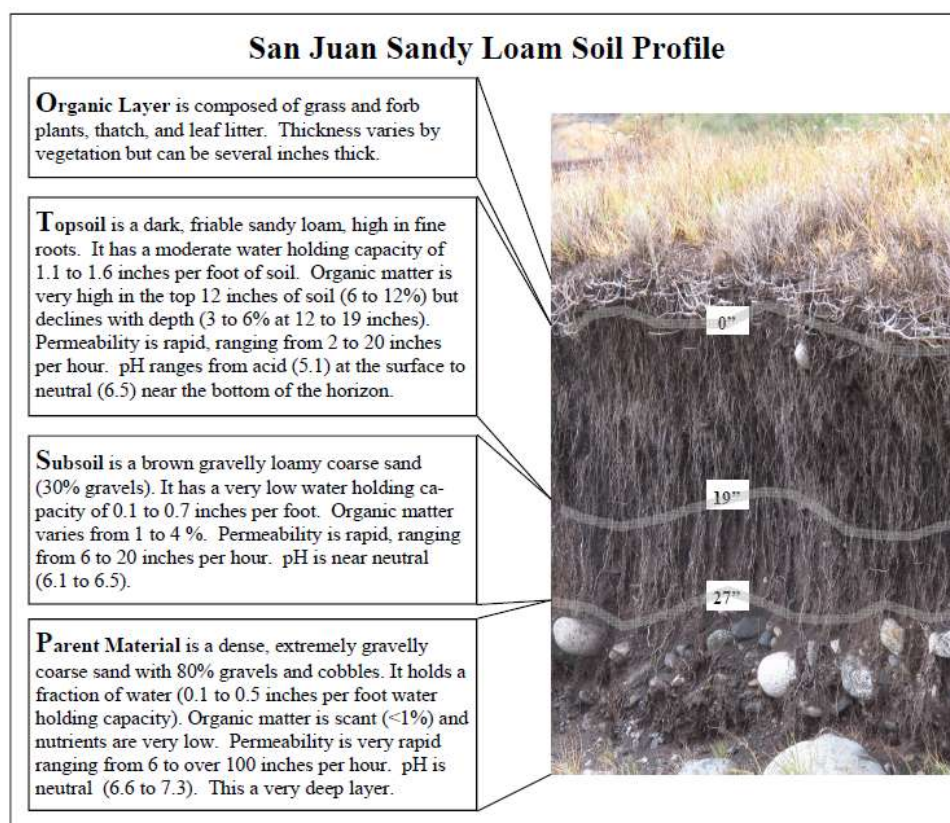


Figure 15. Most European rabbit warrens are in the San Juan sandy loam soil series, the predominant grassland soil at American Camp (illustration by David Steinfeld).

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and damage to soil horizons and allow vegetation to reestablish on barren areas browsed by rabbits, preventing wind and water erosion and increasing water retention. The organic layer would reestablish on barren areas, improving soil conditions.

Cumulative Impacts

In the late nineteenth century until the establishment of the park in 1966, much of the American Camp prairie west of Pickett's Lane was cultivated. The effects of cultivation are generally temporary and the organic layer is rebuilt over time. Construction of roads and parking lots at American Camp has resulted in more permanent disturbance. Other such soil disturbance includes the installation of utilities (power and water lines), digging of wells and pit toilets, and installation of kiosks, informational signs, and wayside exhibits. This infrastructure soil disturbance is restricted to the developed zone of the park.

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing major adverse effect on soils at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have a major long-term beneficial effect on soils at American Camp and there would be no impairment.

4.3.1.3 Soundscape

Methodology and Assumptions

One of the enduring qualities of National Parks is their solitude and natural quietness. This is one of the values that visitors seek when they visit parks. Listening to natural sounds delivers both enjoyment and reduces stress. This is evidenced by the market for products that reproduce natural sounds, such as audio recordings and water fountains. Visitors to San Juan Island National Historical Park come for a variety of reasons, and natural sounds are an important element of their enjoyment of the park, whether it is listening to the surf on the beach, eagles calling, or grassland songbirds.

Study Area

The analysis area for soundscape is the American Camp unit of the park, tide lands and nearshore marine waters, and bordering communities and neighbors.

Analysis: Alternative A (No Action Alternative)

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. The core concentration of the rabbit population at American Camp is along and west of Pickett's Lane. In April 2006 when the rabbit population was at a peak, 3,440 active burrows were counted in the area between the Redoubt earthworks and Pickett's Lane, bounded

by the Redoubt road on the north and South Beach on the south, leaving a highly degraded landscape (West and Agee 2009). Soils in this area are extensively disturbed and the vegetation is nearly exclusively comprised of introduced nonnative species. At high population density, European rabbits may consume up to 75% of the available spring production of above-ground biomass creating a desert-like landscape (Stevens 1975). Outside the core rabbit population area, disturbance to the landscape is on a continuum from high to low. This extensive disturbance provides little habitat, due to a lack of native vegetation and cover, for invertebrates, such as pollinators, small mammals, and grassland nesting birds. The rabbit infested areas have diminished species populations within all three taxonomic groups proportional to rabbit densities (Fig. 8). Most noticeably missing as well, are the sounds of singing and calling birds, such as the ubiquitous savannah sparrow (*Passerculus sandwichensis*), leaving a void in the natural soundscape.

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would allow vegetation to reestablish on barren areas browsed by rabbits. Native plants and wildlife absent from concentrated rabbit population areas would return as ecological conditions improve over time, but may be at lower than natural densities without further mitigation. The most notable change to the soundscape over time would be the return of songbirds, such as the savannah sparrow, to habitats now browsed heavily by rabbits.

Under this alternative, there would be a moderate short-term impact to the soundscape by field operations. Firearms would be used with noise suppression devices to mitigate effects to the soundscape during removal activities.

Cumulative Impacts

Cattle Point road bisects American Camp from west to east. Local vehicular traffic and vehicle traffic from visitors to the park and park staff creates significant disturbance to the natural quietness. The amplitude of this disturbance varies with the time of day and season, being most significant during early morning and late afternoon rush hour times and during the summer months. Vehicular traffic consists of bikes, mopeds, scooters, motorcycles, cars, trucks, shuttle buses, and heavy equipment. Local air traffic also contributes to the background noise increasing during the summer months. Air traffic from jets arriving and departing SeaTac International Airport south of Seattle can also be heard depending on wind and weather conditions. Likewise, motor vessels contribute to the unnatural noise as well, mainly from commercial fishing vessels during the Fraser River pink salmon season when boats fish the Salmon Flats off American Camp, and from whale watching tour boats during the spring and summer season when Orcas are in Haro Strait. The community of Eagle Cove adjacent to the west boundary of American Camp also contributes to the ambient noise, emanating from vehicles, lawn mowers, and construction activities, most noticeably during daylight hours and increasing during the summer months. Roads, parking lots, trailer pads, buildings, and the developed area around the American Camp Visitor Center reduce wildlife habitat in the park, impacting wildlife populations and reducing natural sounds (Fig. 11). European rabbits likewise, significantly impact wildlife habitat leaving voids in the natural soundscape.

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing moderate adverse effect on the soundscape at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have both a moderate short-term adverse effect and a moderate long-term beneficial effect on the soundscape at American Camp and there would be no impairment.

4.3.2 Biological Resources

Much of the prairie at American Camp was grazed or converted to pasture or cultivated for crops for nearly a century. The introduction of rhizomatous, perennial pasture grasses and other introduced grasses and forbs has left the American Camp prairie dominated by a cover of nonnative introduced species (Rocheftort and Bivin 2009). However, a number of native-dominated residual patches of prairie vegetation remain, scattered throughout the American Camp prairie (Fig. 10). Eighty-seven native prairie plant polygons totaling 34.2 ha (84.5 acres) or 12% of the total prairie area were mapped by Rocheftort and Bivin (2009). Lack of a fire regime has allowed encroachment of Douglas fir and common snowberry (*Symphoricarpos albus* var. *laevigatus*) onto the prairie, however, the park is implementing prescribed burning in conjunction with prairie restoration.

4.3.2.1 Terrestrial Wildlife and Wildlife Habitat

Methodology and Assumptions

Mammals, birds, reptiles, amphibians, and nearshore marine fish were inventoried in the park. There is no aquatic habitat in the park suitable for freshwater fish. The park has also inventoried the butterfly fauna. European rabbits are the only mammal population monitored in the park. In 2008 however, cover boards were placed randomly in prairie habitats throughout American Camp in both areas occupied by rabbits and areas free of rabbits as an index to small mammal abundance. Small mammals use cover boards for shelter and will construct runways and build nests beneath them. Cover boards in grassland habitats at American Camp with high densities of European rabbits had little small mammal usage (Fig. 8). Birds are monitored biennially in the park. Bird monitoring in the park began in 2007, and therefore, there is no long-term trend data yet available. A vascular plant inventory was completed for the park and long-term monitoring transects at American Camp are established (Rocheftort and Bivin 2009). Experimental enclosures 1 m² were placed in areas of high rabbit densities at American Camp.

At American Camp, grasslands are the predominant habitat owing to low rainfall, well-drained soil types, southern exposure, and relatively windy conditions near the Strait of Juan de Fuca. American Camp prairie, like most prairies around Puget Sound, was the first choice for pastures and farms. As a result, its native species have been reduced and replaced by non-native pasture grasses and a host of weed species. In spite of that, some high quality remnants of native prairie remain, providing beautiful spring vignettes of blooming camas, chocolate lilies, and buttercups. Along with native grasses such as Roemer's fescue and Alaska brome, a number of other uncommon plant species are found in the prairie. These areas of native vegetation are becoming less common regionally; native prairies currently make up less than 3.5% of their historic range.

Study Area

The analysis area for terrestrial wildlife and wildlife habitat is the American Camp unit of the park.

Analysis: Alternative A (No Action Alternative)

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). In the process of excavating warrens, rabbits disturb and redistribute the soil horizons digging through the organic, topsoil, and subsoil layers into the parent material (Fig. 15). This mix of material is brought to the surface and piled at the entrance to the warren on top of the organic and topsoil layers. This disturbance can clearly be seen in aerial photographs of the park (Fig. 14).

The core concentration of the rabbit population at American Camp is along and west of Pickett's Lane. In April 2006 when the rabbit population was at a peak, 3,440 active burrows were counted in the area between the Redoubt earthworks and Pickett's Lane, bounded by the Redoubt road on the north and South Beach on the south (Fig. 16), leaving a highly degraded landscape (West and Agee 2009). Soils in this area are extensively disturbed and the vegetation is nearly exclusively comprised of introduced nonnative species. At high population density, European rabbits may consume up to 75% of the available spring production of above-ground biomass creating a desert-like landscape (Stevens 1975). Outside the core rabbit population area, disturbance to the landscape is on a continuum from high to low. This extensive disturbance provides little habitat, due to a lack of native vegetation and cover, for invertebrates, such as pollinators, small mammals, and grassland nesting birds and helps maintain nearly exclusive dominance by early seral, aggressive nonnative plants. The rabbit infested areas have diminished species populations within all three taxonomic groups proportional to rabbit densities (Fig. 8).

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and allow vegetation to reestablish on barren areas browsed by rabbits, preventing wind and water erosion and increasing water retention. Hydrology and soil conditions would improve, as well as vegetation composition and cover over time. Improved soil conditions and vegetation composition and cover would improve habitat conditions for native wildlife. Additional

restoration is planned to mitigate the largely nonnative vegetation found in the core population area.

Cumulative Impacts

Much of the prairie at American Camp was grazed or converted to pasture or cultivated for crops for nearly a century. The introduction of rhizomatous, perennial pasture grasses and other introduced grasses and forbs has left the American Camp prairie dominated by a cover of nonnative introduced species (Rochefort and Bivin 2009). However, a number of native-dominated residual patches of prairie vegetation remain, scattered throughout the American Camp prairie (Fig. 10). Eighty-seven native prairie plant polygons totaling 34.2 ha (84.5 acres) or 12% of the total prairie area were mapped by Rochefort and Bivin (2009). The park has an active fire program, designed to reverse woody plant encroachment.

The park has begun preliminary small-scale habitat restoration of the prairie south of the Redoubt earthworks at American Camp and is planning implementation of large-scale restoration in 2010. The park plans to begin habitat restoration of 38.4-40.5 hectares (95-100 acres) of prairie during 2010-2013. In January 2010, the park also began reintroducing Federally threatened golden paintbrush and plans to establish two stable populations with a 5-year running average of at least 1,000 individuals per population as outlined in the recovery plan by the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2000). The park has also entered into a conservation agreement and strategy with the U.S. Fish and Wildlife Service to protect and enhance habitat for the rare island marble butterfly (Pyle 2006).

European rabbits at American Camp help sustain the San Juan Island population of introduced nonnative red fox. Red fox in turn prey opportunistically on native small mammals, grassland birds, and invertebrates further impacting these communities, especially during periods of low rabbit abundance. Rodents are the primary diet for grassland raptors such as the northern harrier, short-eared owl, and barn owl. Population fluctuations of rabbits have cascading effects throughout the American Camp prairie ecosystem affecting predator-prey relationships and plant-herbivore interactions resulting in trophic cascades (Lees and Bell 2008).

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing major adverse effect on terrestrial wildlife and wildlife habitat at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have a major long-term beneficial effect on terrestrial wildlife and wildlife habitat at American Camp and there would be no impairment.

4.3.2.2 Invasive Species

Methodology and Assumptions

There are 4 nonnative mammals (red fox, feral cat, European rabbit, and black rat [*Rattus rattus*]), 6 nonnative birds, 2 known nonnative insects, and 120 species of nonnative plants documented in the park. In addition, both the domestic ferret and the Eurasian skylark were previously documented in the park, but are believed extirpated from San Juan Island. The park monitors populations of European rabbits and nonnative plants annually at American Camp, and birds are monitored biennially.

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. During the summers of 2000, 2001, and 2002, the park was able to hire a seasonal employee for the purpose of manually removing and monitoring exotic and invasive plants. In subsequent years, various park staff and volunteers have manually removed selected exotics, such as tansy ragwort, teasel, and spotted knapweed from high priority locations.

Study Area

The analysis area for invasive species is the American Camp unit of the park.

Analysis: Alternative A (No Action Alternative)

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). In the process of excavating warrens, rabbits disturb and redistribute the soil horizons digging through the organic, topsoil, and subsoil layers into the parent material (Fig. 15). This mix of material is brought to the surface and piled at the entrance to the warren on top of the organic and topsoil layers.

The core concentration of the rabbit population at American Camp is along and west of Pickett's Lane. In April 2006 when the rabbit population was at a peak, 3,440 active burrows were counted in the area between the Redoubt earthworks and Pickett's Lane, bounded by the Redoubt road on the north and South Beach on the south (Fig. 16), leaving a highly degraded landscape (West and Agee 2009). Soils in this area are extensively disturbed and the vegetation is nearly exclusively comprised of introduced nonnative species. At high population density, European rabbits may consume up to 75% of the available spring production of above-ground biomass creating a desert-like landscape (Stevens 1975). Outside the core rabbit population area, disturbance to the landscape is on a continuum from high to low. This loss of vegetative cover leads to damaging topsoil erosion, increased runoff, elevated soil temperatures and increased evaporation, and helps maintain nearly exclusive dominance by early seral, aggressive nonnative plants.

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and allow vegetation to reestablish on barren areas browsed by rabbits, preventing wind and water erosion and increasing water retention. Hydrology and soil conditions would improve, as well as vegetation composition and cover over time. The elimination of this major disturbance regime would lessen the likelihood of new invasive plants establishing. Without additional mitigation however, vegetation composition would remain largely nonnative in the core rabbit population area, although other areas near native plant sources might see some reestablishment of native plant species. Habitat impacted by rabbits would become dominated by late seral stage vegetation over time in the absence of additional disturbance. Removing European rabbits from the American Camp landscape and preventing their recolonization would eliminate the most prolific invasive species, in terms of impacts to natural and cultural resources, in the park.

Cumulative Impacts

Much of the prairie at American Camp was grazed or converted to pasture or cultivated for crops for nearly a century. The introduction of rhizomatous, perennial pasture grasses and other introduced grasses and forbs has left the American Camp prairie dominated by a cover of nonnative introduced species (Rochefort and Bivin 2009). However, a number of native-dominated residual patches of prairie vegetation remain, scattered throughout the American Camp prairie (Fig. 10). Eighty-seven native prairie plant polygons totaling 34.2 ha (84.5 acres) or 12% of the total prairie area were mapped by Rochefort and Bivin (2009). Lack of a fire regime has allowed encroachment of native Douglas fir and common snowberry onto the prairie, however, the park is implementing prescribed burning in conjunction with prairie restoration.

The park has begun preliminary small-scale habitat restoration of the prairie south of the Redoubt earthworks at American Camp and plans to begin habitat restoration over larger areas in coming years. In January 2010, the park also began reintroducing Federally threatened golden paintbrush and plans to establish two stable populations with a 5-year running average of at least 1,000 individuals per population as outlined in the recovery plan by the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 2000). The park has also entered into a conservation agreement and strategy with the U.S. Fish and Wildlife Service to protect and enhance habitat for the rare island marble butterfly (Pyle 2006).

The park has an active, integrated pest management program using best management practices. Mechanical (e.g., hand-pulling), chemical (e.g., herbicide), and cultural (e.g., planting native species) practices are all employed to control nonnative invasive plants in the park. During the summers of 2000, 2001, and 2002, the park was able to hire a seasonal employee for the purpose of manually removing and monitoring exotic and invasive plants. The entire prairie at American Camp and were systematically covered to manually pull, dig, and cut plants. In subsequent years, various park staff and volunteers have manually removed selected exotics, such as tansy ragwort, teasel, and spotted knapweed from high priority locations. In addition, weed crews from the North Coast and Cascades Network Exotic Plant Management Team (EPMT), Washington Conservation Corps, and a variety of volunteer groups have provided assistance. Since 2003, the

EPMT has used broadcast herbicide treatments, including applications of Redeem (triclopyr + clopyralid), Transline (clopyralid), and Milestone (aminopyralid) to control isolated populations of Canada and Bull thistle at American Camps. Use of herbicides and other pesticides in the park is regulated and tracked by the National Park Service Pesticide Use Proposal System (PUPS). The cinnabar moth was introduced by San Juan County to control invasive nonnative tansy ragwort on San Juan Island and is present at American Camp.

European rabbits at American Camp help sustain the San Juan Island population of introduced nonnative red fox. Red fox in turn prey opportunistically on native small mammals, grassland birds, and invertebrates further impacting these communities, especially during periods of low rabbit abundance. Rodents are the primary diet for grassland raptors such as the northern harrier, short-eared owl, and barn owl. Population fluctuations of rabbits have cascading effects throughout the American Camp prairie ecosystem affecting predator-prey relationships and plant-herbivore interactions resulting in trophic cascades (Lees and Bell 2008).

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing major adverse effect from invasive species at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have a major short-term and long-term beneficial mitigating effect on invasive species at American Camp and there would be no impairment.

4.3.3 Threatened, Endangered, and Sensitive Species

Table 1 summarizes the Federal and selected Washington State-listed threatened, endangered, and sensitive species potentially occurring in the project area.

4.3.3.1 Type of Impact

No effect: The project (or action) is located outside suitable habitat and there would be no disturbance or other direct or indirect impacts on the species. The action will not affect the listed species or its designated critical habitat (USFWS 1998).

May affect, not likely to adversely affect: The project (or action) occurs in suitable habitat or results in indirect impacts on the species, but the effect on the species is likely to be entirely beneficial, discountable, or insignificant. The action may pose effects on listed species or designated critical habitat but given circumstances or mitigation conditions, the effects may be discounted, insignificant, or completely beneficial. Insignificant effects would not result in take. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person

would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects or 2) expect discountable effects to occur (USFWS 1998).

May affect, likely to adversely affect: The project (or action) would have an adverse effect on a listed species as a result of direct, indirect, interrelated, or interdependent actions. An adverse effect on a 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 (USFWS 1998).

4.3.3.2 Bald Eagle

Methodology and Assumptions

The Washington Department of Fish and Wildlife monitors bald eagles and conducts aerial nest surveys at five-year intervals. They also collect incidental data on nesting activity and productivity reported to them by other agencies and private landowners. In 2009, park resource management surveyed all known bald eagle nest territories at American Camp documented in the Washington Department of Fish and Wildlife bald eagle database (Jay Shepherd, Washington Department of Fish and Wildlife, unpublished data). Two new active bald eagle nests were documented at American Camp west of Pickett's lane. Three historic nest territories east of Pickett's lane were not active in 2009 and only one historic nest within those territories could be found. That nest was in disrepair and appeared to be falling out of the tree. One of the two new nests found was determined to be an alternate nest from the historic territory west of Pickett's Lane.

In response to concerns raised during public scoping regarding impacts to bald eagles from the proposed action, the park undertook a study of prey remains beneath bald eagle nests to better understand the diet of eagles in the park. Park biologists collected prey remains from beneath bald eagle nests in the park and in various habitats around San Juan Island. Prey items were collected below seven active nests and two inactive nests in six territories. Prey remains were identified to the lowest taxonomic classification possible and grouped by individuals. The minimum number of individuals identifiable within a taxonomic group was counted. Birds comprised the highest percentage of prey items beneath most nests (Table 2). No European rabbit remains were found beneath any of the four nests examined at American Camp. As bald eagle nest locations are sensitive, the park does not release this information to the public, however some nest locations are well known to the public.

Study Area

The analysis area for bald eagles is San Juan Island.

Analysis Common to Both Alternatives

Bald eagles are associated with aquatic habitats and are opportunistic feeders with fish comprising much of their diet. They also eat waterfowl, shorebirds, colonial waterbirds, small mammals, marine invertebrates, and carrion (often along roads or at landfills). In addition to a good food base, bald eagles require suitable perching areas and roosting and nesting sites. Bald eagles nest widely among Pacific Northwest habitats along rivers, lakes, reservoirs, marine shorelines, and tidal bays (Watson 2002). They use large trees and other elevated sites, such as bluffs and cliffs, for spotting prey and roosting. Bald eagles mate for life and typically nest in large super-dominant trees near aquatic habitats, but may nest on cliffs or on the ground in treeless areas. They often return to the same nest every year, but may use one or more alternate nests nearby. In winter, bald eagles typically congregate near open water in the vicinity of concentrated food resources, such as fish spawning areas, areas with concentrations of waterfowl, and near sources of mammalian carrion, such as ungulate winter range. Reproductive success is directly related to food abundance and habitat quality (Hansen 1987).

The San Juan Islands host the largest breeding population of bald eagles in the contiguous 48 states. San Juan Island is a rich marine environment providing an abundance of food for bald eagles throughout the breeding season. San Juan Island National Historical Park is the largest protected public land on San Juan Island and contains 10.73 km (6.67 miles) of undeveloped marine shoreline. In 2009, three historic nest territories on the north side of Mt. Finlayson along Griffin Bay and in the Cattle Point area were inactive. One historic nest territory west of Pickett's lane was active in 2009, as well as a new active nest that may be one of the Mt. Finlayson/Cattle Point territories. The European rabbit population at American Camp declined since reaching a peak in 2005 and was estimated to be 470 (\pm 414-884) rabbits in 2010. (West 2010; Fig. 4).

An examination of prey remains beneath active bald eagle nests on San Juan Island during years of high European rabbit abundance (Retfalvi 1970) and during years of low rabbit abundance (Watson 2002) revealed that productivity was unaffected by rabbit abundance, and that bald eagles simply shifted their diet to the most abundant prey item available. An examination of prey remains beneath bald eagle nests by park biologists in 2009 revealed a wide range of prey items in the diet. None of four nests examined in the park or near the park boundary had any European rabbit remains (Table 2).

Cumulative Impacts

In addition to an adequate food supply and suitable nesting and roosting habitat, bald eagles are sensitive to disturbance. Nesting pairs have varying tolerance to disturbance. A breeding pair with a nesting territory at the west end of American Camp has for years occupied a nest and successfully reared its young within a few meters of the American Camp Visitor Center access road, parking lot, and picnic area. This developed zone receives high volumes of traffic throughout the day during the nesting period and is an attraction to visitors. In 2009, this pair occupied an alternate nest nearby.

Federal Highways in conjunction with the park is preparing an Environmental Impact Statement to realign the Cattle Point Road on Mount Finlayson as a solution to coastal bluff erosion. Under

the preferred alternative for a hybrid mid-slope realignment, it is expected there would be a minor adverse short-term effect on bald eagle use patterns in the project area.

Conclusion: Alternative A (No Action Alternative)

The no action alternative may affect, but is not likely to adversely affect bald eagles at American Camp. There would be a continuing negligible beneficial effect on bald eagles at American Camp and there would be no impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative may affect, but is not likely to adversely affect bald eagles at American Camp and there would be no impairment.

4.3.3.3 Island Marble Butterfly

Methodology and Assumptions

Since the island marble's rediscovery in 1997, a great deal of research into its distribution, population ecology, and life history was initiated and is ongoing (Pyle 2004, Miskelly 2005, Peterson 2008, Lambert 2009). The island marble is restricted in distribution to San Juan and Lopez Islands in San Juan County, Washington. The island marble is currently known to utilize larval host plants in the Brassicaceae (mustard) family, native *Lepidium virginicum* var. *menziesii* (Menzies' pepperweed) and nonnative annual mustards *Brassica rapa* var. *rapa* (field mustard) and *Sisymbrium altissimum* (tall tumbled mustard), in three habitat types, which all occur at American Camp. The island marble is also known to use a number of native and nonnative plants for nectaring.

In 2006, San Juan Island National Historical Park entered into a conservation agreement with the USFWS, which "lays out general guidelines for a broad spectrum of activities at American Camp, including management and restoration of the grassland ecosystem there as a natural component of the cultural/historic landscape... consistent with the goal of conserving the Island Marble butterfly and minimizing potential negative effects to the Island Marble from National Park Service activities" (Pyle 2006). The agreement addresses European rabbits as an overall negative factor at high population levels and that rabbit removal "should be a very good thing for the Island Marble in the mid- to long-term."

Resource management staff at the park conducted a mark-release-recapture study of the island marble at American Camp in 2008 and 2009 and will be continuing annual monitoring in 2010. The park is also conducting research to identify other potential native host mustards. In 2010, the park will begin large-scale prairie restoration, which will include known native nectar species used by the island marble. If new native host plants are identified, they will be included in restoration plans as well.

Study Area

The analysis area for island marble butterflies is San Juan and Lopez Islands. As the known extant population of the island marble is small and limited to San Juan and Lopez Islands with the majority of the population within the American Camp unit of the park, any action has the potential to impact the island marble population as a whole.

Analysis Common to Both Alternatives

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). In the process of excavating warrens, rabbits disturb and redistribute the soil horizons digging through the organic, topsoil, and subsoil layers into the parent material (Fig. 15). This mix of material is brought to the surface and piled at the entrance to the warren on top of the organic and topsoil layers. This disturbance can clearly be seen in aerial photographs of the park (Fig. 14).

The core concentration of the rabbit population at American Camp is along and west of Pickett's Lane. In April 2006 when the rabbit population was at a peak, 3,440 active burrows were counted in the area between the Redoubt earthworks and Pickett's Lane, bounded by the Redoubt road on the north and South Beach on the south (Fig. x from West and Agee report), leaving a highly degraded landscape (West and Agee 2009). Soils in this area are extensively disturbed and the vegetation is nearly exclusively comprised of introduced nonnative species. At high population density, European rabbits may consume up to 75% of the available spring production of above-ground biomass creating a desert-like landscape (Stevens 1975). Outside the core rabbit population area, disturbance to the landscape is on a continuum from high to low. This loss of vegetative cover leads to damaging topsoil erosion, increased runoff, elevated soil temperatures and increased evaporation, and helps maintain nearly exclusive dominance by early seral, aggressive nonnative plants.

Analysis: Alternative A (No Action Alternative)

The island marble is known to use two nonnative mustards in the uplands and one native mustard in the beach zone as host plants, as well as a variety of native and nonnative species as nectar plants. Although the two nonnative host mustards are early seral species that generally benefit from disturbance, they are absent from the area occupied by the core rabbit population at American Camp and do not benefit from rabbit disturbance. Heavy herbivory by rabbits prevents their establishment on areas disturbed.

Analysis: Alternative B (Preferred Alternative)

The island marble is known to use two nonnative mustards in the uplands and one native mustard in the beach zone as host plants, as well as a variety of native and nonnative species as nectar plants. Although the two nonnative host mustards are early seral species that generally benefit from disturbance, they are absent from the area occupied by the core rabbit population at American Camp and do not benefit from rabbit disturbance. It is expected that release from

heavy herbivory by rabbits would improve the area for island marble habitat by allowing establishment of larval host or nectar plants and otherwise making it more conducive to their use.

European rabbit removal operations would avoid areas with host mustards as much as possible. There remains the possibility however, that some island marble pupae could be trampled in the course of field activities.

Cumulative Impacts

The American Camp unit of the park contains the majority of the known extant population of the island marble butterfly and currently provides long-term protection for the island marble. In 2006, the park entered into a conservation agreement and strategy with the U.S. Fish and Wildlife Service to protect and enhance habitat for the island marble (Pyle 2006). This agreement establishes parameters and guidelines for park management activities potentially affecting island marble butterflies and limits certain activities in areas with host plants. As part of the conservation agreement, the park is conducting annual monitoring of the island marble population at American Camp.

The park is planning to implement large-scale prairie restoration in 2010, which will benefit the island marble population in the long-term, and is supported by the U.S. Fish and Wildlife Service. Although National Park Service management policies prohibit propagating nonnative plants (National Park Service 2006). Native nectar plants will be propagated and planted as part of the restoration. In addition, the park is conducting research to identify other potential native host mustards.

Conclusion: Alternative A (No Action Alternative)

The no action alternative may affect, and is likely to adversely affect island marble butterflies at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative may affect, but is not likely to adversely affect island marble butterflies at American Camp and there would be no impairment.

4.3.3.4 Golden Paintbrush

Methodology and Assumptions

Golden paintbrush was listed as Federally threatened on June 11, 1997 [62 FR 31740]. In January and February 2010, the park reintroduced golden paintbrush to American Camp as part of the recovery effort for the population (U.S. Fish and Wildlife Service 2000). Two sites were selected at American Camp, one in a prairie restoration site and one in a native prairie remnant. A total of 336 plants were planted during this initial effort. The U.S. Fish and Wildlife Service

considers these plantings part of the overall greater population, and are therefore protected under the Endangered Species Act.

Study Area

The analysis area for golden paintbrush is the Puget Trough lowlands in western Washington and the southern tip of Vancouver Island in British Columbia. The latter encompasses the entire range of the extant population of golden paintbrush. The success of the American Camp reintroduction increases the prospects for survival of the species.

Analysis Common to Both Alternatives

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). In the process of excavating warrens, rabbits disturb and redistribute the soil horizons digging through the organic, topsoil, and subsoil layers into the parent material (Fig. 15). This mix of material is brought to the surface and piled at the entrance to the warren on top of the organic and topsoil layers. This disturbance can clearly be seen in aerial photographs of the park (Fig. 14).

The core concentration of the rabbit population at American Camp is along and west of Pickett's Lane. In April 2006 when the rabbit population was at a peak, 3,440 active burrows were counted in the area between the Redoubt earthworks and Pickett's Lane, bounded by the Redoubt road on the north and South Beach on the south (Fig. 16), leaving a highly degraded landscape (West and Agee 2009). Soils in this area are extensively disturbed and the vegetation is nearly exclusively comprised of introduced nonnative species. At high population density, European rabbits may consume up to 75% of the available spring production of above-ground biomass creating a desert-like landscape (Stevens 1975). Outside the core rabbit population area, disturbance to the landscape is on a continuum from high to low. This loss of vegetative cover leads to damaging topsoil erosion, increased runoff, elevated soil temperatures and increased evaporation, and helps maintain nearly exclusive dominance by early seral, aggressive nonnative plants.

Reintroduction of golden paintbrush into the park involves significant expenditures of time and effort. It involves collecting seed from a limited population source on San Juan Island, cleaning and storing seed in controlled environments, propagating plants, selecting suitable planting sites, preparing the sites (e.g., prescribed burning), planting seedlings, protecting and monitoring outplantings, evaluating success, and maintaining and enhancing habitat. The U.S. Fish and Wildlife Service estimates the recovery costs for this species throughout its historic range at \$825,000 (U.S. Fish and Wildlife Service 2000).

Analysis: Alternative B (Preferred Alternative)

Populations of golden paintbrush reintroduced to the park at American Camp are in protected areas outside locations with European rabbits and would be avoided during European rabbit removal operations. Removal of European rabbits would eliminate potential herbivory and

destruction of plants by rabbits and allow plants to be reintroduced throughout the American Camp prairie.

Cumulative Impacts

Golden paintbrush historically occurred in the Puget Trough of Washington and lower Vancouver Island in British Columbia south to the Willamette Valley in Oregon. There are 11 known populations, 9 in Washington and 2 in British Columbia. Of these populations, 5 are on public lands and 6 are on private property. These populations are small in terms of both number of individuals and total area occupied leaving them vulnerable to random stochastic events and human perturbations. Golden Paintbrush inhabits generally flat grasslands in the Puget Sound lowlands, including the southern tip of Vancouver Island. Some sites have mounded topography, and others are on steep, grassy coastal bluffs with a west or southwest aspect (U.S. Fish and Wildlife Service 2000).

Much of the historically suitable habitat for golden paintbrush was converted or developed for commercial, residential, and agricultural use. Much of the remaining habitat is being encroached by native and nonnative vegetation that compete with golden paintbrush and create shade, which this species does not tolerate. Fire suppression over the last century has allowed encroachment by Douglas fir (U.S. Fish and Wildlife Service 2000).

While there are no historical records of golden paintbrush occurring at American Camp, the American Camp prairie fits well within the habitat parameters that golden paintbrush is known to occur or to have previously occurred. It is therefore extremely likely that golden paintbrush is historically native to American Camp. Much of the American Camp prairie was converted for agricultural uses prior to establishment of the park, European rabbits have occupied the prairie for more than a century, and fire suppression has allowed encroachment by Douglas fir and common snowberry. It is likely that all these factors contributed to the demise of golden paintbrush at American Camp, assuming its historical presence.

The introduction of rhizomatous, perennial pasture grasses and other introduced grasses and forbs has left the American Camp prairie dominated by a cover of nonnative introduced species (Rocheftort and Bivin 2009). However, a number of native-dominated residual patches of prairie vegetation remain, scattered throughout the American Camp prairie (Fig. 10). Eighty-seven native prairie plant polygons totaling 34.2 ha (84.5 acres) or 12% of the total prairie area were mapped by Rocheftort and Bivin (2009).

The park is planning to continue prairie restoration in 2010 and beyond, which will benefit the golden paintbrush reintroduction effort and help assure the long-term success of the project. The park hopes to establish at least two golden paintbrush populations at American Camp, which will help meet the recovery goals outlined by the U.S. Fish and Wildlife Service and help assure the long-term survival of the species.

Conclusion: Alternative A (No Action Alternative)

The no action alternative may affect, and is likely to adversely affect golden paintbrush at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative may affect, but is not likely to adversely affect golden paintbrush at American Camp. Any effects are expected to be entirely beneficial and there would be no impairment.

4.3.4 Cultural Resources

4.3.4.1 Type of Impact

No effect: There are no historic properties in the area of potential effect; or, there are historic properties in the area of potential effect, but the undertaking will have no impact on them.

No adverse effect: There will be an effect on the historic property by the undertaking, but the effect does not meet the criteria in 36 CFR 800.5(a)(1) and will not alter characteristics that make it eligible for listing on the National Register. The undertaking is modified or conditions are imposed to avoid or minimize adverse effects. This category of effects is encumbered with effects that may be considered beneficial under NEPA, such as restoration, stabilization, rehabilitation, and preservation projects.

Adverse effect: The undertaking will alter, directly or indirectly, the characteristics of the property making it eligible for listing on the National Register.

Analysis Common to Both Alternatives

European rabbits construct extensive underground burrows known as warrens in grassland areas at American Camp. These warrens are used indefinitely by subsequent generations and may be continuously expanded (Stevens 1975). In the process of excavating warrens, rabbits disturb and redistribute the soil horizons digging through the organic, topsoil, and subsoil layers into the parent material (Fig. 15). This mix of material is brought to the surface and piled at the entrance to the warren on top of the organic and topsoil layers. This disturbance can clearly be seen in aerial photographs of the park (Fig. 14).

4.3.4.2 Archaeological Resources

Methodology and Assumptions

A number of archaeological studies, beginning as early as 1890, have been conducted at American Camp focused on prehistoric and historic resources. Archaeological evidence in the park reveals human occupation of San Juan Island dating back 9,000 years or more (National Park Service 2008). American Camp was the site of seasonal occupation by Straits Salish peoples utilizing the bounty of the prairie, readily available freshwater from springs, and abundant marine resources found there. Eight tribes are culturally affiliated with the American Camp landscape. A cultural landscapes inventory is completed for American Camp (National Park Service 2004).

San Juan Island National Historical Park has 19 known archeological sites, some of which date from the historic period and document the joint military occupation of the island that the park commemorates. Many of the sites are prehistoric, dating back as much as 2,500 years before present. These are considered important for the information they provide about past occupation of the area by Native Americans and how they lived. Excavations have been undertaken over the past several decades of a number of the sites, both historic and prehistoric. Several of the shell midden sites are threatened by coastal erosion, as is common in the region.

Study Area

The analysis area for archaeological resources is the American Camp unit of the park including tide lands.

Analysis: Alternative A (No Action Alternative)

Archaeological resources have been found in European rabbit tailings at American Camp. Soil disturbance by rabbits and any archaeological resources they contain may remove them from context and make relationships to other archaeological evidence difficult or impossible to ascertain.

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and disturbance to archaeological resources and allow vegetation to reestablish on barren areas browsed by rabbits, stabilizing these areas and preventing additional wind and water erosion. No archeological resources would be disturbed during European rabbit removal operations.

Cumulative Impacts

Beginning in the mid-nineteenth century, American Camp grasslands were grazed and later tilled and converted to pasture or cultivated for crops ending with the establishment of the park in 1966. Remnant irrigation ditches are still visible on the prairie landscape west of Pickett's Lane. The Hudson's Bay Company established Belle Vue Sheep Farm in 1853 and settlers began arriving in 1859. The U.S. Army occupied American Camp from 1859 to 1874. During the historic period (1853-1874), San Juan Village was established at the site of Old Town Lagoon and at its height consisted of a central throughway lined with twenty buildings that terminated at a wharf. Alaska Packer's Rock was the site of a salmon fishing operation from 1890 to 1930

(National Park Service 2004). A military road was constructed during the U.S. Army occupation and later Cattle Point Road was constructed. Cattle Point Road was partially relocated after establishment of the park and other access roads were constructed.

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing adverse effect on archaeological resources at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have no adverse effect on archaeological resources at American Camp. Any effects are expected to be entirely beneficial and there would be no impairment.

4.3.4.3 Historical Resources

Methodology and Assumptions

A number of archaeological studies have been conducted at American Camp focused on both prehistoric and historic resources since 1970. The park commemorates the historic events that occurred on San Juan Island in connection with the final settlement of the Oregon Territory boundary dispute from 1853 to 1871. The historic period at American Camp interpreted by the park actually began with European settlement of San Juan Island in 1845, when it is said, the Hudson's Bay Company claimed San Juan Island by placing a wooden plaque on Mt. Finlayson on the southeast end of San Juan Island, and ended with the exodus of the U.S. Army in 1874. The period of significance of American Camp however, corresponds to the occupation by the U.S. Army from 1859 to 1874 (National Park Service 2004). In 1966, American Camp was placed on the National Register of Historic Places as a historic district.

The park has 23 structures on the List of Classified Structures (the NPS inventory and database of important historic structures). Fourteen of those structures are currently classified as in good condition. The park's strategic plan for FY 2007 to FY 2011 states that the park will invest staff time and base funding, and project funding where possible, to continue to maintain 14 of the 23 (or 61%) of park historic structures in good condition.

Study Area

The analysis area for historical resources is the American Camp unit of the park including tide lands.

Analysis: Alternative A (No Action Alternative)

Rabbits have caused considerable damage to historic resources at American Camp, most notably by digging tunnels that undermine the earthen fortification known as the Redoubt and by trying

to establish warrens under the Officers Quarters and the Laundress Quarters. These impacts and the periodic efforts required to control or mitigate them would continue indefinitely under Alternative A

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and disturbance to historical resources. Damage to historic structures listed on the National Register from European rabbit digging would cease and these resources would be stabilized. No historical resources would be disturbed during European rabbit removal operations.

Cumulative Impacts

Following the disbandment of the U.S. Army camp in 1874, American Camp was dismantled and the buildings were auctioned off, with most either being destroyed or moved from the site. The Hudson's Bay Company followed suit and relinquished ownership of Belle Vue Sheep Farm in 1875. In 1890, San Juan Town burned to the ground.

Beginning in 1875, American Camp was turned over to private ownership and much of the prairie was grazed or farmed. In 1951, Washington State acquired just less than five acres of land encompassing the American Camp cantonment. Cattle Point Road was constructed following the departure of the U.S. Army. Cattle Point Road was partially relocated after establishment of the park and other access roads were constructed.

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing adverse effect on historical resources at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have no adverse effect on historical resources at American Camp. Any effects are expected to be entirely beneficial and there would be no impairment.

4.3.4.4 Cultural Landscape

Methodology and Assumptions

The park commemorates the historic events that occurred on San Juan Island in connection with the final settlement of the Oregon Territory boundary dispute from 1853 to 1871. The historic period at American Camp interpreted by the park actually began with European settlement of San Juan Island in 1845, when it is said, the Hudson's Bay Company claimed San Juan Island by placing a wooden plaque on Mt. Finlayson on the southeast end of San Juan Island, and ended with the exodus of the U.S. Army in 1874. The period of significance of American Camp

however, corresponds to the occupation by the U.S. Army from 1859 to 1874 (National Park Service 2004). In 1966, American Camp was placed on the National Register of Historic Places as a historic district. The cultural landscape boundary comprises the area west of Pickett's Lane and the Jakle's Lagoon trailhead (Fig. 6) and is eligible for inclusion on the National Register. The cultural landscapes inventory 2009 condition assessment update for American Camp is *fair*, indicating that the landscape shows clear evidence of disturbance and deterioration requiring corrective action within 3-5 years, without which, deterioration of many of the landscape characteristics will cause the landscape to degrade to a poor condition.

The sweeping views which characterize the landscape of American Camp retain integrity and contribute to the significance of the site. Glacial activity created an east-west running promontory ridge with a slightly raised knoll high above the beaches of the adjacent water bodies, a perfect location for the earthen fortification. This position commands the most expansive view throughout the site and provided clear visual access to any advancement by the British Royal Marines. The cantonment, located west of the redoubt at the natural forest-grassland ecotone, was also situated to fully appreciate the views out onto the two bays. Mount Finlayson, east of the redoubt, is the highest point on the southern end of the island at 295 feet. Two views which contribute to the significance of the site are

- the territorial views of the Strait of Juan de Fuca, Griffin Bay, the Cattle Point peninsula and surrounding islands from the redoubt, and
- views of the Strait of Juan de Fuca from the American Camp cantonment (National Park Service 2004).

Study Area

The analysis area for cultural landscape is the American Camp unit of the park including tide lands and bordering communities and neighbors.

Analysis: Alternative A (No Action Alternative)

The core concentration of the rabbit population at American Camp is along and west of Pickett's Lane. In April 2006 when the rabbit population was at a peak, 3,440 active burrows were counted in the area between the Redoubt earthworks and Pickett's Lane, bounded by the Redoubt road on the north and South Beach on the south (Fig. 16), leaving a highly degraded landscape (West and Agee 2009). Soils in this area are extensively disturbed and the vegetation is nearly exclusively comprised of introduced nonnative species. At high population density, European rabbits may consume up to 75% of the available spring production of above-ground biomass creating a desert-like landscape (Stevens 1975). Outside the core rabbit population area, disturbance to the landscape is on a continuum from high to low. This loss of vegetative cover leads to damaging topsoil erosion, increased runoff, elevated soil temperatures and increased evaporation, and helps maintain nearly exclusive dominance by early seral, aggressive nonnative plants. European rabbits are causing extensive disturbance to historic structures listed on the National Register, to other surface and buried historic and archaeological resources, to the National Register-eligible cultural landscape, to contributing views, vistas and overall spatial organization of the cultural landscape.

Analysis: Alternative B (Preferred Alternative)

Removing European rabbits from American Camp would stop further digging of warrens and disturbance to archaeological and historical resources and allow vegetation to reestablish on barren areas browsed by rabbits, stabilizing these areas and preventing additional wind and water erosion. The National Register-eligible cultural landscape would return to more natural-appearing conditions present during the historic period. Damage to historic structures listed on the National Register from European rabbit digging would cease and these resources would be stabilized.

Cumulative Impacts

Following the disbandment of the U.S. Army camp in 1874, American Camp was dismantled and the buildings were auctioned off, with most either being destroyed or moved from the site. The Hudson's Bay Company followed suit and relinquished ownership of Belle Vue Sheep Farm in 1875. In 1890, San Juan Town burned to the ground.

Beginning in 1875, American Camp was turned over to private ownership and settlers established homesteads. Much of the prairie landscape was grazed, converted to pasture, and cleared of rocks (which were moved to central piles or field edges) and brought under cultivation. Farms and homes were established and roads were constructed. In 1951, Washington State acquired just less than five acres of land encompassing the American Camp cantonment. With the establishment of the park in 1966, non-historic structures (i.e., structures not associated with the historic period 1853-1874) were removed and restoration of the cultural landscape began. In the last several years, the park has also begun restoration of the prairie habitat. Less than five acres is currently under restoration, however, the park plans to begin restoration of 38.4-40.5 hectares (95-100 acres) in the area between the Redoubt earthworks and Pickett's Lane between 2010 and 2013.

Currently, Cattle Point Road, a two lane highway, bisects American Camp from west to east and Pickett's Lane bisects from north to south. A park entrance road leads from Cattle Point Road to the American Camp Visitor Center. There are several parking areas throughout American Camp providing access to visitor services, the beach, picnic areas, and trails. A network of trails and foot paths also traverse the unit. Other park above-ground infrastructure includes a well house, an old storage shed, trailer pads for volunteers, informational signs, vault toilets, kiosks, waysides, and picnic tables. The Eagle Cove subdivision on the west boundary of American Camp creates the most significant visual intrusion located outside the park (Fig. 11). European rabbit warrens, unnaturally barren habitats, and nonnative vegetation create the most significant visual intrusions to the cultural landscape within the park.

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing adverse effect on the cultural landscape at American Camp, but would not constitute impairment.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have no adverse effect on the cultural landscape at American Camp. Any effects are expected to be entirely beneficial and there would be no impairment.

4.3.5 Visitor Experience*Methodology and Assumptions*

Visitor experience is interpreted by visitor surveys, by public scoping for this environmental assessment, and through informal conversations with the general public by park staff. The University of Idaho Park Studies Unit, a branch of the National Park Service Social Science Program, conducts both in-depth visitor studies and annual visitor satisfaction surveys. These reports are available at <http://www.psu.uidaho.edu/>.

Study Area

The analysis area for visitor experience is the American Camp unit of the park including tide lands and bordering communities and neighbors.

Analysis: Alternative A (No Action Alternative)

Visitor satisfaction surveys are distributed by the park each year to gauge visitor satisfaction with their overall park experience. These surveys essentially gauge whether a visitor's overall experience is positive or negative and to what degree. They do not, however, measure awareness of omissions, such as missing flora and fauna, or gauge perceptions, such as deterioration of the cultural landscape. It is therefore hard to interpret impacts to visitor experience from such subtle, more esoteric aspects of their experience. The average nonresident visitor (i.e., not a resident of San Juan Island) to American Camp, who may only visit the park once in their lifetime, does not know that European rabbits are not native to San Juan Island unless the park informs them, or that they are causing disturbance to the natural and cultural landscape and to historic structures. Their perspective is short-term, the duration of their visit, and limited to their knowledge and experience. In an in-depth visitor study conducted August 10-16, 1994, 68% of visitors were visiting San Juan Island National Historical Park for the first time, and only 12% of visitors lived on San Juan Island either year round or for part of the year (Littlejohn 1995).

On the other hand, resident visitors to the park have a longer perspective, which for some is a lifetime. They may have grown up with European rabbits on San Juan Island and have a strong affection and affinity for them, or they may have had a negative experience with them and hate them. Never-the-less, no one alive was here during the historic period interpreted by the park and their perspective is limited to their own experience.

In 1966, Congress established San Juan Island National Historical Park for the purpose of "interpreting and preserving the sites of the 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 so-called Pig War of 1859” [Public Law 89-565]. The Organic Act of 1916 establishing the National Park Service requires that park resources for which parks were established be left “unimpaired for the enjoyment of future generations” [16 U.S.C. § 1]. Balancing differing public values and perspectives in the present and managing for future enjoyment, as well as determining what constitutes an impairment are management decisions that must be weighed carefully based upon the best available knowledge, public input, and best management practices.

Among regular visitors to the park and residents of San Juan Island, comments received by the park were mixed, some supporting the proposed alternative and some strongly opposed. Very few comments were received from nonresident visitors, but in general, based on conversations with the public by park staff, nonresident visitors are supportive of the park’s long-range management goals. When visitors were asked what subjects they would most like to learn about in the future, 68% replied natural history, 64% said Native American inhabitants, and 63% replied the history of early settlers (Littlejohn 1995).

European rabbits have impacted the cultural landscape and historic structures for which the park was established, as well as the natural environment. As a result, the ability of the park to interpret the resources for which the park was established in the present and into the future as required by the Organic Act is also diminished. The overall spatial impacts to the viewscape and vistas detract from visitor understanding. Ground disturbance and the resulting nonnative vegetation that accompanies it make it a challenge for visitors to appreciate many of the contributing elements to the cultural landscape.

Analysis: Alternative B (Preferred Alternative)

European rabbit removal operations would be conducted during the fall and winter off-season when visitor use of the park is lowest. Field activities would primarily take place from dusk to dawn when the park is normally closed. Park closure hours may be extended temporarily to accommodate field activities and for safety reasons. Firearms would be used with noise suppression devices to minimize noise impacts during removal activities. By removing the rabbits the park will be able to restore the viewscape and vistas, allowing visitors to experience many of the contributing elements to the cultural landscape and understand their importance for which the park was created.

Cumulative Impacts

Following the disbandment of the U.S. Army camp in 1874, American Camp was dismantled and the buildings were auctioned off, with most either being destroyed or moved from the site. The Hudson’s Bay Company followed suit and relinquished ownership of Belle Vue Sheep Farm in 1875. In 1890, San Juan Town burned to the ground.

Beginning in 1875, American Camp was turned over to private ownership and settlers established homesteads. Much of the prairie landscape was grazed, converted to pasture, and cleared of rocks (which were moved to central piles or field edges) and brought under

cultivation. Farms and homes were established and roads were constructed. In 1951, Washington State acquired just less than five acres of land encompassing the American Camp cantonment. With the establishment of the park in 1966, non-historic structures (i.e., structures not associated with the historic period 1853-1874) were removed and restoration of the cultural landscape began. In the last several years, the park has also begun restoration of the prairie habitat. Less than five acres is currently under restoration, however, the park plans to begin restoration of 38.4-40.5 hectares (95-100 acres) in the area between the Redoubt earthworks and Pickett's Lane between 2010 and 2013.

Currently, Cattle Point Road, a two lane highway, bisects American Camp from west to east and Pickett's Lane bisects from north to south. A park entrance road leads from Cattle Point Road to the American Camp Visitor Center. There are several parking areas throughout American Camp providing access to visitor services, the beach, picnic areas, and trails. A network of trails and foot paths also traverse the unit. Other park above-ground infrastructure includes a well house, an old storage shed, trailer pads for volunteers, informational signs, vault toilets, kiosks, waysides, and picnic tables. The Eagle Cove subdivision on the west boundary of American Camp creates the most significant visual intrusion located outside the park (Fig. 11). European rabbit warrens, unnaturally barren habitats, and nonnative vegetation create the most significant visual intrusions to the cultural landscape within the park.

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing minor adverse effect on visitor experience at American Camp.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have both a minor short-term adverse effect and a minor long-term beneficial effect on visitor experience at American Camp.

4.3.6 Socioeconomic Environment

Methodology and Assumptions

The socioeconomic environment for San Juan County is based on data compiled by the State of Washington available at <http://www.ofm.wa.gov/databook/county/>, and by an in-depth visitor study conducted in the park (Littlejohn 1995).

Study Area

The analysis area for socioeconomic environment is the American Camp unit of the park and San Juan County.

Analysis: Alternative A (No Action Alternative)

The park does have a significant effect on the socioeconomic environment of San Juan County, especially for the community of Friday Harbor on San Juan Island. Visitor services include lodging, restaurants and bars, grocery stores, gas stations, vehicle and bike rentals, taxi and shuttle services, sporting goods stores, guide services, whale watching tours, kayak rentals, souvenir shops, and niche industries, such as wineries. The economy is largely seasonal and San Juan Island National Historical Park is one of the main attractions on San Juan Island. The park is the primary destination for 20% of visitors to the park (Littlejohn 1995). While some people enjoy wildlife viewing, either native or nonnative fauna, this is rarely their sole reason for visiting the park. Native Visitors to the park spent an average of \$51 per capita on travel, lodging, food, and other items during their visit (Littlejohn 1995).

Analysis: Alternative B (Preferred Alternative)

European rabbit removal operations would be conducted during the fall and winter off-season when visitor use of the park is lowest. Field activities would primarily take place from dusk to dawn when the park is normally closed. Park closure hours may be extended temporarily to accommodate field activities and for safety reasons. The contractor would spend money on lodging, food, and transportation on San Juan Island during removal operations.

Cumulative Impacts

The demographics of San Juan County have changed dramatically since World War II as the economy has shifted from agriculture and fishing to construction and tourism. The popularity of the county for retirement and vacation homes has led to gentrification, with a larger proportion of the population comprised of seniors and the affluent (Washington State Office of Financial Management 2010).

Conclusion: Alternative A (No Action Alternative)

The no action alternative would have a continuing negligible effect on the socioeconomic environment in San Juan County.

Conclusion: Alternative B (Preferred Alternative)

The preferred alternative would have a minor short-term beneficial effect and a negligible long-term effect on the socioeconomic environment in San Juan County.

Chapter 5: Consultation and Coordination

5.1 SUMMARY OF PUBLIC INVOLVEMENT

The NPS initiated a 30-day public scoping period for the proposed action from March 12, 2009 through April 10, 2009. A public scoping announcement was placed on the park's web page and in the following newspapers: Journal of the San Juans, San Juan Islander, Bellingham Herald, Skagit Valley Herald, Anacortes American, and The Argus.

The park conducted both internal and external scoping with appropriate NPS staff, agencies, tribes, and the public to determine the range of issues to be analyzed in the EA. Internal scoping included analysis from specialists such as historical landscape architects, hydrologists, biologists, engineers, and other NPS staff from San Juan Island National Historical Park and the Pacific West Region, as well as staff from other agencies. Based on scoping comments received, and Federal laws, regulations, and executive orders, the NPS determined that an EA was the appropriate level of compliance for this stage of the project. This scoping process was used to define the project purpose and need, identify issues and impact topics, outline reasonable and feasible alternative actions, and to describe and evaluate the relationship of the preferred alternative to other planning efforts in the park.

Twenty-four public comment letters were received: 22 from individuals, 2 from nonprofit or homeowner organizations, 0 comments from business owners or managers, and 0 comments from a local government. These were received via email (10), U.S. mail (7), or handed to staff at public meetings (7). All of the comment letters listed Washington State addresses. These comments were analyzed to identify issues and concerns, and the input was incorporated into the project design as appropriate. Park staff also continued to consider public and internal concerns as they arose throughout project planning, and to integrate these additional ideas where possible and appropriate.

Comments were submitted directly to the park at the following address: **San Juan Island National Historical Park, P.O. Box 429, Friday Harbor, WA 98250**. Comments could also be submitted via the NPS Planning, Environment, and Public Comment (PEPC) web site at <http://parkplanning.nps.gov/sajh> or sent via email to the superintendent, project manager, or other staff. Information about the planning process was updated and posted on the park's web site at <http://www.nps.gov/sajh> and on PEPC.

5.1.1 Public Review of this Environmental Assessment

This Environmental Assessment is available for a thirty- (30) day public review and comment period which begins the date the EA is distributed. The availability of the EA is being announced via press releases and the EA is being mailed or emailed to a list of persons, organizations, and

agencies that have expressed interest in San Juan Island National Historical Park proposed actions and events. This list includes government agencies, tribal governments, public libraries, nonprofit organizations, and private individuals (see Distribution List in Appendix D). The EA will also be available at local libraries including San Juan Island Library, Orcas Island Public Library, and Anacortes Public Library. An electronic copy of the EA is also available online at <http://www.nps.gov/sajh>.

Comments on the EA or requests for additional copies of this EA (please specify compact disk or printed copy) should be directed to:

Superintendent, San Juan Island National Historical Park, PO Box 429, Friday Harbor, WA 98250 • (360) 378-2240 • www.nps.gov/sajh • or parkplanning.nps.gov/sajh

Comments will be documented and analyzed at the close of the public review period. If no significant impacts from the proposed action are identified, the EA will then be used to prepare a Finding of No Significant Impact (FONSI), which will be sent to the NPS Pacific West Regional Director for consideration.

During the public review period, additional consultation will occur to affirm determinations of effect (if needed) with the State Historic Preservation Officer and the U.S. Fish and Wildlife Service. Notice of concurrence with the determinations of effect will be documented in the FONSI, if prepared, for this EA.

For more information concerning this EA, please contact the park **Chief of Integrated Resources, Jerald Weaver at (360) 378-2240, extension 2224.**

5.2 CONTACT AND CONSULTATION WITH OTHER AGENCIES

5.2.1 U.S. Fish and Wildlife Service

Section 7 of the Endangered Species Act of 1973 requires agencies to consult with the U.S. Fish and Wildlife Service regarding any action authorized, funded, or carried out by a Federal agency to ensure that it does not jeopardize any listed species or its critical habitat. The NPS received a project-area species list from the USFWS in a letter dated November 2007 (reference number: 1341D-2008-TA-0021). An updated consultation letter was sent to the USFWS in May 2010. This list was used as the basis for the special-status species analysis in this EA. Because there would be no effect on any species listed or proposed as rare, threatened, or endangered, no additional formal consultation with the USFWS is necessary.

5.2.2 Washington State Historic Preservation Officer

San Juan Island National Historical Park consults with the State Historic Preservation Officer (SHPO) during projects that have the potential to adversely impact prehistoric resources or historic properties. Based on the current analysis, there would be no prehistoric resources or historic properties affected by the implementation of the proposed actions under Alternative B, the preferred alternative. If analysis later reveals that historic properties could be affected, additional consultation with the SHPO would occur, including concurrence with the proposed determinations of effect.

5.3 LIST OF PREPARERS

5.3.1 Preparers

Todd W. Trapp Biologist, San Juan Island National Historical Park

5.3.2 Project Interdisciplinary Team

San Juan Island National Historical Park

Peter Dederich	Superintendent, San Juan Island National Historical Park
Todd Trapp	Biologist, San Juan Island National Historical Park
Mike Vouri	Chief of Interpretation, San Juan Island National Historical Park
Jerald Weaver	Chief of Integrated Resources, San Juan Island National Historical Park

National Park Service

Kelly Cahill	Museum Curator, North Cascades National Park Complex
Christopher Davis	Plant Ecologist, Cuyahoga Valley National Park
Cathy Gilbert	Historical Landscape Architect, Pacific West Region
Kirstie Haertel	Archaeologist, Pacific West Region
Laurin Huffman	Historical Architect, Pacific West Region
Gretchen Luxenberg	Historian, Pacific West Region
Stephanie Toothman	Chief of Cultural Resources, Pacific West Region
Fred York	Anthropologist, Pacific West Region

Consultants – Island Conservation

Karl Campbell	Acting South America Regional Director
Chad Hanson	Project Manager
Jacob Sheppard	Environmental Compliance Specialist

List of Acronyms and Abbreviations

CEQ – Council on Environmental Quality

DO-12 – Director’s Order 12, Conservation Planning, Environmental Impact Analysis, and Decision-making

EA – Environmental Assessment

FONSI – Finding of No Significant Impact

GMP – Final General Management Plan and Environmental Impact Statement

IPM – Integrated Pest Management

National Register – National Register of Historic Places

NEPA – National Environmental Policy Act of 1969

NHL – National Historic Landmark

NHPA – National Historic Preservation Act of 1966

NPS – National Park Service

NRCS – Natural Resources Conservation Service

Park – San Juan Island National Historical Park

PEPC – National Park Service Planning, Environment, and Public Comment

PMC – Natural Resources Conservation Service Plant Materials Center

PUPS – National Park Service Pesticide Use Proposal System

Rabbits – European rabbits

SHPO – State Historic Preservation Officer

USFWS – U.S. Fish and Wildlife Service

Glossary

Abiotic – Not biotic or of biological origin.

Antigen – A substance foreign to the body that evokes an immune response either alone or after forming a complex with a larger molecule and that is capable of binding with a product of the immune response, such as an antibody or T cell.

Archipelago – A group of islands or an expanse of water with many scattered islands.

Biodiversity – The biological diversity in an environment indicated by the number of different species of plants and animals.

Biotic – Of, relating to, or caused by living organisms.

Candidate species – A candidate species is any species where sufficient information exists to support listing as threatened or endangered.

Carrion – Dead or putrefying flesh of an animal.

Critical habitat – Specific areas within the geographical range occupied by a species on which are found those physical and biological features that are considered essential to the conservation of the species and which may require special management consideration or protection can be designated as critical habitat.

Disjunct – Marked by a separation of or from usually contiguous parts or individuals.

Endangered species – An endangered species is any species which is in danger of extinction throughout all or a significant portion of its range.

Estivation – A reduction in metabolic rate over prolonged periods in a dry and hot environment during summertime.

Extant – Currently or actually existing; or still existing and not destroyed or lost.

Extinct – A species that is no longer existing.

Extirpated – A species that is completely eliminated from a portion of its former range through extermination or destruction of its habitat, or by other biotic or abiotic factors such as disease or climate change.

Fauna – The animal life, especially the animals characteristic of a region, period, or special environment.

Forb – An herb other than grass.

Hectare – A metric system unit of area equivalent to approximately 2.47 acres.

Hibernation – A reduction in metabolic rate and body temperature near ambient temperature in mammals over prolonged periods in winter.

Holocene – The present or post-Pleistocene geologic epoch.

Hydrology – The properties, distribution, and circulation of water on and below the earth's surface and in the atmosphere.

Insular – Of, relating to, or constituting an island or situated on an island in isolation.

Introduced species – Nonnative plant and animal species that occur outside their native ranges as a result of direct or indirect human actions (see nonnative species).

Invasive species – Particularly aggressive, native and nonnative, plant and animal species that relatively quickly colonize, spread through, or dominate a region, habitat, or environment, especially disturbance regimes.

Lagomorph – Any species of the order Lagomorpha of gnawing herbivorous mammals having two pairs of incisors in the upper jaw one behind the other and comprising the rabbits, hares, and pikas.

Nonnative species – Nonnative plants and animals are species that occur outside their native ranges as a result of direct or indirect human actions (see introduced species).

Perturbation – A disturbance of arrangement or state of equilibrium.

Prairie – Land in or predominately in grass with few trees.

Raptor – A bird of prey.

Rhizomatous – Plants that have and spread by rhizomes (see rhizome).

Rhizome – A somewhat elongate usually horizontal subterranean plant stem that produces shoots above and roots below and is distinguished from a true root in possessing buds, nodes, and usually scalelike leaves.

Riparian – Relating to or living or located along the bank of a natural watercourse, lake, or tidewater.

Seral – A seral community (or sere) is a stage or progression of ecological succession in an ecosystem culminating in a climax community, or the sequential development of a climax community of an ecosystem.

Soil horizon – A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons.

Species of concern – An unofficial status, where the species appears to be in jeopardy, but there is insufficient information to support listing.

Stochastic – Involving a random variable or involving chance or probability.

Taxon (plural taxa) – A taxonomic group or the name applied to a taxonomic group in scientific nomenclature.

Threatened species – A threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Trophic cascade – Trophic cascades occur when predators in an ecological community suppress the abundance of their prey, thereby releasing the next lower trophic level from predation or herbivory (if the next lower trophic level is an herbivore) in top-down community regulation. For example, European rabbits at American Camp at high population densities draw an abundance of predators, such as bald and golden eagles and great horned owls, as well as increased reproduction in the introduced red fox population. When rabbit numbers decline, overabundant predators 1) switch to other native prey, such as the Townsend's vole, which may play a role in native plant seed dispersal for some species, and 2) release nonnative invasive plants in disturbed areas where European rabbits have destroyed native plant communities and wildlife habitat.

Vascular plant – A plant having a specialized conducting system of tissues or vessels that carry water (xylem) and food (phloem) through roots, stems, or leaves. Vascular plants include ferns and fern allies, conifers, and flowering plants.

Vector – An organism that transmits a pathogen.

Warren – A system of subterranean tunnels and chambers or burrows excavated by an animal (as a rabbit) used for shelter and habitation or an area where rabbits breed.

Literature Cited

- American Veterinary Medical Association. 2007. AVMA guidelines on euthanasia (formerly report of the AVMA panel on euthanasia). American Veterinary Medical Association, Schaumburg, Illinois, USA.
- Barlow, N. D. 2000. The ecological challenge of immunocontraception: editor's introduction. *Journal of Applied Ecology* 37:897-902.
- Burley, J. R. W. 1986. Advances in the integrated control of the European rabbit in south Australia. Pages 140-146 *in* Proceedings of the Twelfth Vertebrate Pest Conference. T. P. Salmon, editor. University of Nebraska, Lincoln, USA.
- Climate Impacts Group. 2009. The Washington climate change impacts assessment: evaluating Washington's future in a changing climate. M. McGuire Elsner, J. Littell, and L. Whitely Binder, editors. Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, USA.
- Council on Environmental Quality. 1981. Forty most asked questions. Federal Register 46 Fed. Reg. 18026 (1981), Washington, D.C., USA.
- Donlan, C. J., B. R. Tershy, and D. A. Croll. 2002. Islands and introduced herbivores: conservation action as ecosystem experimentation. *Journal of Applied Ecology* 39:235-246.
- Fleckenstein, J. and A. Potter. 1999. 1997, 1998 project summary Puget prairie butterfly surveys. Washington Department of Natural Resources, Natural Heritage Program, Olympia, USA.
- Flora, M. D. and S. C. Fradkin. 2004. A conceptual model of the upland aquatic and nearshore marine habitats of San Juan Island National Historical Park (Washington). National Park Service Technical Report NPS/NRWRD/NRTR-2004/318, Fort Collins, Colorado, USA.
- Gilbert, C. A. 1987. Historic landscape report: American Camp and British Camp, San Juan Island National Historical Park, Washington. National Park Service, Seattle, Washington, USA.
- Guppy, C. S. and J. H. Shepard. 2001. Butterflies of British Columbia. University of British Columbia Press, Vancouver, Canada.
- Hansen, A. J. 1987. Regulation of bald eagle reproductive rates in southeast Alaska. *Ecology* 68:1387-1392.
- Hanssen, I., H. C. Pedersen, and T. Lundh. 1991. Does intense herbivory from microtine rodents induce production of plant estrogens in the spring food plants of willow ptarmigan *Lagopus l. lagopus*? *Oikos* 62:77-79.

- Holmes, R. E. 1998. San Juan Island National Historical Park Wetland Inventory – 1998. San Juan Island National Historical Park, Friday Harbor, Washington, USA.
- Howarth, F. G. 1991. Environmental impacts of classical biological control. *Annual Review Entomology* 36:485-509.
- Klinger, T., D. Fluharty, K. Evans, and C. Byron. 2006. Assessment of coastal water resources and watershed conditions at San Juan Islands National Historical Park. National Park Service Technical Report NPS/NRWRD/NRTR–2006/360, Fort Collins, Colorado, USA.
- Lambert, A. M. 2009. Island marble butterfly survey at American Camp, San Juan Island National Historical Park: 2008 field survey summary report. University of Washington, College of Forest Resources, Seattle, USA.
- Lees, A. C. and D. J. Bell. 2008. A conservation paradox for the 21st century: the European wild rabbit *Oryctolagus cuniculus*, an invasive alien and an endangered native species. *Mammal Review* 38:304-320.
- Littlejohn, M. 1995. Visitor services project: San Juan Island National Historical Park. University of Idaho, Cooperative Park Studies Unit, Visitor Services Project Report 70, Moscow, USA.
- Miskelly, J. 2005. 2005 surveys for island marble butterfly (*Euchloe ausonides insulanus*) in northern coastal Washington. Washington Department of Fish and Wildlife, Olympia, USA.
- National Park Service. 2001. The DO-12 handbook. National Park Service, Washington, D.C., USA.
- National Park Service. 2004. Cultural landscapes inventory: American Camp, San Juan Island National Historical Park. National Park Service, Seattle, Washington, USA.
- National Park Service. 2006. Management Policies 2006. National Park Service, Washington, D.C., USA.
- National Park Service. 2008. San Juan Island National Historical Park final general management plan and environmental impact statement. National Park Service, Seattle, Washington, USA.
- Natural Resources Conservation Service. 2009. Interagency agreement between USDA Natural Resources Conservation Service, Oregon and USDI National Park Service, San Juan Island National Historical Park. Natural Resources Conservation Service Interagency Agreement 9000-09-003, Portland, Oregon, USA.
- Natural Resources Conservation Service and National Park Service. 2005. Soil survey of San Juan Island National Historical Park, Washington. Natural Resources Conservation Service, Spokane, Washington, USA.

- Orr, L. A., H. H. Bauer, and J. A. Wayenberg. 2002. Estimates of ground-water recharge from precipitation to glacial-deposit and bedrock aquifers on Lopez, San Juan, Orcas, and Shaw Islands, San Juan County, Washington. U.S. Geological Survey Water-resources Investigations Report 02-4114, Tacoma, Washington, USA.
- Pearson, S. F., and B. Altman. 2005. Range-wide streaked horned lark (*Eremophila alpestris strigata*) assessment and preliminary conservation strategy. Washington Department of Fish and Wildlife, Olympia, USA.
- Peterson, M. A. 2008. Population ecology of the island marble butterfly (*Euchloe ausonides insulanus*): quantifying abundance and dispersal. Western Washington University, Biology Department, Bellingham, USA.
- Pyle, R. M. 2004. The butterflies of San Juan Island National Historical Park: final report of a survey conducted May-September 2003. National Park Service, Friday Harbor, Washington, USA.
- Pyle, R. M. 2006. A conservation agreement and strategy for the island marble butterfly (*Euchloe ausonides insulanus* Guppy and Shepard), final, between the San Juan Island National Historical Park, National Park Service and the U.S. Fish and Wildlife Service. U.S. Fish and Wildlife Service and National Park Service, Portland, Oregon and Oakland, California, USA.
- Retfalvi, L. 1970. Food of nesting bald eagles on San Juan Island, Washington. Condor 72:358-361.
- Rocheft, R. M. and M. M. Bivin. 2009. Vascular plant inventory of San Juan Island National Historical Park. National Park Service Natural Resource Technical Report NPS/XXXX/NRTR – 20XX/XXX, Fort Collins, Colorado, USA.
- Rolph, D. N., and J. K. Agee. 1993. A vegetation management plan for the San Juan Island National Historical Park. National Park Service Technical Report NPS/PNRUW/NRTR–93/02, Seattle, Washington, USA.
- Shutt, D. A. 1976. The effects of plant oestrogens on animal reproduction. Endeavour 35:110-113.
- Siegel, R. B., R. L. Wilkerson, H. K. Pedersen, and R. C. Kuntz II. 2009. Landbird inventory of San Juan Island National Historical Park final report (2002). National Park Service Natural Resource Technical Report NPS/NCCN/NRTR–2009/156, Fort Collins, Colorado, USA.
- Stevens, W. F. 1975. The biology of the European rabbit, *Oryctolagus cuniculus*, on San Juan Island, Washington. Thesis, University of Washington, Seattle, USA.
- Stinson, D. W. 2005. Washington state status report for the Mazama pocket gopher, streaked horned lark, and Taylor's checkerspot. Washington Department of Fish and Wildlife, Olympia, USA.

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- Stofel, J., E. Rodrick, and G. Blatz. 2008. Bald eagle protection in Washington State. Washington Department of Fish and Wildlife, Mill Creek, Washington, USA.
- Taber, R. D. 1982. Implications of the rabbit decline on San Juan Island. University of Washington, College of Forest Resources, Seattle, USA.
- Torr, N. 2002. Eradication of rabbits and mice from subantarctic Enderby and Rose Islands.
- U.S. Fish and Wildlife Service. 2000. Recovery plan for the golden paintbrush (*Castilleja levisecta*). U.S. Fish and Wildlife Service, Portland, Oregon, USA.
- U.S. Fish and Wildlife Service. 2007. National bald eagle management guidelines. U.S. Fish and Wildlife Service, Washington, D.C., USA.
- Washington State Office of Financial Management. 2010. 2009 Data Book. Washington State Office of Financial Management, Forecasting Division, Olympia, USA.
- Watson, J. W. 2002. Comparative home ranges and food habits of bald eagles nesting in four aquatic habitats in western Washington. *Northwestern Naturalist* 83:101-108.
- Weisbrod, A. R. 1979. Insularity and mammals species number in two national parks. Pages 83-87 in *Proceedings of the first conference on scientific research in the national parks*. R. M. Linn, editor. National Park Service, 9-12 November 1976, New Orleans, Louisiana, USA.
- West, S. D. 2010. Monitoring of European rabbits at San Juan Island National Historical Park, 2010 monitoring report. University of Washington, College of Forest Resources, Seattle, USA.
- West, S. D., and J. K. Agee. 2009. Monitoring of European rabbits at San Juan Island National Historical Park, 2009 monitoring report. University of Washington, College of Forest Resources, Seattle, USA.

Appendix A: List of Species Referenced with Status

Species	Status ¹
Plants	
Western red cedar (<i>Thuja plicata</i>)	
Lodgepole pine (<i>Pinus contorta</i> var. <i>latifolia</i>)	
Douglas fir (<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>)	
Western hemlock (<i>Tsuga heterophylla</i>)	
Red alder (<i>Alnus rubra</i>)	
Garry oak (<i>Quercus garryana</i>)	
Common snowberry (<i>Symphoricarpos albus</i> var. <i>laevigatus</i>)	
Shortspur seablush (<i>Plectritis congesta</i>)	
Harsh Indian paintbrush (<i>Castilleja hispida</i>)	
Golden paintbrush (<i>Castilleja levisecta</i>)	Threatened (Reestablished)
Narrowleaf plantain (<i>Plantago lanceolata</i>)	Introduced
California buttercup (<i>Ranunculus californicus</i>)	Washington State Threatened
Hall's aster (<i>Symphyotrichum hallii</i>)	Washington State Threatened
Sand pygmyweed (<i>Crassula connata</i>)	Washington State Threatened
Hookedspur violet (<i>Viola adunca</i> var. <i>adunca</i>)	
Roemer's fescue (<i>Festuca roemerii</i>)	
Jepson's blue wildrye (<i>Elymus glaucus</i> ssp. <i>jepsonii</i>)	
Sitka brome (<i>Bromus sitchensis</i> var. <i>sitchensis</i>)	
Menzies' pepperweed (<i>Lepidium virginicum</i> var. <i>menziesii</i>)	

Field mustard (<i>Brassica rapa</i> var. <i>rapa</i>)	Introduced
Tall tumbled mustard (<i>Sisymbrium altissimum</i>)	Introduced
Tansy ragwort (<i>Senecio jacobaea</i>)	Introduced
Mammals	
Mule deer (<i>Odocoileus hemionus</i>)	
Orca (<i>Orcinus orca</i>) – southern resident killer whale	Endangered
Black bear (<i>Ursus americanus</i>)	Extirpated
Gray wolf (<i>Canis lupus</i>)	Extirpated
Red fox (<i>Vulpes vulpes</i>)	Introduced
Feral cat (<i>Felis silvestris</i>)	Introduced
Domestic ferret (<i>Mustela putorius</i> ssp. <i>furo</i>)	Introduced (Extirpated)
European rabbit (<i>Oryctolagus cuniculus</i>)	Introduced
Townsend's vole (<i>Microtus townsendii</i>)	
Long-eared myotis (<i>Myotis evotis</i>)	Species of Concern
Long-legged myotis (<i>Myotis volans</i>)	Species of Concern
Black rat (<i>Rattus rattus</i>)	Introduced
Birds	
Northern harrier (<i>Circus cyaneus</i>)	
Golden eagle (<i>Aquila chrysaetos</i>)	
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Species of Concern
Prairie falcon (<i>Falco mexicanus</i>)	Species of Concern (Historic)
Peale's peregrine falcon (<i>Falco peregrinus</i> ssp. <i>pealei</i>)	Species of Concern
Glaucous-winged gull (<i>Larus glaucescens</i>)	

Barn owl (<i>Tyto alba</i>)	
Short-eared owl (<i>Asio flammeus</i>)	
Great horned owl (<i>Bubo virginianus</i>)	
Midwestern barred owl (<i>Strix varia</i> ssp. <i>varia</i>)	
Western burrowing owl (<i>Athene cunicularia</i> ssp. <i>hypugaea</i>)	Species of Concern (Historic)
Olive-sided flycatcher (<i>Contopus cooperi</i>)	Species of Concern
Eurasian skylark (<i>Alauda arvensis</i>)	Introduced (Historic)
Streaked horned lark (<i>Eremophila alpestris</i> ssp. <i>strigata</i>)	Candidate (Historic)
Savannah sparrow (<i>Passerculus sandwichensis</i>)	
Oregon vesper sparrow (<i>Pooecetes gramineus</i> ssp. <i>affinis</i>)	Species of Concern
Western meadowlark (<i>Sturnella neglecta</i>)	
Reptiles	
Northern alligator lizard (<i>Elgaria coerulea</i>)	
Garter snake (<i>Thamnophis</i> spp.)	
Amphibians	
Western toad (<i>Anaxyrus boreas</i>)	Species of Concern
Pacific chorus frog (<i>Pseudacris regilla</i>)	
Northern red-legged frog (<i>Rana aurora</i>)	Species of Concern
Rough-skinned newt (<i>Taricha granulosa</i>)	Species of Concern
Insects	
Island marble butterfly (<i>Euchloe ausonides</i> ssp. <i>insulanus</i>)	Species of Concern
Taylor's checkerspot butterfly (<i>Euphydryas editha</i> ssp. <i>taylori</i>)	Candidate (Probably Historic)
Valley silverspot butterfly (<i>Speyeria zerene</i> ssp. <i>bremnerii</i>)	Species of Concern

Cabbage white (<i>Pieris rapae</i>)	Introduced
Cinnabar moth (<i>Tyria jacobaeae</i>)	Introduced

¹If no status is indicated, the species is native to San Juan Island National Historical Park and its population is secure.

Appendix B: U.S. Fish and Wildlife Service Consultation

B.1 LETTER INITIATING SECTION 7 FORMAL CONSULTATION



IN REPLY REFER TO:

1621

United States Department of the Interior

NATIONAL PARK SERVICE
San Juan Island National Historical Park
P.O. Box 429
Friday Harbor, Washington 98250

Ken Berg, Field Supervisor
U.S. Fish and Wildlife Service
Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503

October 26, 2007

Dear Mr. Berg:

Reference: Proposed Project at San Juan Island National Historical Park – Control Non-native Rabbits and Restore Prairie at American Camp, San Juan County, Washington.

Subject: Request for List of Federal Species of Concern and Determination of Status of an Introduced Population of a Listed Plant

The National Park Service (NPS) is proposing to control non-native European rabbits (*Oryctolagus cuniculus*) and restore native prairie in the American Camp Unit of San Juan Island National Historical Park (park), San Juan County, Washington (please see enclosed map). This letter initiates informal consultation on the proposed project by requesting a current list of federally listed, proposed, and candidate species; designated and proposed critical habitat; and other species or habitats of concern that may inhabit the project area. In addition, we are requesting technical assistance regarding the nominal status and associated regulatory requirements that would accompany threatened golden paintbrush (*Castilleja levisecta*), if the NPS established a population (or populations) of this plant at the park.

The park's American Camp Unit covers 1,223 acres along the southwestern edge of San Juan Island. The site supported Native Americans for thousands of years before the Hudson's Bay Company established an outpost there in the mid-1800s and extensively altered the landscape through farming and grazing. European rabbits were introduced in the late 1800s. Although farming and livestock grazing no longer occur at the park, rabbits continue to decimate the landscape. A survey completed in spring 2007 estimated a population of approximately 1,500 rabbits (up to 33 rabbits per hectare) and counted nearly 3,000 burrows. Prairies in the American Camp Unit now are dominated by non-native grasses, forbs, and shrubs, including velvet grass (*Holcus lanatus*), quackgrass (*Elymus repens*), annual bromes (*Bromus* spp.), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), one-seed hawthorn (*Crataegus monogyna*) and Himalayan blackberry (*Rubus discolor*). The proposed project would eliminate rabbits from the unit, construct enclosure fencing to keep rabbits out, and restore native grasses and forbs to approximately 600 acres of historical prairie.

Related to prairie restoration, the park is evaluating potential to establish a population of threatened golden paintbrush at American Camp. Natural populations of golden paintbrush occur

near the park, and the park appears to support suitable habitat for this species. However, prior to introducing golden paintbrush, the park is requesting confirmation of the regulatory status that would accompany introduced plants. Regulations associated with non-essential experimental populations (50 CFR 17.80 – 17.86) indicate listed plants introduced on NPS land acquire threatened status (50 CFR 17.83b). We also are interested to know if requirements for the Secretary to promulgate species-specific findings by regulation prior to establishing experimental populations of vertebrates and invertebrates also applies to plants.

Please note the regulatory status of introduced populations of golden paintbrush on NPS land will not necessarily affect the park's decision to establish new populations of the plant; however, it will influence procedural aspects concerning compliance and section 7 consultation.

If you have any questions or comments, please contact me at (360) 378-2240 or by e-mail at 'christopher_davis@nps.gov'. I look forward to receiving your response, including a list of species of concern and associated noise and/or project-timing restrictions, within 30 days of your receipt of this letter in accordance with 50 CFR 402.12. Thank you for your time and consideration.

Sincerely,



Chris Davis
Resource Manager

Enclosure – Park Map/Brochure

B.2 U.S. FISH AND WILDLIFE SERVICE RESPONSE



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503



In Reply Refer To:
13410-2008-TA-0021

NOV 28 2007

Memorandum

To: Resource Manager, National Park Service
San Juan Island National Historic Park
Friday Harbor, Washington

From: *for* Manager, Western Washington Fish and Wildlife Office
Lacey, Washington *Am White*

Subject: San Juan Island National Park Control of Non-native Rabbits and Prairie Restoration

This letter responds to your October 26, 2007, request for information regarding the status of a potential reintroduced population of the threatened golden paintbrush (*Castilleja levisecta*) on National Park lands. We understand from your letter that the National Park Service (Park Service) is proposing to control non-native European rabbits (*Oryctolagus cuniculus*) and restore native prairie in the American Camp Unit of San Juan Island National Historic Park. As part of the native prairie restoration, the Park Service is evaluating the potential to establish a reintroduced population of golden paintbrush at American Camp.

The golden paintbrush was listed as a threatened species under the Federal Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) on June 11, 1997 (62 FR 31740). A recovery plan for the golden paintbrush was completed in 2000. One of the key recovery actions identified in the plan is the establishment of new populations of golden paintbrush (through reintroductions) within the historic range of the species (U.S. Fish and Wildlife Service 2000). Reintroduced populations of federally-listed species retain the same listing status as naturally-occurring populations. Any golden paintbrush that becomes established at American Camp would be protected as a threatened species, and the Park Service would be responsible for ensuring that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the listed species as required under section 7(a)(2) of the Act.

Section 10(j) of the Act authorizes listed species to be released as experimental populations. Experimental populations are only identified as such when the proposed reintroduced population is "wholly separate geographically from nonexperimental populations of the same species." In



order for a population to be considered experimental, the proposed experimental population must be listed as such through a formal rule-making process, including experimental populations of listed plant species. The U.S. Fish and Wildlife Service has been working with other agencies and partners in the Puget Sound region to reintroduce golden paintbrush at appropriate sites within its historic range. None of these reintroductions have been listed as "experimental" as defined under section 10(j) of the Act. We do not anticipate that a reintroduction of golden paintbrush at American Camp would require a Federal listing as an experimental population due to the geographic location of American Camp relative to other extant populations of golden paintbrush, and the status of American Camp as a National Park. As you noted in your letter, the regulations associated with experimental populations (50 CFR 17.80-17.86) treat reintroduced populations of listed plants on National Park Lands as threatened species.

We commend you for your efforts to restore the prairie habitat at American Camp, and we are encouraged that you are considering a reintroduction effort for golden paintbrush. The successful establishment of a golden paintbrush population at American Camp would be a positive contribution towards the recovery of this species. Please feel free to contact us if you need assistance in developing a reintroduction plan or if you have other information needs.

In your letter, you also requested a current list of federally-listed proposed, threatened, endangered, and candidate species potentially occurring in San Juan County, Washington. Please see the attachment for this information. For your convenience, we've posted our species list information on our website at:

http://www.fws.gov/westwafwo/se/SE_List/endangered_Species.asp

If there are any questions about this letter please contact Vince Harke (360/753-9529) or Marc Whisler (360/753-4410), of my staff. For specific questions regarding the technical aspects of a golden paintbrush reintroduction, please contact Ted Thomas (360/753-4327) of my staff.

Attachment:
Species List for San Juan County, Washington (2 pages)

cc:
WWFWO (T. Thomas)

Reference

U.S. Fish and Wildlife Service. 2000. Recovery plan for the golden paintbrush (*Castilleja levisecta*). U.S. Fish and Wildlife Service, Portland, Oregon. 51 pp.

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRI... Page 1 of 2

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN
IN SAN JUAN COUNTY**

**AS PREPARED BY
THE U.S. FISH AND WILDLIFE SERVICE
WESTERN WASHINGTON FISH AND WILDLIFE OFFICE**

(Revised November 1, 2007)

LISTED

Bull trout (*Salvelinus confluentus*) [marine waters]

Marbled murrelet (*Brachyramphus marmoratus*) [marine waters]

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

DESIGNATED

None

PROPOSED

http://www.fws.gov/westwafwo/sc/SE_List/SAN%20JUAN.htm

11/20/2007

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRI... Page 2 of 2

None

CANDIDATE

None

SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)
Island large marble butterfly (*Euchloe ausonides insulanus*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northern sea otter (*Enhydra lutris kenyoni*)
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)
Olive-sided flycatcher (*Contopus cooperi*)
Oregon vesper sparrow (*Pooecetes gramineus affinis*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresii*)
Valley silverspot (*Speyeria zerene bremeri*) [type location]
Western toad (*Bufo boreas*)

http://www.fws.gov/westwafwo/se/SE_List/SAN%20JUAN.htm

11/20/2007

B.3 UPDATED LETTER INITIATING SECTION 7 INFORMAL CONSULTATION



United States Department of the Interior

NATIONAL PARK SERVICE
San Juan Island National Historical Park
P.O. Box 429
Friday Harbor, Washington 98250



INSECT 1001-30
L76

May 26, 2010

Ken Berg, Field Supervisor
U.S. Fish and Wildlife Service
Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503

SUBJECT: Initiating Consultation and Seeking Input on Federal Listed Species, San Juan Island National Historical Park, San Juan County, Washington.

Dear Mr. Berg:

The National Park Service (NPS) is beginning development of a European Rabbit Management Environmental Assessment (EA) for San Juan Island National Historical Park. Development of the EA offers both the NPS and the public a unique opportunity to produce a management strategy for the European rabbit population at American Camp.

The 2008 General Management Plan (GMP) for San Juan established overall strategies for meeting the general goals and purposes of the park. One such general goal was the management of non-native animal species identified as pests. The European Rabbit Management EA will tie from the goals and objectives established by the GMP and provide for the level of detail needed to address these issues, and issues yet to be fully identified by the NPS and the public.

The EA will analyze the management issues and the potential impacts to natural resources. However, we need more up-to-date information on current federally listed species that have the potential to occur within the park boundaries.

According to our records, the following federally listed species and species of concern occur within or have the potential to occur within the park:

Golden paintbrush (*Castilleja levisecta*)
Bald eagle (*Haliaeetus leucocephalus*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northern sea otter (*Enhydra lutris kenyoni*)
Olive-sided flycatcher (*Contopus cooperi*)
Pacific lamprey (*Lampetra tridentata*)



Pacific Townsends big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Western toad (*Bufo boreas*)
Aster curtus (white-top aster)

An early step in the planning process is to initiate consultation with your agency. We are soliciting your comments on the problems and issues to be addressed and the alternatives to be examined. Please also inform us if there are other species we need to be concerned with. Please call Jerald Weaver at 360-378-2240 ext 2224 if you have any questions. Please send your comments and concerns to: San Juan Island National Historical Park, PO Box 429, Friday Harbor, WA 98250.

Sincerely,



Peter Dederich
Superintendent

Appendix C: Washington State Historic Preservation Officer Consultation

C.1 LETTER INITIATING SECTION 106 CONSULTATION



United States Department of the Interior

NATIONAL PARK SERVICE
San Juan Island National Historical Park
P.O. Box 429
Friday Harbor, Washington 98250



INVESTIGATION
L76

May 26, 2010

Allyson Brooks, Ph.D., State Historic Preservation Officer
Department of Archeological and Historical Preservation
1063 Capital Way, Suite 106
Olympia, Washington 98501

Subject: Initiating Section 106 Consultation and Seeking Concurrence on APE Regarding European Rabbit Management Environmental Assessment, San Juan Island National Historical Park, San Juan County, Washington.

Dear Dr. Brooks:

The National Park Service (NPS) is beginning development of a European Rabbit Management Environmental Assessment (EA) for San Juan Island National Historical Park. Development of the EA offers both the NPS and the public a unique opportunity to produce a management strategy for the European rabbit population at American Camp.

The 2008 General Management Plan (GMP) for San Juan established overall strategies for meeting the general goals and purposes of the park. One such general goal was the management of non-native animal species identified as pests. The European Rabbit Management EA will tie from the goals and objectives established by the GMP and provide for the level of detail needed to address these issues, and issues yet to be fully identified by the NPS and the public.

Due to San Juan's historic past and the significant cultural features and events for which the park was established, it is crucial that the park work with you to determine the potential effects of any activities on cultural resources. In accordance with Section 106 of the National Historic Preservation Act, we are initiating consultation and seeking concurrence on APE regarding European Rabbit Management EA (See attached map for APE). We will provide your office with a copy of the European Rabbit Management EA for your early review and comment as the planning process proceeds.

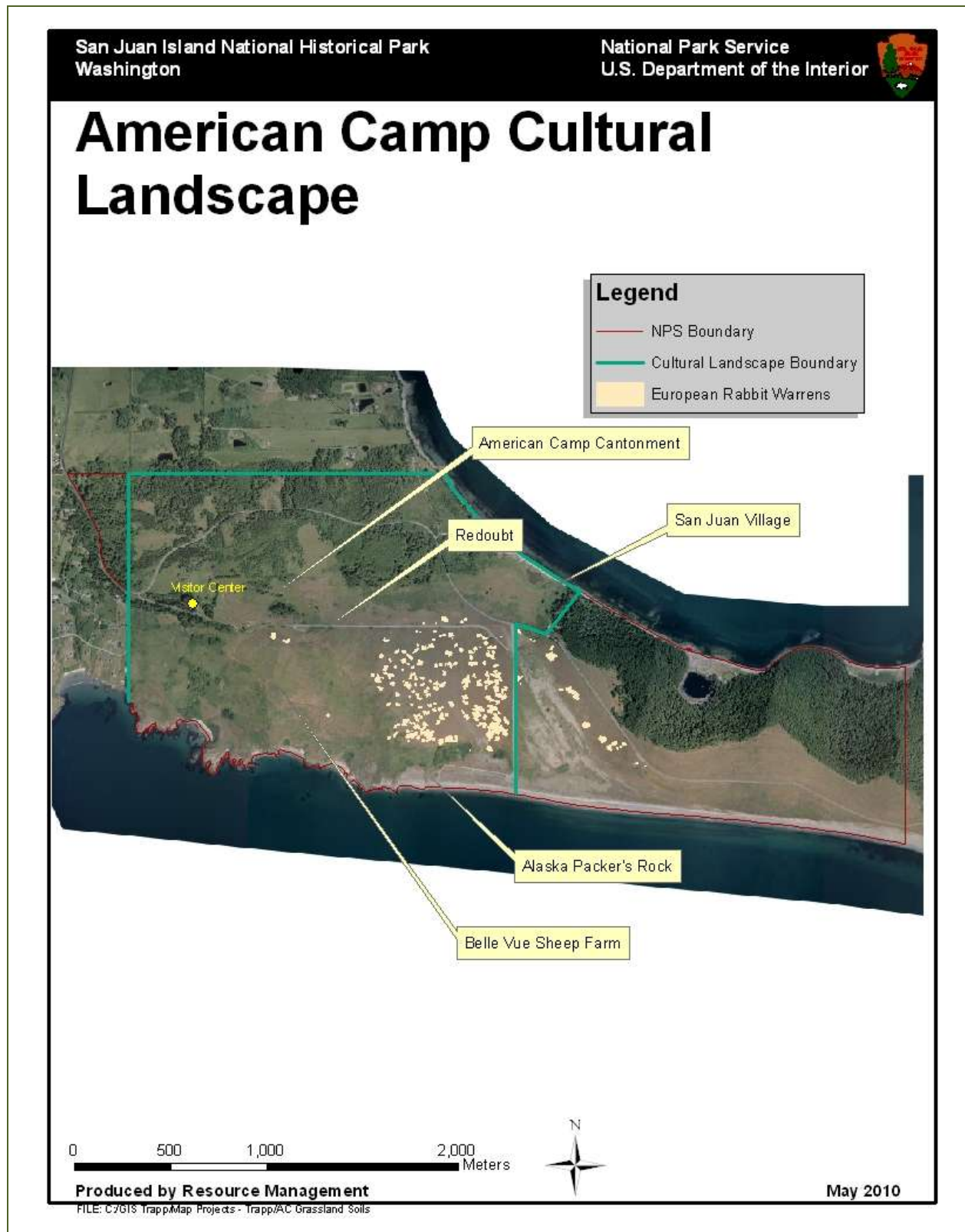
We would like to hear your comments and concerns regarding this proposal and any NHPA, Section 106 issues. Please send your comments and concerns to: San Juan Island National Historical Park, PO Box 429, Friday Harbor, WA 98250, or peter_dederich@nps.gov.

Sincerely,

/s/ Peter Dederich

Peter Dederich
Superintendent
Enclosure





C.2 WASHINGTON STATE HISTORIC PRESERVATION OFFICER RESPONSE



STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

June 1, 2010

Mr. Peter Dederich
San Juan Island National Historic Park
PO Box 429
Friday Harbor, Washington 98250

Re: European Rabbit Management Strategy Project
Log No.: 052710-23-NPS

Dear Mr. Dederich:

Thank you for contacting our department. We have reviewed the materials you provided for the proposed European Rabbit Management Strategy Project at American Camp, San Juan Island National Historic Park, San Juan County, Washington.

We concur with the proposed Area of Potential Effect (APE) as detailed in your enclosures and your proposed survey and identification efforts.

We look forward to receiving the results of your cultural resources assessment efforts and the professional archaeological survey report, your consultation with the concerned tribes, and your determination of effect.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised.

Sincerely,

A handwritten signature in blue ink, appearing to read "R. Whitlam".

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: rob.whitlam@dahp.wa.gov



Appendix D: Distribution List

On July 8, 2010, the European Rabbit Management Environmental Assessment will be distributed to individuals and organizations for formal public review. Public distribution and notification of the comment period, July 8, 2010 – August 12, 2010, will occur through web sites, press releases, compact disk copies, printed copies, and letters. On July 14, 2010, an open house meeting in Friday Harbor, Washington will be held. The complete EA, including maps, will be available on the NPS Planning, Environment, and Public Comment web site at <http://parkplanning.nps.gov/sajh>. A link to the PEPC web site is provided on the San Juan Island National Historical Park home page at <http://www.nps.gov/sajh>. The distribution list includes the following:

U.S. Congress

U.S. Senator Maria Cantwell

U.S. Senator Patty Murray

Representative Rick Larsen

Federal Agencies

U.S. National Park Service

Columbia Cascade System Support Office, Seattle, Washington
Pacific West Region, Oakland, California
Pacific West Region Library
Inventory and Monitoring
Threatened and Endangered Coordinator for Pacific West
Invasive Species Coordinator, Fort Collins, Colorado
Ebey's Landing Reserve Manager

U.S. Bureau of Land Management

Spokane Office Planning and Environmental Coordinator

U.S. Fish and Wildlife Service (Lacey, Washington)

U.S. Environmental Protection Agency (Seattle, Washington)

Indian Nations

Lummi Tribe

Chairman
Cultural Department
Tribal Historic Preservation Officer

Jamestown S’Klallam Tribe

Chairman

Swinomish Tribe

Chairman
Tribal Historic Preservation Officer

Samish Indian Tribe

Chairman
Tribal Historic Preservation Officer

Lower Elwha Tribal Community

Chairwoman

Port Gamble Indian Community

Chairman

State of Washington

State Representative Dave Quall

State Representative Jeff Morris

Washington Environmental Council

Department of Natural Resources

Office of Archeology and Historic Preservation

Counties

San Juan County

Parks
Conservation District
Fire District
Visitors Bureau

Chamber of Commerce

San Juan Island

Organizations and Educational Institutions

San Juan Nature Institute

San Juan Preservation Trust

Sierra Club

The Trust for Public Land

University of Washington Friday Harbor Labs

University of Washington Burke Museum

University of Washington School of Oceanography

The Whale Museum

Huxley College of Environmental Studies

San Juan Islands Audubon Society

Washington Native Plant Society

The Nature Conservancy

San Juan County Land Bank

San Juan County Marine Resource Committee

Oregon Museum of Science and Industry Pacific Marine Science Camps

National Parks Conservation Association

Cape San Juan Homeowners

Cattle Point Water District

Friends of San Juans

Town of Friday Harbor

Experience Your America

U.S. Department of the Interior
National Park Service