



CHAPTER 5: THE AFFECTED ENVIRONMENT

The purpose of this chapter is to describe the physical, biological, cultural, and social environments of San Juan Island National Historical Park, including human uses that could be affected from implementing any of the alternatives described in the preceding chapter. This chapter contains topics that were identified as important issues by the public and the agencies during scoping. It also contains additional background data relevant to both readers and park managers.

THE CULTURAL ENVIRONMENT

Prehistory and History

San Juan Island National Historical Park is the site of one of the last dramatic chapters of American continental expansion. San Juan Island, one of 172 named islands and islets of the San Juan archipelago, is strategically located at the confluence of the Strait of Juan de Fuca and the Strait of Georgia, midway between mainland Washington State, and Vancouver Island, British Columbia, Canada. In the mid-19th century, there remained a lingering dispute over which channel between Vancouver Island and the mainland had been designated by the Oregon Treaty of 1846 as the boundary between British holdings to the north and American holdings to the south. If the treaty negotiators had intended the boundary to follow the Rosario Strait, the islands would be British possessions; if they intended the Haro Strait to the west, then the islands belonged to the U.S. Territory of Washington.

Competing claims between the British and American settlers and officials ultimately led to a brief confrontation between British and American forces in 1859 known today as the “Pig War.” (It was known then as the San Juan Imbroglio.) The crisis was followed by 12 years of joint British-American military occupation of the island while the international dispute was addressed and slowly resolved through mediation by the Emperor of Germany. American Camp at the southeastern end of the island and English Camp in the northwest corner on Garrison Bay, provide the backdrop for interpreting the story of the boundary dispute and its peaceful arbitration. (See Figure 13: English Camp, Historic Conditions—1872 and Figure 14: American Camp, Historic Conditions—1872.)

Occupation of the San Juan Islands by Native Peoples

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

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

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

English Camp: Historic Conditions - 1872

San Juan Island National Historical Park GMP/EIS

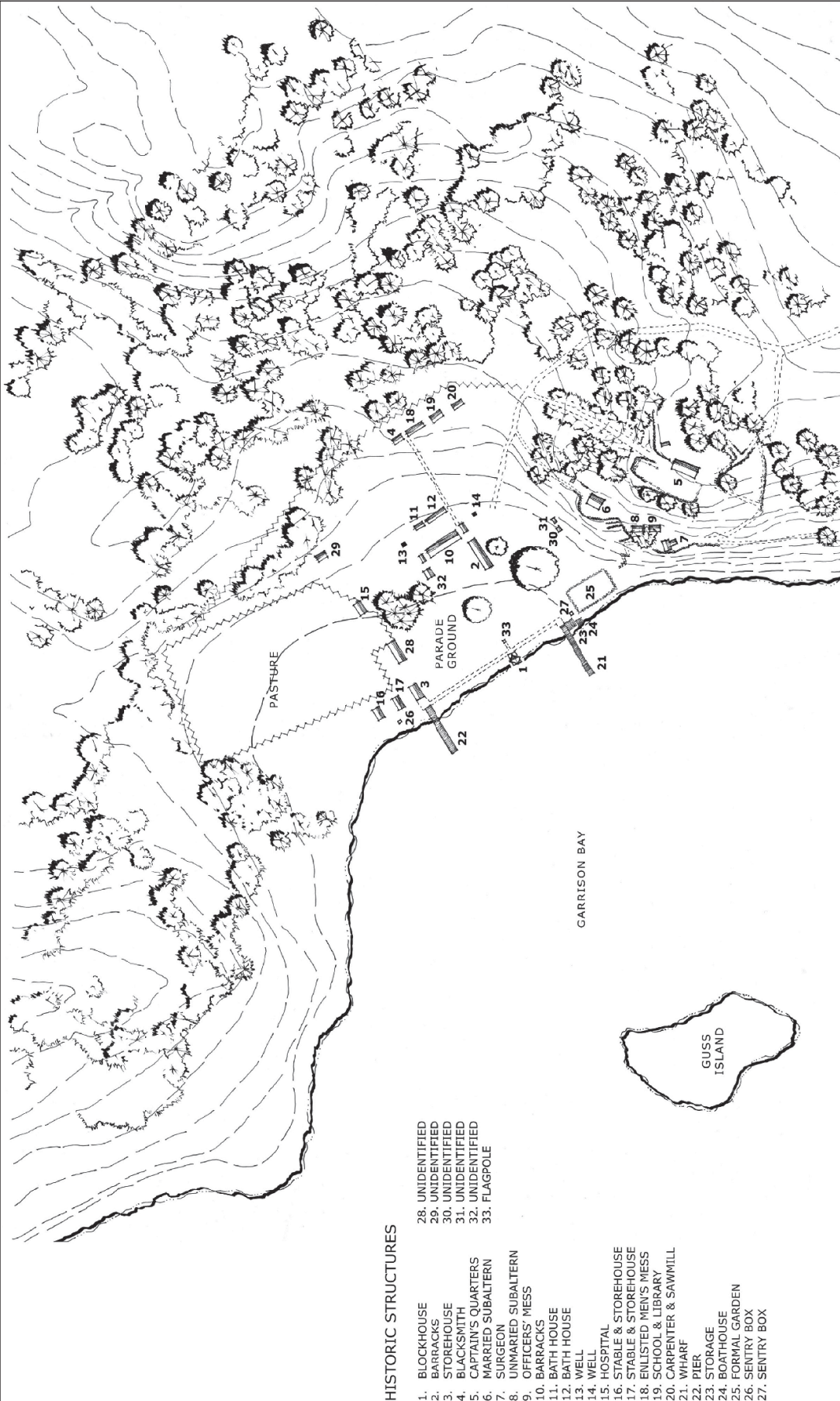


Figure 13

Produced by: National Park Service
 PWRO-Seattle GIS Group
 Date Created: February 28, 2007
 Data Sources: Adapted from "Historic Landscape Report:
 American Camp & British Camp, 1987"

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American Camp: Historic Conditions - 1872

San Juan Island National Historical Park GMP/EIS

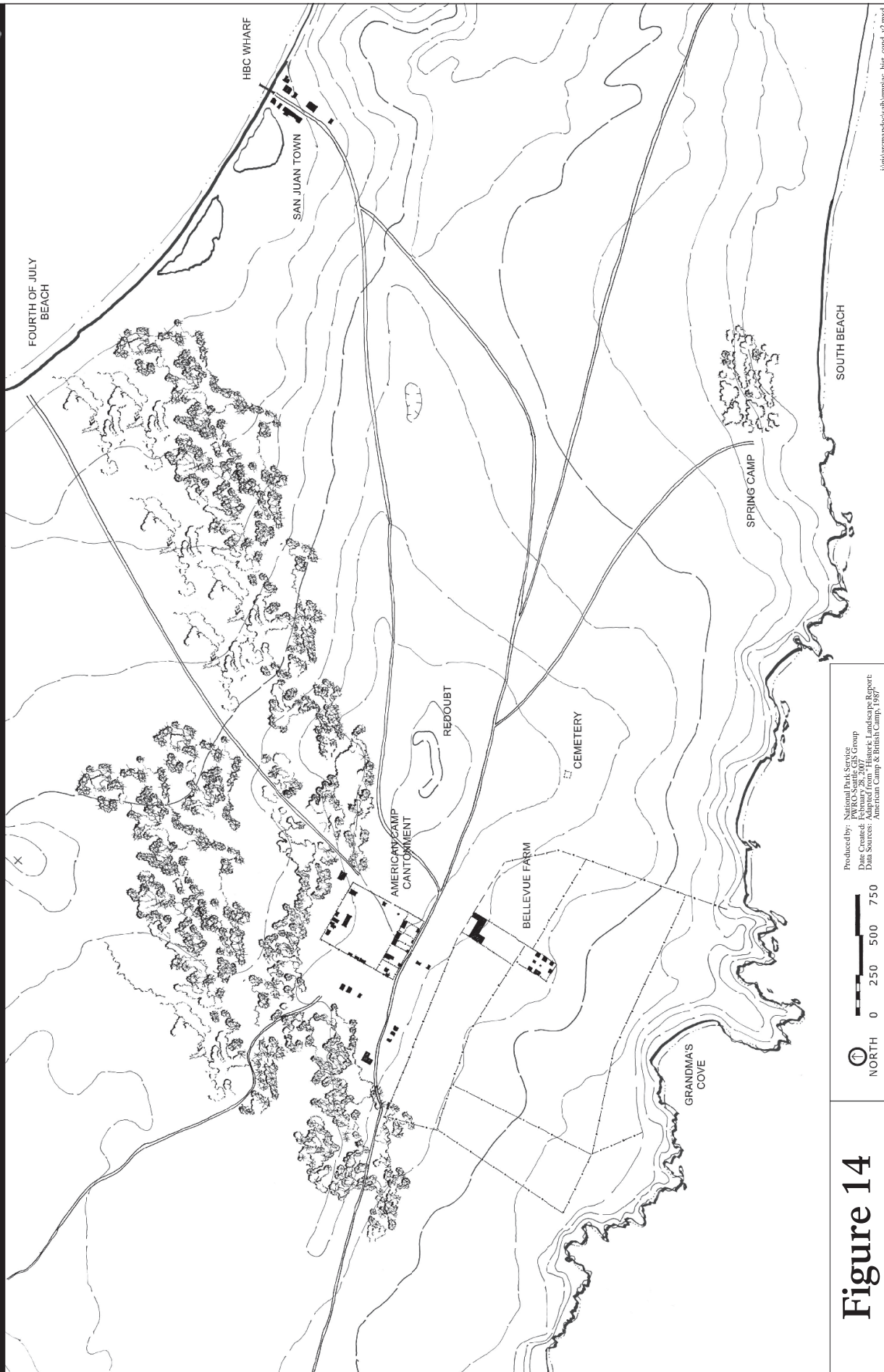


Figure 14

Produced by: National Park Service
 Date Created: February 28, 2007
 Data Sources: American Camp & British Camp, 1887
 American Camp & British Camp, 1887

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and other large animals that grazed on the grassy slopes watered by the melting ice.

These people are referred to by archaeologists as the Paleo-Indians. They hunted in the post-glacial period until about 9,500 years ago when most of the prey was no longer available. To date, no Paleo-Indian archaeological sites containing Clovis spear points have been found on San Juan Island. Sites containing the Clovis points have been found at the Manis Mastodon site near Sequim, Washington, across the straits from San Juan Island. One of the points was also found in a garden above the town of Coupeville, on neighboring Whidbey Island. Many archaeologists feel it is only a matter of time before a Clovis site is found on San Juan Island. Perhaps a site exists on one of the earliest formed benches below Mount Finlayson where the earliest visitors to San Juan might have camped.

Although no Clovis sites have been found on San Juan Island, sites that were left by the successors of the Paleo-Indians have been found within the park.

The oldest archaeological site found within the park is on the bluff above South Beach at American Camp. There, spear points called Cascade points were found by Dr. Arden King (Tulane University) in 1948. These points were used by native peoples from about 9,000 to 7,000 years ago, and were used to hunt the animals that are now commonly found in western Washington.

As no shelters that can be associated with the Cascade people have been discovered in the Northwest, archaeologists have surmised that these people were still concentrating their search for food of terrestrial animals and rarely stopped to erect more than temporary shelters.

About 4,500 years ago, the western red cedar began to appear in the islands offering an excellent wood for the production of tools and shelter. Sometime after 2,500 years ago, salmon began running from the Pacific down the straits, turning near South Beach to either head north up to the Fraser River or south to the rivers on the Olympic Peninsula and those draining into Puget Sound.

Archaeologists suggest that between 4,500 and 2,500 years ago, moderating climate and changes in plant and animal communities were associated with a flowering of native arts and technology and an increase in human organizational structure. Tool making and other craft industries made it easier to

procure resources. These technologies, together with a developing societal structure, offered a more stable environment for family and community life. The native people began to build more permanent shelters and moved from a hunting and gathering lifestyle to more permanent living arrangements. Besides hunting the terrestrial animals, they began exploiting more resources such as shellfish, birds, fish, berries and harvesting edible plants like camas, bracken fern and nettle.

Sometime between 2,500 and 1500 years ago, the number of the people living on the islands increased. People from the mainland moved to occupy the islands year-round, where before they had visited only seasonally to fish, dig camas and collect berries. Archaeologists have determined the population boom by the carbon 14 dating of shell middens and other sites discovered on the islands.

These people produced the art, tools and carvings that we now associate with the Northwest Native American culture. They also began to design and construct long houses—the traditional homes of the northwest people and those first seen by Europeans in the early 16th century.

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

Throughout the southern Gulf and San Juan Islands generally, Northern Straits speaking tribal groups known as the Lummi, Saanich, Samish and Songhees had winter villages in the mid-eighteenth century. However, Suttles notes that by

...the mid-nineteenth century, because of the great loss of life from the early epidemics and from northern raiders, village sites in the islands were abandoned as winter villages.

Their inhabitants had either died out or moved to villages on Vancouver Island or on the mainland, from which they returned to the islands seasonally for fishing, hunting, or harvesting vegetable foods and shellfish (Suttles, 2003: Chapter 10, p.1).

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

Three settlements or village sites were located in northern San Juan Island in a cove just to the west of Lonesome Cove, at Mitchell Bay, and within the English Camp unit of San Juan Island National Historical Park at Garrison Bay. West of San Juan Island, there may have been a fourth village located at Open Bay on nearby Henry Island. Central Coast Salish tribes believed to be residents of these sites included a group known as the Klalakamish (variously claimed as ancestors by Songhees, Lummi and Saanich) the Lummi, the Saanich and the Songhees. In addition to larger settlements or villages, four smaller camps were noted on an 1853-54 U.S. Coast Survey map that were probably associated with one or more of the ten reef net locations along the western shore of the island (Suttles 1998: p.21-25).

At the south end of San Juan Island, east of American Camp, there was “a single small house on or near Fish Creek just north of Cattle Point . . . that belonged to a Clallam man, his Samish wife and their son Captain George” (Suttles 1998: p.26). According to Suttles, Captain George had worked for the American garrison and often hosted Samish relatives who trolled and fished for halibut in the area south of the island around 1850. The family reportedly moved to a Samish village on Guemes Island around 1875 (Suttles 1998: p.26).

In addition to those who occupied San Juan Island villages and used certain reef net locations, other tribes made use of resources on the island or in the immediate vicinity. While the Klallam traditionally occupied the northern slope of the Olympic Peninsula

on the south side of the Strait of Juan de Fuca, some of them established winter villages in former Sooke territory on the Vancouver side of the strait after Fort Victoria was built in 1843 (Suttles 2003: Chapter 10, 1). Intermarriage among Lummi, Samish and other native groups was probably an old practice that persisted in the late nineteenth-century and continued subsequently (Suttles, personal communication). Like the Samish, the Klallam and the Swinomish also used the popular fishery south of Cattle Point.

Treaty relationships with native people of the San Juan Islands were shaped by the on-going competition between Britain and the United States over control of the region. Between 1850 and 1852, Governor James Douglas negotiated a series of British treaties wherein the Saanich and Songhees peoples accepted reserves on the Saanich Peninsula and elsewhere on southeastern Vancouver Island and ceded other lands. In 1855, Governor Isaac Stevens of Washington Territory held a series of treaty councils with Indians of the territory. Representatives of the Lummi, the Swinomish and, it is claimed by present day Samishes, the Samish, signed an early draft of the Point Elliott Treaty of 1855 (Ruby and Brown 1986: p.179). These treaties obligated native peoples to leave the San Juan Islands and take up residence on the reserves and reservations. However, a small number of individuals and extended families remained in the islands during the early reservation period and their descendents continue to be part of the island communities of the present.

European and American Exploration and Settlement of the San Juan Islands, 1790-1859

The first Europeans known to have explored the San Juan Islands were the Spanish. In 1790, Manuel Quimper explored both shores of the Strait of Juan de Fuca and may have reached as far as the southwestern corner of the islands. The following year, Francisco Eliza sailed into this region and is generally credited with giving these islands the name “San Juan.” Eliza explored many of the islands and recorded brief descriptions of what were probably Saanich and Semiahmoo peoples operating reef nets near Point Roberts on the mainland to the north.

The Nootka Convention of 1790 opened the region between Russian America and Spanish California to joint exploration and occupation between Great Britain and Spain. Capts. George Vancouver and Juan Francisco de la Bodega y Quadra met in Nootka Sound in 1792 to work out the details of the Nootka

Convention. The Spanish charted Vancouver Island and the Strait of Georgia while British focused on Puget Sound (named for Lt. Peter Puget) and the Strait of Georgia. The Spanish chart makers, Capts. Dionisio Alcala Galiano and Cayetano Valdes aboard *Mexicana* and *Sutil*, started their surveys of the inland waterways east of Vancouver Island in June 1792. It was here they met the Vancouver expedition off Point Roberts and exchanged notes. The San Juan Islands were partially charted by Vancouver and the Spanish explorers between 1792 and 1794. The Spanish sketched only the outer rim of the island group, while Vancouver identified the interior channels and roughed in the major islands served today by Washington State Ferries. Vancouver also emphasized with a solid line the route he chose in circumnavigating Vancouver Island and its contiguous islands and islets: the Rosario Strait, which runs between the San Juan Archipelago and the mainland. The British would cite this route to support their claim of Rosario Strait as the boundary from 1846 to 1872.

U.S. Navy Lt. Charles Wilkes arrived in the San Juan Island in 1841 as part of the U.S. Exploring Expedition, which had been dispatched by the United States to chart the Pacific Basin. Wilkes also produced charts of the San Juans based largely upon the surveys of Vancouver, Quimper, Galiano and Eliza. However, the American surveyor held that Haro Strait, being deeper, wider and more amenable to sailing craft was the logical boundary between U.S. and British possessions. He underscored his opinion by arbitrarily re-naming all of the island and features, some of which remain today. Vancouver and Wilkes wrote little about native peoples living in the archipelago. Vancouver was focused on chart making while Wilkes had to cut his survey short and rush south on learning that one of the expedition ships had wrecked crossing the Columbia River bar.

The signing of the Oregon Treaty of 1846, establishing the 49th North Parallel as the principle boundary between British and American possessions in the West, had left ambiguous the question of the final boundary line between Vancouver Island and the mainland, which ultimately threw possession of the San Juan Islands into dispute

Euro-American exploitation of the islands may have begun as early as 1840 with some timber harvesting operations. Between 1850 and 1851, the Hudson's Bay Company, operating out of their post at Fort Victoria on Vancouver Island, set up their first seasonal fishing station on San Juan Island. By August 1853,

James Douglas, operating as governor of the British crown colony of Vancouver Island in addition to being chief factor of the Company, was enforcing British jurisdiction over timber resources in the islands. In December 1853, Douglas hoped to further entrench British claims to the San Juan group, and San Juan Island in particular, by establishing a permanent agricultural station on the southern end of San Juan Island within the current boundaries of American Camp. Belle Vue Sheep Farm was a substantial operation, eventually supporting a herd of 4500 sheep. In addition to houses, barns, and outbuildings, there were fenced pastures and more than 100 acres in cultivation. The foundations and other features of the Belle Vue Sheep Farm operation comprise an archeological site on the slope below the redoubt at American Camp.

By the mid-1850s, the non-native population of the San Juan Islands was limited to a few European Belle Vue Sheep Farm employees and the temporary residence of three successive deputy U.S. Customs inspectors. By June 1859, about 25 Americans lived on the island along with the sheep farm staff. Two American surveyors that year staked out speculative preemption claims (in anticipation of the dispute being resolved at some near date) on Oak Prairie (today's San Juan Valley) and near the company dock on Griffin Bay. The act of staking claims attracted a score of failed American miners and others looking for free land, which heightened the paranoia company officials held over potential American incursions upon their real estate. The proximity of these claims, which included some subsistence garden patches, to the Company operations set the stage for confrontation.

The designation of the military confrontation as the Pig War stems from an incident on June 15, 1859, in which an American settler shot a black boar foraging in his potato patch. The boar belonged to Belle Vue Sheep Farm and the subsequent disagreements over compensation as well as exaggerated accounts of the event, led to the American settlers on the island petitioning the government for protection. While the petition sought protection only against northern Indian raids, the department of Oregon commander, Brig. Gen. William S. Harney must have been impressed by the settlers' verbal complaints about the Hudson's Bay Company. On July 18, Harney issued Special Orders #72 to Capt. George E. Pickett, commander of Fort Bellingham. Pickett was to abandon his post on Bellingham Bay and proceed to San Juan Island, where he was to establish a new post to protect U.S. citizens from Indian raids. In a closing

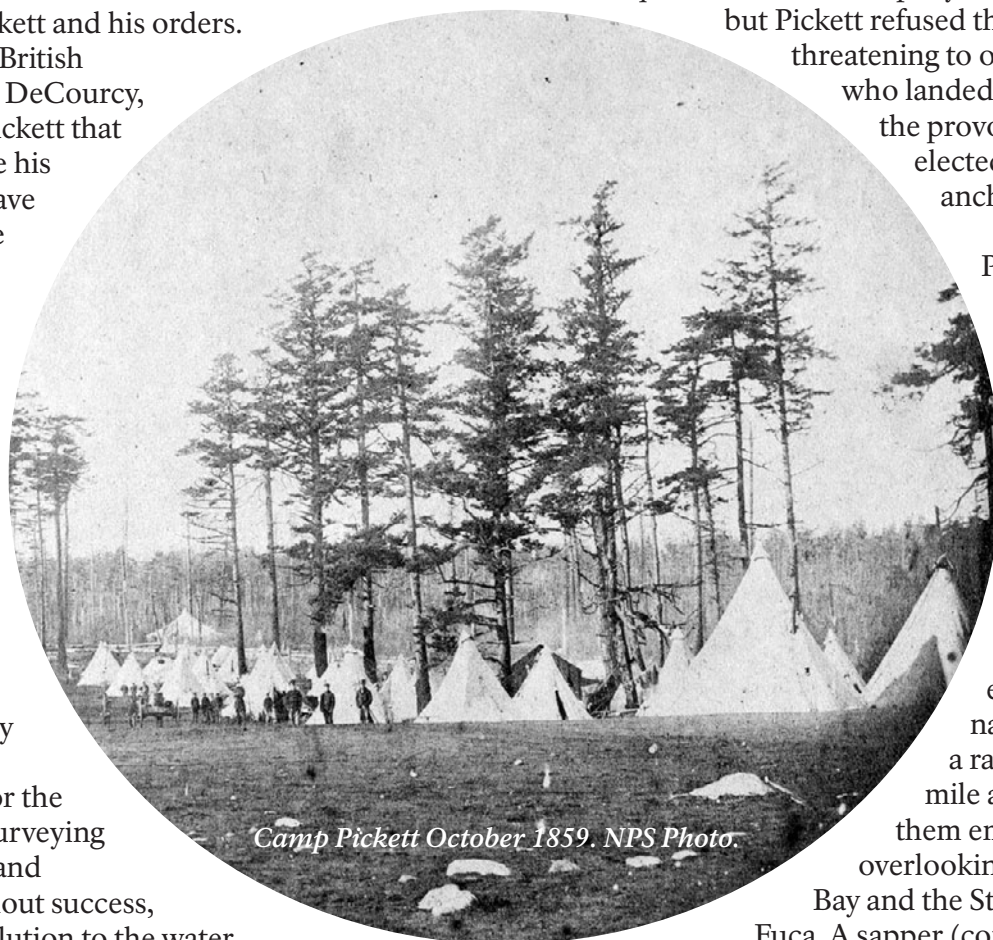
paragraph—almost an afterthought—Pickett also was directed to discourage British officials from assuming jurisdiction over U.S. citizens.

A company of U.S. troops (64 officers and Prevost thereafter enlisted men) arrived on July 27, 1859, landing at the HBC dock on Griffin Bay and establishing their camp just up from the beach on the Griffin Bay shore, about 50 yards from the dock on the other side of what we call today Old Town Lagoon. HMS *Satellite*, a 21-gun steam corvette with a British magistrate aboard, arrived on the bay shortly after Pickett. The magistrate was there to arrest Lyman Cutlar and evict as trespassers all Americans on the island, which placed him in immediate conflict with Pickett and his orders.

Undaunted, the British magistrate, John DeCourcy, announced to Pickett that if he did not take his company and leave that he would be placed under arrest.

Watching all this from his berth on the U.S. Lighthouse Tender *Shubrick* was Archibald Campbell, the U.S. Boundary Survey commissioner. Campbell had for the past year been surveying the 49th parallel and attempting, without success, to negotiate a solution to the water boundary with his British counterpart, Capt. James Prevost, who was also captain of the *Satellite* and in company with DeCourcy in Pickett's camp. Campbell had been notified of Pickett's landing before the fact by Harney's adjutant, Capt. Alfred Pleasonton, but had been away on a hunting expedition in the San Juan's, which is why he was on the bay aboard the *Shubrick*. Prevost thereafter believed that Campbell was engaged in duplicity and had nothing to do with him, which stymied any solutions concerning the San Juans for years to come, never mind George Pickett's provocative behavior.

Pickett escalated the crisis by posting a sign on Old Town Lagoon that proclaimed the islands U.S. territory and himself the sole arbiter of justice. It was in response to this that Douglas dispatched HMS *Tribune*, a 31-gun steam frigate under the command of Capt. Geoffrey Phipps Hornby, son of a Royal Navy fleet admiral, to take Pickett in hand. His orders—to evict Pickett, by force if necessary—were quickly countermanded by the senior British naval officer in Victoria, Capt. Michael DeCourcy (no relation to John). The Royal Navy's British Station policies were clear about not firing until being fired upon. Captain DeCourcy's suggested alternative was to land a number of Royal Marines on Griffin Bay equal to Pickett's company. Douglas assented, but Pickett refused the proposal, threatening to open fire on any who landed. Hornby ignored the provocation and elected to remain at anchor in the bay.



Pickett meanwhile asked Harney for reinforcements, which arrived 10 days later with Lt. Col. Silas Casey, deputy commander of the Ninth Infantry Regiment. Casey brought along eight 32-pounder naval guns (with a range of up to a mile and half) and had them emplaced on a hill overlooking both Griffin Bay and the Strait of Juan de Fuca. A sapper (combat engineers) team led by 2nd Lt. Henry M. Robert

planned and supervised excavation of the earthen fortification, which thereafter became known as the redoubt. (Robert would go on to write *Robert's Rules of Order*.) Hornby watched these proceedings from his quarterdeck with growing alarm. For his original orders had been to take whatever steps necessary to prevent the U.S. from reinforcing Pickett and erecting fortifications; acts that would affirm U.S. intentions to formally occupy the island. By the act of dispatching Casey, 400 soldiers and 8 naval guns and 14 field pieces, Harney was stating that he was ready to fight.

Hornby sent a messenger to his superior, the recently arrived Rear Adm. R. Lambert Baynes, asking if he should land the marines, storm the heights and spike the guns. The admiral rejected this course at once, ordering in strong terms that Hornby remain on station and only fire if fired upon. Baynes knew that his nation, already stressed by war with Russia and two colonial conflicts in the 1850s, could not afford a major conflagration with the United States, a rapidly expanding industrial power. The Royal Navy's mission was to protect British commercial interests around the world. Britain had a huge capital investment in U.S. businesses and a lucrative trade agreement with the United States worth millions more pounds. Where the San Juan Island issue was concerned, Baynes also was aware that British interests were not served by risking war over a 54 square-mile island.

The importance of maintaining peace between the two nations also is underscored by the fact that, with the blessing of the British government, an aged and infirm Lt. Gen. Winfield Scott, was sent on the difficult journey from New York City to Washington Territory, which required transit of the Isthmus of Panama by rail. Scott was considered indispensable as the only leader, military or civilian, in the United States with the moral authority to negotiate a peaceful stand-down with British officials. On that score, Scott and Baynes were a perfect match, both adept in the arts of international diplomacy, even though they were warriors by profession. Heretofore an aggressive businessman and absolutist civil authority, Douglas had to have been both impressed and intimidated by these two men because he quickly toned down his rhetoric and expressed a willingness to arrive at accommodation with the Americans.

In less than a week, the three leaders agreed to remove all reinforcements from the island and surrounding waters, save for a single company of U.S. infantry. The soldiers would remain to protect U.S. citizens and British subjects alike from Indian raids, which had been the primary focus of the petition the Americans had submitted to Harney that June.

Douglas, however, asked Scott to remove Pickett from the island. The governor, still rankled by Pickett's truculence and his proclamation, wanted no part of the Virginian. He was certain that Scott would concur to a command that would "ensure a continuation of perfect harmony and tranquility, until the unfortunate question of title may be forever set at rest." Scott assured the governor on November 9 that no official from Washington territory would be

permitted to interfere with any British subject. British subjects violating the law would be referred to the proper British authorities. Pickett would return to Fort Bellingham, and Captain Lewis Cass Hunt and Company C, Fourth Infantry would remain. Hunt was directed to break up "...that part of the camp near and within sight of the Hudson's Bay Company's buildings... The little clearing in the wood and behind the hill has had comfortable shelter erected upon it where one company will be stationed."

Scott and Douglas agreed to remove all artillery from the island as part of the stand down agreement; an act that also became a key proviso of the formal joint military occupation agreement drafted almost simultaneously a continent away by officials from both nations. The conventional wisdom was that big guns represented the potential for big trouble. Once work on the redoubt was stopped, the guns, ammunition, and other equipment were hauled from the edifice and lugged back down the prairie slope to South Beach.

In October of 1859, Great Britain and the United States agreed to joint military occupation of San Juan Island, buying time for the boundary dispute to be submitted for arbitration to the court of Wilhelm I, Kaiser of Germany.

British-American Military Occupation of San Juan Island, 1859-1874

In March of 1860, British Royal Marines were dispatched to the north end of the island with supplies and provisions for construction of a British encampment. The U.S. camp was relocated three times within the first three weeks of Pickett's landing. The permanent camp, which technically was not on the prairie but in the forest fringe, was established at its present site to guard against naval bombardment should the Royal Navy decide to bring bomb (or mortar) ships into the harbor. From Officers' Row, the U.S. commander had commanding views of Griffin Bay, the Strait of Juan de Fuca, and the British settlement of Victoria on the western horizon.

The joint military occupation of San Juan Island continued for twelve years. Troops stationed at American Camp operated under the command of the Department of Oregon, U.S. Army, headquartered in Vancouver, Washington (now part of Vancouver National Historical Reserve). The Royal Marines were attached to the Royal Navy's Pacific Station command, headquartered at Esquimalt on Vancouver Island. Both military outposts evolved into substantial structural complexes with officers' quarters and

barracks, parade grounds, hospitals and service buildings, fortifications, gardens, cemeteries, and circulation systems. Access by boat and wagon road was established by the two camps and over time, a cordial communication system existed between the military personnel. The American Civil War prevented a speedy resolution of the boundary issue until 1872, when the San Juan Islands were finally awarded to the United States through arbitration. (See Figure 15: English Camp, Cultural Resources.)

American Camp – Physical Evolution, 1859-1872

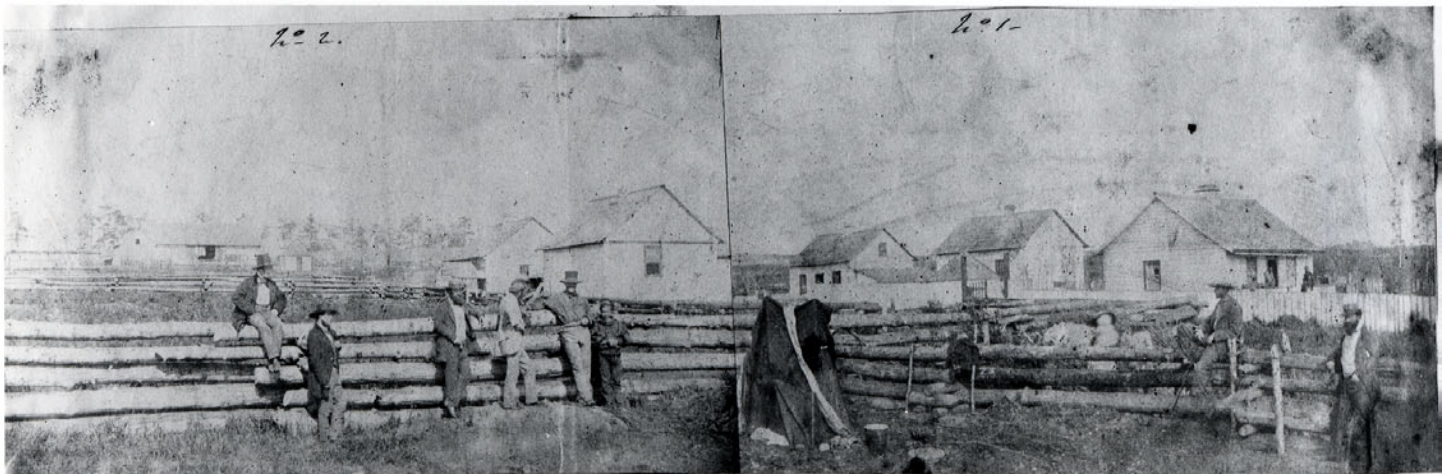
Structural development at American Camp under the military occupation can be divided into two major periods: the years between 1859 and 1865 when the primary framework of the site evolved; and a second period between 1866 and 1872 when improvements and additions established the camp as a major island settlement. A primary physical feature of the camp was the large earthen redoubt, approximately 350 feet in length, which formed the easternmost edge of the overall campsite. Rudimentary barracks, officers' housing, laundress' quarters, a hospital, guardhouse, kitchen, mess hall, and bake house, along with a parade ground, vegetable garden, and extensive fencing were in place by the early 1860s, when the advent of the Civil War halted all construction at the camp. Repairs and construction accelerated dramatically between 1866 and 1868 when the war drew to a close. Seven of the original buildings were repaired and converted to new uses, two received major additions, and the remaining buildings received various types of repairs. In addition, over a dozen new buildings were constructed, along with more fencing and improvements to the roads and trails linking the camp with other island residents. (See Figure 16: American Camp, Cultural Resources.)

English Camp – Physical Evolution, 1859-1872

Captain James Prevost of the Royal Navy selected a suitable location for the British encampment at a cove located on the inland waters of Garrison Bay. Long used by native peoples, the cove offered well-sheltered prairie land for use as the parade ground and a good supply of grass and water. On March 21, 1860, Captain George Bazalgette landed 86 Royal Marines at the site along with construction materials and supplies.

Physically and symbolically, the structural complex at English Camp was divided into a series of “levels” according to rank and function. Officers' quarters were sited on the highest ground surrounding the camp, while troops were housed in barracks located on the broad level grounds around the shore. Service buildings were clustered around the barracks and shoreline enclosing the parade ground. Most of these structures were oriented toward Garrison Bay, which was the primary focus for the entire camp. From the highest points in the camp, signal fires on Vancouver Island could be spotted.

Actual construction took place in two primary phases: an initial phase of development from 1860 to 1866; and a second period between 1867 and 1872, when several new buildings were added. By the mid-1860s, the post included officers' quarters built on stone-walled terraces on the lower slopes of Young Hill, two barracks, a blockhouse-style guardhouse, wharf, storehouses, a barn, cookhouse, mess room, and sutler's (trader or merchant) store. Later developments included a home for the commanding officer, a subaltern's house, hospital, and several service-related buildings.



Belle Vue Sheep Farm, September 1859. NPS Photo.

English Camp: Cultural Resources

San Juan Island National Historical Park GMP/EIS



- Park Boundary
- Primary Road
- Secondary Road

0 500 1,000
Feet



Figure 15

Produced by: National Park Service
PWRO-Seattle GIS Group

Date Created: February 28, 2007

Data Sources: NPS - cultural resources,
DOQ's (1997),
park boundary, roads,
shoreline
USGS - shaded relief

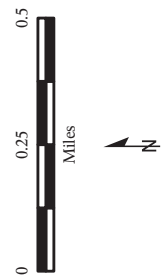
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American Camp: Cultural Resources

San Juan Island National Historical Park GMP/EIS



- Park Boundary
- Primary Road
- Secondary Road



Produced by: National Park Service, PW/RO-Seattle GIS Group
 Date Created: February 28, 2007
 Data Sources: NPS - cultural resources, lakes, park boundary, roads, shoreline
 USGS - shaded relief
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Figure 16

San Juan Town, 1859-1890

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

Late Settlement and Agricultural Activity on San Juan Island, 1873-present

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

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

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

of the historic campsite thus preserving it from further alteration.

At English Camp, the land and many of the structures were acquired by the William Crook family in 1875. For the next 92 years, the Crook family worked and shaped the landscape around the cove at Garrison Bay. Though some of the original camp structures had been sold at auction and removed in 1875, Crook retained and made practical use of many of them. The family also erected new structures, including a substantial barn and house. An orchard was planted on the old parade ground. In 1963, the Crook family transferred ownership of 100 acres of the farm, including the historic campsite, to the Washington State Parks and Recreation Commission. In 1966, with the creation of the San Juan Island National Historical Park, both the English and American Camp sites were transferred from Washington State Parks to the National Park Service.

Historic Properties Eligible for or Listed in the National Register of Historic Places

The cultural resources of San Juan Island National Historical Park have been surveyed, evaluated, and documented over the years through a series of studies prepared primarily by historians, anthropologists, archaeologists, cultural landscape architects, and historical architects working for the National Park Service as staff or contractors. Originally, the Secretary of the Interior identified the two camps as nationally significant historic landmarks in 1961 through the National Survey of Historic Sites and Buildings program, authorized by the Historic Sites Act of 1935. No documentation for the camps was prepared. It was in 1966—just prior to establishment of the Park—that the camps were administratively entered into the newly created National Register of Historic Places with the passage of the National Historic Preservation Act. The National Register listing for the NHL originally encompassed an area of more than 12,000 acres, though no boundaries were described and no nomination form existed for the properties. This informality was not unusual for this period of time. The lack of specificity has led many to treat the NHL and the park as the same, while in actuality, the NHL preceded the park and (theoretically) was much larger. In 1973, the NPS prepared a National Register of Historic Places nomination for American Camp. No companion nomination for English Camp was prepared. The National Register listing did not specifically mention many of the cultural resources

now recognized as important in the park. In an attempt to consolidate all of the historical research and studies previously completed for the park, the NPS prepared a draft multiple property document (MPD) entitled “Cultural Resources of San Juan Island National Historical Park, Prehistory through 1945.” It was prepared under contract with NPS by historian Florence Lentz and forwarded to the State Historic Preservation Officer in 1999. While the SHPO approved the draft, the MPD was never finalized and officially entered into the National Register due to additional documentation required by the NPS Washington Office. Regardless of which alternative is chosen for this GMP, the National Register listing needs to be updated to finalize the documentation for the park and to be in compliance with Section 110 of the National Historic Preservation Act. A new nomination is needed for the prehistoric archaeological sites, as they were not included in the 1999 MPD.

This multiple property listing documentation of 1999 summarized the findings of the following key studies, beginning in 1961, as follows:

- *National Survey of Historic Sites and Buildings: American and English Camps (Pig War Site), San Juan Island, Washington* (Charles Snell, NPS, 1961)
- National Historic Landmark File Correspondence (Pacific West Region, Cultural Resources NHL files)
- *English Camp, San Juan Island National Historical Park: Historic Structures Report – Part One* (Lewis Koue and Erwin Thompson, NPS, 1969)
- *Historic Resource Study, San Juan Island National Historical Park, Washington* (Erwin Thompson, NPS, 1972)
- *Historic Structures Report, Officers’ Quarters, Laundress’ Quarters, English Camp Hospital, San Juan Island National Historical Park* (Harold LaFleur, NPS, 1978)
- *San Juan Archeology, Volume I and II* (Roderick Sprague, University of Idaho, 1983)
- *Historic Structures Report, Crook House, San Juan Island National Historical Park* (Pat Erigero and Barry Schnoll, NPS, 1984)
- *Historic Landscape Report: American Camp and English Camp, San Juan Island National Historical Park* (Cathy Gilbert, NPS, 1987)
- *Archaeological Overview and Basemap of American and English Camps, San Juan Island National Historical Park* (Gary C. Wessen, NPS, 1988)

- *An Ethnographic Overview of the Native Peoples of the San Juan Islands Region* (Gary C. Wessen, NPS, 1988)
- *Deciphering a Shell Midden* (Julie K. Stein, Academic Press, 1992)
- *San Juan Island Cultural Affiliation Study* (Daniel L Boxberger, Western Washington University, 1994)

The multiple property documentation identifies four major historic contexts associated with the American Camp and English Camp sites and lists historic property types, as well as specific resources, associated with each context. These resources have been evaluated for eligibility for the National Register of Historic Places.

Historic Context I: Occupation of the San Juan Islands by Native Peoples, to 1855

Habitation sites associated with the native peoples of the San Juan Islands are thought to have been of two types: cedar plank longhouses and mat-covered lodges. Split cedar plank longhouses were often large structures, as much as 60 feet wide and twice that in length. They had either gable or shed roofs, made of overlapping cedar planks supported by rafter support posts. Walls consisted of cedar planks tied horizontally between pairs of support posts. Inside, the entire house consisted of a single room with a low cedar plank bench running along the inner wall. Space was divided into a series of individual nuclear family areas along the bench and walls sharing a common household area in the center of the floor. Each nuclear family area had its own fire hearth near the bench. Mat lodges were 15-20 feet long, pole structures covered with mats made of cattail rushes or cedar bark. Some lodges had split cedar roofing.

Within English Camp, the remains of a longhouse platform at Garrison Bay have been located, confirming ethnographic reports of a winter village being located at the cove. The site features include evidence of the physical dimensions of the structure, as well as hearths, pits, and post holes. It is eligible for the National Register under Criteria D (resources with the potential to provide significant information). No examples of mat lodge dwelling types have been identified within the park’s boundaries.

Sites related to resource procurement have been identified at both American and English camps.

Sites related to the religious beliefs of the native people of the San Juan Islands include tangible artifacts such as rock cairns and burial sites, as well as significant landscape features. Rock cairns and burial sites have been identified within the boundaries of the park.

Historic Context II: European and American Exploration and Settlement of the San Juan Islands, 1790-1859

Belle Vue Sheep Farm, the sheep station established by the British Hudson's Bay Company is within the boundaries of American Camp. The remains of the 1850s sheep station include foundations and other archaeological features associated with the main structures and related outbuildings. The site is eligible for the National Register of Historic Places under Criteria A (associated with broad patterns of history) and Criteria D.

Lyman Cutlar's farmstead, where the infamous pig was shot, may have been located just outside the present boundaries of American Camp to the northwest, though this has long been subject to conjecture. The site of the subsistence farm of Lyman Cutlar would represent the earliest farmsteads established by American squatters prior to the Pig War. If conclusively identified, it would have the potential to provide valuable information on subsistence farming in the 1850s on the island. Additional historical and archaeological research would be required to solve this 150-year old puzzle.

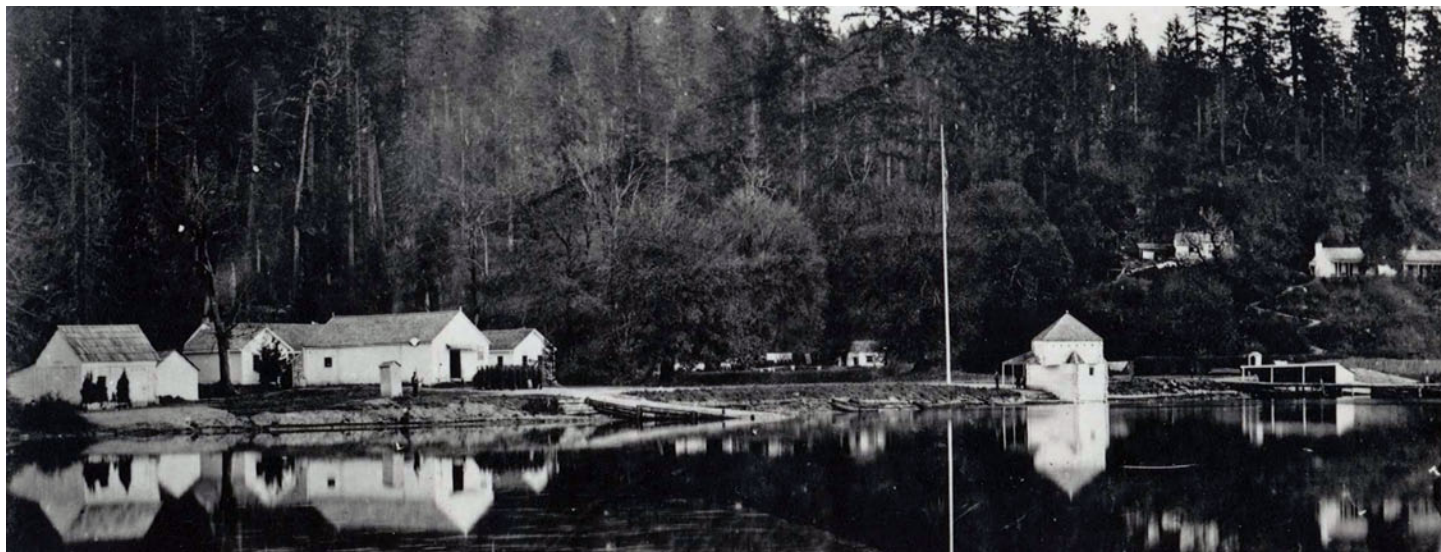
The archaeological remains of the San Juan Town site have been identified within the boundaries of American Camp. Features include foundations and building materials associated with the fourteen

structures of this small settlement that included a store, hotel, and numerous saloons. The site is eligible for the National Register under Criteria D, offering the potential for providing additional knowledge about the physical fabric of San Juan Town, its spatial relationships, and its inhabitants.

Historic Context III: British-American Military Occupation of San Juan Island, 1859-1874.

Both American Camp and English Camp are cultural landscapes incorporating complex layers of structural, landscape and archaeological features that provide a strong interpretive background for relating the military story of the Pig War and the subsequent joint occupation. The great majority of original aboveground features whose existence is documented in early photographs and maps have long since been removed. Two buildings out of an original 28 now stand at American Camp, four out of an original 30 at English Camp. The locations of some former buildings are marked by foundations, chimney rubble, or depressions in the earth; others have been identified by archaeological survey and/or excavation. Elements of landscape patterns that relate to the historic setting are distinguishable at both sites. These include the earthen redoubt at American Camp; rock-walled terraces, shoreline features, and a fenced cemetery at English Camp; and parade grounds and portions of original paths and road systems at both camps. At English Camp, remains of the post sutler's farm and orchard are also in evidence.

These resources represent the primary features contributing to the eligibility of the two sites as National Historic Landmarks and are eligible under Criteria A, B, and D for their associations with the



Bay view of English Camp, post-1867. NPS Photo.

story of the Pig War and the diplomacy associated with the resolution of the boundary dispute.

Historic Context IV: Late Settlement and Agricultural Activity on San Juan Island, 1873-1945

Although both camps were subsequently occupied by farmsteads, the primary resource associated with the post military settlement of the two camps is the Crook house and related archaeological and landscape resources associated with the Crook Farm era.

The Crook family was the caretaker of English Camp for many years. William Crook took possession of the 161-acre property as a homestead in 1876. Ownership was transferred to Washington State in 1963 and the park received it in 1966. The Crook house was determined eligible for the National Register of Historic Places in 1984.

History of Archaeology at San Juan Island National Historical Park

Two prehistoric sites preserved within the boundaries of the park are “Cattle Point” (45SJ1) at South Beach in American Camp, and at English Camp (45SJ24).

Cattle Point

The older of the two sites within the park is Cattle Point. It was excavated twice, first in 1946-1947, under the direction of Dr. Arden King, who was teaching a field school for the University of Washington as a faculty member at Tulane University in New Orleans. Dr. Carroll Burroughs (an archaeologist working for the National Park Service at Mesa Verde who came to teach the field school for the University of Washington) directed the second excavation in 1948. King, who published his results in *American Antiquity* (Memoir 7, 1950) found two different occupations at the site above South Beach. The first and deeper site contained Cascade points and preserved animal bone and charcoal. King did not retain any of the bone or charcoal, so carbon 14 dating of the occupation level was not possible. From the artifact association, the site’s estimated date is somewhere between 9,000 to 4,500 years ago. In addition, the data King recovered at the first occupation depth reveals that the grassy prairie now seen at American Camp has persisted for thousands of years.

Luckily, King did save shell from the second and higher occupation level, and the carbon 14 analysis from the shell produced dates between 2,550 and

2,300 years ago. In this level, King and Burroughs also found interesting rock lined trenches and several circular bowl shaped features. It is unclear what function these features served.

English Camp

The English Camp (45SJ24) was excavated three times. In 1950, Dr. Adam E. Treganza (San Francisco State University) taught a field school there for the University of Washington. The field school consisted of testing the shell midden just west of the parade ground. No formal report was submitted.

In 1970-1972, Dr. Roderick Sprague (University of Idaho) specializing in the historic period, directed a large archaeology excavation within the park. Sprague excavated several of the historic British building foundations at English Camp. His data was used to assist the NPS in reconstructing the historic structures and in the interpretation of the British occupation on Garrison Bay. Sprague’s report, a two-volume document entitled *San Juan Archaeology* was published by the NPS in 1983. The report also includes historical archaeological investigations at American Camp, old San Juan Town and the Hudson’s Bay Company’s Belle Vue Sheep Farm.

An appendix to the *San Juan Archaeology* publication was a small report by Stephen Kenady, a University of Washington student connected with Sprague’s field school. Kenady conducted limited testing of the prehistoric shell midden at English Camp. Most of Kenady’s data, in the form of field notes, were lost for 20 years, and were rediscovered in the mid-1990s. Park and Regional Office funds were provided to allow Kenady to revisit his data and write a report. The final draft report has recently been received and will be published when funds become available.

The third major excavation conducted from 1983-1991, was led by Dr. Julie K. Stein, Curator of Archaeology at the Burke Museum, University of Washington. Stein investigated the shell midden lining the eastern shore of Garrison Bay, underlying the grassy parade ground and continuing partially into the wooded region to the north. The middens were an accumulation of used shell and other food waste and trash that was deposited throughout the prehistoric occupation period.

The largest excavations were at the parade ground, Operation (Op) A, and in the wooded area to the north, Op D. Carbon-14 dates from Op D indicate that people lived there for only a short time, from AD 500

to AD 800. The shell midden accumulated and was abandoned within a few hundred years. The midden at Op A dated from AD 500 to AD 1800, deposited by the native peoples over a thirteen hundred-year period.

Occupation by native people at English Camp covers a two thousand-year period. Tentative testing at Op D, a horseshoe-shaped midden, suggests an early type of shelter similar to a site at Beach Grove in British Columbia. The exact nature of the structure is not clear and further testing may provide more data.

The structures at Op A, on what is now the parade ground, were more likely to correspond to the plank houses that represent the shelters of late northwest Native American culture.

Stein has reported on the English Camp investigations in both *Deciphering a Shell Midden* (Academic Press 1992), and *Exploring Coast Salish Prehistory* (University of Washington Press 2000). A book about the findings at Op D is in draft, but currently remains unpublished.

Museum Collections

The park maintains a significant museum collection of about one million objects, covering a vast array of time, disciplines, and understanding. Only a few dozen items are on exhibit in the American Camp visitor center. The remaining objects are housed in repositories, in order of extent, at the Burke Museum Archeology Collections at the University of Washington, the Marblemount Curation Facility at North Cascades National Park, Fort Vancouver National Historic Site, and San Juan Island National Historical Park (approximately 170 objects on exhibit).

There are 105,000 catalog numbers for the park's museum and archival collections: 66,000 are housed at the Burke Museum, 35 are housed at the Marblemount Curation Facility, and 5,000 are at Fort Vancouver National Historic Site. Because quantities within catalog numbers vary, the item count differs from the catalog number count. These off-site locations provide preservation and protection to the collection and allow scholarly research and comparative analysis of these collections; however, off-site collections also make the collection difficult to access by park visitors and park staff.

The collections are a dynamic set of resources. Research is ongoing in marine biology, landscape and prairie restoration, archival research and in many fields

of archaeology. Collections are better understood with continued access, study, interpretation and description.

The archaeological artifacts are extensive. The NPS conducts research, works to refine descriptions of artifacts, produces analyses of artifacts, and publishes findings. American and British historic artifacts are of particular historic interest and include the Hudson Bay Company farm on San Juan Island, the military presence of the U.S. Army and the British Royal Marines co-occupation (1859-1872), the settlers present during military co-occupation of the island, and immediate occupation by Americans of the English Camp following British withdrawal. Excavated materials include soil, minimally sorted material, well-sorted material and identified artifacts. The items include prehistoric items associated with American Indians, specifically the Lummi tribe, people related by family, culture, and history.

Natural history specimens will increase in the collection as inventory work continues. The natural history collection is chiefly vascular plant specimens collected for the herbarium by NPS staff as part of the inventory component of the Natural Resource Challenge's Inventory and Monitoring Program. Paleontology and geology specimens shape the remainder of the collection. A soil survey conducted in 2003 developed soil voucher specimens, which are stored at the Natural Resource Conservation Service facility in Mount Vernon, Washington.

The park archives document the park's administrative history, legislative action, annual reports, historic structures descriptions and compliance documentation, interpretive programs, research proposals, and facility development. Field notes and documentation from archaeology fieldwork, maps, and photographs comprise another portion of the archives. As homesteaders and caretakers of English Camp lands, the Crook family's documents and letters provide clues of life on the island around 1900, and letters composed by the Harvey Allen family-to-family off-island, weave an 1860's correspondence web. These materials are located at Marblemount, the Burke Museum, Fort Vancouver National Historic Site and at the National Archives and Records Administration in Seattle.

The Marblemount Curation Facility at North Cascades National Park provides a center for resource protection, research, education and interpretation. The collection room has tight temperature and relative humidity requirements and the environment is closely

monitored. Emergency operations plans, fire and security plans and systems conform to NPS museum standards. Housekeeping is performed regularly, and a pest management plan is in draft form. Data sharing is limited at present to museum staff members. Access to collections is with a museum staff chaperone. Access to the Burke Museum collection is under the direction of the Burke museum staff. The exhibits are viewable on San Juan Island at park visitor contact stations and at the Burke Welcome Center.

Since its establishment as an historical park in 1966, NPS professionals and scholars alike have accepted that the *in situ* archaeological resources, including foundations, artifacts and features, are one of the two most important park resources. The historic documentation of military life during the peaceful boundary resolution has continually been strengthened and enhanced by the analysis of the data and artifacts resulting from excavations at San Juan Island National Historical Park. As a result of the archaeological investigations, a primary interpretive theme at the park is the archaeological resources of the camps as much as it is the story of the Pig War.

As a result of 50 years of archaeological investigations at San Juan Island National Historical Park, one million artifacts have been retrieved and a score of scholarly reports have been produced and archived.

The preservation, management, and interpretation of this collection continue to be one of the most important cultural resource issues for the park. Representing the original fabric of English Camp and American Camp and providing insight into the lives of its occupants, it is an internationally significant resource.

San Juan Island National Historical Park Archival and Material Cultural Collections

The institutions below house original historic documents, maps and images that pertain to the cultural history of San Juan Island National Historical Park.

- U.S. National Archives, Washington, D.C.
- University of Washington Library, Seattle, Washington
- Washington State Historical Society, Tacoma, Washington
- Public Record Office, London, England
- Royal Provincial Archives of British Columbia, Victoria, British Columbia
- Washington State Library, Olympia, Washington

- National Archives of Canada, Ottawa, Ontario
- National Collections, Ottawa, Ontario
- American Antiquarian Society, Philadelphia, Pennsylvania

Technology Options for Collection Availability

It is the intent of the park to explore options for making natural and cultural resource collections available on the internet for researchers and interested public. In addition to internet applications, the park could also consider other innovative methods to convey a virtual “hands-on” experience in order for visitors to better experience the collections and park archeology. Examples of these techniques could include viewing field notes and maps, archeological tools, holographic images, and “electronically” looking into storage drawers.

This interface between visitors and the collections can provide a crucial link between the science and the public, and a study collection located at the park can be an excellent tool to help support that connection.

Currently, the San Juan Island National Historical Park archaeological collection is available to the public through a variety of integrated, technological means. An “online collection” project uses several different features to make artifacts accessible to researchers and interested persons.

The Automated National Catalog System (ANCS+) used for recording artifact data has a function that allows a digital image to be attached to an electronic catalog record. Staff and volunteers at the park have been producing digital images for each object in the archaeological study collection, a grouping of approximately 1,000 artifacts. These are designed to show views of an object and a detail of any diagnostic traits. This entire process of digitizing the artifacts and importing the images into the cataloging software can be shown on a monitor in the Marblemount Curation Facility. Visitors to the site can view the artifact image and catalog data as a Museum Technician or volunteer works on the project. During other times, the monitor shows a slide show of images so visitors can be introduced to items from the archaeological collection.

These data, the ANCS+ catalog records and related digital images, are used as the basis for the online collection. Re:discovery Software, in conjunction with the National Park Service Park Museum Management Program (MMP), has developed templates so that the data can easily be accessible through the World Wide

Web. A visitor to this Web Catalog can browse the catalog records, view images, and compose searches and queries to sort or filter data according to their personal research needs.

In addition to the Web Catalog, which is hosted on a server managed by the NPS Park Museum Management Program, the San Juan Island website will include archaeological and curatorial features designed to increase the availability of the collection. Articles on current excavations can be tied to artifact descriptions and images, highlighting the most recent additions to the collection. An online Research Guide will introduce visitors to the collection and guide them to representative artifacts and archival references. Additional features will illustrate conservation projects.

Utilizing technology to increase the availability of the collection would be an integral component of the transition to a research and education center. In addition to continuing the online collection project, several technology options could improve the availability of the San Juan Island National Historical Park collection and other archaeological collections the park holds that are associated with the Pig War and Hudson's Bay Company material culture and prehistoric artifacts. One project could integrate the ANCS+ catalog records with GIS data, visually tying individual artifacts to the units and strata from which they were excavated. This would allow researchers more flexibility when looking at stratigraphic variety, distribution patterns, and other types of spatial analyses. Various software programs could make this visual representation accessible through the Web, and visitors to the website, or to a park kiosk, could interact with map layers (historical features, archaeological excavations, and existing conditions) and corresponding artifacts from the collection. This would in essence place an artifact in time and space, giving visitors a historical context for an item from the collection.

Additionally, the World Wide Web could be more intensely utilized to promote the availability of the collection through virtual exhibits; interactive educational features based on cultural resources, and online versions of archival documents like archaeological reports and photos. Overall, a research center would require online services that address collection availability for both visitors to the park and those who come via the website, and are capable of meeting the needs of researchers as well as visitors who desire an introductory or engaging view of the collection. The NPS museum management program

oversees and makes the majority of decisions about museum technology.

The mission of the research and collection management for the park is to foster the analysis, interpretation, and dissemination of information relating to archaeology, archives and historic architecture. The foundations of the curatorial facility are the park's archaeological collections, the archaeological resources remaining *in situ*, the archives and the existing historic architecture of the park area. These cultural resources form an unparalleled opportunity for researchers, students, and members of the public to study within the fields of archaeology, curation and collections management, museum studies, preservation and conservation, and historic architecture. Possible research topics would include U.S. Army forts and related sites, British Royal Marine forts and related sites, fur trade farm sites, and island homesteading. The mission of the curation facility will be accomplished through the following: repository for archaeological excavations and field school, analysis of existing collections and data, expansion of archival materials, development of web-based educational tools, and the archiving of research papers.

THE NATURAL ENVIRONMENT

Geology

Located in the Puget Sound basin, the San Juan Island Archipelago consists of approximately 473 islands at low tide or 428 at high tide with a wide variety of rock types and formations. Two key geologic processes are responsible for the rugged landscape the islands are known for today—accretion of small microcontinents to the mainland and several glaciations. However, millions of years of geologic activity laid the groundwork for these events to take place. The oldest rocks date to the Devonian Period with a minimum age of 360 million years and include a complex of diorites, amphibolites, gneisses and gabbros. These ancient crystalline rocks are overlain by chert, shale, limestone, greywacke sandstone, and volcanic rocks (Easterbrook and Rahm, 1970).

Over 80 million years ago, plate tectonics set the stage for the complex geologic structure of bedrock underlying the region. Small landmasses moving eastward along the Juan de Fuca plate collided with the coastline in a relatively short period of time. Due to the intense pressure created by the collisions, the smaller landmasses were forced upward against the continental plate producing an intricate system

of thrust faults along the tectonic plates and lenses (Brandon et al., 1988). Many fractures and joints in the varied bedrock are associated with this thrust system.

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

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

At the most recent glacial maximum, the ice sheet depressed the crust in this area several hundred feet. As the landscape rebounded from the immense weight of the glacier during deglaciation, waves cut benches and terraces at various elevations. Long, horizontal benches on the south side of Mount Finlayson record the emergence of this landscape, and date

to approximately 13,500 years ago. The lack of tree cover and the size of these features make them some of the most visible reminders of crustal movements associated with glaciation in this part of the world (Riedel, 2004).

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

Since the end of the Ice Age, the primary geomorphic agent has been water in the form of rain, runoff, and ocean currents and tides. Because the park manages 6.67 miles of shoreline that have been greatly affected by these processes, it is important to understand how they interact. The development of beaches requires an input of loose sand and gravel along the shoreline (Downing, 1983). Coastal bluffs supply this material as they erode, and the sediment accumulates below to form beaches. Loose sand and gravel is moved in and out with the rising and falling of the tide and along the shoreline with longshore currents. Eventually, most of it is transferred to form sand bars, spits, and small capes in shallow water (Terich, 1987). Bluff erosion is critical for the natural maintenance of these shorelines because beaches will begin to narrow or erode if this sediment supply is reduced or stopped (Terich, 1987).

Topography

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

The landscapes of the two park units are quite different. Located on the southeastern tip of the island, American Camp is characterized by a rolling, windswept prairie with the highest point atop Mount Finlayson at 290 feet. The unit is open to Haro Strait to the west, the Strait of Juan de Fuca to the south, and Griffin Bay to the north. Along the southern shoreline, long gravel beaches are broken up by rock outcroppings and protected sandy coves. The northern shoreline also exhibits long gravel beaches with three temperate, marine lagoons occurring on



Glacial striations found on bedrock within the park. NPS Photo.

Griffin Bay (National Park Service, San Juan Island National Historical Park, Statement for Management, 1997).

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

Soils

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

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

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

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

A detailed soil survey, *Soil Survey of San Juan Island National Historical Park, Washington*, was completed in 2005 for the park by the Natural Resources Conservation Service in cooperation with the National Park Service and the San Juan County Conservation District.

Monthly and Annual Averages for Temperature and Precipitation

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

Climate

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

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

The maritime air surrounding the islands also affects the climate by moderating the temperature. Compared with other northern Puget Sound locations, the summers on San Juan Island are short and cool with very little precipitation, and the winters are mild and moderately dry. Snowfall may occur, but most winter precipitation falls as soaking rain (Flora and Sharrow, 1992). At the weather station at Olga, Washington on Orcas Island, the average annual maximum temperature recorded is 57.0° Fahrenheit and the minimum is 42.4° Fahrenheit.

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

Weather Station

A fire weather station operated at American Camp from the spring of 1983 through 1998. It was used to obtain weather readings pertaining to fires and fire hazards. It functioned each year from June 1 until September 20. Current technology does not require a permanent fire weather station. RAWs data are obtained from a station on Whidbey Island. Portable devices are used when fire weather is needed for park activities.

Climate Change

Climate change is defined by the United Nations Framework Convention on Climate Change (UNFCCC) as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (UNFCCC, 1992). In recent years, scientific data have shown that human influence on climate systems is taking place, and evidence of climate change has already presented itself. A 2001 report by the Intergovernmental Panel on Climate Change (representing 39 countries and reporting on the greenhouse effect) projected that the average global temperature will increase by 1.4 to 5.8 degrees Fahrenheit between the years 1990 and 2100. Based on climate change modeling, the IPCC reports that most land areas will warm more rapidly than this global average. The northern regions of North America are highlighted as an area that exceeds global mean warming by more than 40 percent in each model. A 0.09 to 0.88 meter (3.5 inches to 2.9 feet) global average sea level rise is predicted by the year 2100 using computer simulated models (IPCC 2001).

According to Washington State climatologist Philip Mote, summertime temperatures in Washington State have increased an average of over 1 degree Fahrenheit in the last century. The University of Washington’s Climate Impacts Group (CIG) has done extensive research on the potential impacts of climate change in the Pacific Northwest. In the San Juan Islands specifically, concerns related to climate change include rising sea levels and intensified storm events. CIG computer modeling has predicted accelerated warming in Washington State from 1990 to 2050. This modeling shows an increase of approximately 2 degrees Fahrenheit for the San Juan Island area. According to CIG, sea level rise could affect the San Juan Islands, and would affect different areas of the island differently, based on local factors such as beach slope, vertical land movements, land use, and land cover. Potential effects of higher sea levels could include increased erosion, bluff landsliding, salt water intrusion of coastal aquifers, and inundation of low-lying areas (University of Washington, 2007). Climate change could also result in increasing water temperatures, threatening the island’s surrounding marine areas, including the habitats of salmon and the endangered southern resident Orcas. On land, non-native plants as well as pathogens are expected to increase. Already-rare plant and animal species that have narrow habitat requirements and limited dispersal ability may be particularly vulnerable

to loss. While precipitation in the rainy season is likely to increase, there is also the likelihood of increased summer droughts. Moisture stress, higher temperatures, and invasive non-native species could all be expected to contribute to a change in the fire regime.

Within lands managed by the National Park Service nationwide, climate change has already had noticeable impacts on both natural and cultural resources (National Park Service and NASA, 2006). Conditions for sustaining the health and prosperity of animal and plant habitats, glacial, marine, and wetland ecosystems have been diminished and changing patterns of weather and natural hazards such as flooding and wildfires have damaged habitat areas and cultural resource sites. Invasive species of plants and pests, such as bark beetles, are encroaching into areas where they have not previously survived, and threatening the native plants, as well as the animals that rely on those plants for food and shelter.

In response to the increasing need for understanding and action related to climate change impacts in the parks, the NPS has partnered with the Environmental Protection Agency through an interagency agreement to create the Climate Friendly Parks Program. This program enables the NPS to educate its staff about climate change issues, assess the park's contribution to greenhouse gas emissions, create short- and long-term strategies for reducing emissions, determine potential effects of climate change on park resources, and develop skills and strategies for communicating these effects to the public.

Air Quality

Air quality in the Pacific Northwest region is good compared with other areas of the United States (Eilers, Rose, and Sullivan, 1994). Principal air masses for the region are derived from the atmosphere over the Pacific Ocean where the air is clean and moist. Occurring on a regular basis, wind-driven mixing through the Strait of Juan de Fuca effectively disperses air pollution (Puget Sound Clean Air Agency, 2003). Consequently, air pollutant loads are relatively low. However, long-range transport of pollution from Asia may become a growing concern as development occurs in that region.

Sources of air pollutants on the islands are few, predominately from occasional outdoor burning, wood burning stoves, and vehicle emissions. Only

two industrial sources of air contaminants in the county have been listed in the state emission inventory. These sources are the Friday Harbor Incinerator and Friday Harbor Sand and Gravel, both of which are now closed (Garland, 1996). There are several large industrial sources in the adjacent counties including petroleum refineries in Bellingham and Anacortes, an aluminum smelter in Bellingham, and a large pulp mill in Port Townsend. Air quality is generally good with nearby particle monitoring stations at Oak Harbor, Anacortes, and Mount Vernon showing no danger of exceeding ambient air quality standards (Franzmann, 2003).

However, the islands are located in the Puget Sound/Georgia Basin airshed subject to the movement of air pollutants between the large urban/industrial areas of Seattle/Tacoma/Everett and Vancouver/Abbotsford/Bellingham, as well as, the busy Interstate 5 corridor and increasing marine vessel traffic. Recent international efforts to characterize cross-boundary airflow indicate that ozone pollution from both countries may converge around the northern San Juan Islands creating a heretofore unknown hotspot. Additional modeling and/or monitoring will be needed to verify these preliminary results. Concern is also growing over increasing marine vessel traffic and associated emissions in the Georgia Basin and Puget Sound airshed (Environment Canada, 2004).

The park has been designated a Class II area under the Clean Air Act. The 1977 Clean Air Act amendments designated all national parks over 6,000 acres and wilderness areas over 5,000 acres as Class I. This classification affords the most protection from new major emitting sources. All other areas that meet the National Ambient Air Quality Standards are Class II areas for purposes of controlling increases in air pollution under the 1977 Clean Air Act. For a brief period in 2001-2003, the park operated a visibility camera at American Camp as part of the network inventory and monitoring program. This camera took three pictures daily of a fixed vista of the Olympic Mountains to the southwest in order to establish baseline visibility data and to detect visible air pollution that may travel through the Strait of Juan de Fuca (Air Resource Specialists, Inc., 2001). The photos have not been analyzed, as funding ran out and the camera was removed.

Water Resources

Hydrology

Runoff, evapotranspiration, and groundwater recharge are three key components of the region's hydrologic cycle, and they affect the yield and distribution of water within a watershed. Runoff is water that flows from the land surface to a water body with no filtering process, and it can carry pollutants, loose soil, and debris into the body of water in which it drains. It is affected by topography, vegetation, soil type and depth, and precipitation. The runoff on San Juan Island is proportionately high due to exposed bedrock and impervious soil layers. During the winter months, runoff is more prevalent due to heavy rainfall and saturated soils. Of the average annual rainfall, anywhere from 11 to 45 percent results as runoff (Heater et al., 2000). This figure is dependent upon variations in precipitation and the effect of evapotranspiration. (See Figure 17: English Camp: Hydrology and Figure 18: American Camp: Hydrology.)

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

When the final melting of the glaciers occurred, all fractures, cracks, and loose glacial outwash materials underlying the region were supercharged with freshwater. Today, groundwater recharge is supplied in the form of local rainfall. Water available for groundwater recharge is the remainder of the total annual precipitation that is not lost to runoff or evapotranspiration. Recharge almost exclusively occurs from October through April when precipitation is high and evapotranspiration is low. Because geology, soil type, topography and vegetation influence the rate and amount of water infiltration, recharge rate is site specific (Orr et al., 2003). Wetlands increase infiltration by providing a water storage site. The water is filtered as it slowly seeps into the aquifer. Recharge for San Juan County is estimated at approximately 1.99 inches and 6 percent of total rainfall (San Juan County,

Water Resource Management Plan, 2004). American Camp has been identified as an area of significant recharge (Klinger et.al., 2006).

Groundwater

In the region, fresh groundwater occurs as a lens floating atop the denser saltwater in two major aquifer types (Johns, 1997). Fractured bedrock aquifers provide little filtration and water yield is typically low. Glacial outwash aquifers can provide better filtration because the water occurs in the spaces between loose sand and gravel. The yield from these aquifers is generally greater than fractured bedrock, but they tend to be more susceptible to saltwater intrusion. Salt water intrusion occurs when fresh water is removed from an aquifer faster than it is replenished (Flora and Sharrow, 1992). Given the complex geology underlying the island, it is difficult to determine the amount of water available. Shortages often occur during summer months when rainfall is minimal and visitation is at a peak.

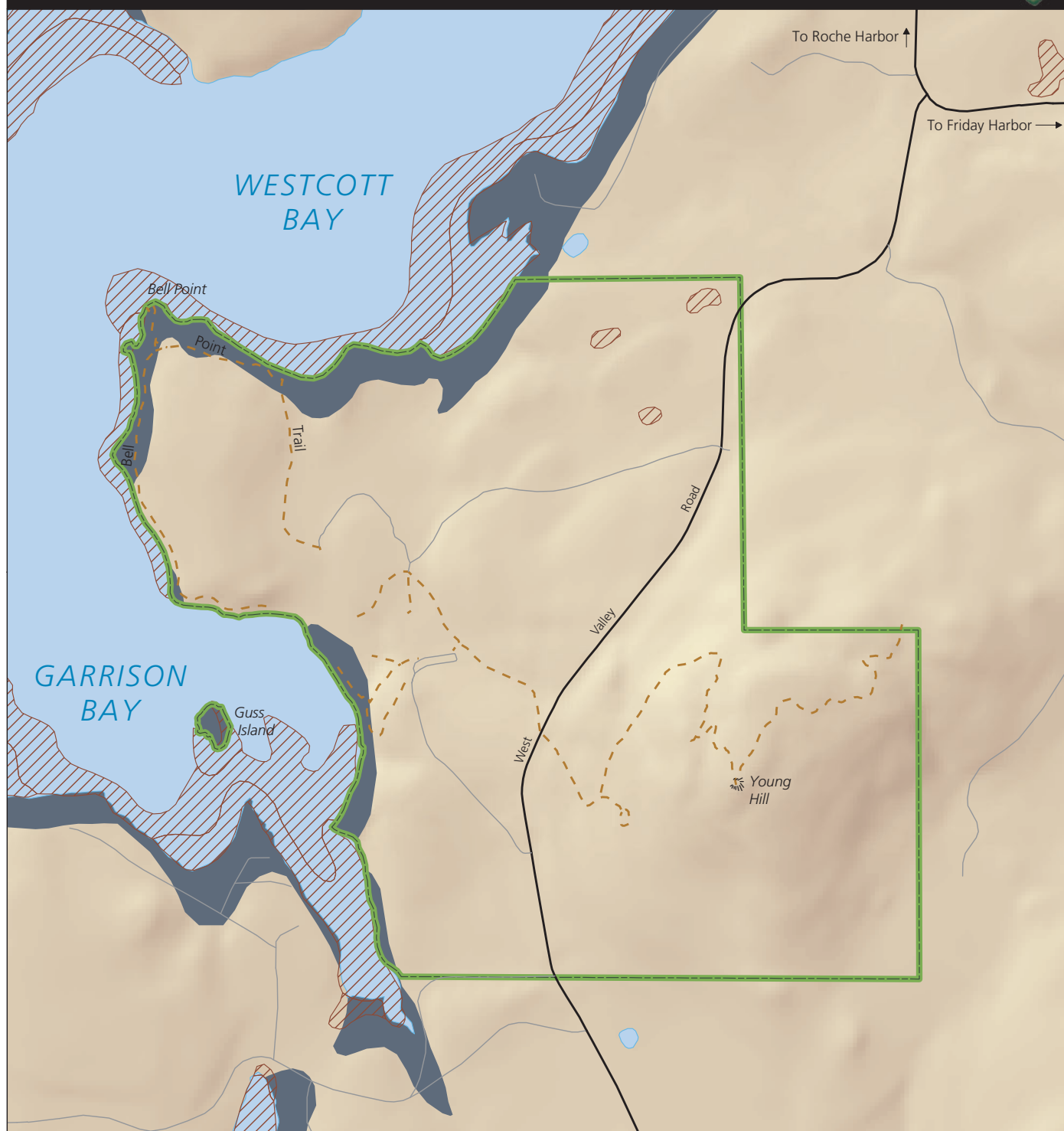
Groundwater is the only sizable source of fresh water in the park. It supplies domestic needs, contributes to the park's wetlands and springs, and is necessary for wildlife habitat and proper ecological function. Both aquifer types occur at American Camp, but only one well is in operation drawing from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

Water Uses and Rights

Maintaining a balance between the domestic, biological, and physical water supply needs is a goal at the park. In order to properly meet each of these requirements, the park must balance three main water rights issues; water rights for administrative purposes, water rights for the protection of park resources, and responding to requests for the exportation of water to adjacent developments from wells within the park (Flora and Sharrow, 1992).

English Camp: Hydrology

San Juan Island National Historical Park GMP/EIS



- 100-Year Floodplain
- Wetland
- Park Boundary
- Primary Road
- Secondary Road
- Trail

0 500 1,000
Feet



Figure 17

Produced by: National Park Service
PWRO-Seattle GIS Group

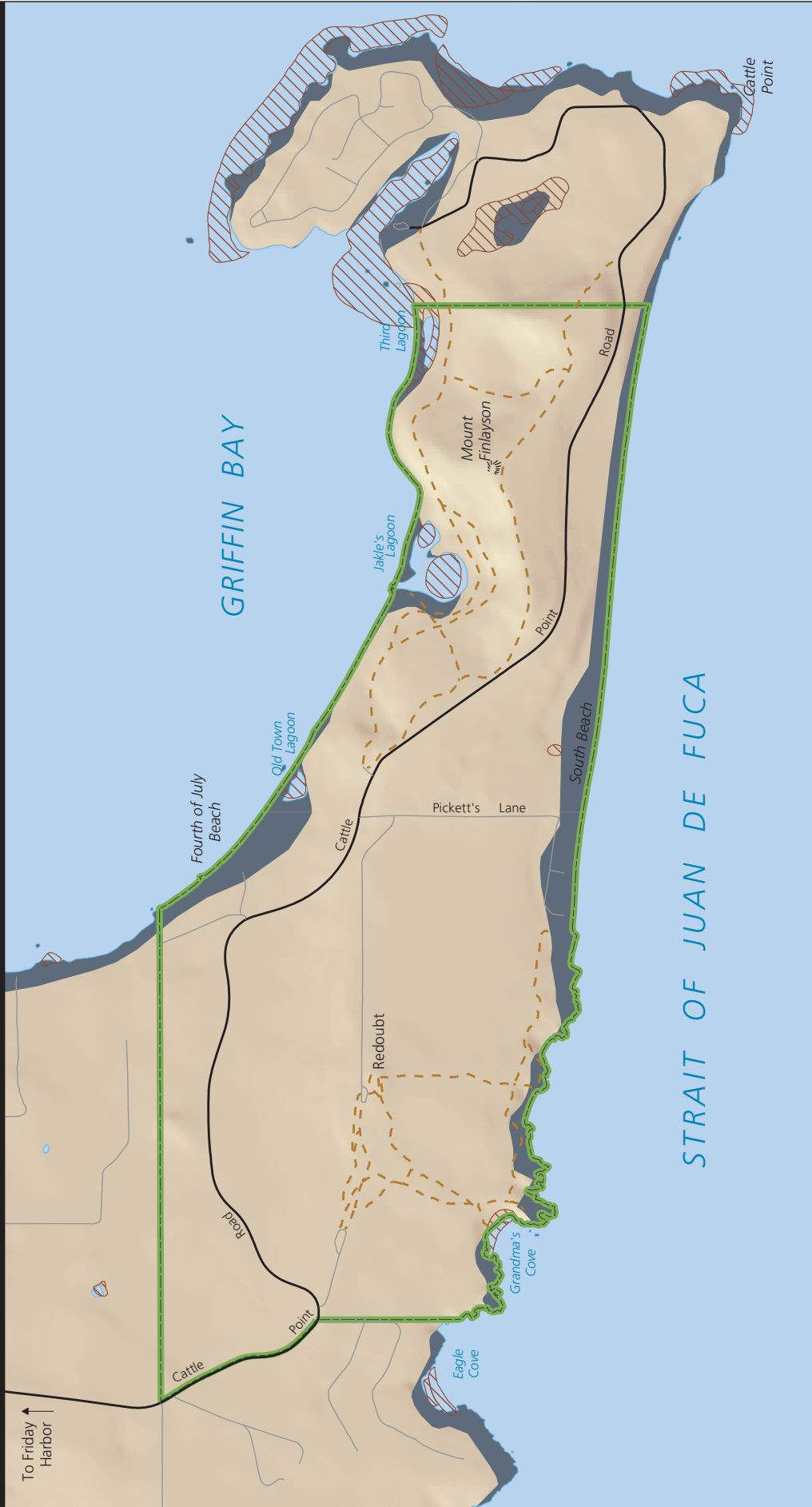
Date Created: February 28, 2007

Data Sources: FEMA - floodplains
NPS - lakes, park boundary, roads,
shoreline, trails
NWI - wetlands
USGS - shaded relief

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American Camp: Hydrology

San Juan Island National Historical Park GMP/EIS



100-Year Floodplain

Wetland

Park Boundary

Primary Road

Secondary Road

Trail

0 0.25 0.5 Miles

N

Produced by: National Park Service, PWRO-Seattle GIS Group

Date Created: February 28, 2007

Data Sources: FEMA - floodplains
NPS - lakes, park boundary, roads, shoreline, trails
NWI - wetlands
USGS - shaded relief

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Figure 18

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

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

Another concern at American Camp is aquifer drawdown as a result of adjacent developments withdrawing groundwater from a glacial drift aquifer that extends across the boundary of the park. If occurring, this drawdown may have an impact on the unit's water quality and water-dependent resources including wetlands, seeps, and the three marine lagoons along Griffin Bay. As stated previously, it is difficult to determine groundwater availability given the complex regional geology. Most of the recharge area for this aquifer also lies within the park boundary. Jakle's and Third lagoons are located just north of the aquifer's perimeter. The hypothesis that the aquifer discharges freshwater into the lagoons has not been thoroughly researched, therefore, quantity and timing of discharge are unknown (Johns, 1997). No certified water rights are associated with the lagoons or wetlands, as it is uncommon for the Department of Ecology (DOE) to issue a water right for an *in situ* use without some kind of 'control' of the water (Johns, 1997).

There is little documentation of the water rights associated with English Camp where two wells and a cistern are used to supply fresh water to the unit. The cistern collects water that is utilized for watering the

formal garden. In 2000, a well was drilled to supply the needs of the maintenance facility including a low-water washing machine, two sinks, and one toilet. The water is not potable. This well replaced two low yielding wells that were constructed by the previous landowner on private property just east of the maintenance facility. A second well supplies water to the drinking fountain in the parking lot, two VIP trailer pads, and the OMSI summer campsite. It appears that both wells meet the exemption conditions set forth by the DOE; therefore, obtaining a certified water right is not required. Documentation of beneficial use establishes the priority of an exempt well. Exempt rights receive the same protection as certified rights. However, the need to protect the right may be unknown because the DOE does not maintain an official record of exempt rights. Ensuring the proper protection of the water supply is essential due to low yielding wells coupled with increasing subdivision and development taking place on the adjacent shorelines.

Surface Water and Wetlands

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

In 1998, the wetlands of the park were inventoried and mapped. A total of 35 wetland areas comprising 91.9 acres (5 percent of total park area) were identified (Holmes, 1998). At English Camp, nine wetlands were documented. Several of the sites have been invaded by non-wetland plants, presumably, due to the drought conditions in the early 1990s (Holmes, 1998).

Twenty-six wetlands are scattered throughout the American Camp unit. Many are small seeps and springs, but larger wetland sites occur on the northern side of Mount Finlayson. Located near the end of Pickett's Lane on South Beach is the site of an historic spring that played a role in the siting of the first American Camp.

The three temperate marine lagoons (First, Jakle's, and Third lagoons) located along the shore of Griffin Bay are also designated as wetland areas. Because they are rare to the Pacific Northwest coast, these features

are valuable ecological resources (Flora and Sharrow, 1992). Jakle's Lagoon, the largest body of surface water in the park, has been designated as an Environmental Study Area, and the University of Washington Friday Harbor Labs has conducted ecological research of marine life at this location (Flora and Sharrow, 1992). Studies show that regular circulation occurs with the bay, but salinity in the lagoon is lower than salinity of the seawater, possibly indicating a groundwater inflow from the aquifer underlying Mount Finlayson.

Water Quality

Overall, water quality in the region of the park is relatively high. Marine waters surrounding the islands are typically of high water quality and are rated class AA (Garland, 1996). Located at the intersection of the Strait of Juan de Fuca and the Strait of Georgia, these waters are well flushed by the strong tidal currents. However, little mixing occurs with enclosed inlets and bays making them susceptible to bacterial and nutrient loading particularly when anthropogenic inputs are a factor. Westcott and Garrison bays are protected bays that are poorly flushed. In 2000, the Washington Department of Ecology and the San Juan County Department of Health and Community Services conducted a water quality survey including a site located in Garrison Bay off the shore of the parade ground at English Camp. The site met Class AA standards for fecal coliform and pH, and Class A standards for temperature and dissolved oxygen (Wiseman, 2000). The Washington DNR recently initiated water quality studies in Garrison and Westcott bays in an attempt to determine possible causes for loss of eelgrass in the area. Data are not yet available

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

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

Watersheds

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

Land and water use can impact the quality of water in the watershed. Forested lands, which help reduce runoff, dominate the watershed with small agricultural plots scattered throughout. Primarily, these 10 to 20 acre farms raise livestock, and the animals have direct access to streams and adjacent riparian land. The average lot along the shoreline of Westcott Bay and the western edge of Garrison Bay is one-half to two acres in size, and the development potential has nearly been reached (Larkin, 1999 and Thompson, 2007). Several failing septic systems have been identified in the watershed, and a program has been established to repair those (Heater et al., 2000).

With regards to water-based activities, there are no mooring buoys in the bays, but the calm waters are an ideal location for boating gatherings. Boaters must drop anchor, which disturbs the marine floor, and the nearest holding tank pump-out facility is located at the Roche Harbor Marina. Because the shoreline directly affects the estuarine region of these water bodies, higher density housing and increased activity pose significant influences on the ecosystems associated with the bays.

In 1997 and 1998, water quality testing of sites within the watershed indicate that runoff events are the likely cause of bacterial pollution entering creeks and the bays (Heater et al., 2000). Areas with little vegetative diversity, primarily occurring on agricultural lands, as well as the upper reaches of the watershed have a high potential for erosion and runoff. However, wetlands occur throughout the watershed where the

soil is inadequately drained, and they help mitigate the effects of runoff by collecting and filtering water.

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

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

Marine Water

While the marine water and associated ecosystems are generally of high quality in the San Juans, many groups, organizations, and government agencies, including the park, are proactively working toward studying, preserving and restoring the resources of the marine waters surrounding the islands. In order to enhance the management of shoreline resources, the park is working toward defining tidal ownership of the 6.67 miles of coast along the borders of the park.

Jurisdiction is patchy along the coastlines at both camps, with tideland ownership sometimes being concurrent with adjacent uplands, but more often retained by the state and under the jurisdiction of the Washington Department of Natural Resources. The park has recently obtained records that document where tidelands were sold to the park and where they were retained by the state. From the cliffs west of Alaska Packer’s Rock to east of the restrooms at South Beach, the park’s jurisdiction extends to the extreme low tide line. East of that to the eastern boundary, jurisdiction extends to the mean high tide line. The jurisdictional line meanders from Grandma’s Cove to the western boundary of the park and along a short stretch of shoreline north of Jakle’s Lagoon. The park’s authority extends to the mean high tide line along Fourth of July Beach from the northwestern

boundary to west of First Lagoon. At English Camp, the park owns tidelands from the northern edge of the parade ground south to the park boundary. The remainder are owned by the state. An old oyster bed lease off Belle Point recently reverted to state ownership.

Marine Protected Areas

Executive Order 13158 of May 2006 was passed to help protect the significant natural and cultural resources within the marine environment by strengthening and expanding the Nation’s system of marine protected areas (MPAs). Marine protected areas are defined as “any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.” The purpose of this order “is to, consistent with domestic and international law: (a) strengthen the management, protection, and conservation of existing marine protected areas and establish new or expanded MPAs; (b) develop a scientifically based, comprehensive national system of MPAs representing diverse U.S. marine ecosystems, and the Nation’s natural and cultural resources; and (c) avoid causing harm to MPAs through federally conducted, approved, or funded activities.”

In the San Juan Islands, the Transborder MPA Initiative is a joint undertaking by the Islands Trust, San Juan County, and the Sound and Straits Coalition of nongovernmental organizations, whose purpose is to generate local, citizen-led efforts to increase public awareness of the state of the marine resources and to take action to protect and sustain them by designating a network of marine protected areas in the Orca Pass International Stewardship Area.

The Orca Pass International Stewardship area encompasses the entire boundary area between San Juan County and the Canadian Gulf Islands. The area is rich in natural scenery, marine biodiversity, environmentally sensitive habitats, and places of cultural and spiritual importance to Coast Salish tribes and First Nations on both sides of the border. The Islands Trust and San Juan County have little or no authority to influence fishery harvests, control international shipping, affect recreational boating activities, or control industrial pollution in these areas. However, these entities work to engage communities of people on the islands that live closely with the marine environment and care deeply about the long-term effects of human activities on these critically important resources.

The Orca Pass Marine Protected Area Initiative promotes the creation of an integrated network of MPAs, with multiple areas designated on both sides of the border. These MPAs can protect and help to restore a range of habitat types. A network can accomplish much more than one or two small, isolated MPAs. This connectivity is increasingly important in the transboundary waters, where international vessel traffic of all kinds is among many competing human uses. Given the role of treaty tribes as co-managers of marine organisms and habitats, and the limited authority of local governments in the marine environment, the designation of MPAs by the Islands Trust and San Juan County requires voluntary restrictions and emphasizes public education and awareness about marine resources and their need for protection (Marine Resource Committee, 2007).

Additional Marine Stewardship in the Islands

In January 2004, the San Juan Board of County Commissioners designated the entire county as a Marine Stewardship Area in an effort to protect the rich marine diversity of the San Juan archipelago. This designation set the course for the Marine Resources Committee (MRC) to identify key action steps toward a healthier and more sustainable island marine ecosystem for the natural resources and the benefit of the people who live, work and recreate in the San Juan Islands. The MRC prepared and finalized the San Juan County Marine Stewardship Area Plan in July 2007, identifying education, community stewardship, management and planning, coordination, and research strategies in order to protect and restore the entire marine system in the San Juan Islands.

The Islands Trust and San Juan County have also developed a Marine Management Area Workbook. This Workbook is designed to help local island communities and others to identify sites for marine stewardship and establish Marine Management Areas in effective collaboration with other jurisdictions, citizen groups, and island communities. The workbook is available from the Islands Trust, the San Juan County Planning Department, and on the internet (Marine Resource Committee, 2007).

San Juan County Marine Resources Committee

The San Juan County Marine Resources Committee (MRC) is a citizen-based advisory committee dedicated to the protection and restoration of marine resources in the San Juan Islands. The San Juan MRC was created to provide a citizen-based forum to advise the Board of County Commissioners on marine issues.

First established in 1996, MRC serves to represent all members of the local community, including commercial users, scientists, environmentalists, fishers, and whale watch operators.

The MRC receives funding and support through the Northwest Straits Commission (NWSC) and San Juan County. Marine Resource Committee members are selected by the San Juan County Council and represent local government, tribal government, and the scientific, economic, recreational and conservation communities.

The goals of the San Juan County Marine Resources Committee are: to protect and restore nearshore, estuarine and rocky reef habitats; to support salmon and bottomfish recovery by establishing marine protected areas; and to promote public awareness about marine resource issues.

The San Juan MRC was created to provide a citizen-based forum to advise the Board of County Commissioners on marine issues. First established in 1996, the MRC serves to represent all members of the local community, including commercial users, scientists, environmentalists, fishers, and whale watch operators (San Juan County Marine Resources Committee, 2007).

Marine Managers Workshops

San Juan Island National Historical Park has participated in three marine managers' workshops sponsored by the Northwest Straits Commission and the MRC in recent years. This forum provides an opportunity for resource managers to collaborate on marine and tideland protection in a variety of ways, including the county's Marine Stewardship Initiative and an Aquatic Reserve nomination currently being drafted.

Northwest Straits Commission

The Northwest Straits Commission provides guidance and offers resources to the MRCs, with the goal of mobilizing science to focus on key priorities and coordinating regional priorities for the ecosystem. As with the MRCs, the Commission uses performance benchmarks developed by the citizens commission as measurable goals.

The Commission's principal work is to: provide focus on the overall health of the Northwest Straits marine ecosystem; develop and propose scientifically sound recommendations to existing governmental

authorities; and to direct and coordinate scientific, technical and financial support to the marine resources committees.

The Commission serves as a “board of directors” for the Northwest Straits Marine Conservation Initiative. Its members represent each of the marine resources committees, tribes, the Puget Sound Action Team and additional appointments by the Governor. Financial administration is provided by the Department of Ecology through the Padilla Bay National Estuarine Research Reserve (Northwest Straits Commission, 2007).

Puget Sound Partnership

The Puget Sound Partnership is a state agency established in the Washington State Legislature in 2007. The Partnership works collaboratively with all levels of government, tribes, businesses, and citizen groups in its charge to lead and coordinate efforts to protect and restore Puget Sound by 2020.

The Partnership is governed by a Leadership Council of independent citizens from around Puget Sound and is advised by an Ecosystem Coordination Board and a Science Panel. An Executive Director leads day-to-day operations and employs a professional staff including the former staff of the Puget Sound Action Team. As of January 2008, the regional salmon recovery functions performed by Shared Strategy for Puget Sound become the responsibility of the Partnership.

The Partnership is working with a vast array of people, groups, businesses and governments to create a long-term plan called the “2020 Action Agenda” by September 2008. The Action Agenda will be informed by an independent Science Panel and it will cover the entire ecosystem affecting Puget Sound. The Action Agenda will identify and assign priorities to actions needed to get to a healthy Puget Sound by 2020, name those responsible for the actions, and identify funding. The Action Agenda will also hold all parties accountable for their actions by tracking progress and reporting the results publicly. In addition, the Partnership will launch an education effort to bring ordinary citizens, businesses and others up to speed on the Sound’s health issues and to inspire them to action (Puget Sound Partnership, 2007).

Personal Watercraft Ban

Personal watercrafts (PWC) are also known by the trademark name “Jet Ski.” Personal watercraft impacts can include water quality degradation, noise pollution,

harassed and injured wildlife, and increased boating accidents. The two-stroke engine often utilized in PWC discharges up to one-third of its fuel, unburned, into the air and water. This engine style also produces hydrocarbons, a primary factor in the formation of smog. Emitting as much pollution over a period of just a few hours as a new car driven for 100,000 miles, many involved in the PWC industry are exploring alternatives to the two-stroke engine (New York State Department of Environmental Conservation, 2000).

In 1996, San Juan County passed an ordinance placing a two-year ban on personal watercraft. The ban was found unconstitutional by the Whatcom County Superior Court in November 1996 because state boat licensing does not distinguish a difference between PWC and other vessels (*Weden v. San Juan County* [135 Wn.2d 678]). The argument claimed that there was no basis for treating PWC differently than any other boat.

The county appealed and almost two years later the decision was reversed by the Washington State Supreme Court in November 1998, upholding the county’s authority to ban PWC use (*Coastlines* 1999). The state constitution allows counties to pass laws that protect the public health, safety, and general welfare. Because PWCs are detrimental to the health of humans as well as the health of the marine environment, this finding allows counties to differentiate between PWCs and other watercraft even though Washington State boat licensing does not.

Forage Fish Habitat Assessment

Friends of the San Juans (Friends) is a local non-profit organization concerned with the health of Puget Sound. They are participating in the San Juan County Forage Fish Habitat Assessment. This multi-year project has combined federal, state, and county agencies with scientists and citizen volunteers to identify and map forage fish habitat in San Juan County. The project has covered 414 miles of shoreline, identifying 47 known surf smelt and Pacific sand lance spawning locations (Whitman, 2003). Since the inception of the project in 2001, Friends has surveyed over 500 potential spawning sites on 19 islands in the archipelago locating 25 previously unknown spawning beaches (Whitman, 2003). Partners involved in the project include the University of Washington Friday Harbor Labs and the Washington Department of Fish and Wildlife.

Oil Spill Prevention Plan and Preparedness

In the event of an oil or hazardous substance spill, the park is prepared with the proper procedures and protocol listed in the *San Juan Island National Historical Park Oil and Hazardous Substance Spill Plan* (1993). A spill within the park would be reported to the appropriate NPS staff, Washington State Department of Ecology, and the San Juan County Sheriff's office (County Disbatch-911). Either the Island Oil Spill Association (IOSA) or the county Hazardous Materials Incident Command Agency would respond to the incident. Park staff would monitor the activities, keep NPS support staff advised of the situation, and would assist as needed. Currently, two park employees are active members of IOSA.

Generally, if a spill occurs in the marine waters adjacent to the park, the Coast Guard would be informed before the park. They will be responsible for making the appropriate contacts and initiating clean-up. In this event, the park would provide assistance and comply with the procedures set forth by the Coast Guard.

University of Washington Friday Harbor Laboratories

The University of Washington Friday Harbor Laboratories (Labs) are world renowned for their excellence in marine biology and oceanography research and education. The facilities include nine laboratories and over 1,500 acres of biological reserves in the San Juan Islands. The park has partnered with the Labs on several occasions, and the results have produced a greater understanding of the shoreline, intertidal zone, and marine resources associated with the park.

The Whale Museum

The Whale Museum operates a Soundwatch Boater Education Program in order to respond to the pressures of whale watching on the marine environment in the San Juan Islands. The primary focus of the program is to offer education for whale-watching boaters. The program operates a Soundwatch boat that patrols the boundaries of marine protected areas, including national wildlife refuges and bottomfish recovery zones, as well as responding to marine mammal strandings (Marine Mammal Stranding Network). Bird surveys are also conducted as a part of the Soundwatch program (Whale Museum, 2007). The Whale Museum is the most active and visible organization doing marine

mammal education in the Puget Sound area. They have played a key role in getting the Southern Resident Orcas listed as endangered. They provide most of the coordination with the Whale Watch Operators Association Northwest and their voluntary guidelines. They are a strong partner with NOAA.

The Washington State University Extension Beach Watchers Program

The Beach Watchers program is a volunteer stewardship program sponsored by Washington State University Extension San Juan County. The program provides marine stewardship training to volunteers in exchange for 100 hours of community service in community education. Beach Watcher volunteers are educated in the physical, biological, and cultural aspects of marine stewardship, and pass on this valuable education to community members and visitors in a variety of venues, as well as assisting with research and data collection. Beach Watcher volunteers also work in cooperation with other local stewardship groups as appropriate (Washington State University Extension, 2007).

Coastal Observation and Seabird Survey Team

The Coastal Observation and Seabird Survey Team (COASST) is a partnership project between the University of Washington and the Olympic Coast National Marine Sanctuary. The project works on long-term bird monitoring programs in collaboration with citizens, natural resource management agencies, and environmental organizations. Surveys are conducted along the Pacific coast of Oregon and Washington, as well as Puget Sound, the Strait of Juan de Fuca, and the San Juan Islands. Citizen volunteers conduct monthly or bi-monthly surveys of marine bird carcasses along the shorelines. This research helps to establish a baseline of normal marine bird mortality, as well as demonstrate when events such as an El Niño event or an oil spill have an effect on the marine environment (COASST, 2007).

Vegetation

Vegetation data mining, which refers to using reference material only, was conducted March 2000 through April 2001. Field surveys were conducted April through September 2001, 2002, 2003, and 2004. In the NPSpecies database, the park has a documented 373 plant species. Out of this total, approximately 121 species are not native. A greater awareness of the plants occurring in the park will improve

the management of native and non-native species (Rocheftort, 2007). (See Figure 19: English Camp: Natural Resources and Figure 20: American Camp: Natural Resources.)

Land Cover

A diverse native vegetative cover has many benefits. Animal diversity is directly related to the complexity of the vegetative cover. Vegetation of varying heights and thickness provide a habitat for a wide range of species. In addition, a range in vegetation protects soil from erosion by absorbing the energy associated with rainfall. Runoff is reduced as the vegetation distributes the rainwater to the soil slowly allowing for increased infiltration. Both park units have invasive species threatening the diversity of the native cover.

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

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

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

Young, dense Douglas-fir stands have become established on the abandoned agricultural fields north

of the redoubt and south of the visitor center along the western boundary. Overlapping tree crowns and dense, impenetrable thickets are signs of a weak forest ecosystem. The trees are susceptible to wind throw, insect infestations, fire, and disease.

English Camp is dominated by mature Douglas-fir (*Pseudotsuga menziesii*) mixed with grand fir (*Abies grandis*), big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), Pacific madrone (*Arbutus menziesii*), and a few western red cedars (*Thuja plicata*) and Pacific yews (*Taxus brevifolia*). Immature cedars and other shade tolerant species form a dense understory in some areas while in other areas there is almost no understory. Much of the cover in the southwest region of English Camp is dense, impenetrable Douglas-fir with a closed canopy. The trees vary in age from 20 to 40 years and they are prone to wind throw due to the height of the trees, the shallowness of the rooting zone, and the wet, poorly drained soil (Rolph and Agee, 1993).

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

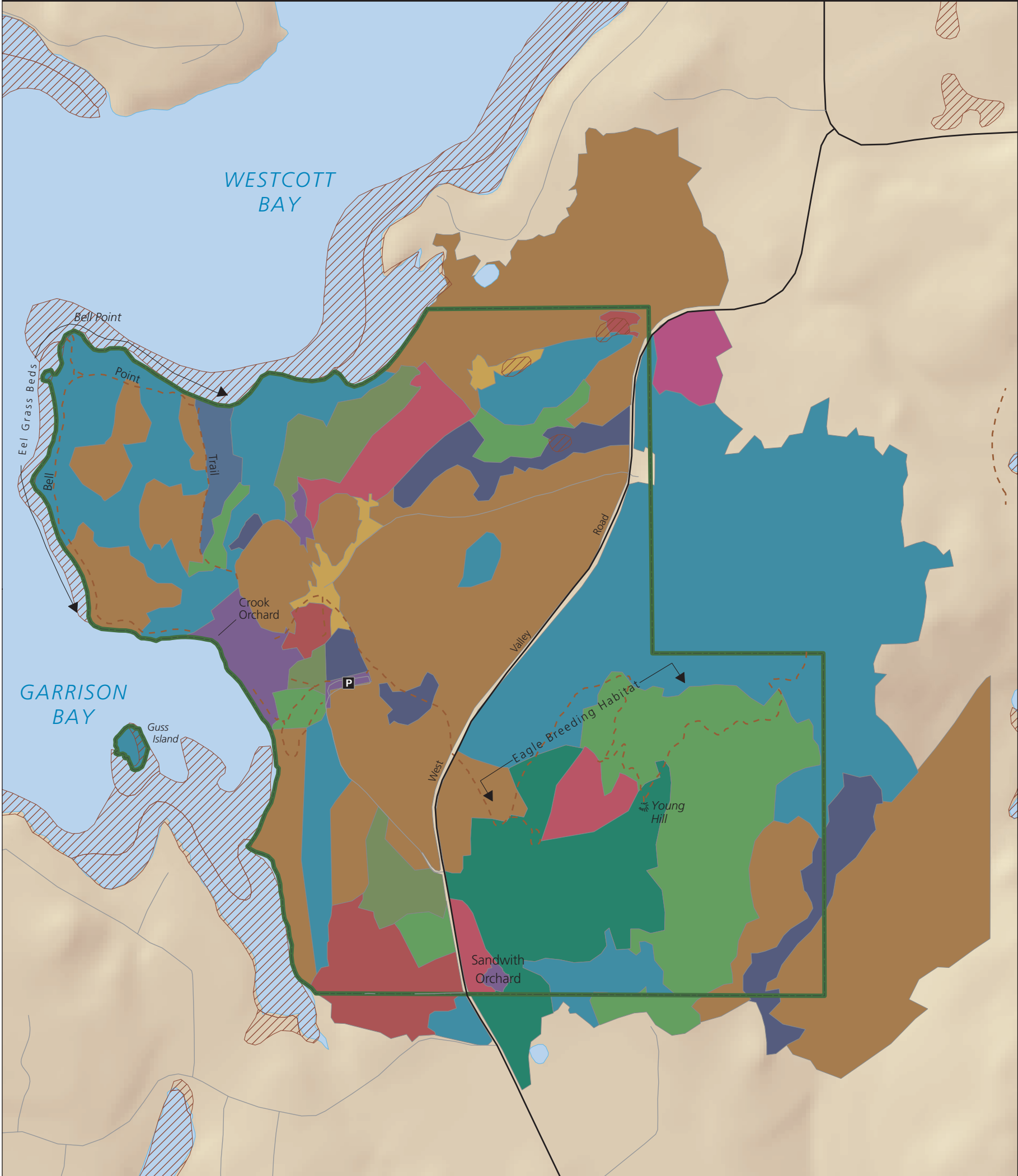
Vegetation Restoration Projects

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

Approximately 600 acres of grasslands exist at American Camp (Rolph and Agee, 1993). These areas have been disturbed by fire, plant harvesting, farming, grazing, and invasive plant and animal species. Native people burned south facing slopes to promote the

English Camp: Natural Resources

San Juan Island National Historical Park GMP/EIS



Vegetation - by Community

- Undefined
- Douglas-fir-Pacific madrone/ocean spray-snowberry
- Douglas-fir-bigleaf maple/grass
- Douglas-fir-garry oak-Pacific madrone/grass
- Douglas-fir-grand fir-western hemlock/salal-ocean spray
- Douglas-fir-grand fir-western hemlock/sword fern
- Douglas-fir-lodgepole pine/ocean spray-snowberry
- Douglas-fir/grass
- Mesic Grassland w/ shrubs and tree regeneration
- Mesic Grassland w/ tree regeneration
- Red alder-Douglas-fir/snowberry
- Red alder-cottonwood/salmonberry

- Wetland
- Park Boundary
- Primary Road
- Secondary Road
- Trail

0 500 1,000
Feet



Produced by: National Park Service
PWRO-Seattle GIS Group

Date Created: February 28, 2007

Data Sources: NPS - lakes, park boundary,
roads, shoreline,
trails, vegetation

NWI - wetlands

San Juan County - roads

USGS - shaded relief

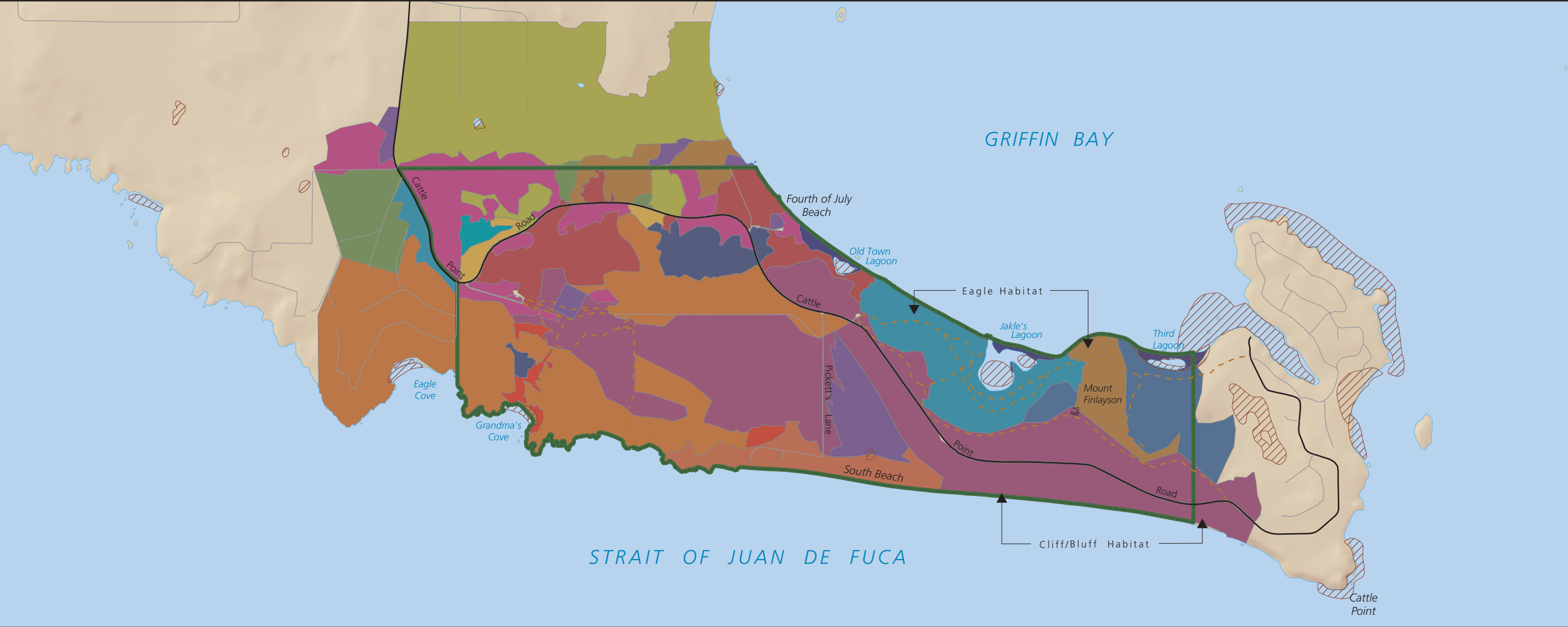
WDW - wildlife zones

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Figure 19

American Camp: Natural Resources

San Juan Island National Historical Park GMP/EIS

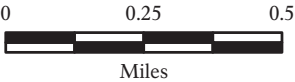


Vegetation - by Community

- Unknown
- Cold-deciduous shrubland
- Distichlis spicata - Salicornia virginica intertidal salt marsh
- Douglas-fir-Pacific madrone/ocean spray-snowberry
- Douglas-fir-grand fir-western hemlock/salal-ocean spray
- Douglas-fir-grand fir-western hemlock/sword fern
- Douglas-fir-lodgepole pine/ocean spray-snowberry
- Mesic Grassland

- Mesic Grassland w/ shrubs
- Mesic Grassland w/ shrubs and tree regeneration
- Mesic Grassland w/ tree regeneration
- Red alder-Douglas-fir/snowberry
- Red alder-cottonwood/salmonberry
- Sparsely vegetated sand dunes
- Sparsely vegetated sand flats
- Xeric Grassland with Shrub Islands

- Wetland
- Park Boundary
- Primary Road
- Secondary Road
- Trail



Produced by: National Park Service, PWRO-Seattle GIS Group

Date Created: February 28, 2007

Data Sources: NPS - lakes, park boundary, roads, shoreline, trails, vegetation
NWI - wetlands
San Juan County - roads
USGS - shaded relief
WDW - wildlife zones

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Figure 20

Fig 19

Fig 20

growth of camas, a bulb they harvested for food. The natural succession of encroaching trees and shrubs was likely reduced due to this practice (Stein, 2000). When the European settlers arrived, this area was used for livestock grazing as well as agricultural purposes. Because native plant species in this area are not hearty enough to tolerate heavy grazing, the establishment of non-native species occurred. Some of these species were introduced through contamination of seed stock, and others were purposefully planted in order to withstand grazing. Today, non-native and invasive plant species are found in the American Camp grasslands. These species are able to succeed at the expense of plants native to this area. The habits of the European rabbit, an invasive animal species, tend to favor non-native plants. As they burrow and dig out their warrens, the soil is exposed and compacted. Often, native plants are not adapted to establishing quickly at disturbed sites or growing in compacted soil. Non-native species are able to tolerate these conditions so they persist.

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

The park uses prescribed burning, mechanical and/or chemical control of invasive plants, and planting of native grasses and forbs to achieve restoration



Vegetation restoration area on American Camp prairie. NPS Photo.

goals. The discovery of the island marble butterfly at American Camp has created distinct management challenges. (See Special Status Species section.) A conservation agreement was developed by the park and the U.S. Fish and Wildlife Service, with the assistance of Dr. Robert Pyle that will guide management actions relative to the butterfly. It is expected that grassland restoration may increase island marble populations in the long-term by expanding suitable habitat in certain locations (National Park Service and U.S. Fish and Wildlife Service, 2006)

Garry oak woodlands, a once thriving and widespread ecosystem in the Puget Sound lowland region, are becoming rare due to urban growth, fire suppression, and the encroachment of Douglas-fir trees. Dense understories of shrubs and young Douglas-fir trees do not allow enough light and space for new oak trees to germinate and grow. Healthy oak woodlands are characterized by scattered trees among a prairie matrix. Native people in this region burned Garry oak woodlands as a hunting aid and to maintain an open prairie (Ericksen, 1993). Garry oaks are fire resistant, but pines, firs and shrubs are not (McGlaughlin, 2001). Thus, fire favors the oaks over conifers and herbaceous vegetation over shrubs.

At English Camp, the park has initiated a prescribed burn regimen to clear out the thick underbrush that is encroaching on the Garry oak woodland located on the southwest side of Young Hill. On July 1, 2003, the park conducted a prescribed burn of 25 acres in the oak woodland. The burn was successful with reports of young oak tree growth. Since then, the park has conducted two other prescribed burns consistent with the park's 2005 Fire Management Plan. Resource management staff from North Cascades National Park is assisting with monitoring post-burn vegetation response. Prescribed fire will continue to be a tool used by the park to restore the Garry oak woodlands.

Wildlife

A wide range of species and biodiversity exist on San Juan Island, but there are fewer species than found on the mainland. The island biogeography theory describes this phenomenon. Smaller more remote islands will exhibit less biodiversity than larger islands closer to the mainland (Schmidt and Olin, 1993). A smaller range of species is sustained when limited space and resources exist. San Juan Island is moderate in size, but it is located approximately 20 miles from

the mainland. Immigration and colonization is limited to those species that are capable of reaching the island.

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

Mammals

In the spring and summer, it is common to see resident killer whales (*Orcinus orca*), Minke whales (*Balaenoptera acuturostrata*), and Dall's porpoises (*Phocoenoides dalli*) off the shore of South Beach. Orcas congregate off the western and southern shores to feed on salmon migrating to fresh water streams for spawning (Washington Department of Fish and Wildlife, 1999).

There are three distinct forms of killer whales, termed residents, transients, and offshores, in the northeastern Pacific Ocean. Resident killer whales in U.S. waters are distributed from Alaska to California, with four distinct communities known—Southern, Northern, Southern Alaska, and Western Alaska. The Southern Resident distinct population segment (DPS) resides for part of the year in the island waterways of Washington State and British Columbia (Strait of Georgia, Strait of Juan de Fuca and Puget Sound), mainly in the late spring, summer and fall. The Southern Resident DPS consists of three pods, known as J, K, and L pods (National Marine Fisheries Service, 2006). At this time, approximately 90 whales comprise the Southern Resident DPS. The population peaked at 98 whales in 1995 followed by a decline in numbers from 1996 to 2001 (lowest in 2001 with 80 individuals). Whether there will continue to be an increase in population is unknown (Center for Whale Research, 2006). (See Special Status Species section.)

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

Camp. This impact is discussed in the "Invasive Species" section.

Three confirmed species of bats inhabit the park: the yuma bat (*Myotis yumanensis*), the big brown bat (*Eptesicus fuscus*), and the California myotis bat (*Myotis californicus*). The bat inventory was updated in 2006 using a variety of techniques at English Camp; however, weather conditions limited the inventory at American Camp (Christopherson, 2006). More than 1,700 yuma bats and big brown bats were counted exiting the Crook House (Christophersen, 2006). However, allowing bats to inhabit the house does not coincide with the preservation and stabilization of this historic building. The park has developed a strategy to relocate the colony into bat boxes, which are human-made fixtures that supply the bats with adequate space and appropriate conditions for breeding and roosting. A total of approximately 514 yuma bats were observed exiting the bat box in 2006, a significant increase from the 136 bats observed exiting the box in a 2005 inventory.

Birds

Approximately 160 species of birds are recorded on the park's species list. While several are assumed to be found in the park, the presence of 93 species has been confirmed. These include a variety of songbirds, shorebirds, seabirds, and waterfowl. Some only breed in the park, others are seasonal residents, and several reside in the park year round. In addition, the San Juan Islands are located along the Pacific Flyway migration route, and the park provides a critical resting stop for several species. Birds of prey including red-tailed hawk (*Buteo jamaicensis*), osprey (*Pandion haliaetus*), and bald eagles (*Haliaeetus leucocephalus*) are commonly observed in the park. A concentration of 40 to 50



Bald eagles tending their young at American Camp.
Photo by Russ Illig.

breeding pairs of bald eagles resides in the islands year-round. Washington State has the fourth largest count of eagle pairs in the lower 48 states following Florida, Minnesota, and Wisconsin. Most nesting habitat is located in the San Juan Islands and on the Olympic Peninsula coastline. Two-thirds of all nests in Washington occur on private land (Center for Biodiversity, 2007). Several nests are located in the park, and the eagles utilize the terrestrial and marine habitat for hunting and rearing their young.

Reptiles and Amphibians

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

Invertebrates

There are over one million known insect species. Because park funding is limited, a comprehensive insect inventory has not been conducted at the park. However, a butterfly inventory was conducted in 2003. Twenty-five butterfly and four moth species were documented at that time with three additional species confirmed in subsequent surveys. Butterfly monitoring will continue in the park, in part because the island marble butterfly (*Euchloe ausonides insulanus*), a rare species thought to be extinct, was recently found on the island, which has emphasized the importance of pollinators in the grassland ecosystem. (See Special Status Species section below.)

Special Status Species

Species of plants and animals that have undergone serious local, state or national declines and which may be threatened with extinction if they are not protected may be listed by the U.S. Fish and Wildlife Service (USFWS) and State of Washington as threatened, endangered, or rare. Species being studied for declines are often categorized as rare or sensitive.

Under Section 7 of the Endangered Species Act and Council on Environmental Quality regulations requiring analysis of whether proposed actions would violate any federal, state or local law, impacts to species listed or being considered for listing by either the U.S. Fish and Wildlife Service or the Washington Department of Fish and Wildlife are considered.

The following tables identify species listed by the USFWS or National Marine Fisheries Service (NMFS) as threatened, endangered, species of concern, or candidate species; as well as those listed by the Washington Department of Wildlife (WDFW) as rare, threatened, endangered or species of concern. This information was obtained from the USFWS through informal consultation under Section 7 of the Endangered Species Act (ESA) and from the WDFW based on information provided at their website.

As shown in the table below, there are 12 federal or state listed plants. The following table shows federal or state listed wildlife, including one species listed as federally threatened, 5 state sensitive species, and none that are federally proposed candidates for listing or species that are candidates for state listing.

Special Status Plant Species

The following table shows those plants that are considered special status species by state or federal agencies, their current status, their habitat occurrence, and whether the GMP will have an effect on the species. (See definitions at end of table.)

Special Status Plant Species*

Plant Species	Status	Habitat Occurrence	Effect of the Alternatives
Marsh Sandwort <i>Arenaria paludicola</i>	FE, SS (potentially extirpated)	See detailed information below.	No effect
Golden Paintbrush <i>Castilleja levisecta</i>	FT, SE	See detailed information below.	May affect, not likely to adversely affect (wholly beneficial)
California Buttercup <i>Ranunculus californicus</i>	ST	S1 Critically Imperiled. <i>Ranunculus californicus</i> grows on bluffs, rocky wooded areas, and in open grasslands along the coast at low elevations. This species generally prefers relatively dry grassland areas, but can be found in moister ecosystems. The plant typically flowers in May and June (Washington Natural Heritage Program, 2004). The taxonomy of <i>Ranunculus californicus</i> is complicated by the presence of <i>Ranunculus occidentalis</i> and the resulting hybrid swarms. During the field survey undertaken on Mt. Finlayson in the spring of 2005, the NPS identified 33 groups (consisting of 2 to 260 individuals) of California buttercup. The estimated total number of California buttercup plants is 1,839; however, due to the decumbent and multi-branched growth habits of this species, determining individual plants is difficult. Altogether, the plants occupy a total of approximately 0.5 acres within the project area. Within each group, the plants were distributed 'scattered-patchy' to 'continuous,' with no more than 16 feet between individual plants (NPS, 2005). The California buttercup also occurs on the American Camp prairie in approximately the same scattered patchy distribution documented on Mount Finlayson. A comprehensive survey, however, has not been conducted to determine the actual number of groups or individuals (National Park Service, 2005).	No effect

Special Status Plant Species*

Plant Species	Status	Habitat Occurrence	Effect of the Alternatives
Nuttall's Quillwort <i>Isoetes nuttallii</i>	SS	GRSS1 Globally secure, critically imperiled. It is found growing in seasonally wet ground or seepages and mud near vernal pools at low to middle elevations (Washington Natural Heritage Program, 2004; National Park Service, 2004).	No effect
Erect Pygmy Weed <i>Crassula connata</i>	ST	G5S1S2 Globally secure, but critically imperiled / state imperiled. Its preferred habitat is chaparral and wet to moist vernal pools on coastal bluffs. Five populations of this species are known to be present on private land within San Juan County.	No effect
Sharpruited Peppergrass <i>Lepidium oxycarpum</i>	ST	G4S1 Globally secure, state critically imperiled. It occurs in moist areas in the salt spray zone and in direct sunlight (Washington Natural Heritage Program, 2004).	No effect
Coast Microseris <i>Microseris bigelovii</i>	SS	G4SX Globally secure, state extirpated. This species is distributed along the coast from southern Vancouver Island, to California. It is found in grasslands, on old dunes and on glacial deposits, in small crevices, and on rock usually with very little soil, near the high tide line (Washington Natural Heritage Program, 2004). The species was historically present at Cattle Point (Washington Natural Heritage Information System, 2005).	No effect
Annual Sandwort <i>Minuartia pusilla</i> var. <i>pusilla</i>	SS	R1 requires more field work to assign rank. It is found in plains, open pine forest, chaparral slopes, and dry rock cliffs at an elevation of 25 to 7900 feet (Washington Natural Heritage Program, 2004).	No effect
Bear's Foot Sanicle <i>Sanicula arctopoides</i>	SE	S1 critically imperiled – five or fewer known occurrences in state. It ranges from the southern tip of Vancouver Island to California and grows in coastal bluffs and grassy sand dunes (Washington Natural Heritage Program, 2004).	No effect
Slender Crazyweed <i>Oxytropis campestris</i> var. <i>gracillis</i>	SS	It is found in a diverse array of habitats, including prairies and is known from San Juan County (National Park Service, 2004; Washington Natural Heritage Program, 2004).	No effect

Special Status Plant Species*

Plant Species	Status	Habitat Occurrence	Effect of the Alternatives
Macoun's Meadowfoam <i>Limnanthes macounii</i>	Canadian rare species	Not known to occur in Washington. It is listed as a rare species in Canada, with populations known from southern Vancouver Island and adjacent islands (National Park Service, 2005). Macoun's meadowfoam is a small annual plant that grows in open areas, close to the Pacific Ocean shoreline. It prefers areas that are seasonally wet in winter (Canadian Biodiversity website, 2005). Suitable habitat for this species is found in the park.	No effect

*Definitions

Federal

FE = Federally Endangered: Listed by the U.S. Fish and Wildlife Service as a species that is in danger of extinction throughout all or a significant portion of its range.

FT = Federally Threatened: Listed by the U.S. Fish and Wildlife Service as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

FP = Federal Proposed: Species for which the USFWS has proposed in the *Federal Register* listing as threatened or endangered.

FC = Federal Candidate: Species for which the U.S. Fish and Wildlife Service has sufficient information to propose for listing as threatened or endangered.

FSC = Federal Species of Concern: Species whose conservation standing is of concern to the U.S. Fish and Wildlife Service, but for which status information is still needed.

State

SE = Washington State Endangered: Any species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

ST = Washington State Threatened: Any species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

SC = Washington State Candidate: Includes species that the department will review for possible listing as state endangered, threatened, or Sensitive. A species will be considered for designation as a state candidate if sufficient evidence suggests that its status may meet the listing criteria defined for state endangered, threatened, or sensitive.

SS = Washington State Sensitive: Any species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats.

Plants

Marsh Sandwort

Marsh sandwort is an herbaceous perennial that has historically been found in Washington and California. It is an obligate wetland species, growing in or very close to water, found at low elevations. Marsh sandwort flowers from May to August. It can grow in saturated acidic bog soils and sandy substrates with high organic content (Washington Natural Heritage Program, 2004; Natural Resources Conservation Service, 2004).

Although marsh sandwort is classified by the state as potentially extirpated (Washington Natural Heritage Program, 2004), it is on the USFWS species list for San Juan County as potentially occurring in the county. Suitable habitat for this species occurs in the park.

Golden Paintbrush

Golden paintbrush is a rare regional endemic that has been extirpated from many of its historic localities. It is an herbaceous perennial found in open grasslands which prefers full sun. Flowering begins the last week of April and continues into July (U.S. Fish and Wildlife Service, 2000; Washington Natural Heritage Program, 2005). Although historically present at Cattle Point, it is currently thought to be extirpated from the park.

Special Status Wildlife Species

The following table shows those wildlife species that are considered special status species by state or federal agencies, their current status, their habitat occurrence, and whether the GMP will have an effect on the species. (See definitions at end of the table.)

