San Juan Island

Prairie Stewardship

Restoring Balance & Integrity to a Legacy Landscape

Prairies were once fairly common in the Puget Sound region of western Washington. Historically, the dense conifer forests that dominate the landscape yielded to an open landscape of grasslands and sparse oak woodlands rich in biodiversity. In the mid 1800s, long before many of these areas were converted to farmlands, residential areas and urban centers, European immigrants to the region referred to these mostly treeless grasslands as “prairie”.

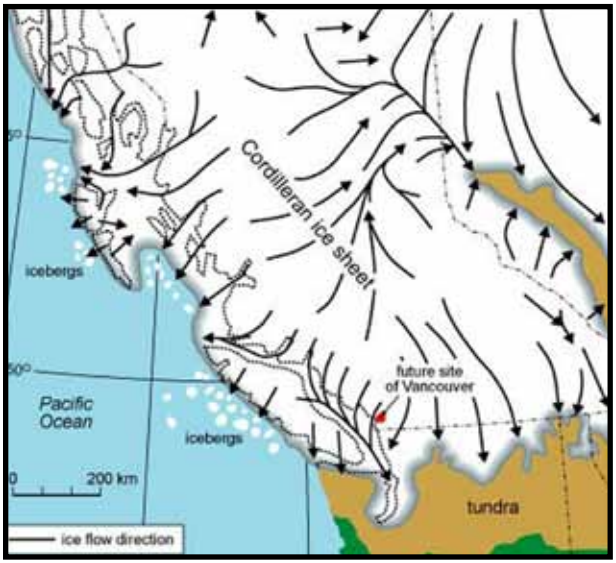
The grasslands were preferred by early settlers, and for many of the same reasons as the indigenous native peoples who sustained these natural gardens for thousands of years before the arrival of exotic immigrants. The prairies provided an open landscape valued for growing crops and providing pasture for livestock because extensive land clearing was not necessary. However, over the past 150 years there have been extensive changes to the once pristine prairie landscape, including land clearing, development, agriculture and fire suppression which have fragmented and drastically reduced the amount of prairie habitat by promoting the encroachment of woody shrubs and trees, as well as a plethora of non-native vegetation.

Landscape alterations and environmental changes have not been without devastating consequences to the native plants and animals that prairie habitats sustain. Our remaining prairies face many continued challenges, such as conversion for agriculture or land development, invasive species, overgrazing, and a lack of the periodic fires that once maintained these areas as grasslands. With a focus on San Juan Island, this brochure provides a glimpse into the past, present and future potential of prairie habitats in the region, and establishes the intent to empower community stewardship and involvement in restoring balance and integrity to an importnat legacy landscape, the Home Prairie.

Located in the Salish Sea at the juncture of Puget Sound, Georgia Strait and the Strait of Juan de Fuca, the San Juan Island Archipelago encompasses 175 square miles of diverse terrestrial habitats, including forests, farms, wetlands and prairies, as well as a wide variety of unique coastal areas and more than 400 linear miles of shoreline. Considered a world class destination, the islands offer a diversity of authentic experiences that parallel its natural wonders. The island ecosystem is biologically rich, yet fragile, so it is fortunate that natural resource stewardship has a long history that characterizes the island culture and vibrant way of life for the local communities.

Prairie Origins

Long before the beauty and bounty of life blossomed on the prairies of western Washington, the Puget Sound region was covered with an immense sheet of ice, Fraser Glacier, which reached an estimated thickness of 4,000 feet over San Juan County about 17,000 years ago. As this massive glacier retreated been 12,000-15,000 years ago, it scraped and carved the terrain leaving behind layered deposits of water-sculpted rocks and gravel of mixed sizes, and forming the landscape features that we know today, including the Puget Sound, the Straits, and hundreds of islands such as the San Juan Islands, an archipelago consisting of 172 islands off of the coast of western Washington.



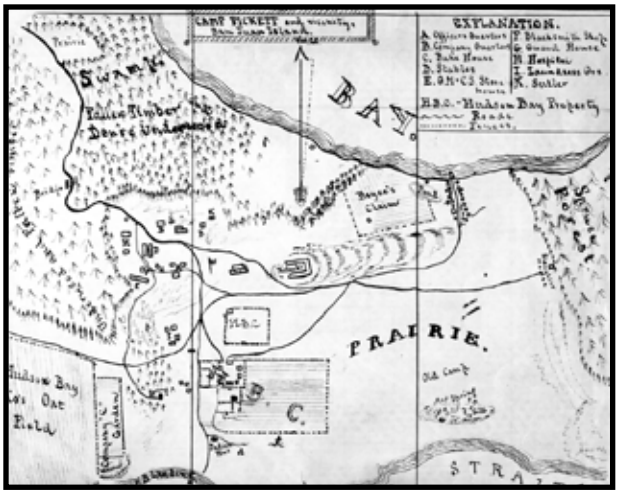
Over thousands of years as the glaciers retreated, rocks broke down, and organic matter accumulated to make up the soils we have today. Many of these soils have a poor capacity to hold water, and the well-drained, nutrient marginal soils initially only supported certain vegetative communities. Grasses and other prairie plants were first to colonize the landscape, and exposure to harsh conditions of direct summer sun, drying effects of wind, and low precipitation in the rain shadow of the Olympic Mountains allowed the prairie to thrive intact. Nevertheless, landscapes constantly evolve in response to climate change, geologic processes and human impacts.

It has been estimated that when European explorers arrived, the prairies of western Washington covered more than 200,000 acres. However, from the time early homesteaders arrived and upset the delicate balance preserved by native peoples, who routinely set the prairie on fire to maintain the landscape, prairie habitat has been reduced by over 90 percent. Those that remain continue to decrease in land cover and experience diminished ecosystem health. In the Puget Sound region, where vegetation is now dominated by forests, prairies of mostly grasses and forbs provide a unique habitat rich in biodiversity and support many increasingly rare plants and animals. Once sustained by native peoples, prairies are one of the most rare and endangered ecosystems. Today, as in the past, they are once again dependent on human activity to protect and sustain them.

Cultural History

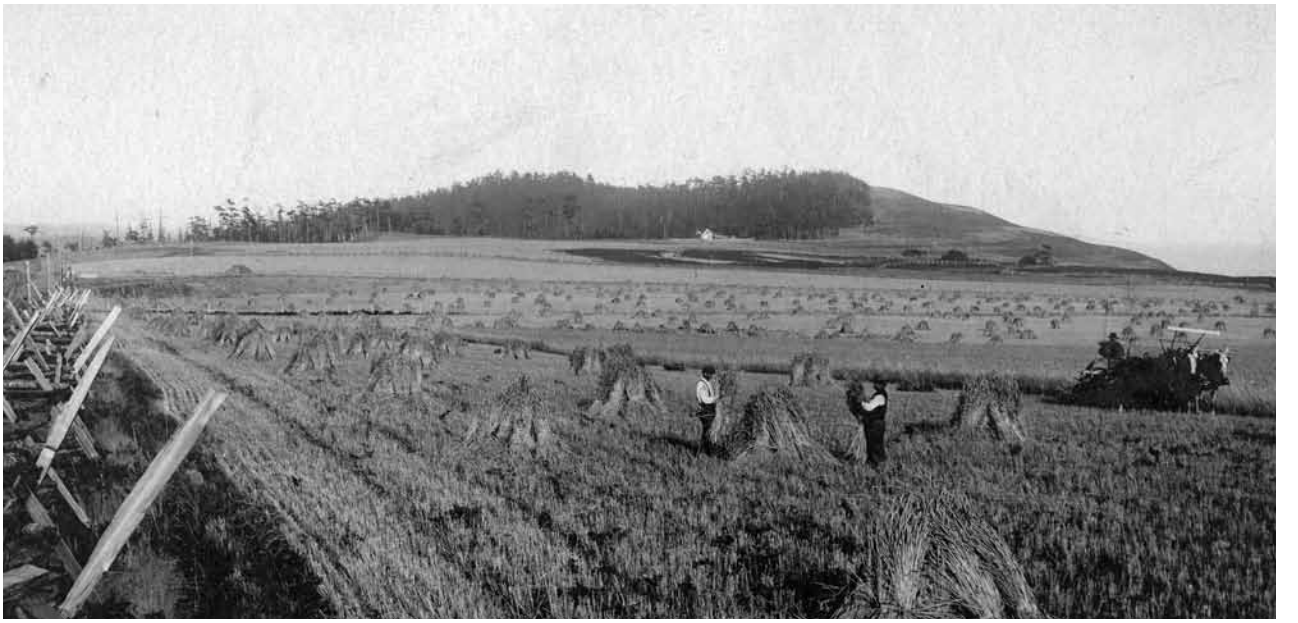
Human occupation and use of San Juan Island's natural resources, especially the historic prairie grasslands and shorelines, has been extensive. Archaeological evidence indicates the presence of indigenous peoples on San Juan Island at least 9,000 years prior to the arrival of European immigrants. American Indians who utilized the islands, known collectively as the Central Coast Salish peoples, include the Lummi, Klallam, Swinomish, Samish, San Juan Tribe of Indians, Mitchell Bay Tribe, and the Canadian Songhees, Saanich, and Semiahmoo bands. Some of these groups established permanent settlements on the islands, while others were transient and used the islands for temporary seasonal camps.

The indigenous Salish peoples sustained the grassy, open plains by setting fires in the summer and fall to keep the encroaching trees at bay, improving hunting and gathering, particularly for wildflowers, medicinal plants and edible root crops, like camas. Bulbs of the native camas, a carbohydrate-rich dietary staple, were harvested, preserved and even traded with other tribes in the region. Root crops also included Chocolate Lilies, the bulblets of which were used like rice, Lomatiums as wild carrots and Alium as wild onion. Berries of plants such as Oregon grape, salmonberry and wild strawberry were harvested. Medicines were wild-crafted from plants such as Yarrow which was used as an antiseptic. Willows, Tule rushes and prairie grasses were used to make baskets, blankets and other textiles. Additionally, the clean, coastal waters surrounding San Juan Island provided enormous provisions of shellfish and fish such as salmon and halibut, other dietary staples which could be easily dried, stored and traded.



Settlement of San Juan Island by early American and British immigrants began during the 1850s. The British Hudson's Bay Company (HBC) established a fishing camp on the island in 1851 and an extensive sheep farm in 1853. Meanwhile American homesteaders began claiming farmsteads in the same open prairies valued by the British for sheep grazing. Settlement issues on San Juan Island increasingly led to disputes over natural resources and land ownership. Tensions came to a head in June 1859 when an American settler shot and killed an HBC-owned pig that he found rooting through his potato patch. The act of killing the pig escalated into an international incident as U. S. Army and British Royal Navy forces confronted one another on the island and surrounding waters. Fortunately the two governments were able to negotiate a stand-down and officially agreed to a joint military occupation of San Juan Island until a diplomatic solution could be achieved. By March 1860, companies of Royal Marines and U.S. Army infantry established military posts on opposite ends of the island to protect the interests of their citizens.

The Americans established their camp in the open grasslands on the south end of the island, while the Britishoccupied a sheltered bay on the north end of the island. Early pioneers settled primarily near American Camp where the original town site of San Juan was established on the shore of Griffin Bay. Slowly as new homesteaders arrived, farms began to be established throughout the island in the vicinity of both camps. Following 12 years of peaceful joint occupation, ownership of San Juan Islands was decided in October 1872 when the international boundary was finally established through binding arbitration at Haro Strait. The British pulled out within a month and “English Camp” (as it was called by settlers) became a farm and homestead until the state of Washington acquired the site in 1963. The American military relinquished control of their camp in 1874, and various homesteaders established farms on the resveration’s vast grasslands to grow crops and pasture livestock. In 1951 the state of Washington acquired the five-acre core of the historic camp, eventually transferring it to the National Park Service in 1966. Although San Juan Island’s economic base has shifted from agricultural, fishing and lime mining over the past several decades, the local communities are still primarily dependent on the bounty of natural resources that now supports more of a recreation and tourism based economy.



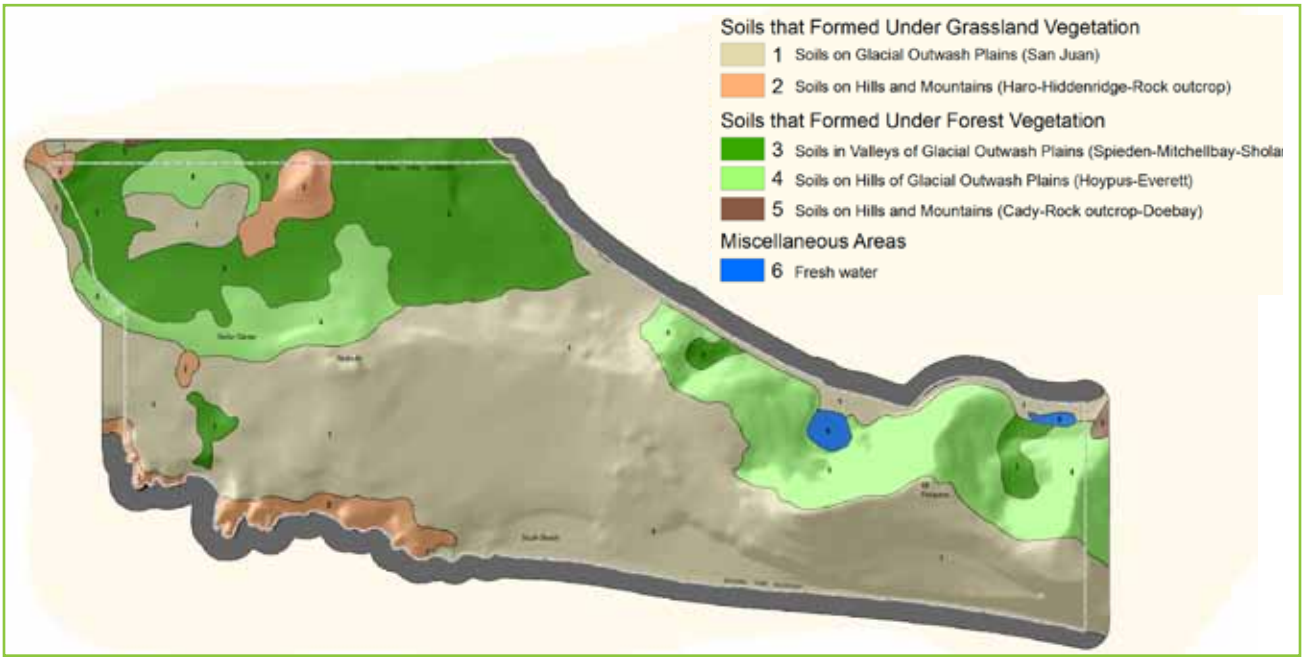
Prairie Ecology

Prairie ecosystems are dominated by grasses and other herbaceous plants collectively referred to as forbs and a close look at the vegetation across a prairie landscape reveals considerable variation. Prairie plant communities are greatly influenced by underlying soils and other primary factors including wind speed, proximity to marine waters, aspect, elevation, and soil properties, such as texture and available water capacity. Each of these factors alone, as well as altogether, can have a wide range of effects on local microclimates, including fluctuations in air and soil temperatures, moisture regimes and ultimately the vegetation, habitat and wildlife that a site can support.

Prairie habitat types are also often described in terms of moisture, as the amount of precipitation or quantity of water that various soils can hold will have a great effect on the plant communities. Hydric or wet prairie sites are often dubbed wetlands, as are bogs, fens, marshes, wet meadows and vernal pools. Mesic prairies have a moderate or well-balanced supply of moisture, and xeric prairies refer to relatively dry grasslands.

Prairie Soils

Given the degraded and altered conditions of many historic prairies, scientists often use soil mapping to identify areas that likely supported native prairies before European settlement. The soils of an area have a major influence on the plants that can grow there and what species of wildlife may be present. Soils in prairies of the Puget Sound region were formed by retreating glaciers and tend to be gravelly, well-drained, and nutrient poor. Of the thirty-seven soil types described and delineated by the San Juan County Soil Survey, eight soil types influence San Juan Island prairies. The appearance and properties of these soils are a result of the interaction of five soil-forming factors—parent material, climate, topography, biological factors, and time. These factors and their affect on soils and the plant communities that they support are interdependent and inseparable. Thus, climatic changes will influence the ecological habitats that are adapted to a particular soil type.



Prairie Ecotypes

PUGET BALD – Soils that support this native plant community are typically shallow and found on south- and west-facing slopes. Haro and Hiddenridge soils support this community. Historically, these areas were kept free of extensive brush and tree cover by burning. Typical native plant species in these communities include Roemer's Fescue, Common Camas, Prairie Junegrass, California Oatgrass, Field Chickweed, and Garry Oak. In some areas, where prevailing winds (especially across marine waters) or elevation contribute to cooler conditions than is typical of the climate that generally is associated with these soils, referred to as cold phase, Garry Oak is usually absent.

XERIC PRAIRIE – The generally deep, coarse-textured, commonly sandy and well drained soils that support this native plant community typically are on glacial plains. Historically, these areas were kept free of extensive brush and tree cover by burning. San Juan and Pilepoint soils support this plant community. Typical native plant species include Roemer's Fescue, Common Camas, Blue Wildrye, Slender Wheatgrass, Field Chickweed, and Garry Oak, although in cold phase areas, Garry Oak is usually absent.

BOG or FEN – Soils that support this native plant community are typically nutrient-poor, very acidic and found in depressional areas with an accumulation of organic matter and a high water table. Semiahmoo, Shalcar, and Orcas soils support this plant community. The areas may have historically been kept free of extensive brush and tree cover by burning. Typical native plant species include Labrador Tea, Salal, Spirea, Sedges, and a minor amount of Lodgepole Pine.

SALT WATER BLUFF – The Generally dry, sandy soils that support this native plant community are usually on, adjacent to or at the toeslopes of steep bluffs directly above unprotected marine waters. Typical soils that support this plant community are Xerorthents. When compared to other native prairie plant communities, this community generally has more Red Fescue and less Roemer's Fescue. Other common native plants are Barestem Desert Parsley and Great Camas.

HIGH SALT MARSH – Soils that support this native plant community are typically nearly level with a water table consistently close to the soil surface, as they are found adjacent to marine waters and affected by extreme high tides and saltwater intrusion. Typical soils that support this plant community are the Dugualla soils. This ecological site is in areas that are cooler than the rest of the immediate Puget Trough area, because it is exposed to prevailing winds from across unprotected marine waters. Typical native plant species include American Dunegrass, Tufted Hairgrass, Red Fescue, Gumweed, Douglas Aster, and Pacific Silverweed.

LOW SALT MARSH – Immediately adjacent to High Salt Marsh plant communities, Soils that support this native plant community are typically nearly level with a water table always very close to the soil surface, as they are found immediately adjacent to marine waters and affected by daily high tides and regular saltwater intrusion. Typical soils that support this plant community are Endoaquents, and found in areas that are cooler than the rest of the immediate Puget Trough area, because it is exposed to prevailing winds from across unprotected marine waters. Typical native plant species include Saltgrass, Seaside Arrowgrass, Lyngby Sedge, Pickleweed, and Seaside Plantain.

Other Prairie Ecotypes - *Oak Woodlands*

Oak woodlands are another community type intricately related to the prairies of San Juan Island because they often, or at least historically, occupied the zone between prairies and conifer forests. Western Washington's only native oak, Garry Oak (*Quercus garryana*), also commonly known as Oregon White Oak, is a native tree species once encountered in far greater numbers. Sometimes Garry Oak are widely spaced forming oak savannahs interspersed with prairie meadows, such as the historic landscape of Oak Prairie (now known as San Juan Valley) and in other areas the trees are dense and form oak stands or woodlands. Oak woodland communities are a type of ecosystem known for supporting high biological diversity, and were historically maintained through periodic burning of surrounding meadows. Low-intensity fires once suppressed the growth of competing tree species and spurred new oak trees to sprout, but the suppression of fire has allowed oak stands to be overgrown by faster growing conifers such as Douglas-fir. Due to the dramatic decline of Garry Oak woodlands in the Pacific Northwest, remaining stands larger than one acre are classified as priority habitat ecosystems by the state of Washington.

Common Prairie Plants

Native Grasses

Lemmon's Needlegrass	(*Achnatherum lemmonii*)
Sitka Brome	(*Bromus sitchensis*)
California Oatgrass	(*Danthonia californica*)
Jepson's Blue Wildrye	(*Elymus glaucus*)
Roemer's Fescue	(*Festuca roemerii*)
Red Fescue	(*Festuca rubra*)
Prairie June Grass	(*Koeleria macrantha*)
American Dunegrass	(*Leymus mollis*)

Native Forbs

Western Yarrow	(*Achillea millefolium*)
Tapertip Onion	(*Allium acuminatum*)
Pearly Everlasting	(*Anaphalis margaritacea*)
Harvest Brodiaea	(*Brodiaea coronaria*)
Common Camas	(*Camassia quamash*)
Field Chickweed	(*Cerastium arvense*)
Fireweed	(*Chamerion angustifolium*)
Miner's Lettuce	(*Claytonia perfoliata*)
Giant White Fawnlily	(*Erythronium oregonum*)
Chocolate Lily	(*Fritillaria affinis*)
Threepetal Bedstraw	(*Galium trifidum*)
Common Cow Parsnip	(*Heracleum maximum*)
Menzies' Pepperweed	(*Lepidium virginicum*)
Barestem Biscuitroot	(*Lomatium nudicaule*)
Common Lomatium	(*Lomatium utriculatum*)
Western Buttercup	(*Ranunculus occidentalis*)
Idaho Blue-Eyed Grass	(*Sisyrinchium idahoense*)
Canada Goldenrod	(*Solidago Canadensis*)
California Nettle	(*Urtica dioica*)
Hookedspur Violet	(*Viola adunca*)
American Vetch	(*Vicia Americana*)
Meadow Death Camas	(*Zigadenus venenosus*)

Native Woody Plants

Black Hawthorne	(*Crataegus douglasii*)
Oceanspray	(*Holodiscus discolor*)
Tall Oregon-grape	(*Mahonia aquifolium*)
Douglas Fir	(*Pseudotsuga menziesii*)
Bracken Fern	(*Pteridium aquilinum*)
Garry Oak	(*Quercus garryana*)
Red-flowering Currant	(*Ribes sanguineum*)
Baldhip Rose	(*Rosa gymnocarpa*)
Nootka Rose	(*Rosa nutkana*)
Trailing Blackberry	(*Rubus ursinus*)
Common Snowberry	(*Symphoricarpos albus*)

Exotic Grasses

Creeping Bentgrass	(*Agrostis stolonifera*)
Soft Brome	(*Bromus hordeaceus*)
Ripgut Brome	(*Bromus rigidus*)
Orchardgrass	(*Dactylis glomerata*)
Quackgrass	(*Elymus repens*)
Common Velvetgrass	(*Holcus lanatus*)
Timothy	(*Phleum pretense*)
Kentucky Bluegrass	(*Poa pratensis*)
Meadow ryegrass	(*Schedonorus pratensis*)

Exotic Forbs

Common Mustard	(*Brassica rapa*)
Spotted Knapweed	(*Centaurea stoebe*)
Lambsquarters	(*Chenopodium album*)
Chicory	(*Cichorium intybus*)
Canada Thistle	(*Cirsium arvense*)
Bull Thistle	(*Cirsium vulgare*)
Queen Anne's Lace	(*Daucus carota*)
Teasel	(*Dipsacus fullonum*)
California Poppy	(*Eschscholzia californica*)
Robert Geranium	(*Geranium robertianum*)
St. Johnswort	(*Hypericum perforatum*)
Oxeye Daisy	(*Leucanthemum vulgare*)
Creeping Buttercup	(*Ranunculus repens*)
Common Sheep Sorrel	(*Rumex acetosella*)
Curly Dock	(*Rumex crispus*)
Tansy Ragwort	(*Senecio jacbaea*)
Tall Tumblemustard	(*Sisymbrium altissimum*)
Common Dandelion	(*Taraxacum officinale*)
Common Mullein	(*Verbascum Thapsus*)

Exotic Woody Plants

English Hawthorn	(*Crataegus monogyna*)
Himalayan Blackberry	(*Rubus discolor*)
Scotch Broom	(*Cytisus scoparius*)

Rare Prairie Species

Rare Plants

Golden Paintbrush	(Castilleja levisecta)
Sand Pygmyweed	(Crassula connate)
California Buttercup	(Ranunculus californicus)
Hall's Aster	(Symphotrichum hallii)

Rare Wildlife

Island Marble Butterfly	(Euchloe ausonides insulanus)
Taylor's Checkerspot Butterfly	(Euphydryas editha taylori)
Streaked Horned Lark	(Eremophila alpestris strigata)

Prairie Challenges

Ongoing challenges to the prairie and oak habitats:

- **Encroachment of exotic and invasive species**
- **Lack of periodic fires that suppress invasive plants**
- **Expansion of agriculture and clearing for land development**
- **Continued fragmentation of prairie habitats, leaving them small and isolated from each other**

Exotic and Invasive Species

Non-native plants and animals, exotic species, have threatened the natural integrity of San Juan Island prairie ecosystem since the arrival of domesticated animals and agricultural practices of early homesteaders. Sheep and other animals introduced to the island by the Hudson's Bay Company in the 1840s likely brought with them seeds of many exotic plants lodged in their fur, and the spread of these new plants to the island certainly increased as the animals were moved throughout the island to graze in the open grasslands and valleys. Exotic plants and animals new to the island ecosystem also became established both inadvertently and even intentionally by settlers as they established homesteads and farms across the island, a trend which has continued for over 150 years. Prairie ecosystems are also subject to undesirable changes by invasive native plants that threaten to overtake prairie habitat. As weather patterns shift and natural succession continues, without active management and maintenance of the grasslands, much of the historic prairie will continue to be consumed by

Exotic Wildlife

European rabbits were brought to the island, c.1890-1910, as a food source for settlers, and have proven to be a significant challenge to many prairies on San Juan Island. The rabbits, which reproduce quickly, are responsible for habitat degradation and an increase in bare soil, which is quickly colonized by invasive plants. Other non-native wildlife problematic for San Juan Island prairies includes feral cats and red foxes. The San Juan Islands, located along an important avian migration route, provide a critical resting stop for many bird species, while others nest in prairie habitats. Cats and foxes prey on many bird species, in addition to wildlife such as mice and voles that play an important role in prairie ecology.

Exotic Plants

Exotic, nonnative, plants are widespread throughout San Juan Island, largely due to past agricultural practices. However more recent development, home gardening and landscape practices continue to introduce a wide variety of new nonnative species, in addition to the introduction of exotic plants by visitors inadvertently carrying exotic seeds from travels abroad. Exotic plants are a particular challenge to native ecosystems because unlike the native plants that developed in this environment over the course of thousands of years, non-native plants originated in other areas and have been introduced to an ecosystem where they are generally free from natural controls, such as insects, wildlife and other organisms that kept them in check in the homelands where they originated. Many species of exotic plants have wreaked havoc on native prairie plants, over-crowding them, competing for available resources and in some cases drastically changing the structure of soils on which the native species depend. Natural function, plant composition and overall biodiversity of remaining prairies have been severely altered by the introduction of exotic plants.

Development Pressures

Land use activities such as urban development, agricultural practices and residential expansion, continue to pose a significant challenge to the prairies that remain. As in other areas throughout western Washington, on San Juan Island many large farm and pasture lands that contain remnant prairie habitats are being further subdivided to make way for new residences. While some lands are actively being converted to other uses, some effects on the prairies are far more passive. The establishment of additional roads and property boundaries such as fences and hedgerows continue to shrink and isolate remaining grasslands. Increased development also brings significant hydrologic changes including further taxing the local water supply, increased impervious surfaces, accelerated runoff, additional septic systems, ponds and other landscape features that alter natural habitats and ecological functions. Development fragments native ecosystems and can isolate wildlife populations, which is a particular concern with rare habitats such as prairie and Garry oak woodlands.

Prairie Restoration

Ecosystems are dynamic. Ultimately no plant community will naturally remain the same indefinitely. The environmental and ecological conditions on San Juan Island during and preceding the historic period are sure to be different than those of present and future years. Climatic patterns, species composition, landscape structure, and disturbance, type, frequency, and intensity are all likely to change and fluctuate over time. Ecological factors present at any time can cause transitions, either abrupt or gradual, from one plant community, habitat type or ecosystem, to another. Sometimes the transitions are gradual, and the effects can be reversed, but more often they are relatively abrupt (such as fire or tillage), and only a massive input of energy can move the community from the new state back to a previous state, especially when transitions to the new state have become relatively stable, such as grassland that has been converted to forest.

Restoration of native prairie is essentially about plant management. Whether halting the encroachment of trees and shrubs or controlling exotic grasses and forbs, restoration of prairie where it once naturally occurred revolves around plant management. However effectively restoring an area to prairie and sustaining it over time can be extremely difficult given modern challenges and increased threats to prairies.

Historically maintenance of prairie ecosystems by indigenous peoples was relatively straightforward. Setting grasslands on fire was once a relatively simple approach to sustain prairies because exotic plants were not a threat, native prairie plants were adapted to fire and abundant to readily re-colonize if consumed by fire, and potential loss of physical property such as homes and infrastructure was minimal. In modern times, restoring native prairie vegetation and sustaining the ecosystem over time is a long-term commitment—not just months but many years. Invasive plant control is typically the most expensive, labor intensive and longest phase requiring the biggest commitment of time and resources.

Re-Vegetation Techniques

Selecting an approach to re-establishing native prairie plants should consider potential constraints including availability of native seed or plant sources, soil conditions, size and scope of planting, weather conditions, water availability, as well as feasibility and appropriate scale of short and long term maintenance.

Seeding

Generally the best source of native seed is from nearby prairie remnants or remaining native species. Seed of some native species may be available from commercial sources, but should be selected with extreme caution and not without thorough consultation. Seed application methods include broadcast, drill seeding and hydroseedling. Direct or broadcast seeding scatters seed over the planting site either by hand or with a grass seed spreader. Drill seeding involves the use of a specialized tractor implement (a drill seeder) to drill seed into the ground at a desired depth while filling the holes with seed of a desired mixture and density. Hydroseeding utilizes specialized equipment to spray a slurry of wet mulch and/or soil, fertilizer, and seed.

Planting

Hand planting of seedlings grown in plug trays involves using a hand tool such as narrow spade or specialized tool such as a hoedad or dibble to create plug-sized holes to install the seedlings. Alternatively, plugs can also be planted with the aid of specialized tractor implements. Installing potted, container-grown plants involves using a shovel or power soil auger to create a hole slightly deeper than the height of the soil in the pot.

Plant Protection

Typically utilized for woody plants, plant protection strategies are an important consideration in areas with intense browse from wildlife such as deer, rabbits and voles, as well as in areas with livestock and around plantings of sensitive or rare plants. Wire mesh, commercial tree protectors and fencing of various materials can be used to protect plantings until they can become established.

Invasive Plant Control

Invasive plant management decisions vary according to plant life cycles, infestation size, environmental parameters, social constraints and management objectives. Pulling a perennial species such as Canada thistle is generally a futile effort, but can be effective for control of a biennial plant such Teasal. Utilizing prescribed fire or application of chemical herbicides may not be socially acceptable practices in every community. Successful plant management requires selection of acceptable and effective management methods, as well as proper plant identification, timing of control application and monitoring the effects over time.

Preventive Control

When feasible, prevention is the most effective method of invasive plant management. Once an infestation becomes established, any increase in size and density requires increasingly more intensive and expensive management efforts. Early detection and rapid response saves time and money. Aggressive management action on small, newly established infestations can result in eradication, whereas complete, long-term removal of a well established species can often be unrealistic.

Cultural Control

Cultural control, the establishment of competitive and desired vegetation, can often slow the spread of invasive species, which are typically opportunistic and readily invade disturbed sites. Ground disturbances that damage or remove desirable and competitive vegetation create sites for exotic plant invasion. Controlling exotic species on such sites can be futile without vegetative restoration, because invasive plants can readily re-invade the disturbed area. Success often depends on proper species selection suitable for a particular soil type, moisture regime and growing season. Other factors such as soil compaction, seeding depth, time of year, and invasive plant control during establishment are usually critical to success of cultural control methods.

Mechanical Control

Mechanical control consists of methods that kill or suppress invasives by disrupting the plants' ability to grow and/or reproduce. Such methods include pulling, cutting, grubbing, digging, disking, plowing, mulching, solarizing and mowing. Success of various mechanical control methods is generally dependent on adequate timing and the ecological life cycle of the target species, for instance many mechanical control techniques that are effective on annual and biennial species, such as hand-pulling, digging or shallow tillage can actually be counter-productive when the target plants are invasive perennial species such as Canada Thistle, Field Bindweed or Japanese Knotweed. Perennial plants often have meristematic buds that can set roots and readily reproduce from root or shoot segments deposited on the soil surface. Mechanical control techniques such as shallow tillage and hand-pulling of perennial weeds can result in a larger, denser and more uniform infestation than the initial patch, whereas mowing is a suppression measure that can prevent or decrease seed head production and limit its spread.

Chemical Control

Herbicide application can provide an effective and time-efficient method of managing weeds, but must be carefully planned and cautiously considered. Numerous herbicides are available that provide selective plant control, but must be carefully handled by individuals trained in proper use, application and cleanup. A variety of methods can be used for applying herbicides. Spot spraying involves single nozzle application targeting individual plants, broadcast spraying consists of multiple nozzles covering a broad area. Wipers and wick applicators refer to using an absorbent material that is supplied with herbicide and then “wiped” over the surface of taller, target species. Stem injection consists of using an herbicide filled syringe to inject chemical into a plant. Additionally there are many variations to these basic application methods.

Biological Control

The goal of biological control is generally not focused on eradication, but the suppression of vigor and spread through the use of living agents. Such agents can be insects, bacteria, fungi, or grazing animals such as sheep, goats, cattle or horses. However due to a focus on insect agents by many agency programs, biological control is most commonly thought of as ‘insect biocontrol’ which involve agents subjected to intensive multi-year screening programs to ensure host specificity (feeds only on target species) prior to approval for release.Biological control agents are typically utilized in cases where eradication is impractical due to the vastness or inaccessibility of an infestation, and where other methods of management are not feasible. Biocontrols can limit the spread and density of targeted exotic species by feeding on leaves, stems, roots and/or seed heads. However it must be accepted that complete eradication of an invasive species cannot be attained through biocontrols, and the agents may have undesirable effects on natural prairie ecology, such as predation on non-target species. The most effective scenario that can be attained is a plant infestation reduced to a tolerable level where the agents are significantly limiting distribution and abundance of the target species and its density is no longer considered detrimental to the desired plant community.

Prescribed Fire

Carefully planned, strategically timed and meticulously managed, prescribed fires are a habitat restoration and maintenance strategy for removing unwanted vegetation and accumulated natural debris, as well as shifting species composition and contributing to renewed soil health by releasing vital nutrients stored in natural materials. Once maintained by Native Americans through periodic burning, many open prairies and associated oak woodlands are now often invaded by non-native vegetation and the expansion of adjacent forests. Throughout the historic range of prairie ecosystems, fire suppression has allowed fast-growing native trees such as Douglas Fir and shrubs such as snowberry and wild roses to become established, but the reintroduction of fire into these ecosystems will favor fire-resistant natives such as Garry Oak, prairie bunchgrasses and forbs like Camas.

Integrated Approaches to Prairie Restoration

An integrated approach to prairie restoration involves utilizing a full suite of invasive plant control methods, native plant establishment techniques and landscape maintenance strategies. This intricate stewardship approach recognizes that there are no blanket solutions and no single method that will be effectively applied across a broad landscape to achieve a desired outcome. It accepts that ecosystems are diverse and dynamic and therefore require a multi-faceted and dynamic approach. The habitat enhancement goals for one prairie restoration site will not necessarily be the same for another, and likely will involve a unique approach and stewardship design. An integrated approach takes into account the vast array of tools and techniques, available resources and funding, various pros and cons, as well as the interests and concerns of stakeholders, to develop a balanced, effective and sustainable long-term strategy to restore function, health and vitality to native prairie ecosystems.

Examples of Prairie Stewardship in the North Puget Sound

Ebey's Landing National Historical Reserve

Located on Whidbey Island in the North Puget Sound, Ebey's Landing National Historical Reserve is a cultural landscape of 17,572 acres including public and private lands, 17 working farms, two state parks and diverse habitats such as native prairies. The Reserve is protected by the National Park Service, recognized as the first historical reserve in the United States and honored as a national model for sustainable development in rural communities. Managed and sustained through a consortium of community stewardship partners, the Reserve lands are protected across a diverse landscape that is lived in and actively farmed while preserving the historic character, conserving natural resources, restoring rare species and enhancing remnant prairies.

Through extensive community support, committed volunteers and partnerships with many local, regional, and national organizations, Ebey's Reserve has implemented a wide variety of prairie stewardship activities, including control of non-native species, reintroduction of prairie fires through prescribed burns, removal of fir trees from prairie remnants, restoration studies, and the production, installation and protection of native plants including the endangered Golden Paintbrush.

More information can be obtained at www.nps.gov/ebla.

Yellow Island Preserve

One of the best examples of long-term, effective prairie stewardship and habitat enhancement in the San Juan Islands is that of The Nature Conservancy's endeavor to restore the grassland ecosystem on Yellow Island. Purchased by The Nature Conservancy in 1979, Yellow Island is an 11-acre island located in the San Juan archipelago, between Orcas and San Juan Islands. Since 1980 the Conservancy has conducted extensive ecological research on the island, and contributed to a greater understanding of island prairie restoration by studying the extent and rate of invasion on the grasslands by trees and shrubs, controlling and reversing ecosystem changes and developing strategies for restoring native species where they have been eliminated from the island.

Like many of the prairies in the San Juan Islands, historically the grasslands were extensively utilized by indigenous peoples for harvesting native plants and regularly maintained by fires prior to the arrival of European immigrants. As a relatively small island, the diverse prairie on Yellow Island was spared from intensive settlement pressures, widespread agriculture, heavy grazing and introduced species threats. However as indigenous use of the island became drastically reduced in the mid 1800s, the prairie, along with its inherent biological diversity, began to be overcome by trees and shrubs. A trend that has been reversed through the reintroduction of fire, effective land stewardship and ecological restoration efforts of The Nature Conservancy, its partners and numerous volunteers.

Visit Yellow Island Preserve

Open year-round between 10 a.m. to 4 p.m., Yellow Island can be reached by private boat or kayak. Visitors should come ashore only at the southeast beach, below the Dodd cabin. Please stay on the established trails. No pets, picnics, smoking, camping or overnight mooring is allowed. Groups of more than six people require written permission before visiting Yellow Island. To arrange for such a visit, please contact The Nature Conservancy at (206) 343-4344.

More information can be obtained on the Conservancy website at:
http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/washington/placesweprotect/yellow-island.xml

San Juan Island National Historical Park

Established in 1966, San Juan Island National Historical Park encompasses 1,752 acres on San Juan Island, including two units located on opposite ends of the island, and commemorates the peaceful resolution between two countries which share the longest unfortified international border in the world. English Camp, with 529 acres, is located on the northwestern shore of the island and includes only a portion of the original British military reservation. American Camp covers 1,223 acres and includes much of the original military reservation established on the southeastern peninsula of San Juan Island.

Protecting and conserving the island prairie ecosystem, including the reestablishment of rare species and ensuring their perpetuation for the enjoyment of future generations, is integral to the purpose and mission of San Juan Island National Historical Park. With information and insights gained from conducting resource studies and restoration trials, the Park is currently working to develop a community-based prairie stewardship plan. With significant input and involvement of the local community and other stakeholders, the plan may direct actions to enhance the native prairie remnants, restore degraded grasslands currently dominated by exotic species, remove the threats to further habitat loss, and reintroduce the role of fire to sustain the prairie ecosystem.

SAN JUAN ISLAND
NATIONAL HISTORICAL PARK

English Camp

At English Camp, the south side of Young Hill is home to a remnant stand of Garry oak where the Park has been engaged in active management efforts since 2003 to preserve the prairie meadows and oak woodlands. Resource stewardship at English Camp has included the control of exotic plants, collecting native plant seeds for propagation, supporting the establishment of new oak trees, removal of encroaching fir trees and the reintroduction of fire to preserve and maintain this increasingly rare habitat.

American Camp

The grasslands at American Camp cover a total of nearly 700 acres and represent one of the largest expanses of prairie habitat in the Northern Straits and Puget Sound regions. However, if current trends continue, the once vibrant and native prairie may become only a memory. Native grasses and forbs are being crowded out by invasive woody and exotic plants that are slowly replacing the grasslands.

The Home Prairie, as it was referred to by Hudson's Bay Company workers, has a long history of agriculture prior to being protected by the National Park Service. What was once a native prairie of bunchgrasses and wildflowers, has become dominated by exotic and invasive species. Some native prairie plants have survived, mostly in small isolated patches on the fringes of the grasslands in areas that were reserved for pasture or where rocky conditions limited the use of plows. Native dominated prairie communities remain at 87 locations ranging in size from 269 square feet to 4.4 acres, totaling 84.5 acres or approximately 12 percent of the total prairie area. The native remnants are significant because they may provide reference sites for developing desired future conditions, supply sources for native seed, and represent islands of native diversity from which restoration can expand.

Prairie stewardship activities at American Camp, to date, have focused on resource inventories and monitoring, restoration experiments and trials, collection and propagation of native plants and small-scale habitat enhancement actions such as exotic species control and native plant establishment. Vegetation studies have been conducted to determine existing plant species and communities, evaluate species present in the seed bank, and identify prairie remnants dominated by native species. Park staff also regularly monitors various species on the prairie such as the rare Island Marble Butterfly, which was once thought to have become extinct in 1909, but was rediscovered in 1998 on the American Camp prairie where the species' largest and most stable population exists. Prairie restoration trials have included evaluating the effect of prescribed burns and herbicide treatments to establish native plants, and experimental plantings have also been conducted. Volunteers have assisted Park staff with collecting native plant seeds for propagation of plants and establishment of seed increase plots to generate large quantities of native seed for future direct seeding on the prairie. Manual control of exotic plants has been conducted seasonally with a specific focus on relatively small and scattered populations, such as Tansy Ragwort, Mullein, Teasel, Oxeye Daisy and Spotted Knapweed, to preempt their establishment. Other prairie stewardship actions have included working with partner agencies and community volunteers to plant native bunchgrasses like Roemer's Fescue and reestablish rare plants such as the Golden Paintbrush on native prairie remnants.

San Juan Island National Historical Park
Volunteer Opportunities

Native Plant Nursery
Nursery Volunteers assist park staff in propagating and maintaining native plants for prairie restoration activities. They may help park staff with sowing seeds; watering, weeding and cultivating native prairie plants at American Camp.

Seed Collection
Seed Collection Volunteers assist park staff in collecting seed from native plant species for use in habitat restoration activities. They help park staff with collecting, cleaning and organizing seeds of native grasses and forbs.

Exotic Plant Control
Exotic Plant Control Volunteers assist park staff in controlling the spread of highly invasive exotic plant species and reducing competition with native plants. They help with manual control activities including cutting flowers/seed heads, chopping stems, covering & smothering and hand-pulling exotic invasive species to remove or reduce the spread of non-native plants at American and English Camps.

Trail Enhancement
Trail Enhancement Volunteers assist park staff in maintaining trails throughout American Camp and English Camp by helping to keep trails clear of vegetation, debris, and litter. They may also assist park staff with other maintenance projects throughout the park depending on their skills, availability and interests.

Park Watch
Park Watch volunteers provide visitors with information and answer questions about park resources, laws, rules, and regulations. They also assist in the protection of natural, cultural, historical, and human resources by patrolling park lands and boundaries to detect and report evidence of illegal and suspicious activities reports observations to Law Enforcement Rangers.

Prairie Restoration
Prairie Restoration Volunteers assist park staff in site preparation, planting and installing protection at restoration sites throughout the prairie grasslands of American Camp and the oak woodlands of English Camp.

Interpretation
Interpretation Volunteers assist park staff with interpretive activities including historic reenactments and sharing knowledge of plants, animals, geology, history, island, community and culture at American and English Camps.

San Juan Island National Historical Park is the only unit of the National Park Service dedicated to the peaceful resolution of conflict.

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BE A PRAIRIE STEWARD

Get involved – your stewardship is greatly appreciated! Whether you engage in restoring, enhancing or protecting prairie on your land, volunteer to assist your neighbors in the community, or participate in prairie planning endeavors, your involvement is critical to effectively securing a sustainable future and lasting legacy for prairie ecosystems.

• **Protect, restore and enjoy your prairie.**

• **Participate in park planning.** The public is invited to provide input on all stewardship plans.
Currently the Park is in the process of developing a strategic plan for restoring prairie habitat and protecting natural resources vital to interpreting the cultural history and sustaining biodiversity across the landscape.

• **Volunteer with prairie projects.** Volunteers are vital to prairie stewardship and enhancement endeavors.
Effective stewardship of public lands requires input and involvement from a wide variety of stakeholders, including community individuals, neighboring landowners, local organizations and committed volunteers. To learn about volunteer opportunities at San Juan Island National Historical Park, contact the Park at 360.378.2240.

Copies of the park's planning documents and information on public involvement opportunities can be found online at www.nps.gov/sajh.