

Glacial Heritage Preserve Management Plan & Prescription

Prepared for Thurston County
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Background:

Native prairie and oak savannas in the Pacific Northwest are among the most endangered communities in North America (Stinson 2005). Fire suppression, habitat conversion, fragmentation, invasive species, and loss of native diversity all contribute to the degradation of these habitats (Dunwiddie et. al. 2006). Additionally, a variety of species that rely on this ecosystem type have recently been listed as endangered or threatened by the federal government (WSDFW 2015). Unlike many ecosystems, prairies require consistent disturbance to be maintained, and require frequent and varied management techniques (Hamman 2011; Stanley 2011).

In 1988, Thurston County purchased the over 1,000 acres of undeveloped land that is now known as the Glacial Heritage Preserve. Initially, the site was completely overtaken by dense, tall, invasive scotch broom, invasive grasses, and coniferous tree species. Even so, the site had significant potential for prairie habitat restoration because of its prairie soils (Spanaway stony sandy loam, Spanaway gravelly sandy loam, and Nisqually loamy sand; USDA 1958), the remnant native plant community remaining on site, the parcel's size, and the site's potential to sustain prairie grasslands, oak savannas, and forests. Prairie restoration activities on this site began in the early 1990's, and active management continues today on over 600 prairie acres year round. This location is now known as one of the premier prairie conservation sites in the South Puget Sound region (USFWS 2015) and the golden paintbrush (*Castilleja levisecta*; a threatened plant and nectar source) and the Taylor's checkerspot butterfly (an endangered pollinator) have since been reintroduced to the site.

Management Goals

Management goals of this site are to restore and maintain a high quality native prairie ecosystem using the principles of integrated pest management by combining physical, mechanical, cultural and chemical methods for invasive plant control. A high quality prairie ecosystem is comprised of less than 5% invasive species cover, a diversity of native plant species, and the ability to support rare species of pollinators and plants. Regular monitoring of the site determines which management techniques are used and where. Hand pulling, mowing, cutting, planting, seeding, and prescribed fires are used as much as possible. Chemical control is only used when other methods are ineffective against certain species, when the amount of an invasive species is too large to manage with other methods, or when other control options are limited (such as by lack of funding, limited man power, or government regulations). Though it is difficult to accurately predict future progress, it is estimated that by 2020 Scotch broom will be able to be managed manually with limited or no herbicides and by 2025 oatgrass control will occur on the entire 660 acres.

Numerous partners are engaged in the management of this site including the US Department of Defense, US Fish & Wildlife Service, the USDA Natural Resources Conservation Service and the Washington Department of Fish and Wildlife. This management plan is based on the most up-to-date research and requirements from these agencies, and may be adapted as new research and management techniques become available. The preserve is additionally used as an active

research site to help further identify effective management techniques and has been referenced in numerous published peer-reviewed papers.

Management Process:

Generally, prairie management has various focal points over the course of the year. In the spring, invasive grasses are targeted with a grass-specific herbicide. Current research indicates that two applications for three consecutive years can reduce the population of invasive grasses to less than 1% cover, and is currently the preferred approach at Glacial Heritage in areas where invasive grasses are present.

In the summer, prescribed burns are completed when possible. At Glacial Heritage Preserve, no more than 20% of the property is targeted to burn each year. The burned area is limited to minimize the impact on native plants and seed sources as well as providing enough undisturbed prairie habitat for existing animal species to thrive and recolonize burn units. This allows for a 3-7 year burn return interval over most of the prairie acres of the preserve. Burns are limited based on funding, weather, air quality, and fire control regulations. If burns cannot be completed, chemical applications may replace the treatment (grass or forb specific). Burn areas are chosen based on habitat quality, type, or management history. Typical areas that are targeted include poor quality areas (with a high percentage of invasive species and few native species), moderate-high quality areas (to help increase native diversity for butterfly habitat), oak savannas (to release the oaks), or areas that have not been burned for over five years.

In the fall, an herbicide application can be applied to the burned units, followed by seeding of native plants. The herbicide used depends upon the composition and timing of the germinating plants. Typically, during hot burns, non-native grasses and forb species germinate first and are targeted by glyphosate applications. In other cases, the non-native and native species germinate at the same time, and clethodim is applied to control invasive grasses and triclopyr to control invasive forbs. Typically, in lower quality areas only fescue is seeded post-fire, and when the prairie quality improves, a combination of native forbs and grasses are seeded.

Throughout the year, manual labor is utilized to pull Scotch broom, remove encroaching conifers, control other noxious weeds (tansy), plant seeds, and conduct other restoration activities as needed.

Invasive Species:

The majority of management control at the Glacial Heritage Preserve is focused on the removal of invasive species. Current species of concern are:

Coniferous Trees (Douglas fir, etc.): Coniferous trees encroach on the prairie when not disturbed. These trees are successfully managed by a combination of manual removal (cutting), girdling (to create standing dead trees for bird habitat), and prescribed fires. No chemical control methods are necessary.

Scotch Broom (*C. scoparius*): A large woody shrub whose seeds persist in soil for many decades. Large well established stands are initially targeted with a combination of mowing, prescribed burning, and a forb specific herbicide (triclopyr) for two years. Once infestations are diminished, a combination of manual removal with weed wrenches, rotations of prescribed burning, and spot spraying keeps populations at bay.

Other Invasive Forbs: Currently, some of the most common invasive forbs on site (excluding Scotch broom) include hairy cat's ear, oxeye daisy and tansy ragwort. These are targeted with a combination of prescribed burning and forb specific

herbicide treatments (triclopyr or glyphosate). Herbicide applications include both boom spraying larger populations post-fire and spot spraying for smaller populations.

Tall Oat Grass (and other invasive broad-leaf grasses): Eurasian grasses introduced as forage for livestock or lawn cover are now widespread in Thurston County. Manual pulling is not effective against invasive grasses. Large, well established populations are targeted with a combination of prescribed burning and grass specific herbicides (clethodim). Research has shown that two spring applications of grass-specific herbicides for three years reduces invasive grass population down to less than 1% cover. Once at low levels, grasses are kept at bay with a combination of prescribed burning and spot spraying.

Monitoring:

To assess success and efficiency of management, Prairie Quality Monitoring is conducted on site every five years (initially started in 2008/2009 year), which quantifies the species composition and cover throughout the preserve. Additionally, the preserve manager designates the restoration stages within the prairie throughout each year to determine the needed management. This allows for a flexible and targeted management approach. For reporting purposes, the property is also classified into four basic stages of management to show management progress within the prairie (starting in 2015). This helps explain management decisions, show progress, and predict future management needs. The phases are defined as follows:

Canopy Cover / Woody Plants: (Scotch broom and conifer dominated) Areas in this phase are targeted first with either a burn or a mechanical cut one year to remove the canopy, and then followed by either a burn or a boom application of triclopyr. Burn management is preferred, when possible. This management stage’s goal is to remove the canopy cover and all woody plants. Currently no acres of this category remain that are being managed for prairie habitat.

Low Quality: (Typically more than 20 percent cover of invasive species) Areas in this phase are targeted to burn every three years, followed by boom application of an herbicide, as appropriate for germinating species. Boom spraying may take the place of a burn, if a prescribed fire is not possible. Spot spraying occurs on these areas in non-burn years.

Medium Quality: (Typically 6 to 20 percent cover of invasive species) Areas in this phase are targeted for burning every 5 years. Burns are followed by a boom application of herbicide, as appropriate for germinating invasive species. After burn and herbicide application, a seeding of fescue occurs. As quality increases, a mix of both native forbs and grasses are seeded after burns. During non-burn years, the area is targeted by manual weeding of scotch broom and spot spraying for invasive forbs and grasses.

High Quality: (Typically less than 5 percent cover of invasive species) Burns are targeted in these areas every 5-7 years, and are followed by herbicide spot or boom applications when needed. After herbicide application, the area is seeded with a mix of native forbs and grasses. During non-burn years, the area is targeted by manual weeding of scotch broom and spot spraying for invasive grasses and forbs.

Management Phases Summary				
	Canopy Cover	Low Quality	Medium Quality	High Quality
Mechanical removal	XX	X		
Hand removal	X	XX	XX	X
Prescribed burn (20%)	XX	XX	XX	XX

Herbicide (woody)	T or G	T or G	T	
Herbicide (forbs)		T or G	T or G	T or G
Herbicide (grasses)		C or G	C or G	C or G
Seeding (grass)		XX	XX	XX
Seeding (forbs)		X	XX	XX

Table 1: X = Indicates that the method is used in that phase of prairie restoration XX = indicates the preferred control method
 T = triclopyr, G = glyphosate, C = clethodim

Chemical Use and Trends:

Currently, a combination of broad spectrum (glyphosate), forb-specific (triclopyr), and grass-specific (clethodim) herbicides are used during site management. Given that the preserve is currently closed to the public (except during certain events) and applications are applied by a WSDA licensed applicator, limited chemical exposure is expected. Boom herbicide applications are not conducted on days when other activities are occurring, and maps of applications are distributed to user groups to eliminate exposure.

Glyphosate: Glyphosate is necessary for successful prairie restoration following a prescribed burn, as without this tool, burning can result in an increase in some fire adapted species of non-native forbs and grasses as fires remove competition and opens bare ground for germination. Glyphosate is the preferred herbicide following a burn because it is non-selective (applications will kill both non-native forbs and grasses) and it has limited mobility (it will not move off the site of application and kill high quality prairie species).

Glyphosate is now solely used to target emergent plants after a burn, when invasive species germinate prior to native species and conditions allow for a chemical application. At maximum, 20% of the prairie will be burned yearly, followed by an application of glyphosate (roughly 120 acres). This works out to be around 50 gallons of glyphosate used per year. This amount is not expected to rise in the future, and even has the potential to decrease as prairie quality increases, because large area applications post burn can be replaced by spot spraying.

Triclopyr: Currently, 100% of the prairie acres at Glacial Heritage are being targeted for Scotch Broom management. Initial efforts include mowing and forb-specific herbicide (triclopyr) applications followed by hand pulling. This has been successful at significantly reducing the cover of this species since management began. With continued reduction of scotch broom cover, triclopyr use will continue to decrease over time, as evident by Table 1.

Clethodim: As scotch broom becomes less prevalent, the restoration focus turns to invasive grasses. Clethodim is a selective herbicide currently used to manage invasive grasses without harming desired prairie species. In 2015, just over half of the prairie acres were being managed for invasive grass control. This area will continue to increase until 100% of the prairie is being managed for invasive grasses. Current research indicates that two applications of herbicide applied for three consecutive years can reduce invasive grass populations to less than 1% cover. Selective herbicide use is expected to increase over the upcoming years as more of the area is managed as medium and high quality prairie. Long-term management goals will ultimately result in less clethodim use, but only after each area of the preserve has been managed for invasive grass control for three years.

Yearly Reporting

Yearly reporting to Thurston County will include a table estimating the total acres of each of the prairie quality management areas (canopy, low, medium, and high). This estimate (and corresponding map) will be based on the

qualitative observations of field staff, as it is their analysis that determines what management tools are applied throughout the prairie acres. Additionally, the following numbers will be reported: amount and type of chemicals used, hours of volunteer time spent manually pulling broom or other invasive species, pounds of seeds planted, and acres burned. A narrative of the yearly progress and predicted outcomes for the upcoming year will be provided. Any other pertinent information will also be included.

Citations

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