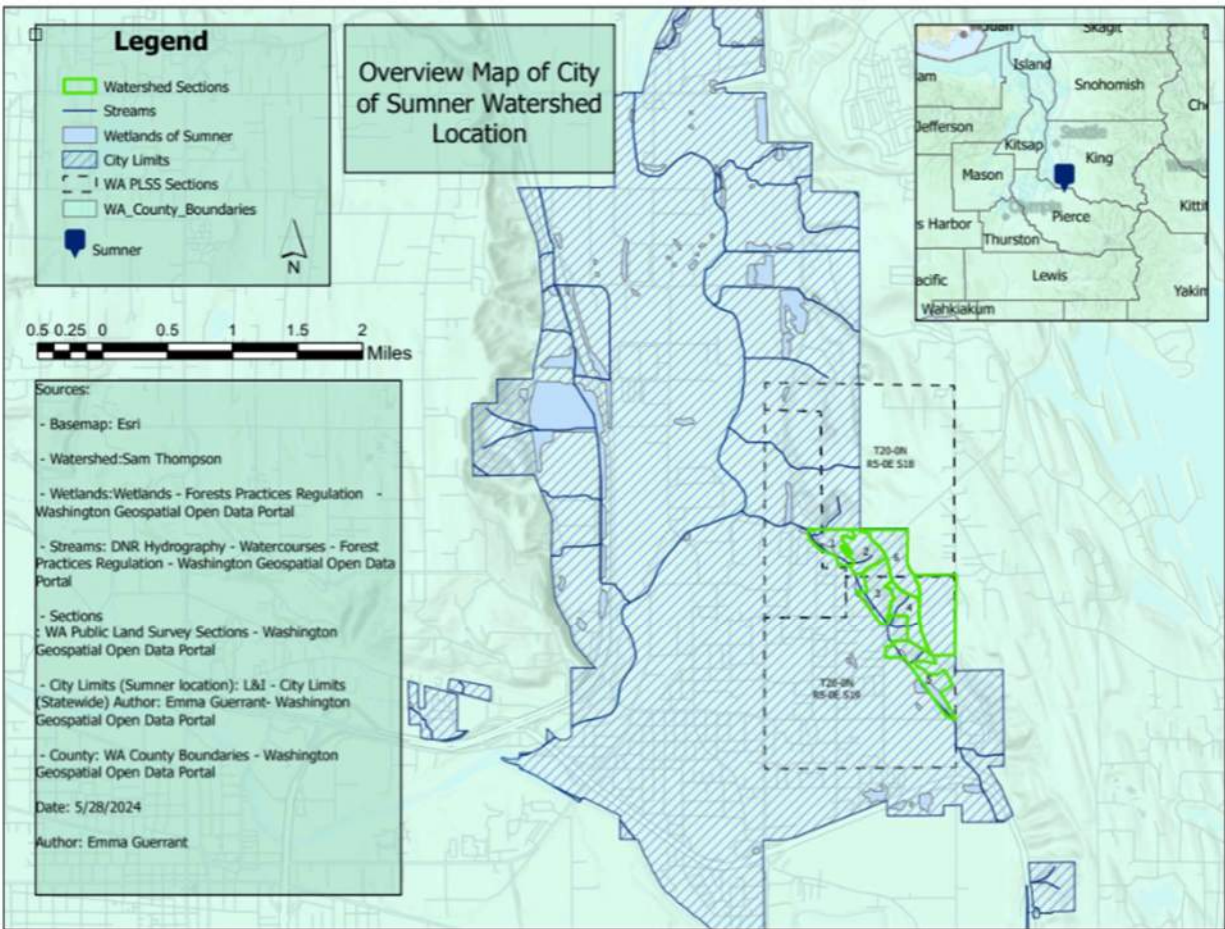


CITY OF SUMNER WATERSHED FOREST INVASIVE SPECIES MANAGEMENT PLAN



Compiled from work performed by
Students of the Natural Resources Program at
Green River College,
Auburn, WA
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Introduction

Description of site

Sumner Watershed, 47.216199 N, -122.215118 W, Pierce County, WA

Puyallup-white WRIA

The Sumner Watershed Forest is approximately 125 acres. The northwestern part of this forest lies just east of the Sumner RV and the property line runs east until just after Sumner Tapps Highway E. From there, the property boundary runs south until Main Street and Sumner Tapps Highway intersect. For this assessment, a class of Green River College students divided the property into six different sections to survey for invasive species. The Sumner Watershed Forest lies in the Puget Sound region and is characterized by a marine west coast climate forest and falls in the Western Hemlock zone (*Tsuga heterophylla* Zone). Douglas-fir (*Pseudotsuga menziesii*) is the dominant tree species. This tree species thrives in moist, well-drained soils, often forming dense stands that can support a variety of understory plants. Western Red Cedar (*Thuja plicata*) is the second most c-dominant species of tree onsite. Western Red Cedar is highly adaptable to different soil types and moisture levels, although it prefers moist, well-drained soils. It can grow under the partial shade of larger Douglas-fir trees, making it a suitable secondary tree in this type of forest. Soil and Topography: The soil quality, which typically ranges from loamy to clay and is often well-drained, supports these species. The mid-canopy and native understory reflect a stable and mature ecosystem typical of the low to mid-elevations in the Puget Sound area, and understanding its dynamics is key to effective environmental management and conservation. Multiple understory species ensure a more continuous supply of resources like food and shelter across different seasons and conditions, supporting a more diverse animal community. As a forest occurring within the Pacific Flyway, a major north-south migration route extending from Alaska to Patagonia, the City of Sumner Watershed property may serve as an oasis for migratory birds needing a travel stop to feed and regain strength before continuing long journeys.

Salmon Creek, an fish-bearing stream known to support culturally, ecologically, and economically valuable Pacific salmon, flows along the southeast-to-northwest boundary of the property at the base of the slope. Using the Web Soil Survey Tool, nearly half this property's area is sloped 45-70%. Washington State Department of Natural Resources has classified the soil productivity of the area as mostly Site Class 3 across the hillside, and Site Class 2 near the base at Salmon Creek. The City of Sumner manages the two springs in this watershed. Much of the City of Sumner's water supply comes from springs on the east hill. There are three spring fields: Sumner Springs, Crystal/County Springs and Elhi Springs. This property is home to two wells, that are owned and operated by the City of Sumner water utility service and is managed for supplying clean water to Sumner and parts of the Cities of Bonney Lake, Mountain View, Edgewood, Puyallup, Auburn, Tacoma, and Pacific. The Sumner Watershed Forests protect the two naturally occurring springs and it is essential to maintain healthy forested buffers around them, minimize nearby land disturbances, and manage this plant community to prevent invasive species from disrupting the native ecological balance.

The City of Sumner has a history of agricultural farming. Aerial photos dating back to 1945 show that part of the Sumner watershed was used for agriculture. As the land use changed from farming to housing development, invasive plant species such as reed canary grass and Himalayan blackberry colonized the area.

Table 1: Native Vegetation

Native Vegetation	Genus/species
Douglas-fir	<i>Pseudotsuga menziesii</i>
Western red cedar	<i>Thuja plicata</i>
Bigleaf maple	<i>Acer macrophyllum</i>
Vine maple	<i>Acer circinatum</i>
Beaked hazelnut	<i>Corylus cornuta</i>
Western sword fern	<i>Polystichum munitum</i>
Salal	<i>Gaultheria shallon</i>
Oregon grape	<i>Mahonia aquifolium</i>
Snowberry	<i>Symphoricarpos albus</i>
Vanilla leaf	<i>Achlys triphylla</i>
Stinging nettle	<i>Urtica dioica</i>
Trillium	<i>Trillium ovatum</i>
Orange honeysuckle	<i>Lonicera ciliosa</i>

Table 2: Invasive Weeds Surveyed On Site

Invasive Species Vegetation	Genus/species
Bittersweet Nightshade	<i>Solanum dulcamara</i>
Blue Bell	<i>Hyacinthoides hispanica</i>
Bull Thistle	<i>Cirsium vulgare</i>
Common Mullein	<i>Verbascum thapsus</i>
Cut Leaf Blackberry	<i>Rubus laciniatus</i>
English Holly	<i>Ilex aquifolium</i>
English Ivy	<i>Hedera helix</i>
Foxglove	<i>Digitalis purpurea</i>
Herb Robert	<i>Geranium robertianum</i>
Himalayan Blackberry	<i>Rubus armeniacus</i>
Horse Chestnut	<i>Aesculus hippocastanum</i>
Old Man's Beard	<i>Clematis vitalba</i>
Reed Canarygrass	<i>Phalaris arundinacea</i>
Scotch Broom	<i>Cytisus scoparius</i>
Spurge Laurel	<i>Daphne laureola</i>

Table 3: Species of Concern

Species of Concern	Genus/species
European horse-chestnut	<i>Aesculus hippocastanum</i>
Laminated root rot	<i>Coniferiporia sulphurascens</i>



Figure 1: Map of City of Sumner Watershed

Site Descriptions of Sections Listed in Figure 1

Section 1

Section 1 sits in Sumner, Washington, just below the Sumner-Tapps Highway that runs on its eastern border and north of East Main Street. Within our site, our section comprises the most Northwestern Corner of the entire property and is ecologically diverse in what is present on the landscape. Of this section, the eastern portion of it is substantially sloped and is made up of a conifer overstory of Western Hemlock and Red Cedar with a strong hardwood understory of Alder, Cottonwood, and Vine Maple. Within this property lie smaller streams that feed towards the site's western regions, which flatten out and become a moist open marsh field alongside Holman Creek and has a similar hardwood canopy. One of the naturally pressurized water systems that runs out of a large water reservoir sits on the eastern portion of this section.

On this site there are many invasive species. They cover a significant portion of this site with the most common ones being Himalayan Blackberry, Reed Canary Grass, English Ivy, and English Holly. The most common polygon was Blackberry and the most common point was Holly. The issue of highest concern appears to be the spread of English Holly and English Ivy. They are prevalent and they can spread further in the understory. Ivy will choke out the trees and holly will shade out plants in the understory. Along with these plant species, we are also concerned about the presence of several other factors, laminated root rot, wildfires, and landslides. To help prevent landslides, trees should be planted or allowed space to grow. The larger roots and weight of trees helps anchor the ground and water. The removal of invasive species or planting of different trees will help the potential diversity challenge that our next concern gives the current trees.

Inventory of Plant Species Present on Site 1		
Common Name	Genus	Species
English Ivy	<i>Hedera</i>	<i>helix</i>
English Holly	<i>Ilex</i>	<i>aquafolium</i>
Canada Thistle	<i>Cirsium</i>	<i>arvense</i>
Blackberry	<i>Rubus</i>	<i>armeniacus</i>
Herb Robert	<i>Geranium</i>	<i>robertianum</i>
Reed Canary Grass	<i>Phalaris</i>	<i>arundinaceae</i>
Annual Honesty	<i>Lunaria</i>	<i>annua</i>

Table 4

Section 2

Section 2 is located on a hill with a small stream originating from the center of the plot that flows downhill westward to Salmon Creek. The canopy is dominated by Douglas-fir, Hemlock and Western Red Cedar, which creates a shady understory with scattered openings in the canopy. In shaded areas, the forest floor is relatively bare, with Dwarf Oregon Grape, Salal, and occasional Western Sword Fern making up the bulk of the native shrubbery in the area. Along the stream edge, and in proximity to Salmon Creek, grows a variety of grasses as well as stinging nettle. Section 2 is not a wetland, but wetland indicators are present, and there is a known and utilized below-ground watershed that spreads throughout the entirety of the forest.

Section 3

Within the Sumner watershed, evidence of wildlife in section 3 was high, as evidenced by leading to believe it is an important wildlife habitat. Three invasive species in this section pose a direct threat to potential wildlife habitat such as the Himalayan Blackberry, English Holly, and English Ivy. These

species are fast growing and quickly outcompete native species, vital for food and shelter that this local wildlife use. The rest of the species on site pose little risk to wildlife habitat and should be considered a low priority if site was managed for wildlife habitat in mind. The importance of the site for Sumner cannot be overstated, as the city depends on its provision of clean groundwater. In addition to groundwater, forests naturally filter rainwater and prevent erosion by stabilizing slopes with roots, which in turn prevent sediment delivery and nutrient pollutants to waterways

Invasives found in section 3 of Sumner watershed	
Species	Latin
English Ivy	<i>Hedera helix</i>
English Holly	<i>Ilex aquifolium</i>
California Blackberry	<i>Rubus armeniacus</i>
Evergreen Blackberry	<i>Rubus laciniatus</i>
Old-man's Beard	<i>Clematis vitalba</i>
Tansy Ragwort	<i>Senecio jacobaea</i>
Herb Robert	<i>Geranium robertianum</i>

Table 5

Section 4

The composition of the forest is primarily Douglas-fir and western red cedar. There is a presence of western hemlock and various deciduous trees like alder and big leaf maple. The understory is relatively open, persisting primarily of salal and Oregon grape.

Invasive Species Present on Property											
Species Common Name	Himalayan blackberry	English holly	Reed canary grass	Herb Robert	Scotch broom	English ivy	Butterfly bush	Old man's beard	Canadian/ bull thistle	Oriental clematis	Yellow archangel
Relative Quantity	High	High	Medium	High	Medium	Medium	Low	Low	Low	Low	Low

Table 6

Section 5

Section 5's southernmost tip starts at the SW¼ of the NE¼ of Section 19 Township 20 North, Range 05 East. The NW corner of the site is SW¼ of the NE¼ of Section 19 Township 20 North, Range 05 East. The NE corner is SW¼ of the NE¼ of Section 19 Township 20 North, Range 05. The SE corner of the site is SW¼ of the SW¼ of Section 20 Township 20 North, Range 05 East. The western extent of section 5 is a housing development and is open space until Salmon Creek, which has usual riparian cover such as willow and red osier dogwood. Beyond the creek is more flat open space until the terrain increases in slope as it turns into a coniferous forest, gaining elevation until it hits Sumner Lake Tapps Highway. There are parts of Salmon Creek that have the common native riparian vegetation, such as various willows, dogwoods, crabapples, and common nettles. Trees and large shrubs help moderate stream temperatures. However, large swaths of open areas are inundated with reed canary grass and Himalayan blackberry. The target of this site is to conserve the native species and restore the land to its original native forest.

Ecologists use certain species within the animal kingdom as indicator species to determine if a habitat is suitable for their existence (Siddig et al., 2016). Salmon Creek, a significant feature within the watershed, is a fish-bearing stream. A solid management goal would be to return it to a quality

fish habitat. It would benefit salmonids, and the water quality would be important to the city of Sumner. According to Washington State's Water Resource Inventory Area (WRIA), salmon require:

- Water quality;
- Water quantity or flows
- Stream and river physical features (e.g., sediment, substrate, and woody debris
- Riparian zones
- Upland terrestrial conditions; and
- Ecosystem interactions as they pertain to habitat (Clark et al., 2000, pg. 2-1).

Invasive Plant Inventory - Section 5		
Himalayan Blackberry	Reed Canary Grass	English Ivy
Yellow Flag Iris	Scotch Broom	Knotweed

Table 7

These weeds threaten Salmon Creek's bank stability and water quality. The reed canary grass erodes the creek's banks while preventing species that could provide shade from taking hold near the creek. This raises the water temperature, which impacts the invertebrate populations and the salmon that use this creek. The dense reed canary grass and Himalayan blackberry choke out any native vegetation in the area. In some areas, the Himalayan blackberry climbs on established alders and willows, slowly choking them out.

None of the six species found on site so far seems to be decreasing. The yellow flag iris seems stable, and the Himalayan blackberry, reed canary grass, and English ivy appear to be increasing, only stopped by reaching their population limits in the area. The site is so overwhelmed, especially by the blackberry and reed canary grass, that it seems there are few places left for it to reach that it hasn't already. The lower reaches of our site are covered in reed canary and blackberry, with other invasives sprinkled throughout. The reed canary is along the wetter areas nearer to Salmon Creek, and the blackberry area immediately adjoins it once conditions are dry enough. English ivy is confined to the hillsides where the other species aren't dominant. As more of the site is more thoroughly mapped, additional species will likely be found. Critical threats to the forests in the section above are the encroachment of English ivy, pockets of Laminated root rot, and fire. English ivy can kill trees by choking out the crown and weighing down branches to the point of breakage. It also poses a threat to the forest's fire risk as it creates ladder fuel in the crown. There are pockets of laminated root rot that allow invasive species to grow and spread.

Section 6

Oregon Grape (*Mahonia aquifolium*), Western Sword Fern (*Polystichum munitum*) and Snowberry (*Symphoricarpos albus*) are examples of the dominant understory species in section 6. They contribute significantly to the biodiversity and structure of the forest floor, helps in maintaining soil moisture and prevents erosion, and enhances the vertical layering and complexity of the understory, improve habitat for various wildlife species, particularly small mammals, and ground-nesting birds.

Common Name	Latin Name	Abundance	Concern
Bittersweet Nightshade	<i>Solanum dulcamara</i>	Low	Low
Blue Bell	<i>Hyacinthoides hispanica</i>	Low	Low
Bull Thistle	<i>Cirsium vulgare</i>	Low	Low
Common Mullein	<i>Verbascum thapsus</i>	Low	Low
Cutleaf Blackberry	<i>Rubus laciniatus</i>	Low	Low
English Holly	<i>Ilex aquifolium</i>	High	High
English Ivy	<i>Hedera helix</i>	High	High
Foxglove	<i>Digitalis purpurea</i>	Low	Low
Herb Robert	<i>Geranium robertianum</i>	Moderate	Medium
Himalayan Blackberry	<i>Rubus armeniacus</i>	High	High
Old Man's Beard	<i>Clematis vitalba</i>	Low	High
Reed Canary Grass	<i>Phalaris arundinacea</i>	Moderate	High
Scotch Broom	<i>Cytisus scoparius</i>	Low	Medium
Spurge Laurel	<i>Daphne laureola</i>	Low	Low

Note. The table shown above lists the invasive species surveyed in Section 6. Field surveys were performed on 4/23/24, 4/30/24, and 5/14/24, by a 3-person team from Green River College. Abundance of each species is listed as found during the time of survey. The level of concern for each species is indicated based on survey results and research regarding impact on native species populations, soil stability, forest structure, and ecosystem functions.

Table 8

Management Goals

The conservation targets for this parcel are to preserve the biological community of native plant life and to maintain a healthy watershed. This target will accomplish the goals of the city, which is to provide clean water for its citizens, and improve fire resistance. This can be accomplished by increasing the overall forest health. We want to facilitate a natural succession process within the forest that will continue to provide a cooling effect on the streams as well as habitat sources for native wildlife. When this goal is met it will leave a natural, native forest that is easy to maintain and keep healthy in the long term. This in turn will provide a clean ecosystem providing fresh water to neighboring communities.

The maintained and continued health of the three naturally occurring springs within the East Hill Sumner Watershed is our priority conservation target. Of the three springs in the watershed, two are actively used to provide water to Sumner. County springs and Sumner Spring provide 1.29 million gallons per day (mgd). The watershed is carefully managed to supply clean drinking water, so protecting these natural sources is vital to the people of Sumner. The city is also projecting that these city water sources will be insufficient to meet future water demand. These sources provide high-quality water that conforms to water quality rules and regulations (Washington State Department of Health, 2024) Conserving a healthy forest condition in the forested land surrounding the springs is a conservation target which helps us complete the priority goal listed above. Trees take up water from the soil through their roots, which increases soil water storage potential and lengthens the amount of time before rainfall becomes runoff. Trees promote infiltration by slowing down runoff and by increasing soil drainage in the root zone. Through this, forested areas can filter sediment and associated pollutants. By enhancing the health, condition, and function of urban forest fragments using various techniques for increasing and improving structure, hydrologic function, diversity, wildlife habitat, and improving conditions for tree growth, we can ensure long-term sustainability of the forest, and thereby the springs. Removal of invasive species will enhance, protect, and conserve the forested watershed, contributing to both healthier water system and ecosystem structure and functions.

Invasive species management has become standard practice when promoting a healthy forest. The invasive species found on site are varied, offering unique challenges to maintaining forest health. Without active maintenance activities, this site will continue to degrade, interrupting management goals. A negative feedback loop exists within the Sumner Watershed: The English Ivy has grown very large up the length of dominant trees to the canopy. This Ivy will kill these trees creating a large opening. The nearby blackberry will quickly move in and outcompete any regenerating conifers. The English Ivy will continue to grow along the ground until it finds another large tree to overtake, and the cycle begins again. Without regenerating conifers, the forest would be overtaken by blackberry. The Reed Canary Grass on the western edge of the watershed has grown to cover a very large area. Reed Canary Grass has the potential to clog up Salmon Creek, destroying salmon habitat.

Laminated root rot is a fungal infection that passes between trees through root to root contact. It can survive for a long time in the soil on decaying roots or just in the soil. A cheap and effective way to combat laminated root rot in the long term is to plant alternative trees and starve the fungus of food. Highly susceptible trees include Doug fir and other high elevation trees. Western hemlock,

spruces, true firs and other high elevation trees are intermediately susceptible to this pathogen and should also be avoided. Cedar trees are resistant, and hardwoods are immune. We recommend that a combination of these be planted. The cedar trees are good at growing in the shade, living a long time, and offer cultural benefits. The hardwoods may not live as long but they are fast growing, quick reproducers, and will help create a diverse forest structure.

The risk wildfire poses to the watershed should not be ignored. It could remove the entirety of the existing overstory canopy and create an opening for more invasive species to establish themselves or spread. The removal of “flash” species, species that will dry out and burn quickly, will help mitigate fire in the short term. For a more long term outlook, planting of fire resistant species such as Ponderosa and lodgepole pines or Douglas-fir’s may help. In areas of laminated root rot, avoid planting Douglas-firs.

Planning goal:

Mapping and researching what invasive plants are within the property boundaries. Determining what kind of control methods are approved for the area. Discuss with land managers if public outreach for volunteer work parties is a consideration, and how they can be arranged.

Cost/maintenance:

Determining the available time for the project, and what invasive plant(s) would have the largest effect to watershed/forest health through invasive control within the scope of time given and future maintenance.

Restoration goal:

Removing invasives damaging the native ecosystem, active replanting of native plants or natural regeneration to regain some of the functions and benefits of a forest and to increase overall watershed forest cover and increase forest canopy. Secondary goals would include future disease resistance, wildfire resistance, and slope stability. Integrating disease resilient trees to curb the laminated root rot occurring onsite is crucial for overall forest health and water protection.

Protection goal: Methods of invasive control must not have a detrimental effect to the springs onsite, nor be detrimental to the wildlife usage onsite.

Threat to Management Goals

The current threat to our conservation goals comes in the form of invasive noxious weeds that threaten to take over the site completely if not properly managed. This threat comes from invasive species such as English Ivy, Holly, Himalayan Blackberry, and Herb Robert. English Ivy threatens to smother the trees within the stand and outcompete other vegetation in terms of sunlight. Currently, Holly is not a major concern in the area, but if left unmanaged it can form a dense thicket that will eventually outcompete the mid-canopy and forest floor. The Himalayan Blackberry is currently the largest noxious weed threat, with its unhindered growth and suffocating root systems making it a major competitor to native plants and a threat to the overall biodiversity of the area. It can take over the entire area if left unmanaged. Finally, Herb Robert has been found in disturbed spots throughout the forest, primarily alongside roads, trails, and clearings. During our survey we did not

find a significant population in the forested section, but it can spread rapidly and has been found in the area surrounding Section 2's forest. Due to the nature of its seed dispersal, it would be easy to transport the plant onto the forest floor inadvertently, which could eventually take over the area if left unmanaged.

Any methods of removal and maintenance, while giving options, will have primary suggestions from the group. The suggestions, while field and work intensive, should be cost-effective. The maintenance will be an ongoing process as species such as English Ivy are hard to eradicate. However, the overall goal is to do restoration of the forest, putting more understory/succession plants and attempting to corner the invasive species. The restoration of the forest will increase and improve the habitat used but the animals that use the watershed for living and corridor travel. The English Ivy currently is weighing the trees it is growing on and it will eventually kill the trees and pull them down. In preventing it from spreading more, it will protect the surrounding trees from coming down.

The invasive noxious weeds on site have many detrimental impacts to the native flora, fauna, and functions of the ecosystem. Competition for site resources such as sunlight, water, and nutrients are a primary factor in the loss of native flora and their functions. Many invasive species can out-compete native plants for these resources. Noxious weeds can also alter the structure of the forest they are in. Many species grow at an aggressive pace, often forming dense thickets which alter soil composition, water availability, and can even create new microclimates. While these thickets can provide benefits such as shelter for wildlife, the displacement of native plants often has cascading effects on fauna that depend on them for food and habitat. Climbing noxious weeds can also cover trees in the area, leading to mortality and increased windthrow. This results in the loss of forested areas and critical forest ecosystem functions that affect water cycling such as shade, water regulation, and erosion control. As these threatened structures and functions provide critical filtering, retention, and regulatory abilities needed to supply spring water to the city of Sumner, the removal of the invasive species listed below is paramount to foster a healthy forest ecosystem.

Threat to Management Goals

This forest is home to an array of native herbaceous, shrub, and tree species which serve a variety of ecosystem functions, including food and cover sources for wildlife, pollinator host species, water filtration, and nutrient cycling. These functions have the potential to be negatively impacted by the presence of invasive species, which are currently outcompeting native plant species for resources. The disruption of this equilibrium that the native species bring, can result in an unhealthy forest. This can likely result in higher mortality and disruption of forest structure. This unhealthy forest will be more susceptible to forest fire and disturbance, which could easily compromise the protection of clean water. Additionally, there will leave no effective ground cover to protect against erosion, which is a risk in some areas of the property where high groundwater saturation, precipitation, and steepness can cause slope failure. The city is also interested in managing this area due to surrounding communities that lie within the wildland urban interface. Investing in an attainable invasive species management plan will help reduce ladder fuels and allow native species to thrive.

When English ivy was present, it was typically covering over half of the tree, and the affected tree was not immediately surrounded by other instances of ivy. We did not see patches of multiple English Ivy[®] wrapped trees in a consecutive row/group. Holly trees occurred in a similar pattern, as we recorded multiple stand-alone Holly trees growing in a suppressed area in a conifer understory, or just outside the edges of the canopy. Himalayan Blackberry bushes were the most aggressive outside of the understory where they were exposed to direct sunlight, this includes a large infestation surrounding the water tower. Other notable (and less common) species in the area included Bull Thistle, Wall Lettuce, and another unidentified species that occurred once.

The most disruptive invasive plants to the health of the forest are those species that dominate and create monocultures. Although none of the invasive species are beneficial on the property, small or less aggressive species are not of priority in comparison to dominant invasives. Throughout the property, there are large areas dominated by Himalayan blackberry. These areas are dangerous because they do not allow tree regeneration or native ground cover to grow. Tree regeneration is crucial to help stabilize steep slopes and loose soil on the property. Himalayan blackberry has shallow roots which are not productive for slope stability. Furthermore, laminated root rot is also threatening existing Douglas-fir trees. This paired with slopes can result in many fallen trees due to the reduction of root mass. Removing invasives while focusing on planting root rot resistant species such as cedar, alder, and willow will help to promote regeneration within these areas providing the needed canopy cover to prevent further growth of invasives.

Section A - Specific Management Recommendations from Group 1

Species were prioritized based largely on the extent of the species. Canada/Bull Thistle was determined to be the top priority, and this was decided due to the lack of Spurge Laurel within the site. The two species both display an equal amount of difficulty in controlling. Spurge Laurel is likely to be migrated from surrounding areas, so continued monitoring will be required. Active management will be necessary to control Canada/Bull Thistle.

Table 2: Weed Management Plan and Implementation Schedule

Weed Management Plan & Implementation Timeline			
Season	Canada/ Bull Thistle	Spurge Laurel	Introduced Grasses
Spring '24	Herbicide (glyphosate) treatment in spring to combat new growth	Can apply triclopyr/ glyphosate in spring to suppress new growth	
Summer '24	Mow before June, continue to mow through summer	Manual removal of plant and root, use protection, sap is irritant,	
Fall '24			
Winter '25	Replant with naïve shrubs, plants, or grasses to shade out new growth	Replant with native shrubs and plants to shade out new growth	<i>Festuca californica</i> , drought tolerant bunch grass, found in woodlands
Spring '25	Spray herbicide (glyphosate) on new growth		
Summer '25	Mow before June, continue to mow through summer		
Fall '25			
Winter '26	Plant shrubs, plants, and grasses to shade out new growth	Manual removal of plants and roots (use protection)	
Spring '26			<i>Carex pachystachya</i> . Native grass, sun or shade, tolerates being mowed

Table 3: Projected Resource Costs

Cost Outlook for 1 year of Treatment					
Species	Labor Hours	Est. Hourly Rate	Cost of Materials	Volunteer Work Hours	Total Cost
Candaian/Bull Thistle	40	\$35	\$637	8	\$1,400
Spurge Laurel	25	\$35	\$332		\$875
					\$2,275.00

*These costs are based off the assumption that a group of 3 will work 65 labor hours between the two species per year at a pay rate of \$35 an hour including L&I and employment insurance. Material costs are for Copperhead shells (Glyphosate) and Ranger Pro (Glyphosate).

3. SPECIFIC WEED CONTROL PLANS

Scientific name: *Cirsium arvense/vulgare*

Common name: Canada/Bull Thistle

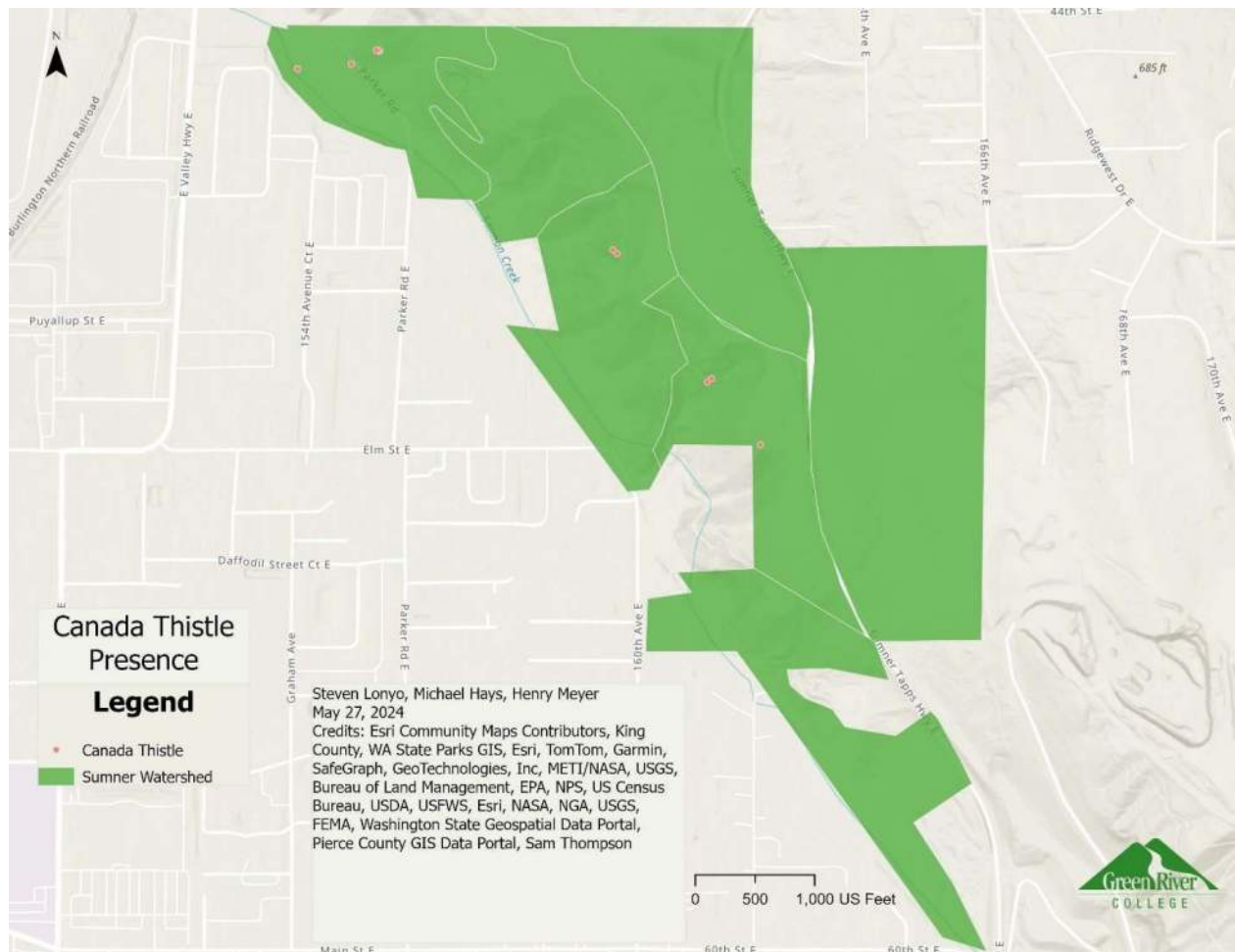
Updated May 12, 2024

A. PRIORITY: Low

B. DESCRIPTION

Thistles are a general group of plants with sharp prickles that are mostly invasive to the PNW. Field identification can be done on many species but many of them are similar and interbreed. Thistles are very useful for pollinators, some birds, and butterfly larvae. They can be invasive, anything from a class A to C noxious weed. Certain class A must be removed everywhere, class B must be removed from areas where they are not present, and class C is left up to the individual county that may care for specific reasons, like agriculture.

C. CURRENT DISTRIBUTION ON THE SITE



D. DAMAGE & THREATS

Thistle will spread quickly, out-competing native groundcover plants. It spreads vegetatively from its roots which can grow up to 12' in one growing season. Thistle is seen as an economic threat in the agriculture industry, reducing crop yields (NWCB, 2024).

E. GOALS

The long-term goals for Canadian/ Bull Thistle is to reduce the population and to replace concentrated patches in the open area to the south of the site with a canopy layer that inhibits further growth.

F. OBJECTIVES (Measurable)

1. Reduce population by 90%
2. Focusing on the open areas to the south of the site.
3. Complete within 3 years.

G. MANAGEMENT OPTIONS

Viable control options are:

(1) No treatment; Canada/Bull Thistle will continue to spread throughout the site, becoming concentrated in the open areas. It is unlikely to take over large continuous patches, as Reed Canary Grass occupies the same habitat and will compete for space.

(2) (Treatment alternative 1); Alternate mowing and herbicide treatment during the summer months. Apply Glyphosate at 6-8 oz/Acre as a spot treatment. Apply to Thistle in the spring when the plant is actively growing, but past the bud stage. When spraying after mowing, a surfactant should be added to suppress rosettes that have grown wider than 6". Three days should pass before any manual removal of the plant to allow proper translocation. Glyphosate will control other grasses, and so should be used with caution to avoid over spray of sensitive species.

(3) (Treatment alternative n); Alternate mowing and herbicide treatment during the spring and summer months. Apply a mixture of Dicamba at a rate of 2lbs ae/A and Glyphosate at a rate of 2 lbs/A to spot treat. Apply at any time that the plants are growing. Avoid over spraying to protect sensitive species. This mixture allows for a wider spraying window, however, due to the site having a higher water level in the wetland area, more product will need to be used to be effective.

Scientific name: *Daphne laureola*

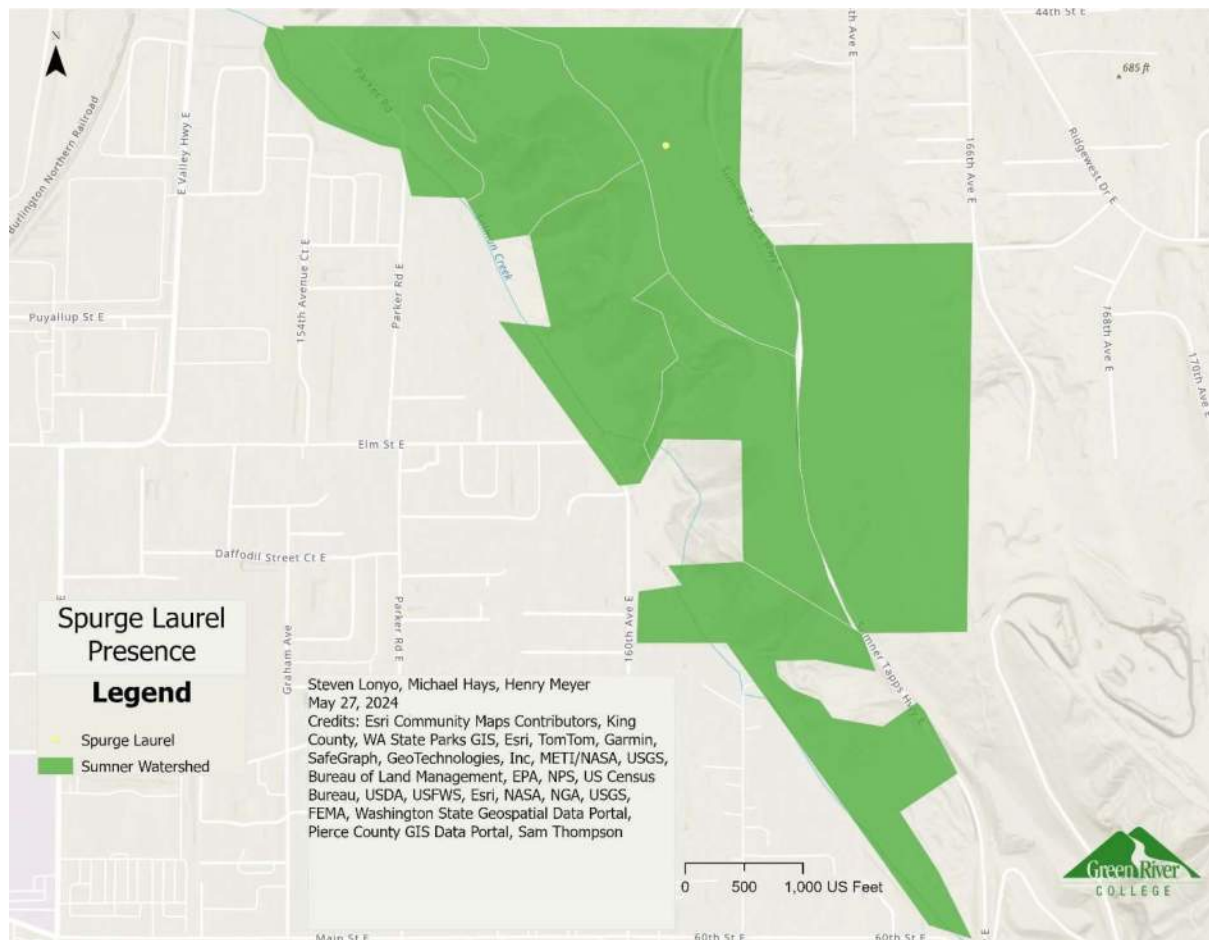
Common name: Spurge Laurel

Updated May 21, 2024

A. PRIORITY: High

B. DESCRIPTION: Spurge Laurel is an evergreen upright shrub that is capable of growing one to five feet tall and can be identified by its dark green narrow, oval leaves that are waxy on the top and that are wider above the middle and can be up to five inches long. In season, its flowers are small, yellow-green and clustered that will eventually bear black berries.

C. CURRENT DISTRIBUTION ON THE SITE: Spurge Laurel is not present in our section of the property but is a consideration in some sections on-site.



D. DAMAGE & THREATS: Spurge Laurel is an extremely toxic plant to humans and animals; all parts of it are dangerous, including the leaves and berries. It is also an extremely prolific and capable of rapid colonization of invaded areas and forming monotypic stands that outcompete native foliage. Also of note is the irritating toxins in the sap, stem, leaves and fruits; anyone handling this plant should be wearing appropriate PPE.

E. GOALS: Our goals are to manually remove the Spurge Laurel long enough to establish a more

natural understory of shrubs to the point that they can out compete any natural recruitment of Spurge Laurel. We would like to remove 90% of Spurge Laurel present on the landscape. Further management could have the appearance of shading out spurge laurel seedlings with native vegetation.

F. OBJECTIVES (Measurable):

1. Remove existing Spurge Laurel manually until 90% or greater of the cover is removed.
2. Plant native shrubs to out compete the Spurge Laurel on site and some native trees to provide shade.
- 3) Continue to monitor and manually remove Spurge Laurel as needed for the following 3 years until shade is established.
- 4) Continue to monitor and remove Spurge Laurel as needed for up to 5 years.

G. MANAGEMENT OPTIONS

(1) No treatment;

(2) (Treatment alternative 1); Mechanical removal followed by the establishment of native vegetation and re-establishment of shade-generating plants.

(3) (Treatment alternative 2); Treating with a Cut-Stem application of herbicide followed by monitoring and further mechanical removal of remaining Spurge Laurel.

Scientific name: *N/A*

Common name: Native/ Introduced Grasses and Shrubs

Updated May 27, 2024

A. PRIORITY: Low

B. DESCRIPTION: Native and introduced grasses can be used in places where you cannot or may not want to put a forest. An example could be an open space or areas with disease. There are invasive grasses that will create monocultures, like Reed Canary Grass, and these could be used in some places where you want to displace or disrupt the spread of invasive grasses. Plants like Chamisso sedge, California fescue, and kinnikinnick. Chamisso sedge, *Carex pachystachya*, can be found in dry to wet areas, along bank sides, forest edges, and open areas. It grows in bunches, tolerates mowing and walking on, and is a very hearty plant. California fescue, *Festuca californica*, can be found in full sun to partially shady and likes dry to moist well drained loamy or clay soils. It is a bunch grass, that is drought tolerant and deer resistant. Kinnikinnick, *Arctostaphylos uva-ursi*, likes full sun to partial shade, dry soils, and is drought tolerant. Animals eat the seeds, and this plant is a good alternative to invasive species or introduced species. Using shade to suppress other invasive species helps with keeping costs low.

C. CURRENT DISTRIBUTION ON THE SITE: Introduced (invasive and non-invasive) grasses could be everywhere that people are.

D. DAMAGE & THREATS: While introduced grasses may be negligible in the way they affect the environment for the most part, their continued spread may continue to disrupt the previously existing native plants.

E. GOALS: Our goal would be to use only native species, but it is likely that introduced species would have to be used in ways that native grasses could not. Introduced species could be chosen because of their quick growth, shading capabilities, or other characteristics.

F. OBJECTIVES (Measurable) : Our objectives are as follows

1. Identify places or spaces where grasses could be planted
2. Find species that can be appropriately planted in those spaces
3. Create a removal and planting schedule so that removed species do not reestablish

4. Continue plan until complete

G. MANAGEMENT OPTIONS

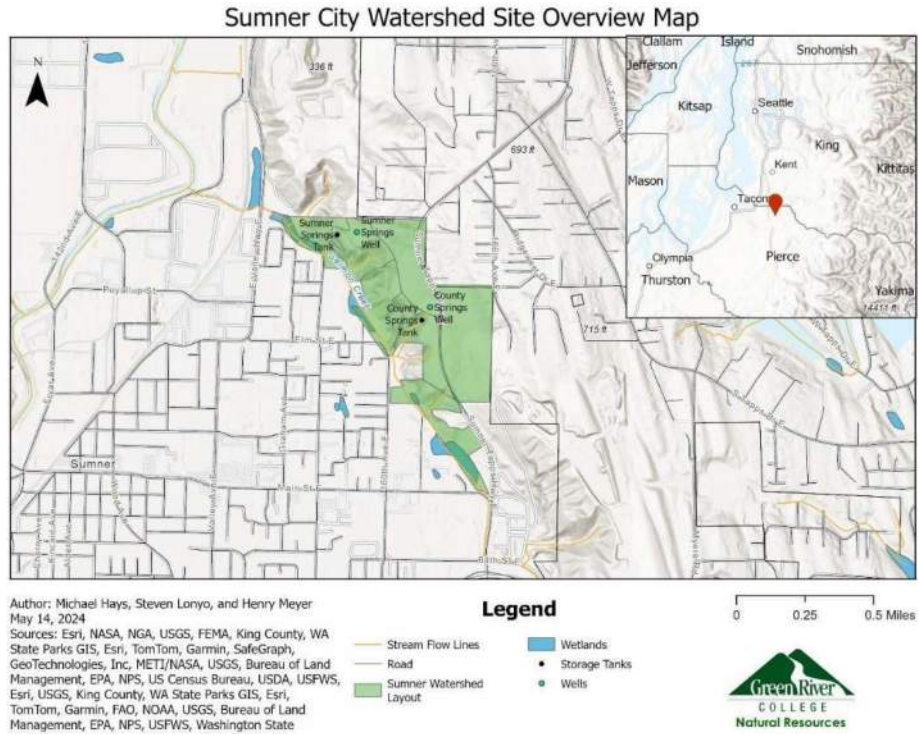
(1) No treatment;

(2) (Treatment alternative 1); Mechanical of invasive species and planting of native or introduced grasses.

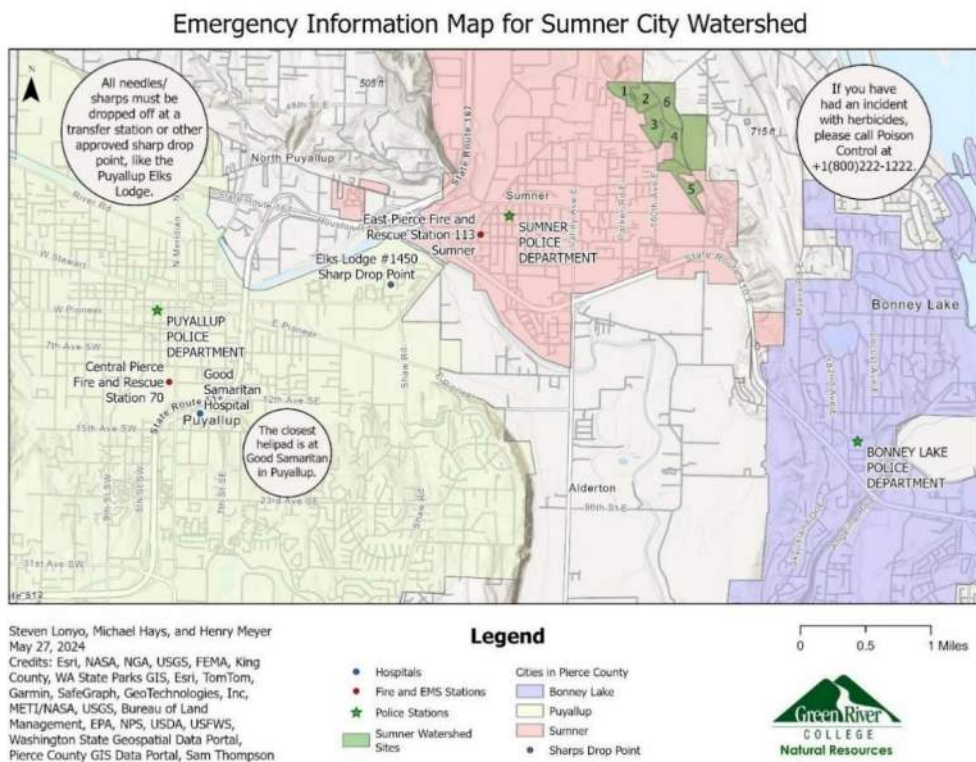
(3) (Treatment alternative 2); Spraying with herbicide and then planting of native or introduced grasses

Appendices:

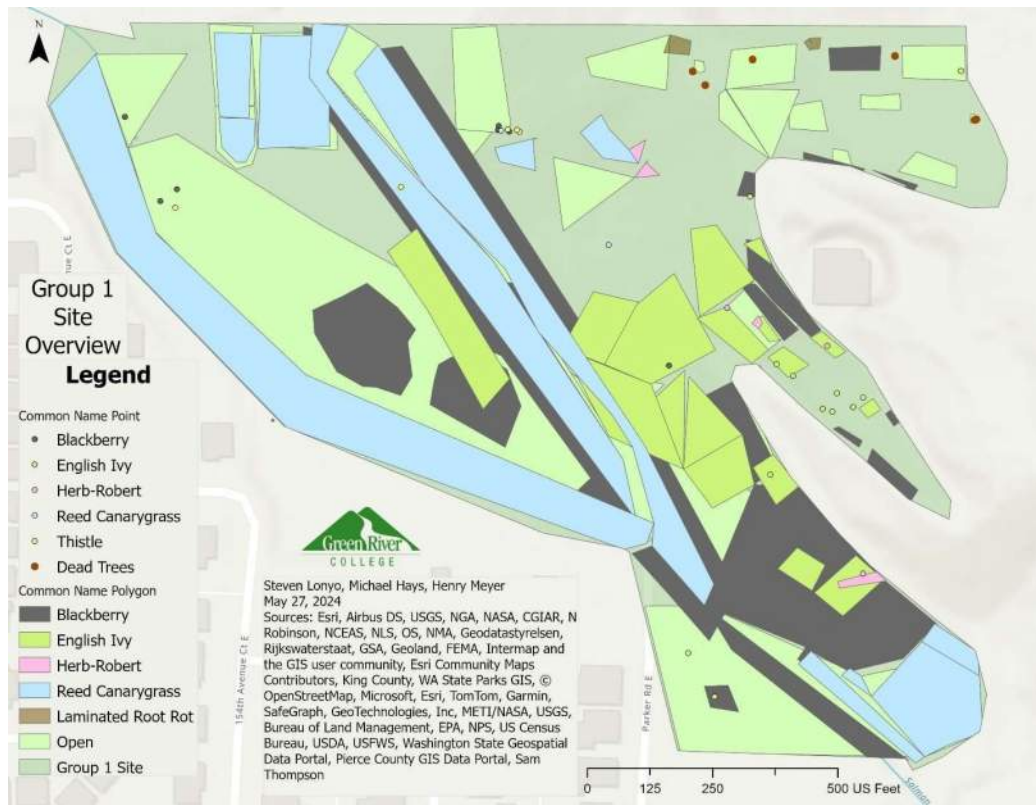
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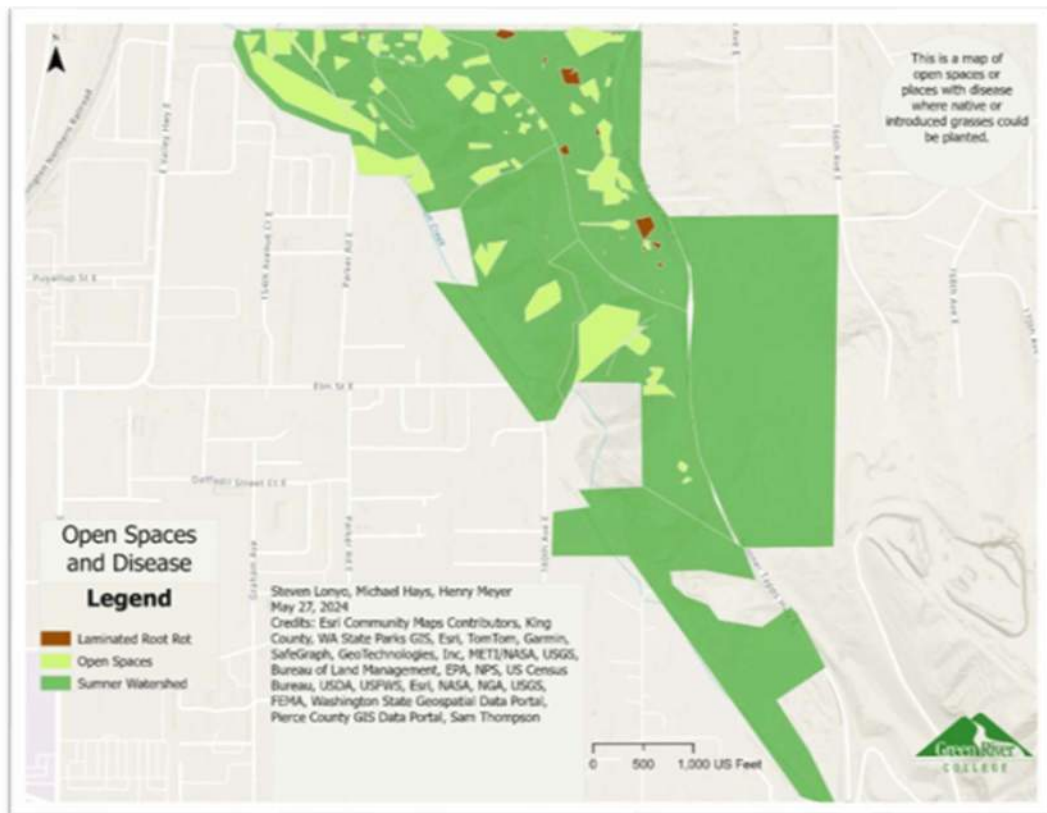
Appendix 2.



Appendix 3.



Appendix 4.



References:

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<https://www.nwcb.wa.gov/weeds/spurge-laurel>
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<https://hortsense.cahnrs.wsu.edu/fact-sheet/douglas-fir-laminated-root-rot/>

Section B - Specific Management Recommendations from Group 2

SPECIFIC CONTROL PLANS FOR HIGH PRIORITY WEED SPECIES

Scientific name: *Fallopia japonica*

Common name: Japanese Knotweed

PRIORITY: Low

DESCRIPTION:

This species of invasive is a perennial plant with spreading numerous reddish-brown, freely branched stems, can reach 4 to 8 feet in height, and is often shrubby. Leaves are alternately arranged with petioles and are 4 to 6 inches long, ovate and have a truncated base and an abrupt tip. The native range of this species is native to the majority of Asia, but is notably prominent in Japan, Korea, China, and Taiwan. It was introduced from Japan to the United Kingdom as an ornamental plant in 1825, and from there to North America in the late nineteenth century. The plant is dormant in the winter and begins growing in early spring, and grows rapidly in the summer. It flowers in July and is spread primarily through rhizome fragments. It is known to grow in a wide range of habitats including riparian areas, wetlands, roadsides, ditches, and fence lines. Japanese Knotweed is also known to fragment and grow from cuttings.

CURRENT DISTRIBUTION ON THE SITE:

Not currently on site, but this species has been sighted further upstream. Population has been found off site near a disturbed construction area adjacent to Section 5 (See Figure 1).

DAMAGE & THREATS:

This species can spread to a wide range using fragmentation growth and crowd out native species, is very aggressive, and can cause mortality in natives. Not only does it compete for space within an area, it will also shade out other plants with its large leaves (especially when a large number of stalks are present in a grouping). Considering its ability to form new plants from cuttings, the stream puts the current site at fairly high risk from the species growing upstream. Cuttings could flow downstream onto the site and take root in the bank.

GOALS:

Though the species is not currently on site it is best to prevent spread and keep currently present local natives from succumbing to mortality. We also wish to keep this plant from becoming ladder fuel for future forest fires.

OBJECTIVES:

Considering that the invasive is not currently on the site, the objective is keep the Japanese Knotweed from entering the property via stream flow. We could potentially speak to the owners of the disturbed lot, Salmon Court Apartments, and offer to remove the knotweed before it has a chance to spread into the watershed.

MANAGEMENT OPTIONS:

- (1) No treatment;
- (2) Weighted covering in May to prevent the upward growth of the plant (this would be done on upstream property to avoid spread)
- (3) Herbicide injection to the base of the Knotweed, most effective in August through to September (also done on upstream property)

ACTIONS PLANNED:

No current permission has been given to treat off-property Knotweed so the only action needed is to observe and report any sightings. If the invasive spreads it will likely be along the streambank, which may be deemed too sensitive for herbicide use given the watershed is used by the local community. Heavy tarps should be put in place in May to smother the plant before it has a chance to grow and spread further.

Scientific name: *Ilex aquifolium*

Common name: English holly

PRIORITY: Moderate

DESCRIPTION:

English holly (*Ilex aquifolium*) is an evergreen shrub or small tree known for its spiny, dark green leaves and bright red berries. It flowers in late spring and early summer, and typically produces distinctive red berries starting in November, which can persist through the winter. Native to western and southern Europe, northwest Africa, and southwest Asia, it thrives in well-drained, slightly acidic soils. Beyond its native range, English holly has been widely introduced and has become naturalized in other parts of the world, including the Pacific Northwest and northeastern regions of the United States, southeastern Canada, parts of Australia, and New Zealand. English holly is notable for its slow growth, long lifespan, and tolerance of shade.

CURRENT DISTRIBUTION ON THE SITE:

English holly has an intermediate-level presence on the site, in comparison with other invasive species such as Himalayan blackberry.

DAMAGE & THREATS:

English holly poses significant ecological threats in regions outside its native range. As an invasive species, it competes aggressively with local flora, forming dense thickets that overshadow and outcompete native understory plants and tree saplings. This dominance alters the structure and function of forest ecosystems, potentially reducing biodiversity and disrupting habitat for native wildlife. Additionally, berries of English Holly are a food source for birds which contribute to its widespread dispersal. The persistent nature and ability to thrive in varied conditions make it particularly difficult to manage once established, creating the necessity for continuous control efforts to prevent further ecological damage.

GOALS:

The distribution of English holly on the site is not fully known at this time, but the priority should be focused on removing large, dense thickets that are out-competing surrounding trees. This will also reduce the chances of the holly becoming ladder fuel in the event of a forest fire.

OBJECTIVES:

Remove as many known large English holly shrubs as possible on the site.

MANAGEMENT OPTIONS:

Viable control options are:

(1) Mechanical Removal: For large shrubs, physical removal is effective. This includes cutting the holly down to the stump. This can be done year round, but should be done in early spring to prevent the tree from flowering. After cutting, immediately treat the stump with an appropriate herbicide (glyphosate and triclopyr have proven effective) to prevent regrowth. Herbicides should be sprayed onto freshly cut stumps, but injection with imazapyr is also viable. The roots must also be dug out or disrupted, which can be labor-intensive but necessary to prevent the plant from returning.

(2) Chemical Control: Applying herbicides that are absorbed through the leaves or cut surfaces can effectively kill English holly; likewise, injection with imazapyr shows promising results. Herbicides containing glyphosate or triclopyr are commonly used. These chemicals should be applied carefully according to the manufacturer's instructions to avoid harming non-target plants and animals.

ACTIONS PLANNED:

Unless approval of the use of herbicides is given, large holly shrubs will be cut to a stump and removed at the roots as much as possible.

Scientific name: *Mycelis muralis* (*Lactuca muralis*) **Common name:** Wall Lettuce

PRIORITY: Low

DESCRIPTION:

This species is a slender, glabrous, annual or biennial plant with stems reaching 2-3' tall that branch near the top. The plant forms fibrous roots and, when broken, secretes a milky white fluid that can be a skin irritant. Leaves are glabrous and have pointed lobes, with a large triangular lobe at the end. It flowers in June through August, when the small light-yellow flowers form along the stem, and goes to seed in late summer or early fall. A member of the *Asteraceae* family, it produces a large quantity of seeds that use tufts of hair to spread through the wind. The plant is native to Continental Europe, Turkey, and the Caucasus; however, it has spread to the United Kingdom, Ireland, and the United States (mostly in Alaska and the Pacific Northwest). It is most commonly found in disturbed sites and along roadways, but can also be seen in forests, meadows, and fields.

CURRENT DISTRIBUTION ON THE SITE:

Currently, Wall Lettuce is found along trails and roads throughout the site, but has not been distributed through much of the site. It has been found near stream water collection points but was rarely seen in the forested areas.

DAMAGE & THREATS:

The plant spreads exclusively through seed distribution and can produce anywhere from 500 to 11,500 seeds depending on sunlight conditions. Growing in both deep shade and full sun, and being adapted to a range of soil conditions, it can easily invade disturbed areas and spread rapidly. This can displace native plants, and its latex production has been known to discourage herbivory.

GOALS:

Though hard to control due to its heavy seed dispersal, we want to keep it from spreading further into the site and keep it from colonizing other disturbed areas.

OBJECTIVES:

Currently, our objective is to remove existing plants before they have a chance to flower and seed. Removal from the roadways and trails is a priority, as that is where the plant is most prevalent.

MANAGEMENT OPTIONS:

- (1) No treatment
- (2) Manual removal (hand pulling) before flowering (late May, early June) or seeding (late summer, early fall depending on climate)
- (3) Planting of native perennials in areas not yet effected to prevent spread

ACTIONS PLANNED:

Manual removal of plants found within the site, specifically along roadways and trails. Removal will be done before June, which will minimize or outright stop the spread of seeds. Using the map should aid in finding and eliminating the Wall Lettuce found on site, and disturbed areas should be monitored for spread.

WEED MANAGEMENT PLAN IMPLEMENTATION SCHEDULE

Weed Priority List	Current Extent	Value of Habitat	Control & Establishment	Current & Impacts	Weed Management Plan Implementation Schedule												Labor Hours	Est. Hourly Rate	Labor Hours of Herbicide Treatment	Est. Hourly Rate of Herbicide Treatment	Cost of Materials	Volunteer Work Hours	Total Cost
					J	F	M	A	M	J	J	A	S	O	N	D							
Wood Species	Category	Priority Rank	Priority Rank	Category																			
Japanese Knotweed / <i>Polygonum japonica</i>	1	2	2	1			8hr	2hr									6	\$ 16.50	0	\$	\$ 274.00	0	\$ 274.00
English Holly / <i>Ilex aquifolium</i>	3	1	1	2					15hr		15hr						15	\$ 16.50	15	\$ 21.25	\$ 402.00	0	\$ 1,006.16
Wall Lettuce / <i>Myriophyllum muricatum</i>	2	2	3	2					1hr								1	\$	0	\$	\$ 10.00	1	\$ 10.00
																							\$ 1,389.16

Figure 3: Management Plan Implementation Schedule showing management timing, estimated work time, and estimated costs associated with management.

Appendix

Maps to be added once complete, including Spread Maps and Emergency Services Map

Sources Cited

Misenar, J. (2024). *Invasive Species Management Plan* [Canvas Post]. Green River College. <https://www.greenriver.edu/>

Section C - Specific Management Recommendations from Group 3

Overview of Weed Management Plan

Philosophy

“Weed control is part of the overall site management and restoration program. We focus on the species and communities we want in place of the weed species, rather than on simply eliminating weeds. We will implement preventative programs to keep the site free of species that are not yet established there but which are known to be pests elsewhere in the region. We will set priorities for the control or elimination of weeds that have already established on the site, according to their actual and potential impacts on native species and communities, particularly on our conservation targets. We will [act] only when careful consideration indicates leaving the weed unchecked will result in more damage than controlling it with available methods.

We use an adaptive management strategy. First, we establish and record the goals for the site. Second, we identify species that block us from reaching these goals and assign them priorities based on the severity of their impacts. Third, we consider methods for controlling them or otherwise diminishing their impacts and, if necessary, re-order priorities based on likely impacts on target and non-target species. Fourth, we develop weed control plans based on this information. Fifth, the plan is implemented, and results of our management actions monitored. Sixth, we evaluate the effectiveness of our methods in light of the site goals and use this information to modify and improve control priorities, methods, and plans. Finally, start the cycle again by establishing new/modified goals.

We set priorities in the hope of minimizing the total, long-term workload. Therefore, we act to prevent new infestations and assign highest priority to existing infestations that are the fastest growing, most disruptive, and affect the most highly valued area(s) of the site. We also consider the difficulty of control, giving higher priority to infestations we think we are most likely to control with available technology and resources” (TNC, 2001).

Setting Priorities

I. Current extent of the species on or near the site

English Ivy is found in large pockets across the Sumner watershed, growing in mats on the forest floor and in open areas as well as up large trunks and into the upper canopy.

Tansy Ragwort is found only sparsely across the site, mostly on open roads, both defunct and used.

We have not encountered Eurasian Watermilfoil on our site.

II. Current and potential impacts of the species

English Ivy threatens all vegetation levels in forested and open areas, spreading along the ground and ascending into the canopy, blocking sunlight from host trees and other plants. The added weight of the vines increases the risk of trees blowing down during storms, especially in a site heavily affected by unstable slopes and laminated root rot. English Ivy is a confirmed reservoir for bacterial leaf scorch (*Xylella fastidiosa*), a plant pathogen that adversely affects a variety of native and ornamental broadleaf species, such as elms, oaks, and maples.

Tansy Ragwort is only found sparingly throughout the site, and while all parts of the plant is toxic and causes cirrhosis of the liver in livestock, the Sumner watershed is not used for agriculture/grazing. However, it may adversely affect resident wildlife and removal may be desired for ecological benefit.

Eurasian Watermilfoil is an aquatic invasive species mainly spread through stem fragmentations. The plant is a perennial with dissected leaves. This vegetation can shade out other aquatic plants and degrade the quality of the water impacting the ecology and directly impact recreational users of the water.

III. Value of the habitats/areas that the species infests or may infest

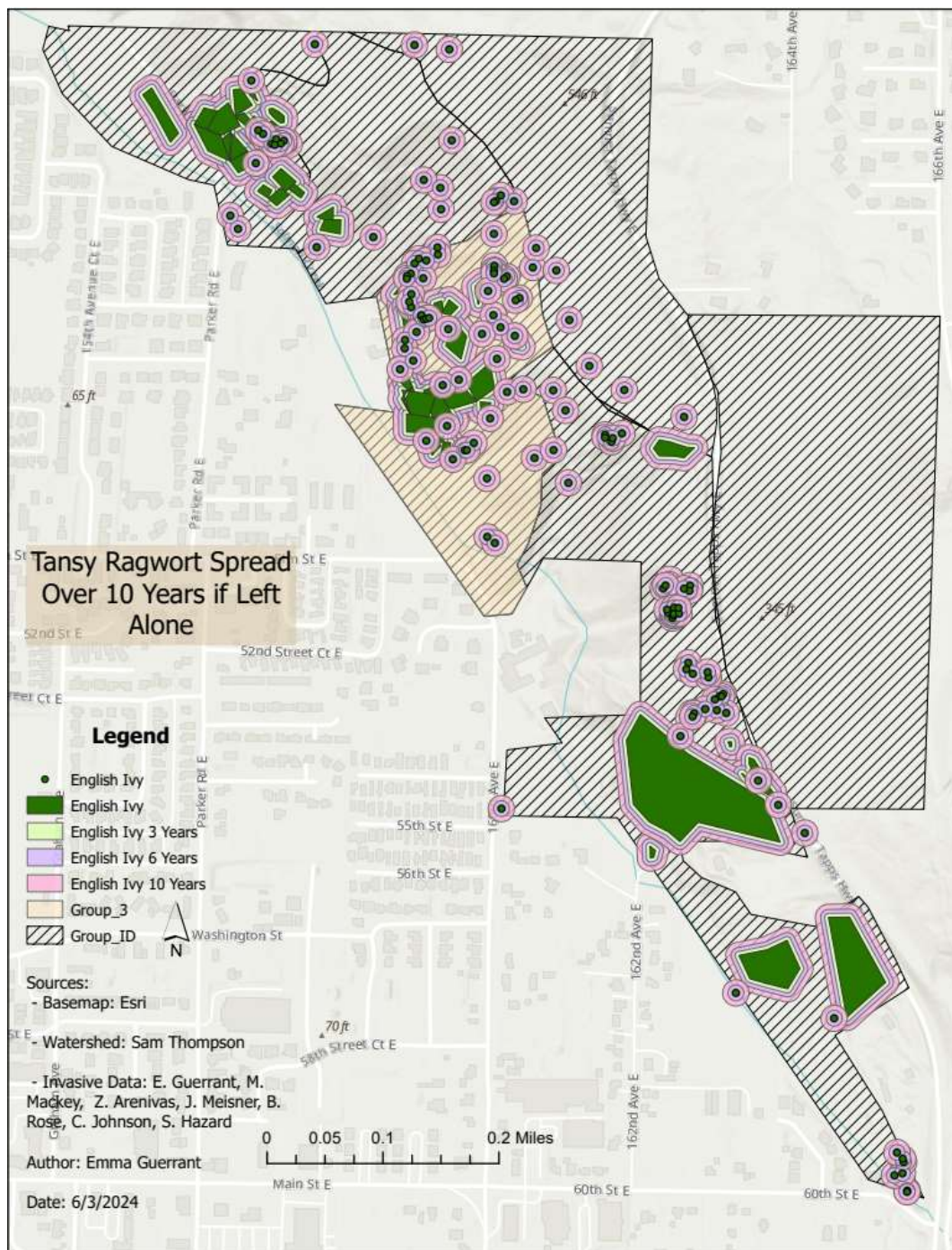
Within the Sumner watershed, evidence of wildlife in section 3 was high, as evidenced by leading to believe it is an important wildlife habitat. Three invasive species in this section pose a direct threat to potential wildlife habitat such as the Himalayan Blackberry, English Holly, and English Ivy. These species are fast growing and quickly outcompete native species, vital for food and shelter that this local wildlife use. The rest of the species on site pose little risk to wildlife habitat and should be considered a low priority if site was managed for wildlife habitat in mind. The importance of the site for Sumner cannot be overstated, as the city depends on its provision of clean groundwater. In addition to groundwater, forests naturally filter rainwater and prevent erosion by stabilizing slopes with roots, which in turn prevent sediment delivery and nutrient pollutants to waterways.

IV. Difficulty of Control

English Ivy is somewhat extensive on the site and so control is expected to be an iterative process but may be achieved within a few years. Since Tansy Ragwort is infrequently encountered on the site, it may be eradicated with reasonable feasibility using mechanical control methods.

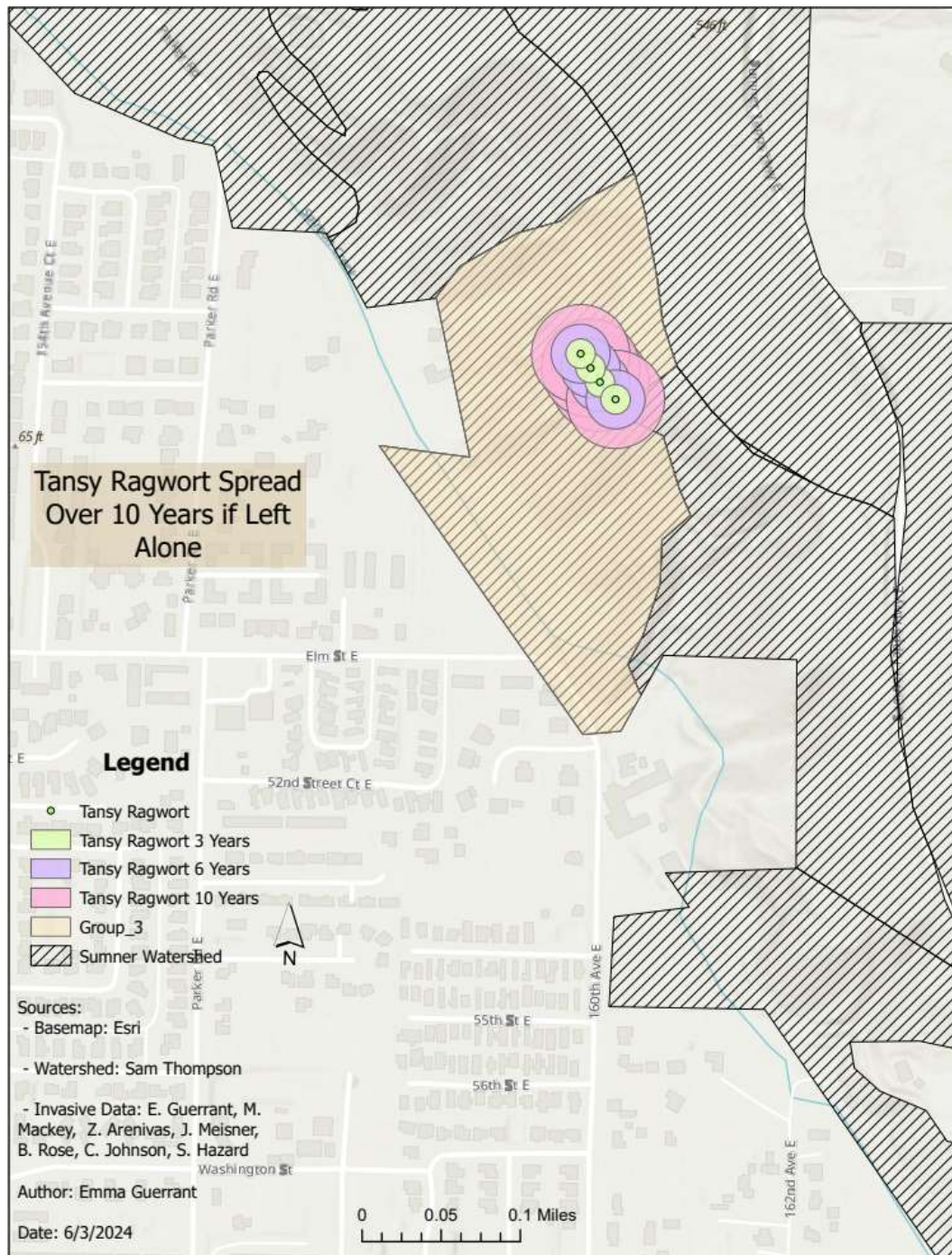
Action Summary

English Ivy will be cut off of trees, making a ring around the trunk roughly five feet up and the vines pulled away and as much out of the ground as possible. Ground stems and roots are easiest to be pulled when the soil is wet and loose. Vines pulled, both from the trees and from the ground, need to be disposed in the trash, not as compost to reduce the ability to be spread. Ivy control will be conducted extensively from April through August. Cutting ivy off before it flowers in autumn will reduce seed production and deplete the plant's energy reserves. A chemical management option to apply a mix of 4% glyphosate, 2% triclopyr and 2% LI-700.



Tansy Ragwort is rare enough on our site that we have chosen not to monitor it and can be easily controlled through hand digging/pulling. Plants are easiest to remove once the flowering stem

has emerged but before flowering. We intend to bag and remove all parts of the Tansy Ragwort plant when it is seen to prevent further spread as mandated being a Class B control species.



Eurasian Watermilfoil can be controlled though manual removal using volunteers and professional divers. A physical method that can be used to control the plant is exposing it to drying and

freezing conditions. A chemical treatment of 2-4 D, fluoridone or triclopyr can be effective in controlling this species.

Tables

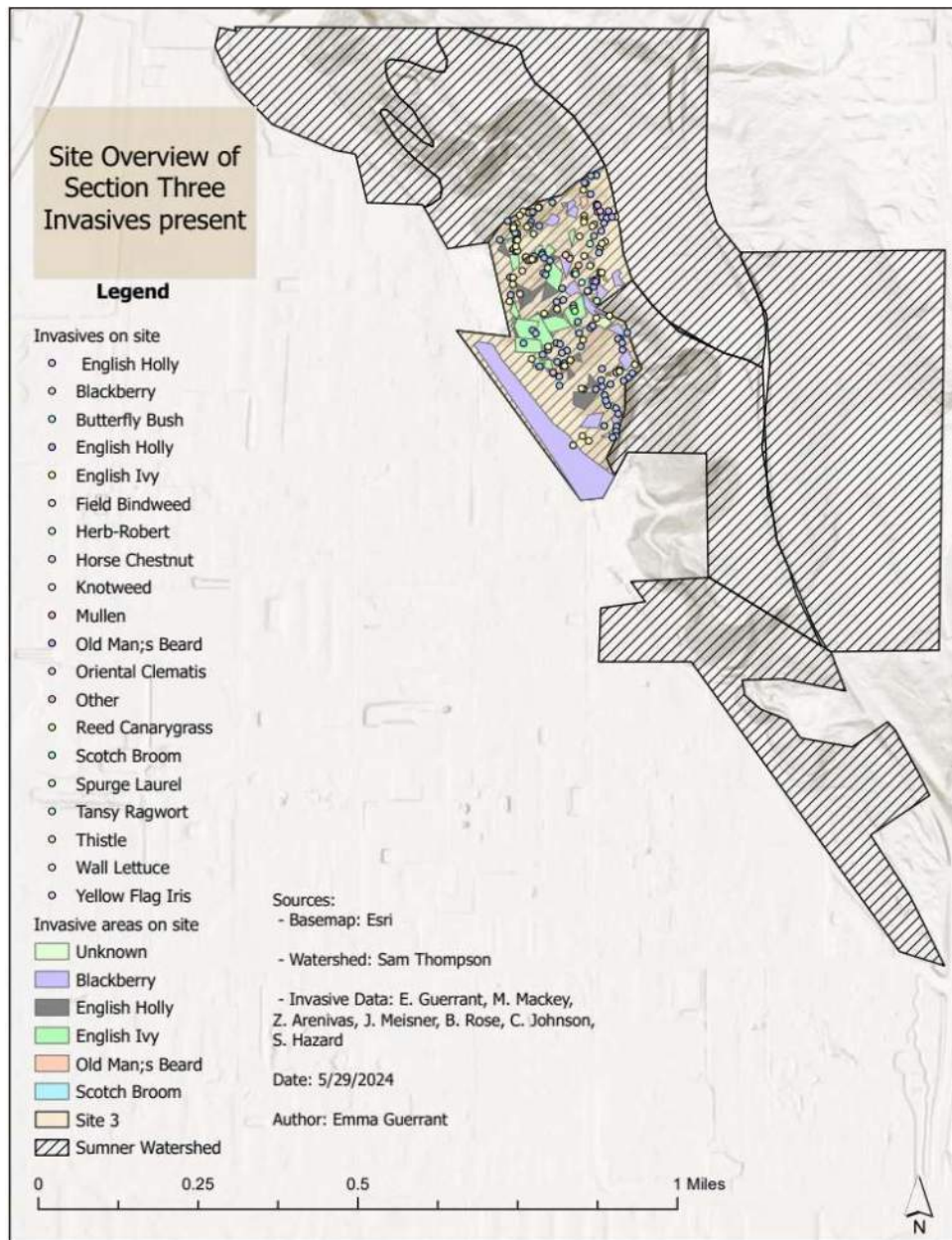
Table details the weed species prioritization list for all weed species found on site in section 3 of the City of Sumner Watershed according to the U.S. Geological Survey 2001 resource guidelines. This table also includes a monthly Calendar with each species' months marked down for the ideal management window. The Total cost of each species is taken from the cost per hour and the number of labor hours calculated to manage Section 3's invasive species.

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Bull Thistle	2	2	1	4			X	X						X	X	X	25 Hours	\$ 22.00	\$25	50 Hours	\$ 1,175.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

Hedera spp. are native to forests in England, Ireland, the Mediterranean, and across Northern Europe, where they are also sometimes considered pests because of their aggressive growth habit. In introduced ranges, it excludes nearly all herbaceous plants and most shrubs by outcompeting for water, nutrients, and space, persisting as a waxy evergreen and growing through winter, and possibly poisoning other nearby plants through allelopathy. Ivies may take a decade to establish before they begin flowering and can live for centuries. Many tiny flowers appear in tight clusters in fall which mature into purple fruits by spring, when American Robins are known to be a crucial Ivy seed spreader.

Jacobaea vulgaris is a class B noxious weed native to Northern Africa and Eurasian regions. The weed is a biennial herbaceous plant with two stages of development with its first year being a rosette stage. The leaves are dark green with basal leaves that take on a ruffled shape. The second stage normally taking place in year two is when the plant develops a flowering stem. The flowers are flat-topped clusters and yellow in color with an average of 13 flowers sprouting from the plant. The stem can reach up to 4 feet tall and the seeds can appear hairless and smooth.

C. CURRENT DISTRIBUTION ON THE SITE



D. DAMAGE & THREATS

This site is heavily affected by root diseases such as laminated root rot (*Phellinus weirii*) and over 45% of its area is composed of Xerochrepts series soil with 45-70% slope according to the Web Soil Survey Tool. Furthermore, the pistol-butting growth habit of many trees growing onsite confirm the prevalence of steep, shifting slopes. One acre of heavy ivy infestation is estimated to weigh up to ten tons, accumulating additional pounds from water, snow/ice, and wind-throw. Ivy contributes greatly to the risk of felling trees/snags, particularly those weakened by disease. Since much of the site is so sensitive

to erosion, making sure stabilizing tree roots remain in the soil by carefully removing ivy to prevent uprooting is a major priority.

E. GOALS

The short-term goals of site 3 is to eliminate all invasive vegetation to reduce the amount of presence and begin to reverse the growth and spread. All areas in which the invasive species were located would be documented and monitored to reduce the re-sprout from taking hold again.

The long-term goals of site 3 are to remove the seed back source found in the soil over the decades to come by either removing the contaminated soil or by using chemical spray to reduce the chance of re-sprout. The plan is to have all the vegetation removed, and the long-term focus will be to monitor and eliminate any small pockets found to be reintroduced on site.

F. OBJECTIVES

The impact of the numbers is to reduce half of the population of the invasives found on site within a 5-year period using chemical and mechanical management practices. Another possible option is to hand remove all the invasives over a 10-year period with no chemical application used.

G. MANAGEMENT OPTIONS

1. No treatment. Cost \$0, No action would be taken to treat site.
2. Treatment option 1. Site would cost \$47,000 for mechanical and chemical treatment. Labor would be contracted to carry out a management plan with an estimated completion time of 5 years. There will be a 3-year monitoring period after 100% restoration.
3. Treatments option 2. The site would be treated using volunteer labor with shovels and garden tools. The project is estimated to be an ongoing eradication project. The cost will be \$3000 for tools and would be subjected to constant updates to long-term goals based on the watershed's needs. No mechanical or chemical treatment would be used.

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Section D - Specific Management Recommendations from Group 4

Current Extent of the Species on or Near the Site

1. Scotch broom; *Cytisus scoparius*

Although several infestations of Scotch broom are present on site, there are still a relatively small concentration of the plant specimens compared to other present invasive species. These specimens are largely contained within a close area, primarily along a road. For this reason, control of the existing Scotch broom plants in the Sumner Watershed should be feasible.

2. Himalayan blackberry; *Rubus armeniacus*

Himalayan blackberry is present onsite in large amounts, with high potential to spread. The species' aggressive growth patterns and adaptability to a variety of conditions makes it difficult to contain. It is likely that, if not mitigated with a management plan, the blackberry will rapidly take over a larger area within the site.

3. Landslide reforestation (Himalayan blackberry)

Although the landslide areas make up a significant part of our site within the Sumner Watershed, their area is not presently expanding. There is potential for further landslide activity to expand these areas, but there is no present spreading like there is for the Himalayan blackberry. Landslide activity will be monitored, and prioritization may be modified accordingly.

Current and Potential Impacts

1. Scotch broom; *Cytisus scoparius*

Scotch broom has a large impact on the ecosystem around it. In addition to increasing fire risk, the plant also alters the nutrient composition of the surrounding soil and impacts mycorrhizal communities, upon which native tree and shrub species are reliant. This species also has the potential to outcompete native understory vegetation (Zouhar, 2005).

2. Himalayan blackberry; *Rubus armeniacus*

Himalayan blackberry is a highly competitive species which has been known to outcompete native understory vegetation. Although its flowers and fruit provide food to pollinating insects, birds, and other native wildlife, it takes resources from native food sources upon which some native species may be reliant. Although it has been known to dominate recently disturbed areas, this species is also very successful in undisturbed forested areas.

3. Landslide reforestation (Himalayan blackberry)

The deforested landslide area has several factors which exclude native species. The eroded soil and steep slopes make it difficult for plants to grow, particularly hardwood and conifer trees. Overly competitive invasive plants such as Himalayan blackberry, however, have been known to dominate disturbed hillslopes. Also, the steep slopes result in water and nutrient runoff, instead of permeating the soil. This hinders native species growth.

Value of the Habitats/Areas that the Species Infests or May Infest

1. Landslide reforestation (Himalayan blackberry)

The integrity of the Sumner property is highly dependent on the regeneration of conifers which help to anchor the sloped areas preventing erosion and further landslides. The slide area currently has no conifers established due to the invasive Himalayan blackberry. Reforesting this area with native trees, shrubs, and forbs is crucial to maintaining the Sumner property and restoring forest succession.

2. Himalayan blackberry; *Rubus armeniacus*

Himalayan blackberry can be found throughout the Sumner property. Its widespread distribution allows it to outcompete native understory species and prevent the regeneration of areas affected by disturbances. Removal of Himalayan blackberry will improve the property by allowing native species to return.

3. Scotch broom; *Cytisus scoparius*

Scotch broom can be found on the property mostly around the edges near roadways or in breaks of the overstory canopy. Although not as widespread, scotch broom negatively impacts the more open areas of the property and is spreading. Removal of Scotch broom would allow more diversity in these areas providing benefits to wildlife and native understory plants.

Difficulty of Control

1. Himalayan blackberry; *Rubus armeniacus*

The sheer volume and the wide distribution of blackberry on the property will make it very difficult to control. However, proper planning and the use of volunteers can help reduce its

distribution on the property. Steep sloped areas are concerning as they may not be assessable on foot and would require specialized equipment and training to access.

2. Landslide reforestation

The combination of steepness and loose soil make this area difficult to access. In addition, the landslide area is very large and covered in blackberry. For any chance at successful regeneration most of the blackberry would need to be controlled before planting conifers in the landslide area.

3. Scotch broom; *Cytisus scoparius*

The scotch broom on the property is relatively isolated since this species can't grow under the forest canopy. Removal efforts here have will greatly aid in the eventual eradication of the species. However, due to the longevity of the seeds, the population may never truly be removed, only suppressed. Preventing the plant from seeding more, will reduce the seedbank in the soil, and thus the future populations. Filling the space with native plants, so the scorch broom cannot return is the only method of preventing return. The scotch broom is also found on relatively flat ground allowing for easy access.

Summary of Actions Planned

The actions that will be taken to rehabilitate the natural vegetation in this area are all a part of an incremental restoration process. The priority is to stabilize the landslide area whilst also removing invasive species. The Himalayan blackberry will be removed in patches starting from the bottom of the slope, making progress up, and replacing it with native trees and shrubs to reduce reemergence in the next growing season. This entails mechanical/physical reduction of volume using power or hand tools. The replanting must take place directly afterwards to give new trees time to increase lateral size. The blackberry will grow quickly and will likely need to be removed multiple times before the trees are properly established and no longer impeded by competition from the blackberry. Before this is done, it is vital that the toe of the slope is stabilized first with trees/shrubs with heavy root masses. However, these cannot be the common large conifers that exist on the property, as many in the landslide area are leaning or have already fallen. They have proven to not be stable and should not be used to stabilize the slope. These species include Douglas-fir, western hemlock and black cottonwood. This is important to anchor the erosion and give resistance to the movement of soil down the slope (MEOEA, 2003). After the slope is fully replanted with native species, maintenance will be required to prevent the blackberry from outcompeting the new plants. This will entail mechanical suppression of the blackberry merely to keep its size down. It will return regardless of methods taken; however, the importance is to get larger root structures in the ground. If the blackberry returns, removal of the roots can be the method after the trees are creating a proper canopy (canopy is closed and branches are touching each other). Additionally, the landslide area should not be sprayed with herbicide

The Scotch broom is of higher priority than the blackberry or the slope since it is not as widespread and treatments can be highly effective. This plant grows primarily in areas of full sun exposure for most of the day. It is identified in the powerline corridor or by the highway. This plant can be removed mechanically or with herbicide. This plant will need to be replaced with a fast-growing shrub that can compete appropriately. Since Scotch broom has taken advantage of open areas that are left open for human use, it cannot be shaded out by trees. Therefore, ocean spray or similar shrubs can be used to compete with the return of the scotch broom.

Prioritized list of invasive species

1. Scotch broom
2. Himalayan blackberry

Weed Management Plan Implementation Schedule

Invasive Species Management Plan																					
Weed Priority List Weed Species	Current Extent	Value of Habitat	Control & Establishment	Current Impacts	Weed Management Plan Implementation Schedule												Labor Hours	Est. Hourly Rate	Cost of Materials	Volunteer Work Hours	Total Cost
					J	F	M	A	M	J	J	A	S	O	N	D					
	Category	Priority Rank	Priority Rank	Category																	
Himalayan blackberry (Year 1)	High	Medium	Low	Medium									x				60	\$35	\$290	40	\$2,390
Himalayan blackberry (Year 2)	High	Medium	Low	Medium				x									60	\$35	\$525	40	\$2,625
Himalayan blackberry (Year 3)	High	Medium	Low	Medium									x				60	\$35	\$290	40	\$2,390
Himalayan blackberry (Year 4)	High	Medium	Low	Medium				x									60	\$35	\$525	40	\$2,625
Himalayan blackberry (Year 5)	High	Medium	Low	Medium									x				60	\$35	\$3,290	40	\$5,390
Landslide-risk slope (Year 1)	Medium	High	High	High	x		x	x		x	x		x	x			80	\$35	\$250	30	\$3,050
Landslide-risk slope (Year 2)	Medium	High	High	High			x	x		x	x		x	x			50	\$35		10	\$1,750
Landslide-risk slope (Year 3)	Medium	High	High	High			x	x		x	x		x	x			50	\$35		10	\$1,750
Landslide-risk slope (Year 4)	Medium	High	High	High	x			x		x							80	\$35	\$150	30	\$2,950
Landslide-risk slope (Year 5)	Medium	High	High	High				x		x			x				50	\$35		10	\$1,750
Landslide-risk slope (Year 6)	Medium	High	High	High				x		x			x				50	\$35		10	\$1,750
Landslide-risk slope (Year 7)	Medium	High	High	High	x					x					x		80	\$35	\$150	30	\$2,950
Landslide-risk slope (Year 8)	Medium	High	High	High						x					x		50	\$35		10	\$1,750
Landslide-risk slope (Year 9)	Medium	High	High	High						x					x		50	\$35		10	\$1,750
Landslide-risk slope (Year 10)	Medium	High	High	High	x					x					x		120	\$35	\$3,000	40	\$7,200
Scotch broom (Year 1)	Low	High	High	High									x				48	\$35	\$525	10	\$2,205
Scotch broom (Year 2)	Low	High	High	High									x				24	\$35	\$315	7	\$1,155
Scotch broom (Year 3)	Low	High	High	High									x				16	\$35	\$225	5	\$785
																			\$46,215		

Table 2: Budget and timeline information for each control plan described below.

Specific Control Plans for Himalayan Blackberry on Landslide Risk Slope

Scientific name: *Rubus armeniacus*

Common name: Himilayan blackberry

Updated: _____

A. PRIORITY: High

B. DESCRIPTION

Himalayan blackberry is a perennial shrub with long, arching stems that can grow up to 10 feet in length. Native to Armenia and Northern Iran, *Rubus armeniacus* was introduced to other parts of the world, including North America, Europe, and New Zealand, where it has become invasive. This species is found in a multitude of environments, but seems to prefer wetter soils or climates (King County, 2008).

C. CURRENT DISTRIBUTION ON THE SITE

A large portion of the section's slope/landslide zone is covered in the blackberry. It has created a monoculture down this highly disturbed site. There are areas of native plants that have kept the invasive plant from spreading, primarily the East side of the ground water flow. However, the West side is very overcome by the blackberry. See distribution map for a visual.

D. DAMAGE & THREATS

This species is very efficient at growing above other shrubs and young trees to access light in the understory or in open sun. It is incredibly fast-growing and will return quickly if the root mass is left intact (King County, 2008).

E. GOALS

The goal is to remove the blackberry from this hillside in order to improve soil stability with the replacement of deeper root masses.

F. OBJECTIVES: The objective is to remove 90% of the blackberry in sections across the 3 acres of the hillside. There are sites of particular severity in comparison to other areas in the landslide area. The area of focus is the drawl leading down the slope to the County spring tank. See appendix C for map and F for imagery of location. Additionally, the fill side of the road directly adjacent to the tank is a high-risk area for erosion as well (bottom right of appendix F).

. In the incremental sections moving up the slope, 90% of the species needs to be removed to allow for the trees to grow above the blackberry. Each section will take up to 10 years for the blackberry to no longer impede the growth of the trees. During this time, it will need to be manually reduced 6 times per year during the first 3 years, 3 times per year for the next 3 years, and 2 times per year (or as needed) until the 10th year.

G. MANAGEMENT OPTIONS

Option 1: Manually reduce (cut) the blackberry in 10-foot increments from the bottom of the slope and moving out from the flat area at the bottom of the hill. The flat does not have blackberry and will likely respond well to planted trees. Firstly, the flat should be planted with western red cedar with an 8-foot spacing. The 10-foot cut area should be live staked with pacific willow. This process includes planting a live branch of a willow tree which has the capability to grow into a new tree. They should be spaced 5 feet apart. The cutting of the blackberry versus pulling the roots will leave the root masses in the ground which will still act as support for this landslide area (Smith et al., 2021). The trees will grow and replace the stability structure of the blackberry, while also being more effective in that role. Once the trees are properly established, between 3-5 years old, then the next 10 feet should be cut into the blackberry. To prevent the blackberry from out competing the trees, they will need to be cut back as they begin to grow over the young trees. The blackberry should be manually reduced 6 times per year (2 times per season except Winter) during the first 3 years, 3 times (once per season except Winter) per year for the next 3 years, and 2 times per year (or as needed) until the 10th year. Once the trees are fully established (10 years), then the blackberry can be pulled and replaced with shrubs. These shrubs include ninebark, vine maple, beaked hazelnut, salmon berry, and thimble berry (King County, 2013). There should be an emphasis on getting evergreen understory coverage after the

blackberry root mass has been pulled. This should include salal or Oregon grape as ground cover. These species have a good likelihood of preventing the blackberry from returning and minimizing maintenance (King County, 2013). The shrubs can be planted as seedlings or as seeds as a mixed group to maximize success in case some species don't respond well to the environment. This same method should be used for the fill slope that is adjacent to the tank in this area. The hillside leading down to it from the road is fully covered in blackberry. Follow the same cutting timeline and planting of willow/shrubs.

Option 2: Another option is to cut back the blackberry in 20-foot sections from the flat in contrast to the 10-feet. Rather than planting trees, the listed shrubs above can be planted directly after the manual removal of the blackberry. They should be planted between December and the absolute latest, March. The shrubs will provide competition for the blackberry and will eventually out compete them with the assistance of manual removal. The blackberry will need to be cut 2 times per season (excluding Winter). This will likely continue for 3-5 years until the shrubs have fully covered the ground and do not allow for the proper reemergence of the blackberry. This method will not provide the same amount of erosion protection as large tree species will, however, if planted densely, the native shrubs have a much more significant root mass than the blackberry. This has a good likelihood to be sufficient for landslide prevention.

Option 3: An option is to take no action. This could be successful as there is a fairly concentrated number of blackberry root masses in the soil, and this could be effective at holding the soil from erosion. However, this is not incredibly likely that it will handle any sort of extreme flooding event. Additionally, the trees nearby are suffering from slope failure and there are multiple accounts of leaning and falling. With time, there will not be much shade in the surrounding area, which will lead to better circumstances for the blackberry to spread. This will further weaken the slope.

Specific Control Plans for Scotch broom

Scientific name: *Cytisus scoparius*

Common name: Scotch broom

Updated: _____

A. PRIORITY: High

B. DESCRIPTION

Scotch broom is an understory shrub with bright yellow flowers in the pea family. It is native to some parts of Europe but has become invasive in many regions around the world, especially in North America. Scotch broom grows quickly and stands at heights of 6 to 10 feet tall. Its stem supports small green leaves and round yellow flowers that bloom from April to June (Zouhar, 2005). Its ability to spread rapidly and outcompete native plants has made it a concern for land managers.

C. CURRENT DISTRIBUTION ON THE SITE

Scotch broom is concentrated around the edges of the property and in open areas. Forested areas prevent the spread and establishment of Scotch broom on the property. (Refer to appendix C)

D. DAMAGE & THREATS

Scotch broom if left on the property can outcompete native species, destroy prairie habitats and prevent nutrient transfer in the soil by fixing nitrogen. Over time Scotch broom can grow taller and contribute to increased wildfire intensity by serving as ladder fuel for larger shrubs and trees (Hoshovsky, 1986).

E. GOALS

Goals include restoring open areas with native plants and grasses. Reduce the amount of Scotch broom to improve fire resilience and prevent nutrient depletion in the soil while allowing better access to inspect site infrastructure. Focus on moving towards eradication while Scotch broom remains relatively isolated.

F. OBJECTIVES (Measurable)

Scotch broom cover reduction of 95 percent over a 3-year period throughout the one-acre area of Scotch broom currently present on the property.

G. MANAGEMENT OPTIONS: (Organized by most effective to least effective options)

Option 1: Cut stump method. The cut stump method involves cutting the scotch broom stem approximately 1-2 inches from the ground then following up with a triclopyr based herbicide (Hoshovsky, 1986). Once the plants have completely died workers can follow-up with re-planting native species such as Ocean Spray and Salmonberry which will help prevent Scotch broom from returning. For this application Crossbow herbicide is preferred for the scotch broom. Mix 5 ounces of Crossbow per 3 gallons of water and flow all label directions. The herbicide can then be applied by a sprayer on the freshly cut Scotch broom stem. This option limits excessive overspray that is often associated with foliar applications. Application should be performed in the summer to late fall. Current distribution of known Scotch broom falls outside of the watershed drainage area and all applicators must confirm that they are outside of the drainage area before spraying herbicides. Due to the small concentrations of scotch broom and the increased difficulty in removing the roots this option would be the most effective.

Option 2: Manual grubbing. Avoids any pesticides but requires intense labor and proper tools to pull the root systems out. Use of a weed wench tool can aid in the efficiency of removal while allowing workers and volunteers to effectively remove the whole plant intact with the roots. The plants once pulled will need to be removed from the property and disposed of properly. Although Scotch broom is relatively isolated on the property manual removal is still difficult due to the root system. Moreover, this option will be more labor-intensive and require ongoing removal treatments to be effective. Following up with planting natives including Ocean spray and Salmonberry will help to prevent Scotch broom from returning and reduce on going removal treatments.

Option 3: No control. Doing nothing will increase the spread of Scotch broom overtime. However, the species can only spread to open areas and forest edges of the property. Since Scotch broom seeds remain viable in the soil for decades postponing treatment would likely make future eradication impossible.

Specific Control Plans for Himalayan Blackberry

Scientific name: *Rubus armeniacus*

Common name: Himalayan blackberry

Updated: _____

A. PRIORITY: Low

B. DESCRIPTION

Himalayan blackberry is a perennial shrub, characterized by thick, arching canes armed with recurved prickles and large edible fruit (King County Noxious Weed Control Program, 2018). Native to Armenia and northern Iran, Himalayan blackberries were introduced to the Pacific Northwest in the 1880s as a cultivated crop and became established on the west coast by 1945 (Soll, 2004). This species is known for its rapid, vigorous growth and is listed as a Class C Noxious Weed in Washington State.

C. CURRENT DISTRIBUTION ON THE SITE

Himalayan blackberry is present throughout the Sumner Watershed property, typically in large patches. (Refer to Appendix C). Overall, there are approximately 15 acres of blackberry on the property.

D. DAMAGE & THREATS

Himalayan blackberry is very fast-growing and highly competitive, outcompeting native plant species and disrupting ecosystem processes. The presence of this species can reduce overall plant and animal diversity in an area.

E. GOALS

The long-term goal of blackberry removal is to free up space and resources for native understory vegetation growth.

F. OBJECTIVES

The removal objective is to eliminate 50% of the present blackberry over the course of 5 years. Complete eradication from the site is likely not possible.

G. MANAGEMENT OPTIONS

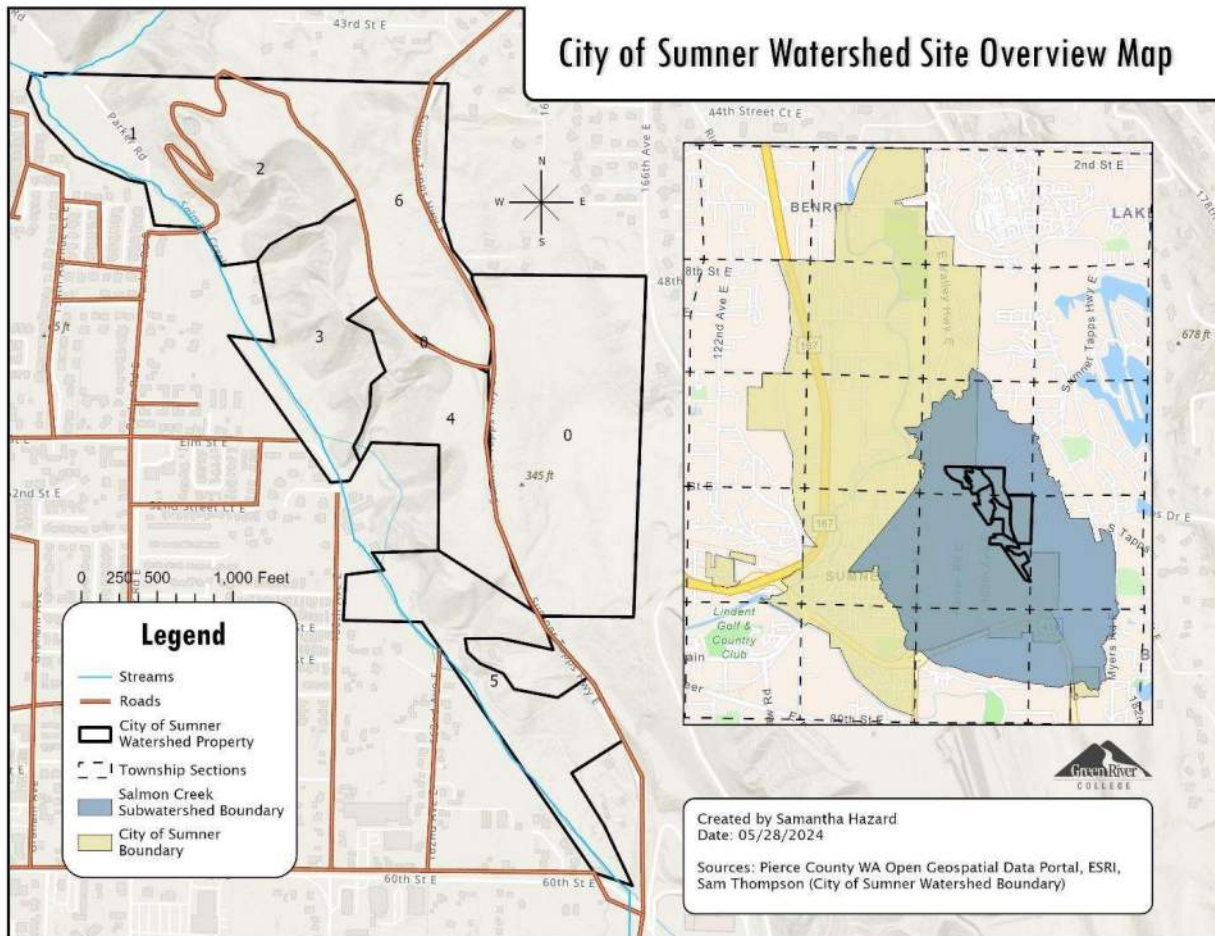
Option 1: One option is to spray the blackberry with foliar herbicide, followed by planting of native vegetation. Glyphosate is an herbicide which inhibits the plant's production of amino acids and proteins, resulting in the halted growth and eventual death of the plant. This should be broadcast using 2.25-3 lb/acre. Herbicides should be applied once per year during September or October, as this is when the treatment is most effective. Alternatively, triclopyr-based herbicides (such as Garlon 4, Garlon 3A, or Crossbow) may be applied in areas previously treated by glyphosate. This herbicide would also require a foliar application, when the blackberry is actively growing. This should be broadcast using 2 lb/acre. Triclopyr has a different method of action than glyphosate, instead causing uncontrolled, disorganized growth which results in the death of the plant. Alternating treatments with herbicides with different methods of action would mitigate resistance. Chemical control methods would be most cost-effective in areas 200 square

feet and larger. However, this would not be recommended in areas where the groundwater leads to the city's water supply

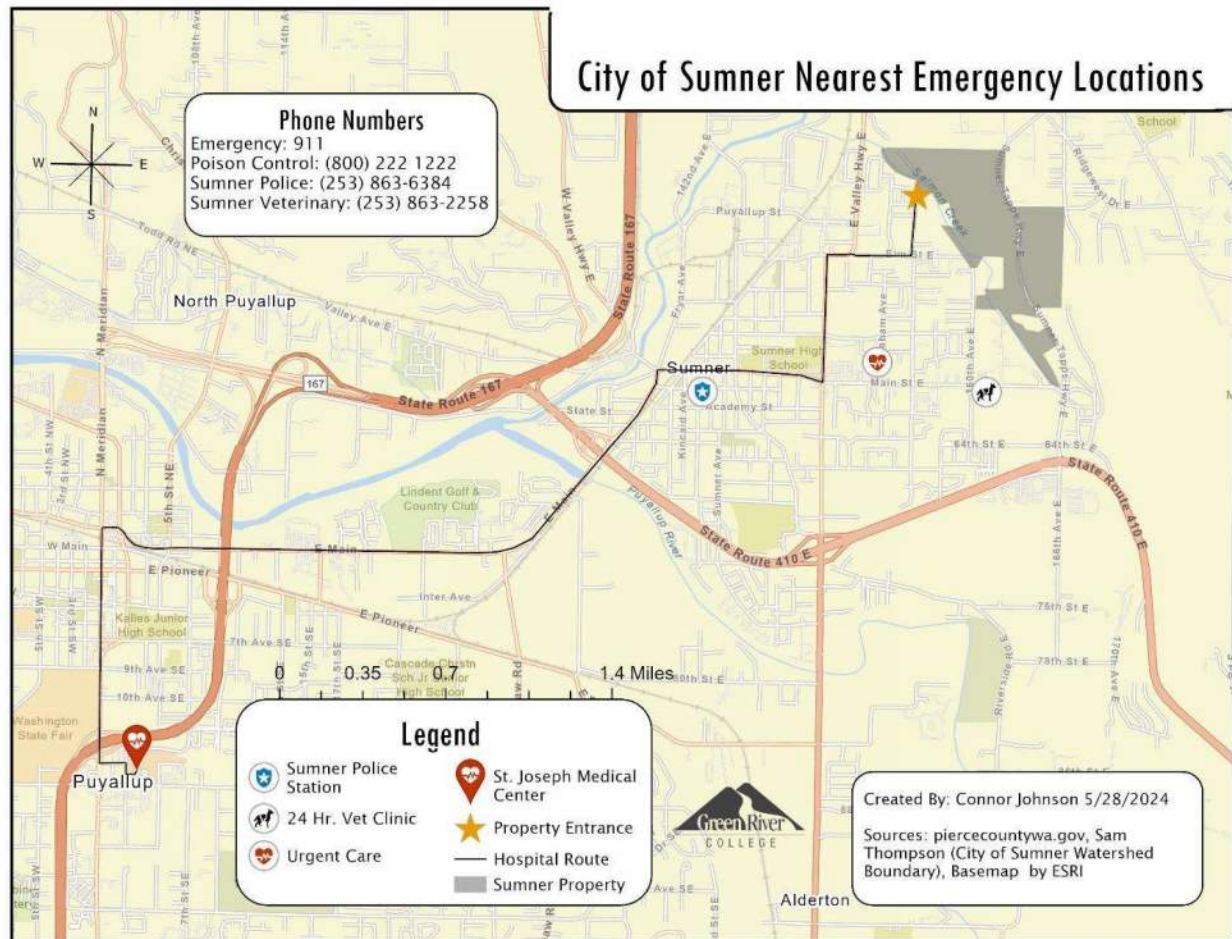
Option 2: One option is manual removal of the blackberry. This will involve cane cutting with loppers followed by pulling rootballs, either by hand or using tools such as shovels, pickaxes, or pulaskis. This method should be repeated five times per year for the best results, primarily in June through September. Following manual removal, native vegetation, including, should be planted in previously infested areas to prevent re-infestation. Cane fragments should be left in place as mulch or composted on site. Rootballs should be removed or This method would be most effective in areas less than 200 square feet.

Option 3: Another option is that we take no action against the blackberry. This is not recommended, as unmanaged blackberry grows rapidly, with canes growing up to 20 feet in a single season (King County Noxious Weed Control Program, 2018).

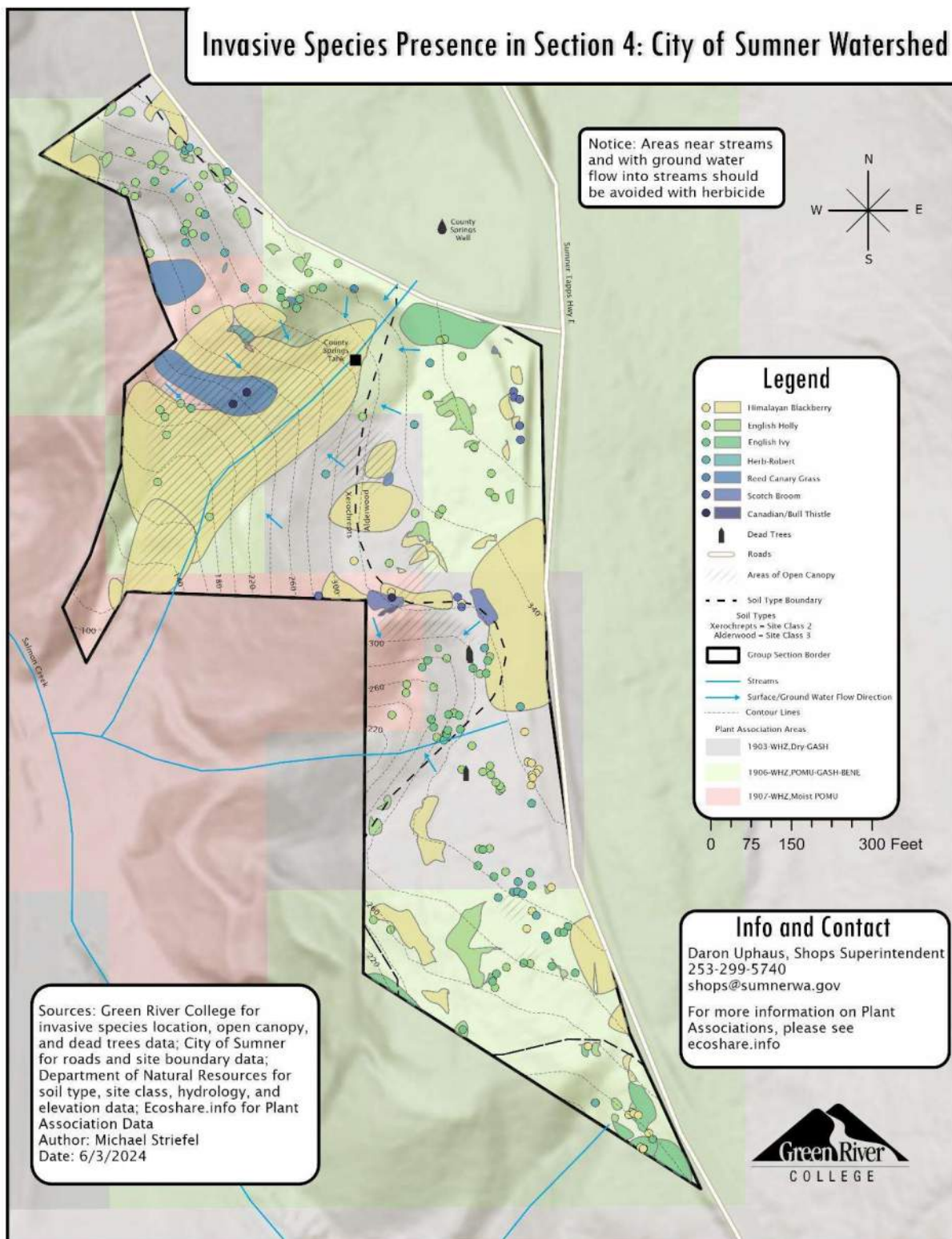
Appendices:
Appendix A



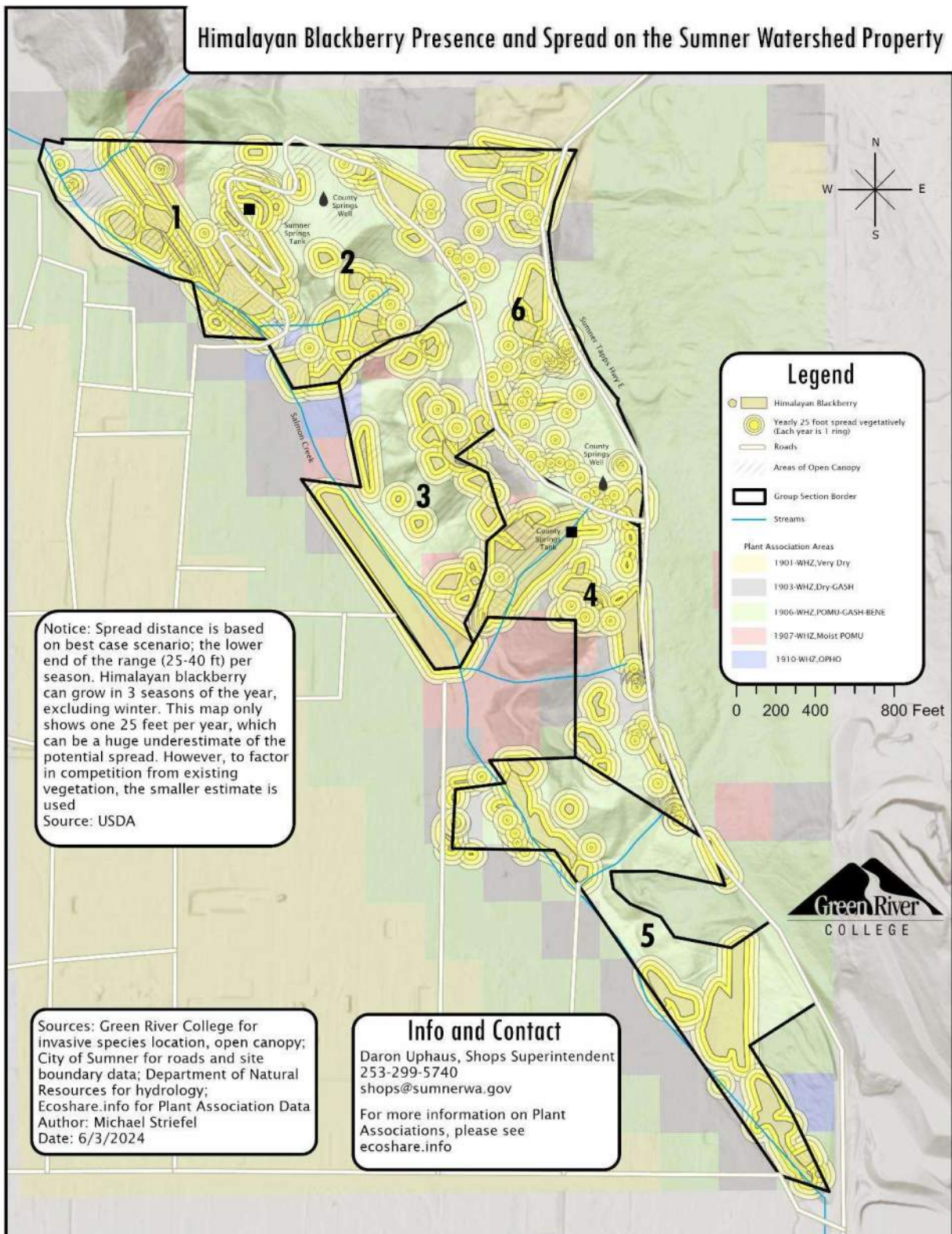
Appendix B



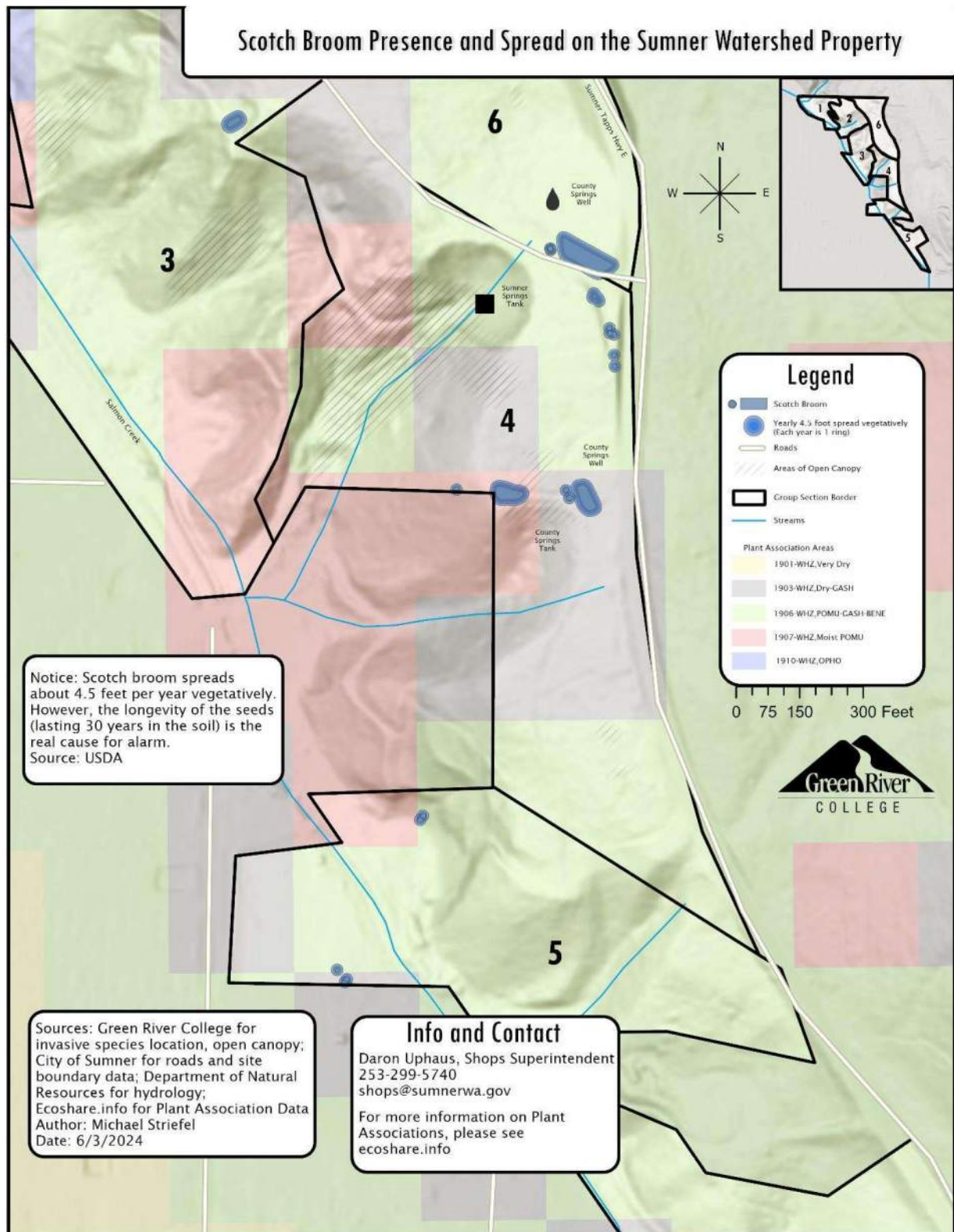
Appendix C



Appendix D



Appendix E



Appendix F



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Section E - Specific Management Recommendations from Group 5

Management Plans:

Setting Priorities for Bindweed

- 1) **Current extent of the species on or near the site:** Field bindweed on this property is limited to the edges, sporadically covering 3 acres.
- 2) **Current and potential impacts of the species:** Bindweed can choke out other plants by winding itself around the stems and leaves. It is especially detrimental to young trees and shrubs.
- 3) **Value of the habitats/areas that the species infests or may infest:** Field bindweed has been found near a Type B wetland. If live stakes were used as a cultural control to shade out other invasive species, bindweed may negatively impact the success rate of plantings.
- 4) **Difficulty of control:** Field bindweed is a difficult weed to control. It reproduces through rhizomes, seeds, and stem fragments. The seed bank can lay dormant in the soil for up to 50 years.

Summary of specific actions planned for Bindweed

Scientific name: *Convolvulus arvensis* **Common name:** Field Bindweed

A. PRIORITY: High

B. DESCRIPTION

Field bindweed is a generalist species. It can live in full sun or shade, is tolerant to drought, and is found in all settings, from forests to urban developments. It is a

perennial herbaceous rhizomatic plant that can grow roots as far as 30 feet deep on the extreme end. It is native to Europe, Asia, and North Africa.

C. CURRENT DISTRIBUTION ON THE SITE

It is found in the NW part of the property adjacent to the type B wetland.
(Refer to maps, Section 1C)

D. DAMAGE & THREATS

Field bindweed has caused minimal damage to this site. However, if left unmonitored, it could overtake that part of the property.

E. GOALS

Our section's long-term goal for field bindweed is to reduce its ground cover and overall volume. It is encroaching on a sensitive area, a Type B wetland. Total eradication would be preferable. However, the challenging and persistent nature of field bindweed eradication may not be attainable.

F. OBJECTIVES

1. The presence of field bindweed is still relatively small. The Washinton State Noxious Weed Board says that once it is established, it is nearly impossible to completely eradicate it. While total eradication may not be feasible, I think it could be severely diminished from the site.
2. Field bindweed has been observed sporadically in a 2.5-acre area.
3. A reduction of 90% can be achieved within two growing cycles.

G. MANAGEMENT OPTIONS

Three viable control options will guide the landowner to make a prudent decision based on cost, ease, and priority.

Option 1 is to do nothing. The presence of bindweed is minimal, so monitoring it once or twice a growing season to decide if further action is warranted is a solid option. This option will only cost a worker about an hour to monitor.

Option 2: Hand pulling. If the landowner had volunteer work parties, a couple of experienced volunteers could be given the task of manually removing bindweed.

Manual removal could be labor intensive and, if not done correctly, could further spread bindweed.

Option 3: Cultural control. Reed canary grass is the dominant species wherever bindweed is present. If and or when it is time to restore the area where the RCG is, it would be a good idea to remove the RCG and plant native grass plugs that would smother the bindweed and stop any potential spread.

Setting Priorities for Yellow Flag Iris

1. **Current extent of the species on or near the site:** Minimal (3sq meters)
2. **Current and potential impacts of the species:** The current impact of Yellow Flag Iris is minimal as Reed Canary Grass is out-competing it. It could spread up and downstream on Salmon Creek, further crowding out native species.
3. **Value of the habitats/areas that the species infests or may infest:** Yellow Flag Iris prefers wet areas which would be Salmon Creek and nearby wetlands on site. Salmon Creek provides salmon habitat and the local wetlands harbor species that depend on that environment.
4. **Difficulty of control:** Yellow Flag Iris would be easy to control since it is present in such a small area. However, if left unchecked, it could spread much further, making control more difficult.

Summary of specific actions planned for Yellow Flag Iris

Scientific name: *Iris pseudacorus*

Common name: Yellow Flag Iris

A. PRIORITY: High

B. DESCRIPTION:

Perennial aquatic plant reaching 2-3ft tall growing along shorelines with large yellow flowers, native to Europe and North Africa. Yellow Flag Iris spreads through rhizomes and primarily through seed. It produces thousands of seeds each year, which

causes it to be so invasive and is the main threat it poses to native environments. Broken pieces can also float to new areas and regrow. Yellow Flag Iris blooms in Spring.

C. CURRENT DISTRIBUTION ON THE SITE:

The current distribution is minimal. It is only found on Salmon Creek in a small patch in the Southwest corner of the site.

D. DAMAGE & THREATS:

Yellow Flag Iris is causing minimal damage as it is only present in one small area. It could pose a larger threat in the future as it is growing along Salmon Creek, but it is currently only growing in an area already overrun by Reed Canary Grass.

E. GOALS:

Eradication from the site.

F. OBJECTIVES (Measurable):

The community is still small, so simple mechanical removal of 100% of the population is easily attainable and requires no further multistage objective other than future monitoring.

G. MANAGEMENT OPTIONS:

1. **No Treatment;** Do Nothing (least preferred) – Population so small that prevention of establishment seems to still be possible
2. **Treatment Option One:** Mechanical Removal (preferred) – Hand-pulling

Priorities (See Appendix)

Setting Priorities for Reed Canary Grass:

- 1) **Current extent of the species on or near the site:** The site has extensive reed canary grass coverage, with most of the site covered by it. If it is not occupied by reed canary grass, it is occupied by Himalayan blackberry.

- 2) **Current and potential impacts of the species:** Reed canary grass does not provide the shade necessary to keep the stream cool for the invertebrates and salmon that use Salmon Creek. It also does not provide bank stabilization and prevents any native species from taking root and growing.
- 3) **Value of the habitats/areas that the species infests or may infest:** High-value areas are the stream bed and riparian areas. Low-value areas would be where the sewer line runs as Blackberry overtakes that.
- 4) **Difficulty of control:** This will be extremely difficult to control as there is a vast extent of reed canary grass on the property. While walking on the site, the ground feels plush as you walk over the dead plant material from last year.

Summary of specific actions planned for Reed Canary Grass

1. Mowing site and removal of clippings (or possible use of goats).
2. Solarization (using a clear plastic tarp to cook the plants).
3. Several layers of cardboard covered by 4 to 6 inches of wood mulch.
4. Planting fast-growing trees and shrubs.

Summary of specific actions planned for Reed Canary

Scientific name: *Phalaris arundinacea* Common name: Reed Canary Grass

A. PRIORITY: Medium

B. DESCRIPTION

Reed canary grass is native to Europe and Asia. Reed canary grass was brought to the U.S. in the 1800s and planted for erosion control. The reed canary grass quickly took over and has out-competed native species. Reed canary grass grows in wet soils and is most commonly found in wetlands, ditches, and near rivers/streams. Reed canary grass can grow up to six feet tall. Reed canary grass blooms from May to June

and produces seeds in late June. You can ID reed canary grass by pulling back the leaf, and you will see a transparent/whitish ligule.

C. CURRENT DISTRIBUTION ON THE SITE

Reed canary grass covers about 40% of the site. See appendix

D. DAMAGE & THREATS

Reed canary grass outcompetes native plants, making it hard for saplings or shrubs to grow. It likes wet areas, so it takes over banks of streams and rivers, raising the water temperature as the grass does not allow any native plants to provide shade to Salmon Creek.

E. GOALS

Our short-term goal is to reduce the size of the reed canary patch to allow more native species to grow. Complete removal of reed canary grass would be ideal but is unlikely and will take a massive amount of time and a large budget.

F. OBJECTIVES (Measurable)

Our objective is to reduce the reed canary grass percent cover by 10% every year for five years or until wholly eradicated.

G. MANAGEMENT OPTIONS

1. **No Treatment: If this site was not treated**, little would change as all open areas are already occupied with reed canary grass.
2. **Treatment Option One:** Mow the reed canary grass in the late spring after the grass has put out its new growth—plant tall and fast-growing native plants after mowing. Clear any reed canary growth surrounding the newly planted natives throughout the year. It is recommended that this be done section by section to see how successful this treatment will be in this area.

3. **Treatment Option Two:** Use glyphosate or imazapyr herbicide in late summer. Plant tall and fast-growing native plants after herbicide application. Clear any reed canary growth surrounding the newly planted natives through the year. Do not use herbicide treatment in areas where there is groundwater recharge to the wells, in areas that flood frequently, or near Salmon Creek.

4. **Treatment Option Three:** Mow reed canary grass in late spring after the grass has put out its new growth. Lay down clear plastic tarping to kill off the reed canary grass. Remove the tarping and lay several inches of cardboard, followed by 4-6 inches of wood mulch. Then, plant fast-growing native species. It is recommended that this be done section by section to see how successful this treatment will be in this area.

Timeline:

Timeline for Bindweed:

Treatment	Proposed Timeline
Manual Control/Monitor.	Spring/Summer 2024: M,J,J,A,S,O
Seed native grasses such as tufted hair grass as a smother crop.	Summer 2024

Timeline for Yellow Flag Iris:

Treatment	Proposed Timeline
Manual removal	Spring/Summer (As soon as possible)

Timeline for Reed Canary Grass:

Treatment	Proposed Timeline
Mowing site and removal of clippings (or possible use of goats).	Spring/Summer 2024

Maps:

Sumner Watershed Site Overview Map

