North Creek Forest
UW-REN 2015 - 2016 Stewardship Plan

Prepared for Friends of North Creek Forest
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Project Description:

Located along the western edge of North Creek Forest, our ecological restoration site is downhill of a residential neighborhood, and in the heart of the City of Bothell. It is a small part of the 64 acre mixed evergreen/deciduous canopy of North Creek Forest that is a prime example of an upland forest in the Puget Sound Lowlands, representing wetland and riparian habitats as well. The project site (Site 5) is part of the North Creek watershed, with groundwater outflow from within the site as well as the surrounding forest draining into North Creek. The soil throughout the site is highly saturated and even periodically inundated during the fall and winter months and will stay wet most of the year. The exception is Polygon 5 which lies underneath a dense coniferous canopy provided by several large western redcedar (*Thuja plicata*). Polygon 5 receives far less moisture, as well as sunlight, compared to the rest of the site. There is little-to-no canopy coverage in the majority of the site due to the sparsity of mature trees, and this has provided a suitable environment for many sun-loving species to thrive. The southern parts of Polygons 1 and 3, however, both receive partial deciduous shade from big-leaf maple (*Acer macrophyllum*).

With the help of Friends of North Creek Forest and the hard work and dedication of volunteers, we have accomplished many of the tasks laid before us to successfully restore this portion of North Creek Forest. Much of our time on site was dedicated to the removal of invasive species, mulching trails, removing garbage and planting. Trails were created by adding a layer of mulch approximately 12-18" thick to absorb moisture and provide accessibility to the site. Many areas where we made trails had excessive moisture and were considerably muddy, requiring a thicker mulch layer in order to maintain trail stability. We lined the trails using large branches that had fallen and become available. We also had to deal with a tall snag that was located at the top of the site in Polygon 2 because it was considered a hazard to volunteers and a nearby neighborhood resident who's backyard was located a few meters from where the snag was. It was cut down and taken offsite. The most recent work done to Site 5 was the addition of wine-cap stropharia (*Stropharia rugosso-annulata*) inoculated mulch to the eastern access trail, insertion of oyster mushroom (*Pleurotus ostreatus*) plugs into a fallen red alder (*Alnus rubra*) at the bottom of Polygon 3, and the construction and placement of mason bee (*Osmia* sp.) boxes, bumble bee (*Bombus* sp.) habitat structures, a black cap chickadee (*Poecile atricapillus*) birdhouse, and a habitat structure for western screech owls (*Megascops kennicottii*) or northern Saw-whet owls (*Aegolius acadicus*).

Prior to restoration activities, the site was heavily dominated by the native species salmonberry (*Rubus spectabilis*) and the non-native invasive species Himalayan blackberry (*Rubus bifrons*).

Dense impenetrable thickets comprised of both of these species covered approximately 60% of the site. Two other non-native invasive species, English ivy (*Hedera helix*) and English holly (*Ilex aquifolium*), were also heavily present on the site. Much of the site could not progress to a later stage of succession due to the presence of these invasive species.

Our first goal was to establish native vegetation to initiate site development towards later-successional maturity characteristic of Puget Sound lowland forests prior to extensive logging. The first objective to accomplish this goal was to rid the site of invasive species. This would make room for the planting of native species in their place and also decrease the competition that existing native vegetation onsite had to deal with. However, the slope of the site made the removal of invasive species challenging. Digging up the invasive species would leave the soil exposed to rain-drop erosion and erosion from the lack of stabilizing root systems (Gold 2016). Sediment loss and erosion will result in a loss of organic matter within the local soil. We also need to ensure that the unprotected soil does not wash off-site into the creek below, which flows into North Creek. Sediment pollution can lead to declines in fish populations by clogging fish gills and affecting egg and larvae development (MARC 2016). In order to try and prevent erosion from going into the creek that was caused by foot traffic and digging while working on the site, we worked with Friends of North Creek Forest (FNCF) to install a silt fence that runs along the eastern border of our site. Our second objective was to remove lumber and any garbage present, as well as apply an 8-12" covering of wood chip mulch across the site, and install a fascine on the western border of Polygon 1 to stabilize soil and slow runoff. Our third objective was to install biologically and structurally-diverse native species suitable for the current successional stage of site.

Goal 2 for our project was to improve ecological functions onsite as well as those provided to nearby habitat and the local watershed. To accomplish this goal, we wanted to plant native species that would improve water absorption and filtration, aiding in the reduction of surface erosion and assisting the uptake of excess surface water. We also selected plant species with extensive root systems that would be useful for soil stabilization, such as twinberry (*Lonicera involucrata),* snowberry (*Symphoricarpos albus),* and pacific ninebark (*Physocarpus capitatus).* Our final objective for Goal 2 was to increase fungal diversity and potentially improve water quality, via filtration by the fungi, by inoculating the main mulched trail with wine-cap stropharia. To do this, we planned on acquiring wood chip mulch colonized by the mycelium.

Goal 3 was focused on increasing the wildlife value of our site. We wanted to create structurally-diverse wildlife habitat to attract local fauna such as birds, bats, insects and amphibians. To do this, we planned to install a variety of native vegetation that could be used

by wildlife for food, shelter and nesting, as well as integrate a variety of hand-built facilities that would provide additional shelter and nesting opportunities.
Our final goal for our project site was to engage the community in restoration efforts and continued maintenance of project site, and we plan on doing this by informing residents and students in the area of the benefits of restoration activities like we have at North Creek Forest, for their educational opportunities and fun activities. It is important that stewardship persists on our site to ensure its progression towards successional maturity.

Post Installation:

Overview

In all of the polygons, we have created access trails for the team and volunteers to be able to get to previously hard-to-reach areas of the site for restoration activities. Each polygon was carefully considered for what the conditions were and what plants would do best for various goals and objectives picked out by the team, such as soil stabilization, water filtration and slow-down of runoff, and food/shelter for small mammals and birds, etc. Most of the polygons had some trash or debris that needed to be cleared out before major restoration could begin, including large pieces of wood, plastics and dead branches that had fallen off trees. We used the fallen branches to make borders dividing trails from planted areas, and we cleaned up all of the trash and debris that remained. We mulched the access trails much more heavily than we expected we would need to. Our goal was to have an 8-12" layer of wood chip mulch throughout the site, but for the access trails, the mud sank deep enough to where we required an additional 6-12" to make them safe enough for foot traffic. Invasive removal was also a major goal for us, as this was an initial step needed before we could begin planting our native plant species throughout the site. There was some areas of very dense thickets of Himalayan blackberry, and English ivy had spread into each polygon (more densely in some than others). We also encountered several established patches of English holly throughout. The invasive plants present in each polygon have been removed in order to make way for the native plants that were mentioned in each polygon description above, and we have planted all of the planned native species for the site. The removal of invasive species left the soil exposed, and this would eventually result in a loss of organic material onsite because of continued sediment loss/erosion. We needed to ensure that the unprotected soil does not wash off-site into the creek below.

Polygon 1

1,295 square feet. Southwest section of Site 5

Prior to restoration, Polygon 1 received partial deciduous canopy coverage provided by a number of big-leaf maple and contained a sparse shrub layer made up of several vine maple (*Acer circinatum*), but much of the polygon was dominated by a carpet of English ivy (*Hedera helix)* and a thicket comprised of mainly Himalayan blackberry (*Rubus bifrons*), both of which prevented other native species from establishing. Our goal for restoration in this polygon was to stimulate successional maturity by building a fast-growing and robust shrub layer, fill in the groundcover layer using sun-loving and part-shade tolerant species, and plant tree species that will eventually be able to reduce canopy gaps. Accomplishing these tasks will deter the re-emergence of problematic invasive species, reduce the high water table of the site, stabilize the soil to prevent soil erosion and sediment pollution, and create habitat and food sources that a variety of wildlife can use.

To begin, we removed all of the English ivy and Himalayan blackberry that we could find and then proceeded to add an 8-12" layer of wood chip mulch across the polygon. Once the area had been cleared, we began planting. Because much of this polygon is open to sun and contains mostly moist-to-saturated soils, we chose to plant several sitka spruce *(Picea sitchensis*) throughout that can tolerate both abiotic factors. Over a number of years, these will grow tall and be able to provide substantial amounts of evergreen shade to the area, which will prevent English ivy and Himalayan blackberry from returning and will provide adequate conditions for later-successional species to establish. One was planted near the start of the western access trail in a moist patch, another at the southeastern corner of this polygon and a third being installed along the borders of Polygons 1 and 2. Also, we installed an additional big-leaf maple right in this middle of Polygon 1 to enhance the deciduous canopy in this area as well as provide leaf-litter and woody debris that will help to absorb water and provide potential nutrients to the soil in the form of organic matter. In order to speed up the successional process and develop a small deciduous canopy very quickly, we planted a number of Pacific willow (*Salix lucida ssp. lasiandra),* Hooker's willow (*Salix hookeriana)* and sitka willow (*Salix sitchensis)* as live stakes in this area. These are known to grow fast and are establish well in saturated soil conditions (USDA 2016). Due to their ability to survive high-moisture soil content, and preference for shade, we planted some western redcedar (*Thuja plicata)* to help begin the process of establishing late-successional evergreen understory (Pojar 2004).

To increase the density and diversity of the mid-story layer in Polygon 1, we planted several extra vine maple (to supplement those already in this polygon) in the somewhat dry, more

elevated portion of Polygon 1 located west. Moisture-tolerant shrubs, such as red-twig dogwood (*Cornus sericea)*, snowberry, and Pacific ninebark were planted in the wet and high-sun areas in the form of live stakes and bare root plants. All of these species will provide a number of services to this polygon such as competition against invasive species, habitat and food sources for small mammals and birds, nectar sources for pollinators, and stabilization of the site's slope (Leigh 1999). Another shrub species, swamp gooseberry (*Ribese lacustre)* was added in some spots as a food source for birds and small mammals. A couple of Goat's beard (*Aruncus dioicus)* were also added because of their tolerance of moisture and their production of seeds that birds can eat (USDA 2001).

In order to promote a healthy understory in Polygon 1, we have added a number of species. The two most planted of our understory species were slough sedge (*Carex obnupta)* and Henderson's sedge (*Carex hendersonii*)*,* which were installed primarily to improve erosion control and to filter sediment from surface runoff, but also to provide habitat for small birds and mammals and act as a food source (browse and seeds). Slough sedge is especially well-suited for early-successional planting because as the site matures, this species will be able to survive the changing light conditions, can persist through all stages of succession and it's evergreen cover is important in winter (USDA 2016). False Lily of the Valley (*Maianthemum dilatatum)* has also been installed to help with preventing invasive species from returning since they act as an aggressive groundcover, and it is also considered a good food source for small mammals (Shebitz 2003). Several salal (*Gaultheria shallon*) were recovered from salvage and planted in the northern portion of this polygon where there is partial shade. This species will do well to add more sources of berries for wildlife, bind the soil on the hillside, and give small mammals and birds another resource for cover (Tirmenstein 1990). The final understory species that was to be planted in this polygon was deer fern (*Blechnum spicant).* This species requires a decent amount of shade, so we installed it in the northeastern area of this polygon underneath thicker deciduous cover. Deer fern will be useful to absorb water out of soil and provide browse for deer (Matthews 1993).

Polygon 2

1,567 square feet. Northwestern portion of Site 5

Polygon 2 was dominated by dense, impenetrable thickets of salmonberry and Himalayan blackberry prior to restoration. These two species alone accounted for approximately 80% of the vegetation throughout Polygon 2 because not much else was able to establish in the thickets. English ivy was also problematic in this polygon, for it had completely covered a snag at the southwestern corner (that has since been removed with the help of Jim Freese at Friends

of North Creek Forest) and had also climbed to the top of a mature western redcedar (approximately 100 ft tall). Some native understory species such as skunk cabbage (*Lysichiton americanus*) and horsetail (*Equisetum* ssp.) were also present. Three young (under 40 years old) western redcedar (*Thuja plicata*) are located along the eastern border of Polygon 2.

Polygon 2 receives almost no shade and consists of extremely saturated soil throughout (except along the western border where it is slightly drier), so we installed species that would tolerate both abiotic factors. The species were also chosen to initiate canopy development, absorb moisture from the soil, and bind the soil with their root systems. We installed 3 sitka spruce bare root plants in various locations in this polygon. One was placed near the trail dividing Polygons 1 and 2, and the other two were installed in the center where they will receive high amounts of sun and help with initiating our objective of an evergreen canopy (Scott 1992). Two other tree species were planted in this polygon for the purpose of developing evergreen canopy cover and to absorb water: western redcedar and Sitka spruce (*Picea sitchensis).* The first western redcedar was planted next to the northern border in a position where it will receive partial shade from the present salmonberry thicket. The other was planted next to the edge of the evergreen canopy produced by the mature western redcedar trees in Polygon 5. We installed three Sitka spruce in this polygon because of the moisture conditions. This species is a fast-growing early-successional pioneer, so it will quickly add to the canopy layer. Sitka spruce provides roosting, nesting, and winter cover for birds, and food for deer, elk, and squirrels (Leigh 1999).

The most highly-planted vegetation in this polygon were the willow species (*Salix* sp.), which were installed in the form of live stakes. They will address two very important issues in this polygon which are to add aggressive competition to combat the invasive *H. helix* and *R. bifrons* and to stabilize the soil with their extensive root systems (Labbe 1998). The species installed include sitka willow, Hooker's willow and Pacific willow. Pacific willow will act as a fast-growing tree species that will add thin deciduous canopy to Polygon 2, and the other two willow species will help to replace the mid-story layer that became less dense after removing the Himalayan blackberry. The final tree species in this polygon will be cascara (*Rhamnus purshiana).* There are some sparsely scattered throughout our site, so we bare root planted 4 additional individuals a minimum of 6 ft. apart. This species is tolerant of high-sun and wet conditions, and will also be useful for a number of purposes such as binding soil, providing berries as food for birds and small mammals, and acting as a source of pollination for wasps such as yellow jackets (Leigh 1999).

Pacific ninebark was a frequently-planted shrub species in Polygon 2, which were installed as bare root plants. These were planted where Himalayan blackberry had been previously

established in order to recreate the shrub layer. It is extremely useful for riparian slope stabilization and it prefers open sites. Also, the berries will continue to be a food source into the late winter months, so it has a high wildlife value (McWilliams 2000). We also planted live stakes of red-twig dogwood and a mix of bare root plants and live stakes of snowberry to fulfill similar tasks. Finally, twinberry was installed near the center of the polygon which is useful for slope stabilization and it can also handle a variety of light conditions. Twinberry provides a source of berries for birds and small mammals, as well as a valuable nectar source for hummingbirds and butterflies (Darris 2011).

Due to much of the soil in this polygon being saturated or inundated, skunk cabbage was able to grow throughout. It is a wetland obligate, so it will be able to handle the wettest conditions in our site. The leaves and flowering parts are used by flies for food and mating (NOWPP 2005-16). There is a high number of skunk cabbage that revealed themselves early in the month of April, so there was no need to add additional individuals. Slough sedge is an important understory species in this polygon for the areas in particular need of soil stabilization, so we planted approximately 50 throughout. Intermixed with the slough sedge, we planted some False Lily of the Valley to also help maintain slope stability and absorb some of the excess moisture. Finally, we installed a pair of deer fern in the northeastern corner of this polygon where a cluster of mature western redcedar trees present in Polygon 5 provide partial-to-dense evergreen shade.

Polygon 3

803 square feet. Southeastern portion of Site 5.

Prior to restoration, Polygon 3 contained several red alder (one of which fell in Fall 2015) and big-leaf maple that provided sparse overstory cover. It was also inhabited by some dense patches of salmonberry and Himalayan blackberry and the understory was dominated by a widespread establishment of English ivy. Some native understory was present such as sword fern (*Polystichum munitum)* and horsetail, as well as a small patch of Youth-on-age (*Tolmiea menziesii)* located in the southeastern corner. Because of the existing deciduous overstory covering most of this polygon, we only have two tree species that were installed here. One sitka spruce was bare-root planted fairly close to the main trail that acts as the eastern border of our site (AKA the eastern access trail) where there is some sun coming through the canopy and a high level of moisture, and another was planted under near the access trail that divides Polygons 3 and 4. The other species was western redcedar, installing two individuals along the border between Polygons 3 and 4 where they will receive some shade and be placed in moist-

to-wet soil. These trees will help to initiate the development of an evergreen canopy in these spots, and will also help to stabilize the soil and absorb water.

The southwestern corner of Polygon 3 has a small mound where the soil is slightly less wet than the surrounding soil. A single vine maple was already growing here, so we installed two more near it to increase the density of the mid-story at this location. Along the border between Polygons 3 and 4 and the border between Polygons 1 and 3, there was mostly wet, saturated soil and medium-to-high light availability. This is where our moisture-tolerant shrubs were placed that also required adequate sunlight. A total of 6 live stakes of snowberry were planted in Polygon 3 along these borders, along with a couple of bare root plants. Several red-twig dogwood live stakes were planted in the same area. Along the border between Polygons 3 and 4 in the northwestern portion, we installed 2 Goat's beard. The final shrub species for this polygon was Pacific ninebark, 2 of which were planted as bare root plants slightly south of the border between Polygons 3 and 4 to assist the other installed shrubs in this location with slope stabilization and mid-story development.

Because there was deciduous shade present, we installed the understory species red huckleberry (*Vaccinium parvifolium).* It requires a substrate that is high in organic matter (preferably decaying wood), so when we salvaged this species, we took some of the wood that they were growing in as well. 2 of these were planted adjacent to the access trail that divides Polygons 3 and 4 on top of a remnant stump. Here there should be adequate shade and plenty of organic matter for them to establish. This species will be useful to provide cover and nesting sites for small mammals and birds, and will produce red berries that wildlife can use for food (Tirmenstein 1990). Sword fern is very durable and useful for erosion control, water absorption and provides good cover for small mammals and birds (Zouhar 2015). We chose not to plant very many of this species throughout our site because there is already a very high presence, especially in Polygon 5. However, In Polygon 3, we installed 4 that were recovered from salvage fairly close to the center of the polygon. We also installed a single deer fern in the densest shade of Polygon 3. Finally, skunk cabbage was planned to be installed in the wettest portions of Polygon 3, but because some of it appeared in this polygon in April and because there is such a high density of skunk cabbage throughout the site, we chose not to plant any additional individuals.

Polygon 4

2,433 square feet. Largest polygon, sits in-between Polygons 3 and 5 on the eastern side of Site 5.

Polygon 4 was by far the most diverse in vegetation. This polygon receives the most sunlight in comparison to the rest of the site, and was the most heavily dominated by both salmonberry and Himalayan blackberry (approximately 70% coverage) before our restoration activities. English holly was also a problem, for it had developed very dense roots and was beginning to spread. One individual English holly was approximately 20 ft. tall, which members of FNCF came onsite to cut down using an axe. The stem will need to be injected with Imazapyr in the summer of 2016. According to EarthCorps and King County, Imazapyr is the most effective treatment for dealing with English holly (Salisbury 2014). Some English Ivy was also spread throughout, but Polygon 4 was not as heavily infested as the other polygons. Aside from the dense thicket of salmonberry and Himalayan blackberry, there was also some red alder, cascara, skunk cabbage, English holly, red huckleberry, and beaked hazelnut (*Corylus cornuta* var. *californica)* mixed into the thicket in some spots.

Along the northern border of Polygon 4, the vegetation begins to transition into a western redcedar and low Oregon-grape (*Mahonia nervosa*) dominated landscape where the soil is drier and the canopy begins to close. Several pioneer tree-species we chose were planted along the edge of the closing canopy in this polygon in order to help to expand the overstory canopy. Because of the high availability of light, sitka spruce will do well in this polygon. The moisture next to the border between Polygons 3 and 4 will provide suitable conditions for this species to establish, so we installed 2 here. Big-leaf maple will also do well here because of the high availability of light, but had to be placed in slightly drier microsites. There were none previously established in this polygon, so we planted 4 of these in Polygon 4 through the middle at least 8 ft. apart.

Douglas fir (Pseudotsuga menziesii) will quickly add to the evergreen overstory, so we planted a total of 4 along the border dividing polygons 4 and 5 at least 6ft. apart. We also added several bare root western redcedar in the northwestern corner of this polygon where there are several young but fairly tall western redcedar already present that are providing shade. Our final two deciduous trees we planted in this polygon are cascara and Pacific willow. There is one existing cascara just east of the center of this polygon, so we planted an additional one next to it. Several Pacific willow were installed as live stakes around the center of Polygon 4 in order to initiate canopy development there. With such a significant volume of Himalayan blackberry

removed, the soil was also highly susceptible to erosion, so Pacific willow's extensive root system will be beneficial in this area as well.

When we were planning the shrub species for this polygon, we took into account the fact that much of the mid-story layer would be gone with the removal of the vast amount of Himalayan blackberry that was present before restoration. The chosen shrub species planted here will be of great benefit to this polygon, providing increased and higher-quality wildlife services than the Himalayan blackberry could alone. Both Hooker's willow and Sitka willow were installed in this polygon and will quickly replace the mid-story layer. We live-staked 3 red-twig dogwood in the southwestern corner of Polygon 4, next to the border that divides it with Polygon 3, in an area of high moisture and great need for slope stabilization. We installed an additional red-twig dogwood live stake near the center of the polygon, in an area with high amounts of sun and wet soil, giving us a total of 4 red-twig dogwood live stakes installed in polygon 4. 6 snowberry live stakes were planted, scattered throughout the southern half of the polygon. Twinberry was also planted in this polygon. The tubular flowers that it produces attract hummingbirds and will create an appealing feature to have trailside (Leigh 1999). The conditions were appropriate, so we bare-root planted 6 of this species (at least 2 ft. apart) along the eastern border of Polygon 4 next to the trail. We planted 3 Pacific ninebark in the middle of the polygon to help reduce erosion, and one Goat's beard was installed with the twinberry next to the trail because it produces visually appealing flowers and is able to handle the moisture conditions present in that location. Our final shrub, swamp gooseberry, was planted in a pocket of moisture found at the southeastern corner of this polygon, and the area just west of center of the polygon, giving us a total of 3 planted. This species will handle the high levels of moisture on the slope and will tolerate high levels of sunlight.

For the understory, we divided up the plants based the varying light availability present throughout the polygon. The northernmost portion of our polygon that stretches all the way across the border between Polygons 4 and 5 will receive more shade than the rest of this polygon. Because of that, we planted species in this particular spot that require more shade to thrive. Salal was chosen to be planted here for that reason and we installed 6 from salvage. Most of the hillside that Polygon 5 is located on has high amounts of salal already present, so we expanded its range to the southern part of that hillside. Red huckleberry is another species that likes shade, and there were already some established prior to restoration near the border that divides Polygons 4 and 5. We installed 3 more along this border where there is some decaying wood available and suitable conditions for its establishment. We also installed 4 plugs of redwood sorrel *(Oxalis oregana)* because of the moist soil and their requirement of shade. The last understory species we installed to make use of the present shade conditions in this polygon is deer fern*,* and this was placed in the northwestern corner of this polygon where

there is a small stand of young but tall western redcedars (Leigh 1999). The rest of the understory will consist of species both more tolerant of sunny conditions and useful for slope stabilization. These will be installed throughout most of the site. Slough sedge was the most heavily planted of all understory species in this polygon with 23 plugs (or salvaged plants) being spread through the polygon. Within that same range, we installed 4 plugs of false lily of the valley and five salvaged sword fern along the slope. Because sword fern prefers less moisture than slough sedge and false lily of the valley (Zouhar 2015), we placed these in some of the less-saturated spots on the slope that still require soil stabilization.

Polygon 5

1,395 square feet. Northeastern corner of Site 5

Polygon 5 was completely different from the rest of the site because of the high levels of shade provided by the evergreen stand of mature western redcedar trees, and because it is on an isolated mound that separates it from the slope we see throughout the site. The soil here is slightly drier (but still moist) and there is a higher diversity of understory and mid-story species already present here in comparison to other parts of the site. There are 2 tree species we installed here that were not planted anywhere else on site. The first is western hemlock (*T. heterophylla)*, which is a late-successional lowland forest climax species usually found in more mature forest stands as the dominant overstory species. Because of the high amount of shade provided, the conditions in Polygon 5 will be ideal. We installed five as bare root plantings underneath the dense western redcedar stand, and they will do well to provide thermal cover for wildlife in the winter months (Tesky 1992). The second tree species we will install that requires similar shady conditions is western yew (*Taxus brevifolia)*. This species will act more as a shrub in Polygon 5 because it does not grow very tall, but it will act as a source of cover for birds and small mammals and will also be a source of browse (Bolsinger 1988). We installed two of this species in Polygon 5 underneath the western redcedar overstory.

We only planted one mid-story species (vine maple) since there were already many of them growing in this polygon prior to restoration, especially just across the stream in the northwestern corner of the polygon. We planted 3 more from salvage south of the other vine maple to increase the density of the mid-story layer.

The understory in this polygon will consist of species that can tolerate higher amounts of shade. Red huckleberry is one of those species that will be able to grow on the decaying wood that is available in this polygon. 2 were placed near the border dividing Polygons 4 and 5 just before the edge of the western redcedar canopy, and 2 were placed in the middle of the polygon

underneath thick shade (for a total of 4). Salal, which is already fairly common in this polygon (especially in the eastern portion along the slope), was also installed. We obtained six from salvage and planted them further west of the slope, underneath the western redcedar canopy where it was less common.

Trail

The trail that borders our eastern site has been mulched over in order to provide access to UW REN team members and volunteers. We plan to inoculate sections of this mulch with the fungal species wine-cap stropharia. Wine-cap stropharia mycelium is a documented food source for bees (Stamets 2005). This fungi will also be able to absorb and filter water, as well as help to reduce the fecal coliform count in the surface water flowing from our site (Taylor *et. al.* 2015). In order to grow this species, we will simply mix colonized wood chips into the existing wood chips on the trail in determined spots. Another fungal species that we installed along the trail is oyster mushroom (*Pleurotus ostreatus)* in order to increase the fungal diversity present and help with water filtration. We purchased colonized plugs and hammered them into a fallen red alder that is adjacent to the trail. This species should eventually colonize the entire log.