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Veg Mon Program

Introduction

Welcome to the Snohomish County Surface Water Management Vegetation Monitoring Program. This protocol has been designed specifically to incorporate trained volunteer citizen scientists into restoration project success monitoring and analysis. Snohomish County is dedicated to the recovery of critical habitats which support a diverse array of wildlife. Much time, money, and effort is spent each year in the acquisition, conservation, planning, rehabilitation, and monitoring of county lands, as well as in partnerships with private landowners who have granted the County access to natural resource commons. You have indicated an interest in aiding county staff in assessing the success of restoration projects in regard to vegetation.

VegMon was initiated in 2000 as a vegetation monitoring component of a larger countywide natural resource monitoring effort. Primarily our interest in documenting change in plant community composition over time at stream, wetland, and forest rehabilitation and restoration projects across the county. Monitoring is critical to determining the relative success or failure of a project. Monitoring is key to adopting an informed adaptive management approach to natural resource management.

The goals of vegmon are:

- To provide consistent, high-quality data to be used by managers and scientists to measure conditions of our regions plant communities, in both reference sites and restoration sites,
- To contribute to the creation of a regional database of revegetation projects .....
- To educate and inform Snohomish County citizens about the ecology and importance of Puget Sound ecosystems and the native plants found in them,
- To provide opportunity for Snohomish County citizens to become involved in the stewardship of the county's ecosystems.

As a SnoCo VegMon Volunteer, you will participate directly in the collection of valid scientific data, and immerse yourself in the diverse natural resourses of Snohomish County.

What to Expect

Participation in the Snohomish County Veg Mon program begins with introduction to this monitoring protocol manual through one of several training modules offered through out the year. A thorough reading through the protocols and procedures prior to training will enhance your ability to comprehend the field procedures. After training, you will be assigned to or assembled into

monitoring teams and offered/assigned monitoring sites from our project roster. Optimal team size is three, although two seasoned field crew can be efficient. Never work alone, for safety reasons and efficiency!! For each monitoring site, you and your team members will be given a project file, all the proper monitoring tools, and an introduction to the site by the SWM native plant steward and or project manager. Most sites will already have an established baseline to work from. A few will require complete set up.

Baselines are installed similarly in most sites. Baselines extend the length of riparian projects parallel to the stream coarse at the outmost periphery of the project area. This can be a road or trail edge, a fence-line, top of bank, etc., wherever the plantings stop. Transects are laid perpendicular to the baseline and extend across the project site, crossing the stream or aquatic area and ending at the project limit at the other side. Transect ends are generally marked permanently with T-posts and given a unique id number. Transect id numbers begin at the upstream end of the project and are numbered sequentially in downstream direction.

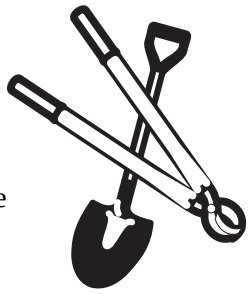
Monitoring is conducted during the peak growing season of June through August.

Getting Started

Site Selection

SnoCo Veg Mon sites are prioritized for visitation at the beginning of each field season dependent upon site age, accessibility, time line for particular site, response to seasonal site assessment, and availability of staff and volunteers. Assignments are given based on a projects monitoring complexity experience of the volunteer monitors. You will be given a project folder with all pertinent imformation about the project site.

Equipment



All necessary monitoring equipment is provided by SWM and assigned to each monitoring team lead. Be sure all the equipment you need is in the container. Consult the equipment check list for the correct array of gear you will need for a particular set of monitoring protocols. Please take good care of the equipment and make sure you return it all when done with your assignments. Leave SWM Monitoring ID Placard in car windshield.

Personal gear: Make sure you dress appropriately for field conditions. Up to you to decide level of protection necessary for particular field condition. Consider hat, sunglasses, sun screen, protective clothing (long pants, long sleeves), foot wear (sturdy shoes, rubber boots), rain gear, field vest.

Safety

Never work alone. First aid kit. Cell phone. Let someone know where you are going to be and when you will be back.

Treat all sites as potentially hazardous. Watch for poor footing, loose hidden barbed wire, old farm implements, mountain beaver burrows, bulls, cranky farmers, etc.

Data Management

Make sure you fill out all information on your data sheets. Pencil is best. Make sure all entries are ledgible and easy to read by someone beside yourself. Keep good track of sheets. Stow them in a safe place as you complete each one. When you return from the field, make photocopies of sheets and related field notes and place them in the project folder/binder. If you are doing the data entry, enter your data into the accompaning Excel spreadsheet as soon after your field work as soon as you can and email it in. Return data sheets to SWM, especially if you are not doing the data entry.

Site Establishment Site Information

Your site folder contains pertinent information necessary to successfully assess your site. General location map and address, written directions to the site and the project, landowner information. Aerial photo of site with critical features highlighted. Map, description, and GPS coordinates to locate project features such as baseline endpoints, transects, bioengineered structures, and hard reference points. At minimum it should have the as built plant list/schedule and list of additional volunteer plants identified on site since established. This may include a planting plan. The as built schedule tells how many plants by species were planted onsite.

Existing Sites:

You may be visiting a site that already has baseline and endpoints already established. The greatest challenge will be relocating all the monitoring reference points. Each visit to site should also be used as an opportunity to dress up, repair, and make each point easily found next time. Rely on notes and maps from previous years. Check with Lead Steward if you have difficulty relocating any or all points.

Establish a new site:

You are so lucky. This is an important task to the overall, long-term success of the monitoring program. A well set up baseline and transects will make your job easier, and for monitors who follow in later years (it could be you, but may not), so document it well! This is often the most time consuming portion of the whole monitoring protocol. In all cases we will establish at minimum a monumented baseline the length of the project site that will serve as a starting reference for all future monitoring episodes, whether those are temporary or permanent procedures.

Monitoring Site

Establishment & Preparation for B thru E

Objective: Establish monitoring site baselines and transects to facilitate long term evaluation of project site. B thru E assessments for growth, vigor, mortality and cover provided by plantings at restoration sites. (Instructions for establishing monitoring sites using methodologies other than baselines and transects will be provided on a site-by-site bases.)

Equipment Needed:

- 50-meter tape
- T-posts
- Post driver
- Hand sledge
- Aluminum nails
- Compass
- Tags
- Rebar caps
- Measuring rod
- Graph paper
- Site information sheet
- Field notebook
- Pencils
- Colored flags

Methodology:

This method establishes a baseline approximately parallel to a stream channel and permanent or temporary transects perpendicular to the baseline. The baseline may coincide with the outside edge of the project, a fence line or some other designated monument.

The monitoring site should be established and site map completed before any monitoring begins. All measures should be to the nearest tenth meter.

The baseline ends should be marked permanently with t-posts or other permanent markers. Measure length of baseline to the nearest tenth meter and compass direction of the baseline. Record the length and compass direction in the field notebook or site information sheet. Draw site map with baseline and prominent features.

Vigor and Plant Morphometry assessments are made using 2m belt transects, Shrub cover (line intercept) assessments are made along the midline of the 2m belt transect. 2m belt transects can be temporary or permanent. 2m belt transects are located at predetermined random points that should be provided with site instructions. On the measuring tape extended along the baseline, locate each of the assigned 2m belt transect intercepts. If the 2m belt transects are permanent, place a numbered permanent marker or tag the origin of each 2m belt transect at the baseline. If the 2m belt transects are temporary, mark each location with a colored flag. Fasten the end of 50m measuring tape to transect post and run it out to the stream edge or to the opposite project boundary, 90(to the baseline. For permanent transects, place a t-post or rebar post at the endpoint of each transect and mark the post with the number of the transect. If transect length is greater than 10 meters, install additional t-posts along length to prevent line from “bending”, aiding in the exact relocation of the tape in future revisits. Colored flags can be used the mark the ends of temporary transects. Record the length of the transect and compass direction in the field notebook or site information sheet. All measures should be to the nearest m.

Repeat process for all transects, recording the lengths and compass directions in the field notebook or site information sheet.

Draw the 2m belt transects at their assigned locations on the site map and number each of the transects in consecutive order.

Photo-document each transect line while measuring tape is in place. Place camera at the origin of the transect at the baseline and point the camera in the direction of the endpoint of the transect. A transect identification card, hand held at a distance of about 10 meters, should be included in photograph. The site name, date, and transect should be clearly printed in bold black lettering on the number card. Also record the date, transect number, frame number, camera type, aperture, and lens speed in the field notebook.

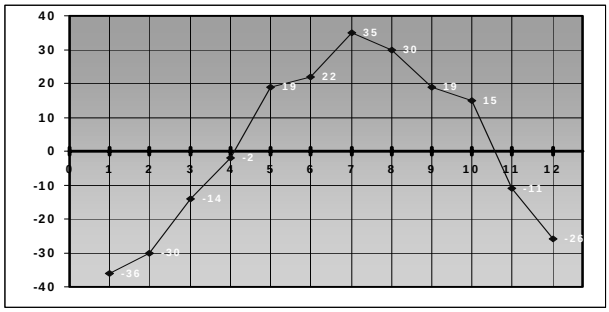
Monitoring Procedures

Overview: Monitor Components

Sno Co Veg Mon Protocol is a robust monitoring tool designed to assess a wide variety of vegetation and the plant communities in which they reside. Monitoring projects will include linear riparian communities, patches of floodplain or wetland, natural or restoration sites. Monitoring elements range from brief walk through assessments to complex multiple canopy cover analysis. Each protocol is designed to act independently but more often is linked to a hierarchy of increasing detail.

The protocols have been designed to minimize subjectiveness of an individual observation. Most of the methods are quantitative - a particular trait or characteristic is directly measured with a scaleable device and that number is recorded, summed, and analyzed to derive a score or biometric for that character. The overall sum of these measured observations gives us information about the relative success about the project, and allows us to better predict its long term trajectory. These include plant measures such as stem diameter, plant height, shoot number, line intercept increments, ...

That said; there are a few elements of the monitoring protocols that remain qualitative. You must use your best professional judgement, educated interpretation, or gut level instinct. Qualitative measures include vigor assessments, photodocumentation, and herbaceous cover (quadrats). Training, practice, and on the job cumulative experience using a consistent protocol will make your observations comparable with your teammates and other monitoring teams.



A:

Site Assessment

This is the most basic level of site monitoring. It is a qualitative assessment performed once a year for all ongoing projects, especially in their first three years of establishment. This is an opportunity to conduct a casual walk through the site to in order to become familiar with the location, features, assess overall planting condition, identify particular groups of plants that may not be performing well, and potential problems with the site. This observation period and report will help determine and plan seasonal maintenance needs for the site. Does it look like the planting plan? Can you identify all the species on the species list? Are there signs of natural recruitment? (Desirable plants present that were not planted?) Any sign of vandalism? Is fencing intact and gates secure? Are there any problem or noxious weeds present and if so what is there relative threat to the planted species? Or are there obvious signs of animal damage? Do the plants need water, mulch, staking, or browse protection? Are there persistent problems that were identified the previous year?

If monitoring has been established on this site can you find baselines, transect endpoints, and monuments?

Bring:

Site & Location Map Monitoring Manual Previous year's assessment forms. Access permission form, if needed. Personal Identification Plant ID book Level I assessment form Planting schedule.

B:

Vigor and Mortality Assessment

Objective: Establish estimate of plant vigor and mortality within a 2 meter wide belt transect.

Equipment Needed:

- Site map and planting schedule
- 50 m tape
- Measuring rod or 2-meter carpenter's rule
- Vegetation Monitoring data sheets (use one sheet for each transect)
- Code sheet w/ 4-letter species codes and damage codes Calipers

Methodology: Using the site map and planting schedule as a guide, locate the baseline and the origin of the first 2m belt transect. Fasten meter tape to the origin of the transect and extend tape to opposite endpoint of the transect. Stretch tightly and make sure tape is in contact with intermediate waypoints. Return to origin. Extend a measuring rod or 2m rule and center over the measuring tape, so that the rod extends a meter to each side of the tape. Walk along tape and count and record species of each plant, using the appropriate 4-letter code, which occurs within one meter on either side of the tape. In the **Vigor Assessment** section of the Vegetation Monitoring Form, record in the **Class** column, whether the plant is thriving, alive, stressed, or dead using the following codes:

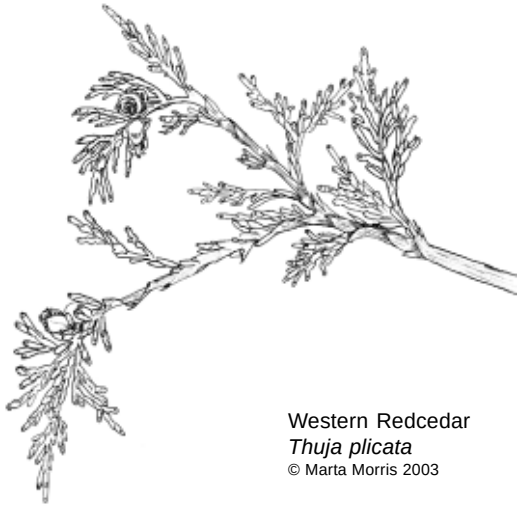
1= thrive Evidence of vigorous growth includes: new green leaders, flowers, developing fruits, sign of last years fruits, etc.

2= alive No evidence of above, but plant is green and has no apparent signs of damage or stress.

3= stressed Plant color poor, withering leaves, desiccated leaders.

4= dead No sign of life. Scratch bark to check for green cambium layer.

Try to determine whether this plant was installed as a live stake. Look for a central stem that has been cut off at the top and lateral branches that arise from the stem. If the stem is from a live stake, mark Y=yes in the Live Stake column of the Vigor Assessment section.



Western Redcedar
Thuja plicata

If the site instructions require a damage assessment, carefully examine the entire length of the plant and record the appropriate code for damage. Stems girdled by rodents is a commonly observed animal damage; record the best estimate of the percent girdled next to the code for animal damage (e.g., ad/25%) in damage column of the Vigor Assessment section.

Repeat for all transects.

C:

Morphometric Vigor and Growth

Objective: Determine growth trajectory by annual measurement of height, diameter, and number of stems.

Equipment needed:

- Site Map and Planting schedule
- Vegetation Monitoring data sheet
- 50 m tape
- Code Sheet w/ 4-letter species codes and damage codes
- Calipers
- Tree calipers or dbh tape
- Clinometer 100 meter tape

Methodology: Set up for **Morphometric Vigor and Growth** is identical to the Vigor Assessment using the 2M Belt Transect with the additional step of measuring and recording diameter, height of

each individual species, number of stems arising from the ground, and its distance along the transect.

Record data in the **2M Belt Transect** section of the Vegetation Monitoring data sheet Be sure to record the 4-letter species code. In the "Intercept" column, record the location along the transect that the plant occurs, using the approximate center of the plant.

Shrubs

For shrubs and tree seedlings/saplings (< 2 m), measure diameter 10 cm above the ground, and record in the **Diameter** column. If it is a multiple stemmed shrub, record the diameter of the thickest stem and the total number of stems emerging out of the ground, using the **Stem Count** column. Record diameter to the nearest tenth of a centimeter (cm).

Hold your measuring rod or carpenter's rule vertically adjacent to the shrub and sight across the top to get an estimate of height. Refrain from straightening up the shrub, unless it has been knocked down by other vegetation.

Live Stakes

If you can see that your plant is a live stake, enter the number of leaders greater than 10 cm long and the length of the longest one in the live stake column. If site instructions require leader counts (LC) and leader lengths (LL), count the number of leaders emerging from the stake and measure the longest 5 leaders to the nearest tenth centimeter.

If surveying a site predominately planted with live stakes and posts use the special live post vigor form and attached instructions.

Trees

Tree saplings (trees less than 2 m tall) should be measured like shrubs - diameter 10 cm aboveground. Trees greater then 2 m tall are measured as a tree. Diameter is recorded as "diameter at breast height" or **dbh**. Breast height is considered to be 4.5 ft above ground. Tree diameters are measured using the diameter tape, which gives a diameter when you measure circumference. See attached instructions. Enter in **Diameter** column, recording to the nearest tenth of a meter.

Red Elderberry
Sambucus racemosa

For tree heights greater than 2 m, use your clinometer. Unless instructed otherwise, use Method 2 (single angle). Height calculations should not be made in the field. Use the Live Stake columns in the Vigor Assessment to record:

1) distance from the tree to the observer to the nearest tenth meter,

2) clinometer angle reading in degrees (°),

3) eye height of observer to the nearest tenth meter. (e.g., 109.4 m/ 47(°1.7m).

See attached instructions for specific directions in using the Suunto clinometer.

If you are having trouble identifying a particular plant or group of plants, collect a sample with as many parts you can; leaves, stems, flowers, & fruits; place in a plastic bag labelled with site name, transect number, and at least a temporary name: unknown shrub #1, goober, or steve. Use this name on your data sheet in place of the 4 letter code. Bring your plant specimen to a botanist you can trust for positive id.

D:

Vegetation Cover

Shrub and Tree Cover: Line Intercept

Objective: Determine and characterize vegetative cover for trees, shrubs, and problem herbaceous species.

Equipment Needed:

50m tape
diameter tape
field forms
meter stick or 2-meter rod

Methodology: Using the site map, locate the existing 2M Belt transect established earlier. Secure the end of the 50 m tape to the origin of the first 2m belt transect and extend to endpoint making sure your tape is in contact with waypoint monuments if any. Record total length of the transect.

- Shrubs and tree canopy: Starting at the origin of the transect (0.0), walk along the tape, record only the plant species that fall directly under or above the tape. Record the 4-letter species code and the intercept length to the nearest cm of each species from the point it is first encountered and the point it ends along the tape. For visualization, pretend this tape represents a parallel, vertical plane passing through the tape extending to the ground and sky above. Any plant parts that this plane passes through are in the intercept. This is mostly for planted shrub and tree sapling cover. However, please note distances and intercepts for the stream edges (Ordinary high water mark "OHWM"), dominant volunteer vegetation, reed canarygrass, Himalayan blackberry, and other noxious weeds such as Japanese knotweed. Repeat for each belt transect.
- Tree Basal area: Within the 2M Belt transect, record species and measure height and diameter breast height (4.5 ft) of all trees over 4.0 cm in diameter. Also, record approximate intercept.

  If there are larger trees onsite, lying outside the boundary of the 2M Belt that contribute canopy to the intercept, record tree info for this tree also and distance to intercept tape. At this approximate intercept, use spherical densiometer, for canopy cover estimate.
- Segment Intercept: In some instances you will be asked to perform a variation on the line intercept method. Set up procedure is identical. Instead of reading the 50 m tape intercept continuously along the transect, you will be asked to record intercept increments in randomly pre-selected 1-meter long segments.

Oregon Grape
Mahonia nervosa

Herbaceous Vegetation Cover Analysis

Objective: Determine and characterize vegetative cover of the ground level, herbaceous component.

Equipment Needed:

Site map and planting schedule
50 m tape
Code sheet w/4-letter species code
Sampling frame
Herbaceous stratum data sheet
2 dm 1/2 inch rebar
yellow survey caps

Using the site map, locate the existing 2M Belt transect established earlier. Secure the end of the 50 m tape to the origin of the first 2m belt transect and extend to endpoint making sure your tape is in contact with waypoint monuments if any. Record total length of the transect.

Establishment

Six to eight quadrats per transect are adequate and maximum for our purposes and available time. They are best if randomly selected, but is more interesting if placed to capture gradient elements such as the wetted edge of the stream, upland sites, and intermediate. Stay away from immediate vicinity of baseline and project edges. Use a random number generator to select locations along transect. Locate your first plot, and place sampling frame on downstream side of transect, immediately adjacent to the tape, with one frame corner at the selected number, and the other corner towards the higher numbers on tape.

Record the meter location along the tape for each quadrat in the plot # box at the top of plots columns.

Record species of all herbs, grasses, and grass-like plants **rooted** within the quadrat using appropriate 4-letter code. Please create a table or legend with 4-letter code and plant name using common, latin binomial, or alias "herb1", "Ralph", "goober", etc. Record estimated percent cover or Daubenmire cover class for each plant species present within the quadrat. Total cover may equal greater than 100%. Include bare ground.

In some cases, you may be asked just to do frequency instead of cover. In this case, simply record the names of the species present (rooted in) in each quadrat.

Make this quadrat location permanent by pounding rebar into ground on inside, opposite corners of quadrat frame, with one rebar at the transect increment provide by random number generator. Place yellow cap on top of rebar for easier relocation. Top of rebar should be nearly flush with ground level.

Daubenmire Cover Class

Coverage Class	Range of Coverage	Midpoint of Range
1	0-5%	2.5%
2	5-25%	15
3	25-50%	37.5
4	50-75%	62.5
5	75-95%	85
6	95-100%	97.5

Quadrats (illustration) (relative cover comparison)

Live Post Vigor Protocol

Instructions for Monitoring Live Posts and Stakes to accompany data sheet "livepostvigor.xls"

Objective: Assess survivorship, vigor, and growth phenology of live stakes and posts.

Equipment Needed:

Sequentially numbered permanent tags

Aluminum nails

Hammer Meter tape, stadia rod, folding rule, etc. (min of 2.0 meters)

Diameter breast height (dbh) tape or tree caliper

Data sheet on water resistant paper, clipboard, pencil

1. Post: nail a numbered tag to post near top, or wire tag to stake. Record number on data sheet.
2. Species: record species
3. Diameter: use dbh tape or calipers. Record in centimeters. Measure dbh at 1.0 meters above ground.
4. Height: record in meters. If you know the original length of the post/stake you might want to add a column with that info.
5. Record condition: Alive or dead. Is underlying cambium still green?
6. Girdle Percent: % of circumference. Deep girdling such as with beaver, surface such as voles, etc.
7. Leaders: Record number of leaders over 10 centimeters in length and record lengths of the 10 longest leaders in centimeters.
8. Record condition of all leaders for which you recorded a length.
9. Comments: area for custom comments such as Protection method (Paint w/sand, chickenwire), damage, environmental observations.

Notes:

Protection: We are currently trying several methods for protection where beaver activity is suspected to be high. Paint with sand: recycled latex paint to which course sand is added (30% by weight), painted on the entire above ground portion of the post. Chickenwire: posts are wrapped with 1" mesh , 3-4 feet widths, staked to the ground with wood stakes or wire staples. Deterent powders and sprays.

Equipment Tutorial

- Compass
- Vertical Densiometer
- Clinometer
- Quadrat
- Calipers

Parallax?

What is the Riparian Zone?

What is canopy?

Plant Etiquette

Minimum Impact Monitoring

The focus of riparian restoration projects is to restore the damaged system back to a natural and working habitat. In order for these fragile habitats to evolve into a natural system the human impact needs to be minimized, and ideally eliminated. However, we need to monitor these sites to identify maintenance needs and acquire growth measurements. This requires people to walk through restoration sites, causing some disturbance.

As a vegetation monitor, you will walk through the restoration sites to record measurements and set up transects. The following is a list of minimum impact rules you can use to prevent your site from becoming damaged:

- **Keep group sizes small.** Less people keeps the trampling impact at a minimum.
- **Clean boots before entering a site.** Invasive species are successful because their mode of reproduction is extraordinary, don't let any of their seeds travel in the soles of your boots and be deposited in a restoration site.
- **Carry your garbage out with you.** Garbage can pollute and harm the wildlife.

Plant Collection

You might be asked to collect plant specimens that you are unable to identify in the field. Use the following guidelines when choosing whether to collect a plant:

Become familiar with the rare plants in the area.

Washington has many plants listed as endangered, threatened, etc. These plants are on the list due to various disturbances, such as human collecting, that the plant wasn't able to compete successfully with. This includes human collecting. If the plant appears on any rare plant list, do not take any part of the plant. A description will work as a substitute for the plant specimen.

Use the 1-in-20 rule. Do not collect a specimen until you find at least 20 plants in the area. This also applies to shrubs and mat-forming plants.

Salmonberry
Rubus spectabilis

Never collect more than five percent of the shrub or plant. Choose specimens that are representative of the general plant size and are in flower and fruiting.

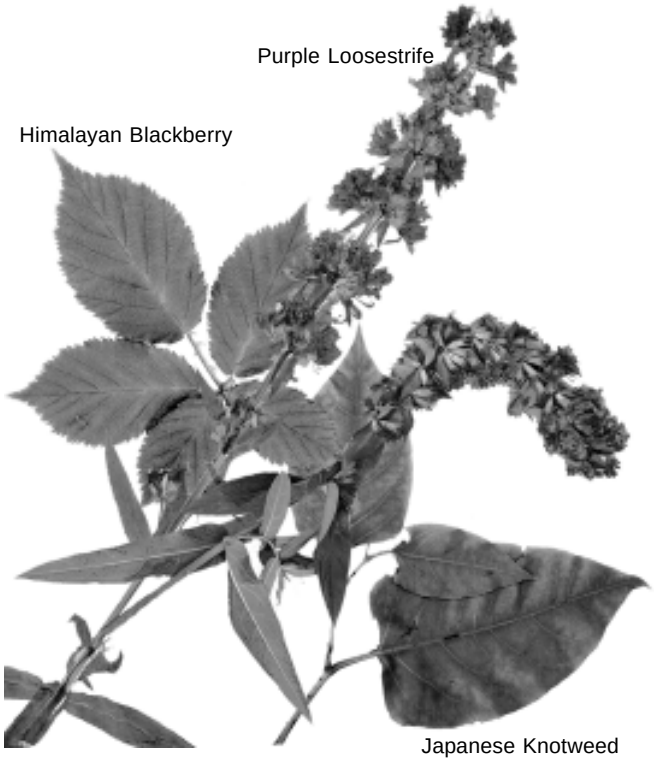
How to collect:

Use a trowel or other digging tool to loosen the plant from the soil, being careful to keep the roots attached to the plant as you pull it from the soil. Knock as much soil from the roots as possible. Place the plant in a plastic bag, with collecting number, and put in an ice chest or refrigerator until it can be identified.

Record the following information in your notebook:

- Your name and collection number (also write on collecting bag)
- Date collected
- Location including township, range, section, county, and state with general driving and walking directions
- Habitat information including slope, aspect, elevation, shade, and moisture regime
- Associated species
- Notes on plant size and flower color

Invasive Plant Species



Japanese Knotweed

Polygonum cuspidatum

- Small whitish flowers in drooping clusters from leaf axils; mid or late summer, through the fall
- Leaves are 4"-6" long
- Stems are smooth and hollow, resembling bamboo-like canes; they are jointed and swollen at the nodes
- Herbaceous perennial, strongly rhizomatous, reaching over 12 feet tall; stems die back at first frost
- Once established, forms large rhizomatous mats, making control very difficult; spreads mainly by fragmentation; dominates and out competes riparian vegetation
- Tolerates a variety of adverse conditions including full shade, high temperatures, high salinity, and drought
- Found near water sources, such as along streams and rivers, in low-lying areas, waste places, utility rights-of-way, and around old home sites
- Introduced to the U.S. in the late 1800's as an ornamental and has also been used for erosion control and for landscape screening

Scotch Broom

Cytisus scoparius

- 5-angled stems; yellow pea like flowers in leaf axils; perennial, deciduous shrub; flowers mid-spring
- Black, flattened seed pods that eventually dry and pop open, throwing the seeds; results in an excellent form of reproduction and seed dispersal
- Common along road ways and in disturbed sites
- Introduced in 1850 to Vancouver Island

Himalayan Blackberry

Rubus discolor

- Prefers sunny to partly shady areas with wet to moist soil
- A few inches to several feet high; stems are thick, sprawling canes with piercing thorns
- Leaves are dark green with notched edges
- Flowers are small, white blooms
- New growth spreads rapidly in the spring with sweet-tasting berries ripening late in the summer
- An Asian species introduced from India via England; widely spread in disturbed sites

Reed Canary Grass

Phalaris arundinacea

- Reproduces by long rhizomes
- Identified as a Class C weed on the Washington State Noxious Weed list
- The state Weed Control Board describes it as forming 'dense, highly productive single species stands that pose a major threat to many wetland ecosystems'
- Grows so vigorously that it is able to inhibit and eliminate competing species.
- Completely overgrows stream channels, resulting in loss of habitat and extreme streambed siltation.

Equipment Checklist

The following is a list of equipment needed to perform vegetation monitoring. Snohomish County will provide each item listed below in the monitoring tool kit. Use this list as a check out of equipment received. This form will be used as a check in at the end of the monitoring season.

Check Out:

_____ Monitoring manual
_____ Windshield identification
_____ Plastic bags
_____ Permanent marker
_____ Plant ID book
_____ Flagging tape
_____ First aid kit
_____ Waterproof field notebook
_____ Camera
_____ 50 (2) meter tape
_____ Compass
_____ T-posts
_____ Aluminum tags & nails
_____ Post driver
_____ Hand sledge
_____ Rebar & caps
_____ 2 meter measuring rod
_____ Calipers
_____ Dbh tape
_____ Clinometer
_____ 100 meter tape
_____ Sampling frame: 0.25 m^2
_____ Photo sign board
_____ Bamboo stakes

Site Specific:

_____ Location map
_____ Access permission form
_____ Site planting schedule

Date: _____

Volunteer signature: _____

Coordinator signature: _____

Check In:

_____ Monitoring manual
_____ Windshield identification
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_____ Bamboo stakes

Site Specific:

_____ Location map
_____ Access permission form
_____ Site planting schedule

Date: _____

Volunteer signature: _____

Coordinator signature: _____

Glossary

acre: a unit of area equal to 43,560 sq. feet or 0.405 hectares, approximately equal to a square measuring 209 feet on a side

basal area: the cross sectional area of a tree's trunk at breast height; is used as an index of coverage

bearing: direction of travel identified using a compass

biological community: any assemblage of interacting plants and animals which inhabit a given area

biological diversity (biodiversity): the variety of life that occurs at all levels of biological organization – genetic, species, community, and ecosystem

canopy: the uppermost layer of tree leaves in a forest

circumference: the distance around the outer edge of a circle such as a tree trunk

coverage: the proportion of ground covered by a plant species, as viewed from above

density: the number of individual plants per unit area

diameter: the distance across the exact middle of a circle such as a tree trunk

disturbance: a natural or human-induced event that alters an ecosystem and results in the mortality of organisms; examples of natural disturbances include fire caused by lightening, wind, natural flooding, and drought; examples of human-induced disturbances include land clearing, timber harvesting and the introduction of exotic species

ecosystem: the organisms in a biological community and the nonliving environment in which they exist, which function together as a system

foliage: the collective term for the leaves on a plant or group of plants

frequency: the number of times an event occurs in time or space; for example, when analyzing tree monitoring data, frequency would be measured by the percentage of plots in which a species occurs

herbaceous: plants in which the aerial portion is relatively short-lived and the tissues are relatively soft, i.e. non-woody

indicator species: species whose presence in an ecosystem tells us something important about the quality of the habitat

invasive species: species that are currently expanding their range, often as a result of human-induced changes in the environment; invasive species include many on-native and some native species; an aggressive non-native species is particularly harmful to an ecosystem because it displaces significant numbers of native species

monitoring: measuring some aspect of a system in order to detect changes over time

native species: in North America, native species are often considered to be those species which were present in an area before European settlement

non-native (or exotic) species: in North America, non-native species are considered to be those species which were not present in an area before European settlement; non-native species occur in an area as a result of human influence

perimeter: the edge surrounding a given area

plot: an area in which terrestrial monitoring is conducted

quadrat: a square plot

recruitment: the gradual replacement of old trees with new ones

sapling: a young tree; trees > 1 meter tall and less than 10 cm dbh

seedling: small trees < 1 meter tall

shrub: a woody plant that is multiple stemmed at or near the base; seldom attain height greater than 10 feet (~ 3 m)

snag: a dead standing tree

stable: a system that is not likely to change over time as a result of disturbance

succession: a slow, orderly sequence of change in the structure and complexity of an ecosystem, resulting in progressive change in species composition over time

taxon: any unit of classification of a life-form such as family, genus, or species

topographic map: a type of map that shows the physical characteristics of land, particularly the variations in elevation

transect: a straight line through a forest, usually marked with rope so that some measurement may be taken along it

tree: a woody plant which has a single stem or trunk coming out of the ground; grow to a height of at least 12 feet (~3.5 m); branch well above the ground

understory: the plants growing on the forest floor beneath the canopy

vine: a woody plant that wraps around trees or trails along the ground

woody: plants whose stems and roots increase in diameter from year-to-year

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Salal
Gaultheria shallon

Snohomish County Surface Water Management

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