



FOREST STEWARD FIELD GUIDE

WINTER 2009

**This abridged version presents the
Tree-iage concept and practices.
December 2009**

*This field guide was created with extensive content developed by
Seattle Parks and Recreation and the Green Seattle Partnership. The
Green Redmond Partnership thanks the Green Seattle Partnership for
their generosity.*



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Our Vision: A healthy, livable city with sustainable forested parklands

The Green Redmond Partnership (GRP) is a public-private venture between the City of Redmond, its residents, and the Cascade Land Conservancy. Our vision is of healthy, sustainable forested parklands, diverse and invasive-free, supported by an aware and engaged community in which individuals, neighborhoods, nonprofits, businesses and City government work together to protect and maintain Redmond's forested parklands for current and future generations.

Why the Green Redmond Partnership?

A large portion of Redmond's urban forests are reaching the end of their natural lifespan and at the same time, invasive plants are choking out the seedlings that would replace today's forest. Without action, we stand to lose a significant portion of our forested parklands over the next 20 years. The Green Redmond Partnership is committed to creating healthy forested parklands supported by long-term community stewardship and establishment of resources within the city.

Our Goals

- **Restore 1,035 acres of forested parkland in the City of Redmond by 2029;**
- **Establish financial and volunteer resources to provide long-term maintenance and ensure the sustainability of forested parklands; and**
- **Galvanize an informed, involved and active community around forest restoration and stewardship.**

To achieve these goals the Green Redmond Partnership is undertaking an ambitious volunteer recruitment campaign which will accelerate the process of restoring Redmond's forested parkland.

FOREST STEWARDS PROGRAM

The Forest Stewards Program was developed to harness the energy and excitement of the community, while providing assistance so that individual community-based restoration groups don't have to reinvent the wheel. By supporting and enhancing the capabilities of volunteer groups, the Green Redmond Partnership (GRP) provides an opportunity to establish a foundation for the long-term stewardship and health of our city's forested parklands.

Benefits of GRP Support:

- Access to plants and materials
- Tools
- Contracted crew labor where needed
- Watering and maintenance assistance
- Volunteer networking between groups working with GRP
- Staff dedicated to helping you recruit volunteers and accomplish your site goals
- Better monitoring of progress made on your project

Forest Steward Duties:

As the GRP Forest Steward it is your responsibility to carry out the following duties and/or delegate them within the group:

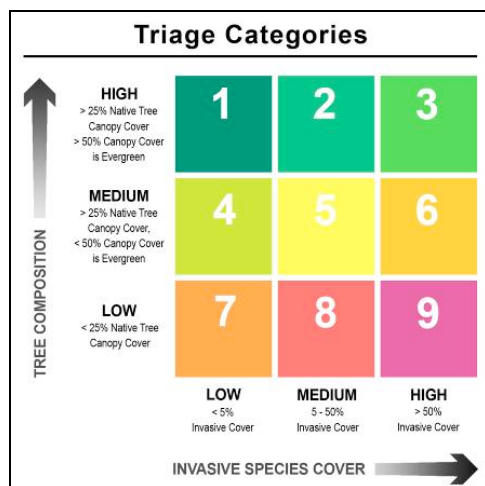
- Serve as key contact person for the Green Redmond Partnership
- Coordinate volunteer forest restoration events and activities in your forested parkland
- Coordinate with GRP staff to develop site restoration plans and annual goals
- Communicate! Send GRP event notifications, resource requests, work logs and sign in sheets to document restoration activities and progress
- Attend annual training event

Redmond Parks and Recreation and Cascade Land Conservancy staff will coordinate to provide guidance and technical assistance to all Forest Stewards.

TREE-IAGE ANALYSIS

The Green Seattle Partnership created an approach called the *tree-iage* model to assess forest conditions and identify priority areas. Each category in the tree-iage model requires a different restoration strategy. This model will also be used on GRP sites to help prioritize restoration efforts.

The purpose of this model is to use a matrix system to determine a priority rating for each site based on the quality of the overstory tree composition and the threat of invasive cover within. Data is collected to assign each site a tree composition value (high, medium, or low) and an invasive species threat value (high, medium, or low).



- **High-value forested** areas are Redmond's highest-quality forest stands and are dominated by mature, native evergreen trees.
- **Medium-value forested** areas have more than 25% native tree cover, but less than 50% covered by conifers or other native evergreens.
- **Low-value forested** areas represent forests composed of little to no conifers and/or native deciduous trees.

THE 4-PHASE APPROACH

The Green Redmond Partnership recommends a 4-phase restoration approach summarized below. While most forest areas will need all four phases of restoration, some areas with low levels of invasive plants may start in Phase 2 or 4. Characterizing restoration sites in phases will aid in monitoring and development of site-specific management strategies.

Phase	Tasks	Average labor investment
1	Invasive removal	400 hours/acre
2	Secondary invasive removal and fall planting	100 hours/acre
3	Invasive removal, watering and mulching	40 hours/year for up to 3 years
4	Stewardship and maintenance	5 hours/acre annually

- **Phase 1** focuses on removing invasive plants. Areas with high levels of invasive coverage may take more than one year to complete initial invasive removal.
- **Phase 2** requires follow up invasive removal, then native planting.
- **Phase 3** repeats invasive removal and includes plant establishment. Sites are weeded, mulched and watered as needed. Sites may stay in Phase 3 for up to three years.
- **Phase 4** is long-term site stewardship, including monitoring by crews and volunteers to provide information for long-term site maintenance. This may be as simple as neighborhood volunteers patrolling park trails to find invasive plants.

Where to Start Working

On-going control of invasive vines, such as English ivy and clematis, is important to any forest restoration site. Volunteer groups can start, or continue work parties before they are officially accepted for GRP support. Creating "life-saver" rings (see BMPs for English ivy) on trees infested with ivy and clematis is a great way to get started. It is also a rewarding experience for volunteers and may help to build momentum on

your project. Remember, GRP staff must be notified prior to working in the park.

BEST MANAGEMENT PRACTICES (BMPs)

The following BMPs are a compilation of a range of experience from volunteers and restoration professionals. BMPs are updated and revised as new methods are tested and deemed successful. Your feedback on these methods is essential!

A. INVASIVE CONTROL MANUAL AND MECHANICAL METHODS

Manual removal techniques may be applied to shrub and herb layer weeds where there is a small infestation or a large volunteer work force. Volunteers are restricted from using power tools on Redmond Parks property; mowing, chainsaw work, and brush-cutting must be performed by Parks staff or contractors. Weedy trees often require treatment with herbicide or power tools and will generally be addressed by natural areas crews or contractors.

Weed Pulling and Cutting with Hand Tools

Hand Pulling – Most appropriate for small herbaceous plants and some vines.

Hand Tools – Most appropriate for shrubs and some vines.

- Maintain safe distance of at least 10-feet between volunteers using tools
- Work carefully to minimize soil disturbance
- Avoid pulling non-target plants
- Use tools of appropriate size for the job to avoid stress on both hands and tools:

Cutting tools: Hand pruners for stems < 1", Loppers for stems 1-2", Handsaws for stems > 2".

Root-removal tools: Hand-picks for herbaceous plants, large picks, shovels and weed wrenches for shrub or tree roots and rhizomes.

Weed Waste Disposal

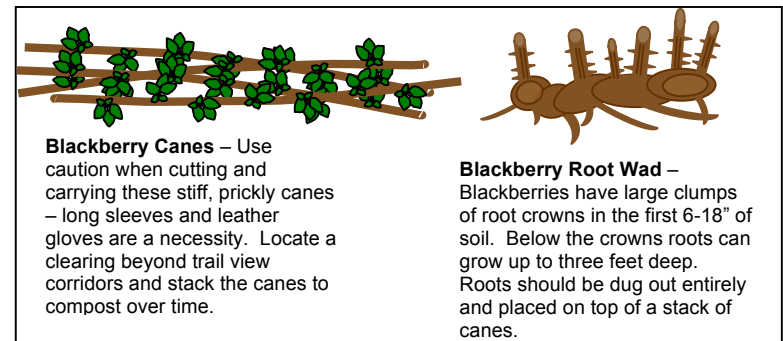
- Weed waste is generally not appropriate to dispose of in Redmond's green waste recycling system as this encourages the spread of weed seed.

- Stems of many plants, including blackberry canes and ivy vines, may be gathered into central composting piles out of trail-view corridors and composted on-site.
- Composting piles should have at least 2 layers of cardboard underneath (1 box folded flat = 2 layers). An optional addition for control is to wrap the pile in burlap, tucking the burlap deeply between the weedy plants and cardboard. Overlap the layers of burlap by at least 6" and seam together at points with cut wire.
- Reproductive parts, such as seed-heads and roots, should be collected separately and placed on top of composting piles so they do not sprout or root in the soil.
- Bohemian knotweed and other noxious weeds are capable of re-sprouting from plant fragments. All plant parts of Bohemian knotweed, purple loosestrife, garlic mustard, and giant hogweed should be removed from the site and disposed of in a land-fill or hot composted in landscape fabric on site to reduce size, then later disposed of in a landfill. Flowering parts of Purple loosestrife and tansy ragwort should be clipped into plastic bags and disposed of in a landfill immediately.

Weed-Specific Methods

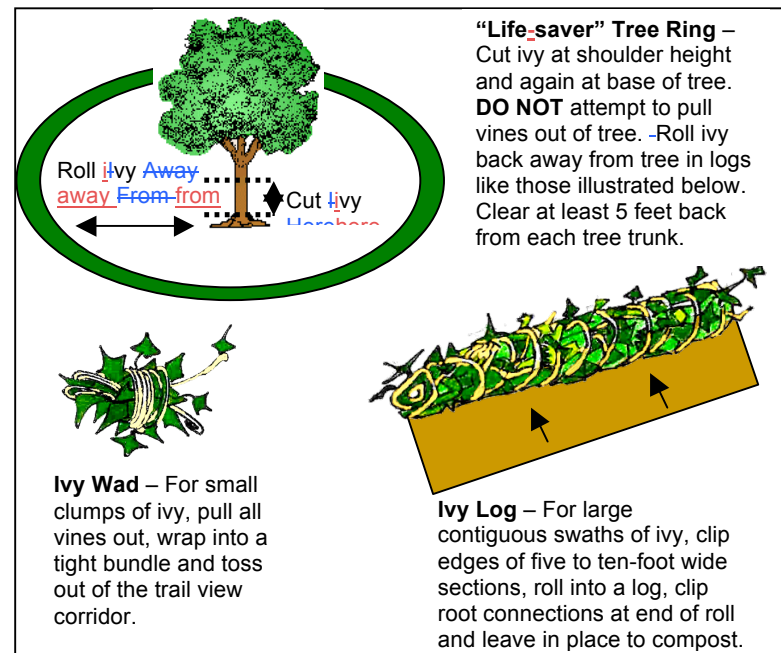
Himalayan and Evergreen Blackberry

- Cut and grub root wads (may be necessary to repeat for 2-3 growing seasons before planting)
- For sites ¼- to ½-acre, remove half of the infestation in first year and half the second
- It is recommended for sites greater than ½-acre not to remove more than ¼ of the infestation each year.



English Ivy

- Create tree “life-savers” by cutting vines at shoulder height, then again at the base of the tree. Grub out a radius of at least 5 feet away from the tree. **Do not** attempt to pull vines out of the tree, they will die and decompose on their own.
- Remove ground patches of ivy by clipping edges of swaths and rolling into a mat.
- Take care to cut around or gently lift ivy mat over existing native plants.
- Clear ivy at least 10 feet beyond proposed planting area to create ivy-free buffer.



Clematis and Grape

- Cut vine at the base in early summer before seed production and grub out root, stems may be pulled in winter when brittle.

Field Bindweed (Morning glory)

- Hand pull at least 3 times per year (early growing season, mid-summer, and late summer) for at least three growing seasons.
- Flag site and monitor.

Hawthorne (non-native)

- Cut to the ground repeatedly for at least 3 growing seasons.
- Mark stump and monitor.

Bohemian Knotweed

- Chemical - Stem injection (only to be preformed by Parks staff or contractors).
- Hand removal of knotweed is impractical and could exacerbate the problem.
- Grubbing may work for very small patches – all material must be bagged and disposed of in a landfill immediately.

Cherry Laurel/English Holly

- Small, young plants may be hand-pulled or weed-wrenched.
- Cut seed heads, place in plastic bag and dispose of in a landfill immediately.
- DO NOT simply cut down a tree without removing its roots. This will cause it to send up suckers which grow into many more trees greatly multiplying the problem. Any tree that cannot be completely removed should be left for a professional crew.
- Trees can be girdled by stripping a small section of bark and cambium, which will kill the tree without encouraging it to sucker.
- Large plants require herbicide (only to be performed by Parks staff or contractors).

Scot's Broom

- Hand-pull small plants and weed-wrench or excavate larger plants when soil is moist in spring; OR
- Cut plants in early summer, just as flowering begins, then cut again at least once later in summer.

Reed Canary Grass

- Insert weed-specific methods here

Soil Solarization/Landscape Fabric

Landscape fabric should generally be avoided - it is expensive, requires follow-up removal, and creates non-recyclable plastic waste. However, extremely large and dense blackberry infestations may warrant use of fabric. Contact GRP staff for more information on this method.

B. PLANTING WHY PLANT IN THE FALL?

The following section was provided by Sound Native Plants
Plants installed in the fall usually outperform those installed in the late winter or spring. Planting projects scheduled for early October to mid-December are your best bet.

More root growth before the growing season

It can take several months for roots to grow beyond the planting hole sufficiently to start absorbing moisture and nutrients from the native soil. Fall soil is warm and aerated and many plants actively grow roots during this time. Some species will continue root growth through our mild winters, and most begin their most vigorous root growth period in the late winter or early spring. Only fall transplants have this critical time for root extension *before* spring top growth takes off. Plants installed in the spring may hardly recover from transplant shock before the heavy demands of growth and summer drought are upon them.

Ideal transplanting weather

The cool, cloudy days and frequent precipitation of fall and early winter provide ideal transplanting conditions. Until sufficient roots develop, newly installed plants will undergo transplant stress that can be exacerbated by warm, sunny days. Fall and winter weather allows for reduced transpiration and provides ample moisture for the roots while plants recover from transplant shock.

Overall

Fall plantings enjoy advantages that are especially important for projects that will receive minimal maintenance and irrigation. The earlier plants go into the ground in the fall, the more time they have to recover from transplant shock, adapt to

the site, and expand their root systems before the growing season. They will require less water and grow more vigorously than if they are planted in the spring. In climates where the ground is frequently frozen several inches deep, it may make sense to delay planting until spring, but in Western Washington we have perfect winters for plant establishment.

PLANT SELECTION (Developing a Plant Order)

Many Parks properties have Vegetation Management Plans or other guidance documents that outline plant palettes to meet various management objectives. These documents are based on extensive site inventory and developed with community involvement and agency environmental review. Adhere to plant palettes and project scheduling as outlined in park-specific documents. Where guidance is not available, work with GRP staff to develop plant palettes.

Selecting Planting Areas

Planting areas are distinct plant communities that require different restoration approaches. Sites overwhelmed by invasive plants will require more intensive planting and maintenance than those that already have some native canopy cover. Divide your project site into the following three types of planting areas and sketch these areas onto the planting plan form provided at the end of this chapter.

TYPE A: Establish Plant Community – These are areas of completely bare ground, likely due to clearing an invasive plant community.

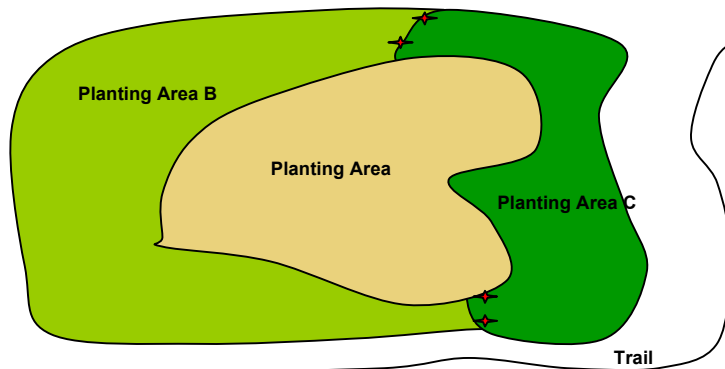
TYPE B: Enhance Plant Community – Areas where there are some native plants, but additional density and/or species diversity is required to meet canopy cover and habitat goals.

TYPE C: No Planting – Areas that are fully occupied by a diversity of native species that provide multiple layers of canopy cover OR otherwise currently meet management objectives.

Posting Planting Area

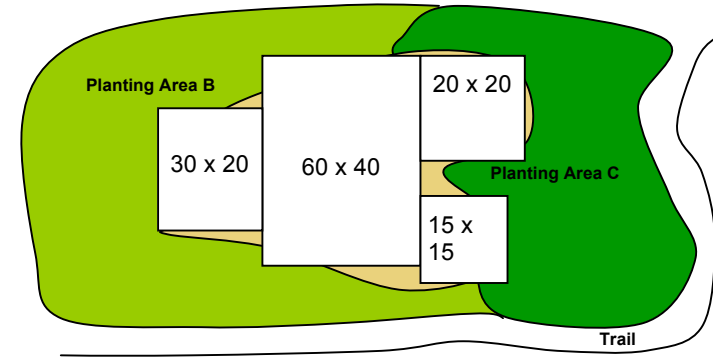
Delineating the above planting areas is helpful for taking measurements and identifying where to distribute plants when they are delivered. Visual clues in the forest will help you

determine boundaries or “edges” between planting areas. Type “A” areas are the easiest to delineate with clear boundaries between bare or chip mulched soil and the start of other plant communities - posting edges is not necessary in these areas. Where boundaries are less clear, define planting area boundaries by flagging edges at head height. Flagging is strictly for purposes of site measurement and locating areas on planting day. All flagging or stakes should be removed immediately after plants are installed and site has been mapped.



Measuring Planting Area

Planting area estimates are required in order to develop plant quantities for orders. Plants do not grow in perfect geometric patterns, so planting area shapes are often irregular. Depending on the shape of the area, divide it into a series of squares or circles and add these elements together (example below). If the entire area approximates a regular shape, i.e. roughly circular or rectangular, estimate the area of just the one large shape.



Area Formulas:

Square or Rectangle = Length x Width

Circle = $3.14 \times \text{Radius}^2$

For the example above: Planting Area A = $(30 \times 20) + (60 \times 40) + (20 \times 20) + (15 \times 15) = 3625 \text{ sq. ft.}$

Plant Stock Types

Stock refers to the packaging of plant material.

Container and B&B Stock

The most familiar stock types are container plants and balled and burlaped (B&B) trees or shrubs. These stock types are preferred for Parks plantings because they have well-developed root systems, the packaging will protect plant roots during transport, and they can be staged for periods of time without special cold storage or watering instructions. Container and B&B plants are appropriate for fall and winter planting (October 15 – March 1) so they will have adequate time to develop new fibrous roots before the growing season. Container stock comes in a variety of sizes. Trees and shrubs are purchased in gallon containers and herbaceous plants in 4” pots. Larger, more mature stock is expensive and has difficulty adapting to variable sites conditions.

Livestakes, Plugs, and Bareroot Stock

Riparian and wetland site managers often take advantage of less familiar stock types including livestakes, plugs, and bare-root material. These materials are lightweight and very inexpensive. The main disadvantage to these materials is storage. These stock types all have special watering requirements and bare-root and livestake materials need to be

kept in cold-storage. Livestakes may be planted fall through early spring (October 15 – March 15).

Spacing

Spacing refers to the amount of distance between installed plants. Spacing objectives are determined by management goals related to canopy cover and plant competition. Planting natives densely will occupy site resources including water, nutrients, and light and limit opportunities for invasive species. Spacing will ultimately determine how many plants you need to order.

Type A and Type B planting areas have different spacing protocols. The general idea for both types of sites is to occupy as much of the site as possible without creating excessive competition between native plants. Type A sites are fairly straightforward because you are working with a blank slate. Type B sites require evaluating the current plant density and approximating the number of additional plants you would need to fully occupy the site.

The spacing table below was constructed by Sound Native Plants. Divided by plant type and desired plant density, the table indicates the spacing – how far apart each plant should be from another – and the square footage that each plant will occupy based on the spacing (*see caveat on herbaceous plants*).

#Plants Needed = Planting Area ÷ Square Footage per Plant
 #Plants Needed = 3625 sq. ft. ÷ 36 sq. ft. per plant = 100 plants (densely spaced trees)

PLANT and STOCK TYPE	DESIRED PLANT DENSITY	SPACING	DIVIDE SQUARE FOOTAGE BY
Trees	Dense	6 ft on center (oc)	36 ft ²
	Average	8,9, or 10 ft oc	64, 81, or 100 ft ²
	Sparse	15 ft oc	225 ft ²
Shrubs	Dense	3 ft oc	9 ft ²
	Average	4 ft oc	16 ft ²
	Sparse	5 ft oc	25 ft ²
Live Stakes	Dense	1 ft oc	1 ft ²
	Average	2 ft oc	4 ft ²
	Sparse	3 ft oc	9 ft ²
Emergent Plugs	Dense	6 in oc	0.25 ft ²
	Average	12 in oc	1 ft ²
	Sparse	18 in oc	2.25 ft ²
Herbaceous/ground cover – 4" pots in groups of 3	Dense	2 ft oc	4 ft ²
	Average	3 ft oc	9 ft ²
Herbaceous/ground cover – 1 gallon pot	Dense	2 ft oc	4 ft ²
	Average	3 ft oc	9 ft ²

Herbaceous layer figures have been adjusted down from Sound Native Plants suggestions to account for presence of trees and shrubs. For 4" pots, multiply final plant number by 3 as each group of 3 plants should receive 4 ft² of space. - Sound Native Plants (2004) www.soundnativeplants.com

If you desire to create a densely planted mixed conifer/deciduous canopy you would need to figure out what percentage of your square footage you would like each species to occupy. Let's assume we want 30% cedar, 50% maple, and 20% alder.

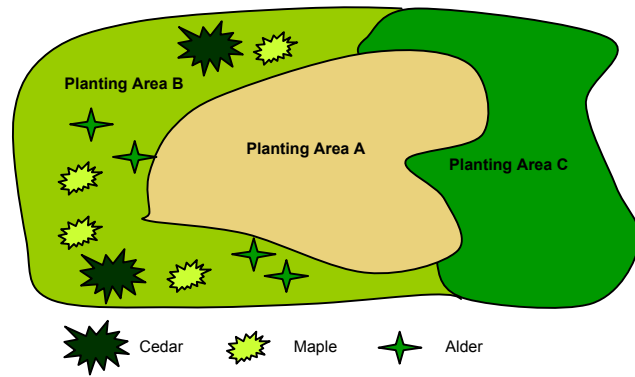
#Trees Needed = 3625 sq. ft. ÷ 36 sq. ft. per tree = 100 trees
 Cedar Needed = 100 x 0.3 (30%) = 30
 Maple Needed = 100 x 0.5 (50%) = 50
 Alder Needed = 100 x 0.2 (20%) = 20

Follow the same steps for each canopy layer to occupy the site fully. Do not be terribly concerned about overloading each canopy layer. Density protects the integrity of a project on two levels; 1) The site is fully occupied by natives excluding

invasive plant opportunities, and 2) It is a form of insurance for poor plant survival. In restoration plants are cheap relative to invasive species removal. It takes substantially less effort to thin a few excess native trees or shrubs than it does to clear ivy or blackberry from the same area. It is also extremely unlikely that you will have 100% survival.

If you are working on a Type B site, you will need to estimate the current site occupancy and adjust the quantity of plants needed. The simplest way to do this is to count stems and divide by site square footage. Don't worry about getting a perfect count, this process is an art and a science and there are no perfect answers.

As an example, see the diagram below. Let's assume Planting Area B is also 3625 square feet.



The site is currently occupied by 2 cedars, 4 maple, and 4 alder. Assuming we have the same density goal as our previous example, we can follow the same steps above, then simply subtract the number of plants already occupying the site from needed to match our management goal.

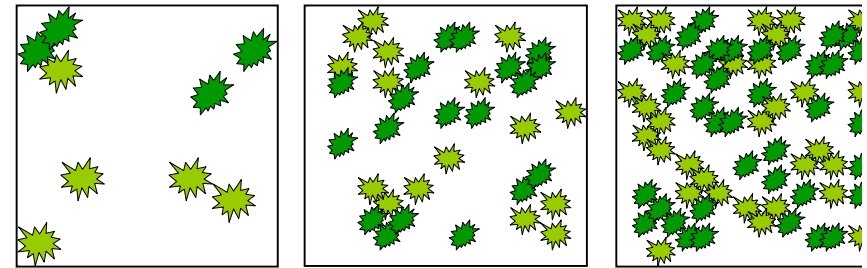
$$\text{Cedar Needed} = 30 - 2 = 28$$

$$\text{Maple Needed} = 50 - 4 = 46$$

$$\text{Alder Needed} = 20 - 4 = 18$$

Tree stem counts are simple, shrub counts, a little more complicated and groundcover counts are frankly challenging. If you already have dense ground cover, or plants are in clumps too close to identify individuals, estimate a percent cover then

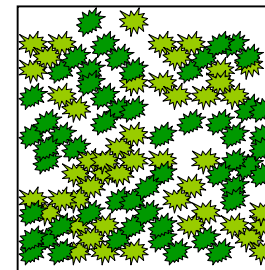
work your way back to occupancy. The diagrams below illustrate five levels of cover. Use these pictorials to help you estimate, again, this is somewhat subjective so don't worry about getting it perfect. If you have 70% native ground cover and your goal is 100%, you need to occupy 30% of your site with additional ground cover.



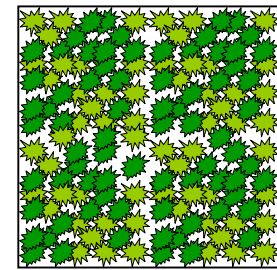
5% Cover

25 % Cover

50% Cover



75% Cover



95% Cover

$$\text{Ground Cover Plants Needed}_{\text{Dense}} = 3625 \text{ sq. ft.} \div 4 \text{ sq. ft. per plant} = 906 \text{ plants}$$

In order to account for current occupancy multiply the number needed for full occupancy by the percent of bare ground on your site.

$$\text{Bare Ground Percent} = 100 - \text{Current Percent Cover} = 100 - 70 = 30\%$$

$$\text{Ground Cover Plants Needed} = 906 \text{ plants} \times 0.3 (30\%) = 270 \text{ plants}$$

Plant Order Form

With the plant palette, stock types, and spacing settled, and planting areas delineated and measured, you are ready to combine these elements and put together a plant order. Fill out the form provided by Redmond Parks as completely as possible and submit to the Urban Forester by e-mail or post at the address provided on the form.

Freestyle Planting Plans

This may seem like a lot of work, but if you are an experienced gardener or landscape technician, or have performed the above process many times, it gets much, much easier. An experienced reforestation specialist can walk to a site, estimate area and percent cover and calculate plants needed in less than an hour. While you work your sites, practice the following technique. Think of objects of known area. A car is approximately 25 sq. ft., an average bedroom is 100 sq. ft., and an average story of a house is about 1000 sq. ft. Estimate stem density and eyeball percent cover. After you practice a bit, run through the above steps and see how close your educated guess came to your measured results. Over time your skills will improve dramatically and you will need significantly less time to develop planting plans. Remember restoration is an art and a science, there are no perfect answers!

Plants for steep slopes/soil erosion control

The best strategy for stabilizing a slope with plants is to establish vegetation at multiple levels—plant trees, shrubs, and groundcovers. A multi-level canopy will do the best job of intercepting and slowing precipitation before it hits the ground, thus reducing surface erosion. Multiple vegetation types also provide both deep and spreading roots which stabilize the entire soil profile.

If maintaining a view is important, plant trees at the edges of the view, space them widely, or prune selectively, but don't leave them out—you can't beat a mature tree for its root system.

The plants recommended here are drought tolerant, except for those with "wet soil" noted in the Comments. Most slopes shouldn't be irrigated, since irrigation can exacerbate soil

erosion. These plants are also relatively rapid growers that stabilize soil quickly.

Plants for steep slopes/soil erosion control:

Trees		Comments
Grand fir	<i>Abies grandis</i>	
Big leaf maple	<i>Acer macrophyllum</i>	
Shore pine	<i>Pinus contorta</i>	
Douglas fir	<i>Pseudotsuga menziesii</i>	
Cascara	<i>Rhamnus purshiana</i>	small tree
Pacific willow	<i>Salix lucida</i>	wet soil
Scouler's willow	<i>Salix scouleriana</i>	small tree
Shrubs		
Vine maple	<i>Acer circinatum</i>	
Red-osier dogwood	<i>Cornus sericea</i>	wet soil
Oceanspray	<i>Holodiscus discolor</i>	
Indian plum	<i>Oemleria cerasiformis</i>	needs shade
Thimbleberry	<i>Rubus parviflorus</i>	spreads by suckers
Salmonberry	<i>Rubus spectabilis</i>	wet soil, likes shade
Hookers willow	<i>Salix hookeriana</i>	wet soil
Sitka willow	<i>Salix sitchensis</i>	wet soil
Snowberry	<i>Symphoricarpos albus</i>	spreads by suckers
Groundcovers		
Kinnikinnick	<i>Arctostaphylos uva-ursi</i>	slow to establish
Strawberries	<i>Fragaria vesca</i> , <i>F. chiloensis</i>	chiloensis good in sandy soil
Sword fern	<i>Polystichum munitum</i>	needs shade

PLANT INSTALLATION

Plant Inspection

Visually inspect nursery stock on delivery. It is extremely difficult to communicate or negotiate regarding poor stock after the delivery truck has left. Plants require special care and the

nursery is generally not responsible for the fate of stock after it has been received. Signing a plant delivery order implies that you have received the stock and certify that it is acceptable. At delivery count and examine the health of all varieties of plants received. Pull some plants from containers to examine the root ball. Occasionally plants are delivered in containers larger than required for root and plant needs. If you pull a 4" pot size plant from a gallon container and most of the soil immediately falls off, make a note and communicate this to both the delivery driver and the person that ordered the plants.

Staging

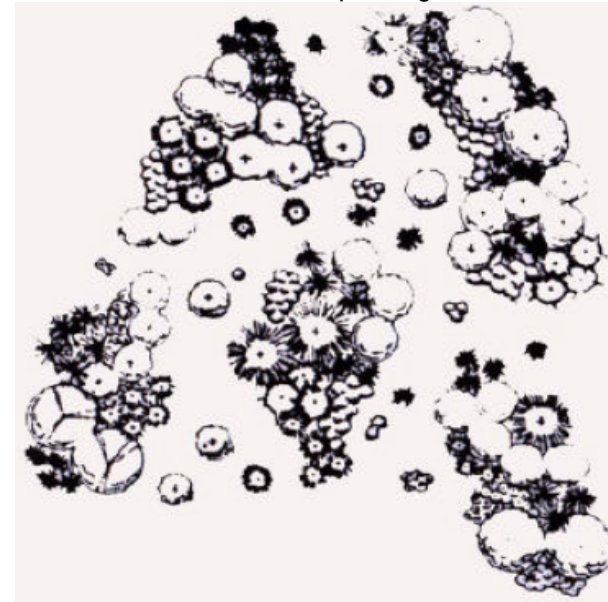
Plan adequate time in work plans for plant staging. Staging is the distribution of plants across a site in preparation for planting. Many one-time volunteers and new crew members are not familiar with each plant species or its ecological niche, so it is very important to have plants placed where they will be planted prior to the planting event. Consult annual plans, GRP Project Managers, and the Urban Forester for assistance in staging plants. Small patch plantings of 50-100 plants may be placed by an individual in an hour. Larger more elaborate plantings can take several hours and the help of a crew to stage. On delivery have the nursery driver and crew if available help you place plants in groups by species, preferably in clumps of 10 for easy distribution across the site.

Forested parkland plantings are staged to meet management objectives. Specifically, plants are selected and placed to meet interconnected needs of wildlife, aesthetics, slope stability, and recreation. The general forested parkland aesthetic is naturalistic, defined by a randomly placed assemblage of multiple canopy layers. Species are selected to suit site-specific soils, aspect, and existing plant communities. Some VMPs may call out specific planting styles based on a desired aesthetic which require specific staging methods. This is unusual, and unless otherwise noted, the following three plant staging techniques are acceptable.

Clump-Gap Mosaic

Micro-site is the specific location within a site that a plant will be placed. Plant palettes are selected to meet general site conditions, however within each site there is variability in soils, sunlight and moisture availability. In order to address micro-site

issues, the Clump-Gap mosaic planting pattern was developed. The basic pattern is that 3-5 plants of each species are "clumped" with several other groups of 3-5 plants of other species. Between these clumps are gaps where individuals of the different species are randomly placed with wider spacing. This layout ensures that each species will be distributed across the site and in association with several different other suites of species as well as alone. It provides several unique niche opportunities for each species and lends a random and naturalistic aesthetic to the planting.



Clump-Gap Mosaic Planting Pattern

Forest Thicket

This style is a high-density version of clump-gap as above, without the gaps. Stage groundcovers and shrubs at dense spacing in groups of 3-5, with individual tree species placed in between, also at dense spacing. Visually there will be less bare ground than the clump-gap style. This style of planting is particularly useful to address areas heavily invaded by pervasive weeds as it maximizes site occupancy by native plants.