

Addendum N
Seward Park Vegetation Management Plan
Standard Operating Procedures

Practices described in this section are intended to provide “how to” information to execute management recommendations found in Chapter 6. These two chapters are meant to be used together, coupling what is to be done, when, and where (recommendations) with specifically how to accomplish things (below). Individual practices are covered in separate categories. This chapter should provide adequate guidance to carry out maintenance and project-specific work outlined in this VMP.

The practices described have been excerpted from forthcoming and recent Seattle DPR planning documents¹. These practices include maintaining, improving, and restoring vegetation and habitat, as well as establishing plants and removing unwanted vegetation; they are tailored to the specific conditions and needs of Seward Park.

Project Planning

Vegetation management includes both routine maintenance and implementation projects. Implementation projects, whether initiated by Parks’ Horticulture Unit, District staff, or a community group, should provide the department as whole basic information on the proposed project in a standard format. This assures that the project will meet the goals for vegetation management according to this VMP, and adequate resources (labor, funding, and materials) are in place to complete the project. This step also facilitates basic communication between Parks’ work groups that may not have daily contact. When a project is monitored and evaluated, the project plan can be used to measure how well the work met the project objectives. A proposed form for this purpose is found in Appendix F and should be reviewed by the necessary work groups before a project is executed. Ideally, the essential data on the form should be entered into a spreadsheet that keeps track of projects in the park.

Amending Soils

Seward Park’s soils require amendment only in very limited situations. Rather than attempting to alter soil characteristics by amending, plant species should be selected for the existing micro-site conditions. Soil moisture, degree of canopy closure (e.g. sun/shade), and surrounding native species are the most important indicators influencing plant selection for a particular site. Soil amendment is recommended only where irrigation will be difficult to provide or non-existent, and in developed landscape areas with severe soil compaction. Most park soils favor mesic-to-dry upland species, except in ephemeral drainage corridors, wetlands and lakeshore.

The park’s upland soils are predominantly well-drained, mineral soils of sandy loam texture. Organic content is low, but an intact duff layer covers most undisturbed ground in wooded areas and contributes beneficial natural mulch. Shoreline soils are variable, the result of imported roadbed fill and armoring, upland erosion, lacustrine deposits and spotty organic matter accumulated from decomposing plants. Limited seasonally-mucky organic soils are found in the park’s two forested wetlands, and are generally poorly drained. These should be protected from wet-season compaction but will require no amendment.

Only in the case of project plans that do not include establishment irrigation, soil amendments must be used to help hold moisture near the plant's root ball and increase the chances of survival.

¹ These include Parks Forest Management Plan (anticipated 2005), Landscape, Horticulture and Urban Forestry Best Management Practices Manual (2005), Sand Point Magnuson Park (2001), Parks and City Among the Trees (1998).

Amendments that perform this function include high-quality compost, starch-based irrigation supplements and polymer hydrogel granules. Generally, the best way to add soil amendments to an area is to clear the site of invasives, aerate or scarify the soil if necessary, then spread amendment (e.g. compost or equivalent) on the surface throughout the planting area. Avoid root zones of mature trees. Seasonal timing should be such that bare soils are not exposed to winter rains.

Where feasible and particularly needed, amendment can be tilled into soil in combination with a mulch. However, surface-applied compost or woodchips can add nutrients and improve soil moisture-holding capacity over time. This latter technique is best suited to most Seward Park planting sites, due to the prevalence of existing trees and regenerating natives whose roots should be protected.

Starch-based irrigation supplements (like DriWater) are containers of water combined with small amounts of food-grade starch to turn it into a gel. The container is opened and buried upside down at the time of planting. As soil temperatures warm during the summer, soil microbes decompose the starch, releasing the water contained in the gel. These supplements are used in roadside planting projects by several state highway departments. They are expensive on a per-plant basis, but may be effective where no other solution is feasible.

Polymer hydrogel is a powder that is mixed in small amounts with native soil during planting. The polymer granules absorb water and swell exponentially. They hold water in gel form and keep moisture available to plant roots that come in contact with the gel granules. They have a mixed reputation, partly because they are easy to overuse.

Creating Snags and Down Woody Debris

[Adapted from U.S. Army Corps of Engineers’ Snags as Ecosystem Components’ and the Canadian Ministry of Forestry’s (2000) “Short Term Strategy for Coarse Woody Debris Management in British Columbia’s Forests”]

Down woody debris (DWD) currently available at Seward Park can be supplemented with additional DWD generated by snag creation. Some guidelines for DWD selection and placement follow. Spies and Franklin (1991) suggest that 15%-20% DWD cover and at least two large logs per acre (12”-17” in diameter and greater than 20’ in length) within the total DWD cover for that area be retained for wildlife purposes. Larger pieces of DWD are more valuable than smaller pieces — they last longer, hold more moisture, and are useable structures for a greater number of organisms.

Ecologically, it is advantageous to maintain the full range of decay and diameter classes of DWD on every site — different functions and ecosystem processes require DWD in different stages of decay. Coniferous material lasts many times longer than deciduous material and therefore remains part of the useable structure of a stand for a much longer period of time. However, the faster decay rate of deciduous DWD likely provides significant short-term ecological benefits. Retention of a diversity of species is advantageous. A more even distribution of DWD across the landscape, rather than a clumped distribution, is considered to provide greater habitat value for wildlife.

Two interrelated elements for increasing habitat structural complexity are discussed in this section: creating snags (with canopy gaps as a result), and scattering downed wood in the forest to increase availability of down woody debris as habitat for wildlife.

The recommendation for snag retention in managed forests is three large snags per acre. Larger snags are more valuable for wildlife than small ones; 10" diameter (dbh) is a recommended minimum to add habitat value for wildlife. Potential snag trees in Seward Park thus should be as large as possible, but no smaller than 10" dbh. However, candidate trees will be selected from trees that are already suppressed or in decline. Canopy dominants will not be recruited for snag creation.

To create snags, trees should be girdled at 2-3' above the ground, and a 4" strip of bark removed around the circumference. After this, cuts into the sapwood should be made. Roosting slits (small 1- to 2-in.-wide by 8-in. slits that are angled upward into the cambium) can be added when the trees are first girdled to provide roosting habitat for bats and certain birds. In addition, small (6-in. x 6-in.) sections of bark at the base of a suitable tree can be chopped out during snag creation. Disease-causing pathogens will enter the wound and start the decay process, eventually creating cavities that various birds and mammals may use. Temporary nest boxes may also be deployed at the time of snag creation, to attract cavity nesters to areas with newly created snags.

Canopy gaps will result from snag creation. The girdling associated with snag creation disrupts vascular flow to the upper bole (trunk) and canopy, and gradually kills a tree (usually within 1-2 years). The loss of leaves from the tree canopy will allow for a greater amount of light to reach the forest floor. Additional removal of smaller trees nearby may allow for a larger canopy gap, if desired. Canopy gaps should only be created in dry to mesic areas where invasives have been controlled, and made initially on a trial basis.

Planting

Planting in Seward Park will consist mainly of installing upland species of trees and shrubs. Typical scenarios include understory regeneration planting in the forest where denuded, and replanting after invasive understory and/or hazard tree removal. In many cases, planting will be unnecessary to regenerate native vegetation at Seward Park because abundant native seed and rhizomes are present. Planting may also occur as part of future restoration of known wetlands, moist drainages and lakeshore habitat.

In all cases, species selection will be critical to planting success and meeting project goals. The park's native forest should have a species composition and distribution typical of the Puget lowland forests. The Appendix 'Seward Park Plants' provides specific plant selection references. These include:

- Forest Type/Plant Association sheets, for each describing its usual site, vegetation and ecology and including a list of its dominant canopy and understory species. Most Seward Park vegetation fits (or could evolve to fit) one of these categories. Besides using existing native species already present on a site, one can use these association sheets to identify which main species to plant and appropriate target proportions.
- Seward Park Restoration Plant List, to supplement Associations and utilize when converting lawn back to forest. Species are listed by Plant Type, with moisture and light tolerances as well as recommended spacing noted for each.
- Friends of Seward Park's list of native plants currently found in the park. Due to past disturbance that removed much understory vegetation, certain once-indigenous species may be absent. Their reintroduction is not a primary objective of this plan; the main planting emphasis will be to regenerate species indigenous in the park today.

Depending on the condition of the existing plant community, reforestation will entail either 1) a complete or near-complete re-establishment of native plants or 2) enhancement of the existing native plant population.

In both cases this is accomplished through managing invasive non-native plants either by eradication or control (refer to section on Weeds & Invasive Plants). Beyond invasives management a restoration project may include the installation of native trees and plants. This is mandatory in Type A reforestation projects and depending on the condition of the existing plant community, may be necessary in Type B projects as well.

PLANTING TYPE A: ESTABLISHING A NEW PLANT COMMUNITY:

A new plant community is needed in areas so over-whelmed by invasive plants as to be completely devoid of native vegetation. Such areas will require a deep and energetic commitment from the local neighborhood and the Seattle community at large.

- Plant species are selected based on their capacity to out-compete other plants – especially non-native invasive species.
- Such native plants will typically be robust growers capable of spreading vegetatively as well as from seed.
- When replacing invasive plants which bear prolific amounts of berries or seed it is important to plant natives which do the same.

PLANTING TYPE B: ENHANCING AN EXISTING PLANT COMMUNITY:

Many forested areas have existing plant communities but are facing inundation by invasive plants. Enhancement reduces the threat of invasive inundation by eliminating spot colonization by non-native plants and replenishing the local flora as needed.

- Invasive Removal – if necessary – will follow all standard procedures and protocols
- If planting is necessary – plant palettes should include species currently existing on the site.
- Planting densities will be great enough to cover all bare soil areas within 4 years

Planting density and spacing thus will depend on existing site conditions, existing vegetation, and the plant community that is desired. Bare areas completely cleared of invasives (e.g. blackberry thickets) will be planted more densely than project sites that already have existing native vegetation. Recommended density ranges and general spacing guidelines are given in Table 8 below. These are meant to be guidelines that can be adjusted according to the specifics of a project.

Recommended Planting Densities for Projects in Seward Park

<i>Vegetation layer</i>	<i>Spacing</i>	<i>Final Density</i>
<i>Tree</i>		
<i>Conifer</i>	8-15' on center (oc.)	150-200 per acre
<i>Deciduous</i>	5-10' oc.	200-400 per acre
<i>Tall Shrub</i>	4-8' oc.	700-1800 per acre
<i>Short Shrub</i>	2-4' oc.	1200-2500 per acre
<i>Live Stake</i>	3-5' oc.	1000-2000 per acre

Seattle Department of Planning and Development calculates plant densities based on specifications below, for cases where significant vegetation is being removed due to construction. This chart will be useful for estimating counts of emergent and herbaceous species not included above, and for locations where total forest regeneration is being undertaken and a planting plan developed.

PLANT SPACING BASED ON FINAL DENSITY

PLANT 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
Emergents	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” pot	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 – 1 gallon pot	Dense	12 in oc	1 ft ²
	Average	18 in oc	2.25 ft ²
	Sparse	24 in oc	4 ft ²

- *Sound Native Plants. Generalized spacing guidelines. (2004) www.soundnativeplants.com*

PLANTING TECHNIQUES

The two basic steps in planting are preparing the site, and setting the tree or shrub (or herbaceous plant). Proper preparation will encourage root growth rather than adding to the challenges natural area plantings already encounter.

PLANTING TREES AND SHRUBS – Natural Areas

PREPARE THE PLANTING SITE

Site prep will encourage root growth not add to the difficulties already challenging the new plant.

SELECT A SITE

DIG A HOLE 2 – 3 times the size of the root ball or container.
At least 12” greater than the root ball or spread.
No deeper than the root ball or container soil level

*Depending on soil conditions
Wider than either root spread or root ball
Root ball should sit firmly on the undisturbed subsoil.*

INSTALL THE PLANT GENERAL

**Fertilize only if specifically directed by VMP or SPR
Urban Forestry staff
Backfill with native soil**

*This will encourage plant to seek out naturally occurring nutrients (where available)
This will improve rooting success and help prevent root-killing drainage problems
Organic material is good to use as a top dressing, once the plant been planted and watered in. Keep the top-dressing away from the trunk and root crown.*

Do not place any organic material, such as woodchips in the hole

BALL AND BURLAP

- 1) **Place ball and burlaped plant in the hole**
- 2) **Make sure its vertical**
- 3) **Remove all rope from around the tree and the top 1/3 of the root ball**
- 4) **Fold top 1/3 of burlap down and back into the hole.**
- 5) **Remove the wire basket, if one is on the root ball**
- 6) **Backfill ½ of the hole and**

Don't disturb the burlap until the plant is set in the hole

Don't remove the rope or burlap until the plant is set in the hole and in its final position.

The burlap will hold moisture next to the roots. If possible, cut the top 1/3 of the burlap off and completely remove it. Use bolt cutters and try to avoid moving the root ball. Watering in is preferable to

If water is available	thoroughly drench with water. Allow soil to settle. Backfill remainder of hole and drench again	<i>tamping the soil, if water is available this method will be used. Backfill with native soil</i>
If water isn't available	Back fill in 4"-6" layers, tamping each layer as you go. – Don't tamp muddy backfill	<i>Be gentle but firm. Backfill with native soil.</i>
	7) Water thoroughly	<i>This settles the soil, reduces air pockets and re-wets the root ball.</i>
	8) Build a water well – a 3" high circular berm just past the perimeter of the root ball. Wet the inside wall and make sure it will hold water.	<i>Don't disturb the soil just placed in the planting hole – use additional soil. A successful water well will hold water around the newly planted plant.</i>
	9) Fill the water well with water.	<i>Congratulations on a successful planting!</i>
	10) Apply 3-4" woodchip or forest duff mulch	<i>Place in well / immediate plant root zone; avoid piling against stem or trunk.</i>

IMPORTANT NOTES ON POT-GROWN PLANTS:

Most forest plantings use container-grown material, for which planting methods are similar to above procedures. Three key steps before installing a containerized plant should also be taken:

- Remove pot by tapping (not by pulling out by neck) then inspect for girdling roots. Prune cleanly if found; reject stock if severely rootbound and girdling is uncorrectable.
- Immediately before planting, tease roots apart slightly to encourage growth into native soil but keep moist and shaded until planting. Careful “butterflying” or scoring roots of shrubs and herbaceous material with a utility knife may facilitate establishment if roots are dense.
- Check pot for excess depth of soil covering plant collar; remove soil to height of true collar before planting – especially important for trees to prevent rot and failure to thrive.

Supplementary techniques and considerations regarding individual plant types follow. Some (like staking) are relevant primarily in developed landscape areas of the park.

Trees

- Berms should not be constructed in clay soils or on heavily compacted sites.
- Stake only in situations where normal planting procedures does not provide a stable plant; otherwise, staking is not generally required.
- Staking is sometimes recommended as a vandal deterrent device or to prevent mechanical injury from mowers or trimmers. Ties for stakes should be some biodegradable or flexible fastener that precludes collaring of the trunk if the ties are not removed in a timely fashion.
- Stakes shall be removed at the end of the first year.

- Plant trees at the depth they were growing in the nursery.
- Do not wrap tree trunks.
- Remove tree trunk wrapping materials, tags, and all ties at the time of planting.

Shrubs

- If needed, incorporate amendment into soil before adding plants (see Amending Soils).
- Wait until plants are established before adding chemical fertilizer.
- Plant at proper depth taking into consideration room for mulch.
- Plant shrubs with proper spacing to allow for spread at mature size.
- Plant bare root stock at the same grade as grown in the nursery.

Live Stakes

Live stakes are cuttings harvested from live native plants. Stakes are cut from the parent plant, and then installed directly into the soil where they establish roots and grow to maturity. The best species to use for live stakes are willow species, black cottonwood, and red osier dogwood. Stakes should be planted in areas that will be consistently moist throughout the growing season, such as shore and wetland areas. Although live staking can be done throughout the year, to maximize survival the best time for taking cuttings and installing them is during the dormant season, between early November and late February.

Stakes can be harvested from an appropriate site, or purchased. They should be installed as soon as possible after harvesting – ideally within 24-72 hours – and kept wet in a bucket and in the shade until installation. Stakes should be at least 2-3' in length and $>\frac{3}{4}$ " diameter for willows and cottonwood, and $>\frac{1}{2}$ " diameter for red osier dogwood. If harvesting your own stakes, no more than 5% of the parent plant should be removed at any one time.

Stakes should be installed with a rubber mallet if the ground is soft enough, or by using a planting bar to create the hole in more compacted soils. The stake should be installed with no more than 3-6" remaining above the ground, and there should be good soil contact below ground for the length of the stake.

Mulching

Mulching is one of the easiest and most important maintenance practices for protecting and nurturing all vegetation types. When site access is possible, mulching is an essential component of any natural area planting project for suppressing weeds/invasives and thereby reducing root competition, to conserve soil moisture and keep soil cool, and to add organic matter to the nutrient-deficient soils.

The extensive trail system in Seward Park will facilitate the transport of mulch to remote sites. Hand transport off-trail will be required, however. In natural areas, the most desirable mulch material is 2-4" of composted wood chips. Compost, GroCo, or leaf mulch can be added either on top of or underneath the chip layer if soil amendments are desired. Wood chips from recycled Parks Department plant material are usually available at no cost, by advance request through District gardener or crew chief to coordinate delivery. Some chips will be directly generated on site as part of tree work operations.

Where large areas of invasives have been removed (e.g. ivy mats and blackberry thickets) and there are concerns regarding invasive regrowth, if site access is good the entire planting area should be sheet mulched. Use a combination of cardboard sheet mulch overlain by 4-6" of wood chips to minimize re-invasion. Sheet mulching should not be done in the vicinity of mature trees, largely limiting use in Seward Park to open areas. Plastic, landscape fabric or inorganic mulch should be avoided, except as specified for highly invaded areas, where it may be the only effective strategy.

In cases where specific plants or groups of plants are to be mulched, use guidelines below. This scenario will most likely be the case when conifers or groups of shrubs are being planted in dry uplands and follow-up watering is not feasible.

Trees

- Clear weeds and grass from under the tree, in a circle out to the drip line at the tips of the branches.
- Spread 3-4" deep layer of organic mulch in a circle out to the tree's drip line or in a 3' diameter circle (whichever is greater).
- Keep mulch away from the tree trunk to prevent crown rot or insect damage.
- Maintain mulch annually (during 3-year establishment period and beyond as needed).
- In heavily-used locations, tree mulch rings should be kept permanently, to reduce soil compaction and prevent potentially fatal equipment injury to trunk and roots.

Shrubs

- Follow similar procedures as for trees, above.
- Spread layer of organic mulch 2-3" deep and 2-3' in diameter around shrub.
- Cover entire planting area with mulch where applicable.
- Keep mulch away from contact with crown of plant.

Watering

Watering is an important component of establishing new plantings with maximum success. Seattle receives an average of 39 inches of rain each year, but only 13 of those inches fall during the growing season. Plants grown in a nursery are acclimated to exactly the opposite condition: they receive regular watering to facilitate rapid growth. Summer watering the first three years is critical to help the plants acclimate to a radically different moisture regime.

New plants must grow an entire new root system before they can survive in the summer dry season. For this reason summer watering is important for all new plants, even drought-tolerant natives. Water delivery to planting sites in Seward Park will require good planning and significant labor, since the park interior has no water supply lines. Developed landscape areas have automatic irrigation or quick-coupler systems. Irrigation water may be available for forest plantings using couplers or hydrants along the perimeter path, by arrangement. Lake water withdrawal by pumping is not permitted.

In consultation with resource staff, the project manager must determine what irrigation is most feasible and efficient for the project being planned. Some areas will be close to quick couplers so that hoses can be attached for overhead irrigation. Other areas may be close to a road or a path where a truck can deliver water with a water tank. In these situations, either hand watering from

the tank or hookup to an irrigation system may be preferred, depending on the personnel available for the work.

Some areas will be away from reasonable water access. In these cases, soil amendments like hydrogel or compost should be considered (see previous section above); deep mulching and frequent weeding will be an absolute necessity. Watering can be done by portable containers to each plant, but this must be weighed against the cost of labor and the damage that repeated foot traffic can cause to the site. A final option is to substantially overplant such areas, anticipating water-related losses. All planting should be completed during late fall or winter where irrigation is problematic.

In general:

- Choose species and select sites that require limited watering.
- Water new trees and shrubs thoroughly at planting – do not depend on rainfall.
- Water new trees and shrubs (weekly at least 1”) during first two summers, tapering watering (to ½” weekly) in the third year.
- Begin watering at the beginning of June to prevent drought stress.

See also Planting and Three Year Establishment Care sections for instructions on watering newly installed trees and shrubs.

Three Year Establishment and Care

Typically, all new plantings should receive frequent and intensive follow-up care for at least three years to insure survival. At a minimum, the components of this three-year care program are mulching, watering, monitoring and weeding. A typical three-year calendar for these actions is shown below. Detailed instructions on how to perform these maintenance actions can be found in this chapter under the title of the specific practices: Mulching, Watering, Weeding and Invasive Control.

Once the three-year period is over and the plantings have established, care for these areas should be incorporated into any regular ongoing maintenance that occurs within the surrounding management area. In locations where particular invasives or site conditions make restoration especially difficult, intensive monitoring and establishment care may need to continue for five years. The objective for most forest restoration projects is that plants will need little-to-no maintenance once well established.

In Seward Park, new plantings, particularly on western exposure sites, should receive regular watering. Site access can make this labor-intensive. Because of remoteness, some areas may be difficult or impossible to mulch for the same reason. A means of conveying water to plants, such as a temporary irrigation system, water tank or hand-carried containers should be developed for each project. The spine trail system and perimeter path should facilitate water transport to within feasible hand-carrying distance to sites.

If a site that has been planted will not receive watering during the three-year establishment period, mulching heavily at the time of plant installation should be done if at all possible. Weed control should be done with diligence at any planted site, and in certain cases may be the only type of three-year establishment care that can be provided. Adjustments to the plant establishment calendar, in terms of actions taken, should reflect the particular project’s site conditions. For all projects, monitoring of site conditions is crucial to success. Parameters may include: presence of invasive plants, extent of invasive regrowth, new plant survival and increase

in height/spread, plant damage from humans, animals or pests, and water stress. See Chapter 9 – Monitoring for more information.

Three Year Establishment Care Calendar

Action	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
At Time of Installation												
Mulching												
Watering												
Year 1												
Mulching												
Weeding				•	•							
Watering						•	•	•	•	•	•	•
Year 2												
Mulching												
Weeding				•	•							
Watering						•	•	•	•	•	•	•
Year 3												
Mulching												
Weeding					•							
Watering						•	•	•	•	•	•	•
Removing Inorganic Mulch												

■ Indicates time period when action may be taken, timing and frequency to be determined by site conditions

• Indicates specific time to perform action

Mulching: See “Mulching”

Weeding: See “Weeding and Invasive Control”

Watering: If site access allows, all new plantings should be watered in at the time of planting. Regular three year watering, if given, should consist of at least 1” weekly for first two growing seasons, then taper to ½” weekly for plantings in natural areas. See 7.7 “Watering”.

Removing Inorganic Mulch: Inorganic sheet mulch used in areas of severe invasive species problems should be removed during the dormant season after 3 years and entire area should be mulched with 4-5” layer of wood chips. Depending on site conditions and concern about re-invasion by weeds, entire planting area can be sheet mulched with a double layer of cardboard underneath the wood chips. Application of these techniques is not typically advised and would probably be limited to planting areas with severe invasion problems that are around the edges of the hillside and therefore accessible for this intensive action.

Pruning and Removal

Pruning is not a common practice of forest management in natural areas, but can be important for achieving safety and forest health goals. Moreover, the outstanding trees at Seward Park merit pruning to maintain aesthetics. Trees in Seward Park may be pruned or removed when it is necessary to mitigate risk to park users, right-of-way or adjacent properties as explained in Section 7.11. Otherwise, tree work will be restricted to instances where it directly achieves a project objective. Such instances might include:

- A mature tree may be pruned or removed to encourage nearby sapling trees to grow. Wherever possible, the preferred technique for reducing competition will be pruning. If a tree is removed, it should be converted to a “snag”, essentially a branch-less trunk. This reduces costs and increases habitat features in the park.
- A group of sapling trees may be “thinned” by cutting down weaker, damaged or poorly located trees until there is enough space between the remaining trees for them to grow to mature size. Some planned projects may plant trees closely together to be thinned in the future for this same reason.
- Low branches on trees along a trail or street may be pruned to provide overhead and side clearance.

All tree pruning and removal in the park is to be handled by SPR Urban Forestry staff, in accordance with the Parks and Recreation Tree Policy (2001)). Except for the purposes of snag creation, current policy prohibits ‘topping’ of trees. Pruning of park vegetation must be done under supervision of qualified professionals, either City staff or hired contractors. Technical expertise is required to avoid damaging valuable vegetation. Normally, native shrubs will not be pruned, except along road or trail edges for reasons of safety and clearance.

Weeding and Invasive Control

Generally, the most effective long-term control of invasive species is achieved by using a combination of control methods, reducing site disturbance, and establishing healthy native plant communities. All control efforts should be directed over time towards establishing and maintaining more sustainable native plant communities.

Controlling invasive plants is essentially an ongoing maintenance action throughout the Park in developed landscape as well as natural areas. In addition, most natural area planting projects will include initial removal and ongoing control of invasives as a major component of the project, as will reclamation and renovation projects in the historic landscape areas of the Park. Invasive control is also an important part of 3-year establishment care for all newly planted areas.

Invasive plant control focuses both on individual species and infested areas. See VMP Appendix for maps showing present locations of major invasive species in Seward Park: English ivy, holly, laurel and Himalayan blackberry. Below are listed species frequently found in Seattle Parks; all but walnut have been documented at Seward. Additional species often seen include non-native hawthorn, cherry, mountain ash, Scot’s broom, Japanese knotweed and grasses. The most commonly-encountered and problematic invasives are listed below, with a brief description of plant characteristics, issues, and recommended eradication and control approach for each species.

INVASIVE PLANTS COMMONLY FOUND IN SEATTLE PARKS

PLANT NAME	SCIENTIFIC NAME	MAJOR ISSUE	CONTROL METHOD
Himalayan Blackberry	<i>Rubus discolor</i>	Wide-spread Disrupts native systems	Manual removal Mechanical removal Mulching Herbicide
Cut-leaf Blackberry	<i>Rubus laciniatus</i>	Wide-spread Disrupts native systems	Manual removal Mechanical removal Mulching Herbicide
English Ivy	<i>Hedera Helix vars.</i>	Regenerates in shade Disrupts native systems	Manual Removal Mechanical Removal Mulching
English Laurel	<i>Prunus laurocerasus</i>	Regenerates in shade Disrupts native systems	Manual Removal Herbicide
English Holly	<i>Ilex aquilifolium</i>	Regenerates in shade Disrupts native systems	Manual Removal Herbicide
Black Locust	<i>Robinia pseudoacacia</i>	Nitrogen-fixer Alleopathic	Manual Removal Herbicide
Norway Maple	<i>Acer platanoides</i>	Generates in shade	Manual Removal Herbicide
Walnut	<i>Juglans spp.</i>	Alleopathic	Manual Removal Herbicide
Horsechestnut	<i>Aesculus spp.</i>	Readily naturalizes Regenerates in shade	Manual Removal Herbicide

Usually, invasive removal is the first, key step in the multi-stage, multi-year process of forest restoration. Effective reduction of plants such as Himalayan Blackberry, English Ivy, English Holly and Laurel requires not only a physical elimination of vegetative material but also may require subsequent replacement of that material with native fruit-bearing species. In Seward Park’s main forest area, natural regeneration can be expected to reduce the need for replacement plantings.

EFFECTIVE INVASIVE PLANT MANAGEMENT REQUIRES:

- **DOCUMENTING YOUR WORK**
- **PREVENTING INVASION HOLISTICALLY**
- **DETECTING INFESTATIONS EARLY**
- **ERADICATING WHEN REALISTIC OR REQUIRED**
- **CONTROLLING INVASIVE POPULATIONS EFFECTIVELY**
- **BEING ADAPTABLE**

DOCUMENT YOUR WORK

Keep track of on-going work with written documentation and a map. Maps and good record-keeping are extremely important. Except in really small parks, it is nearly impossible to keep track of all the sites where weeds have been removed unless written records are kept. Since every site needs to be revisited, good record keeping will be synonymous with success. The aim of control is not to eradicate weeds, but to reduce weed density and abundance below an acceptable threshold.

PREVENT INVASION HOLISTICALLY

- Clean shoes, tire treads and equipment before and after entering a park.
- Know the source of all amendments and landscape products coming into a park and make sure they are sterile or do not carry any unwanted plants or seed.
- Replace non-native fruit producing plants with native ones.

Preventing a new weed from becoming established in a park is one of the best ways of ensuring long-term preservation. In general, colonization of an area by non-native, weedy species can be attributed to 1) human activities, and 2) bird and wildlife foraging. Human activities can track undesirable seed from one space to another when we walk or bike through an area and pick up seed on shoes or bike tire treads. It also occurs during construction, from vehicle and equipment wheels tracking undesirable seed onto the work site, or from soil amendments that haven't been properly sterilized.

Bird and wildlife foraging also contributes to the presence of non-native invasive plant spread. Many plants need their seed to pass through the gut before it can germinate. Typically these sorts of plants enclose their seeds in fruit which entices, as well as

nourishes foragers. Birds and wildlife eat the fruits and later drop the activated seed. In order to effectively reduce invasive plant spread, it is necessary to replace this food source with native fruit producers.

DETECT INFESTATIONS EARLY

- **Make regular trips through the park**
- **Work as you walk – if you see an unwanted plant pull it up**
- **Stay connected and share observations with others**

Detecting new weeds and responding to them quickly is as important as prevention. New weeds will continue to reach Seward Park. The inevitability of arrival doesn't mean that they will persist. Containing a new weed, like containing an epidemic, depends on identifying it as soon as possible and initiating a rapid, coordinated response. The main need is for park users and staff to be attentive.

It's hard to overemphasize the importance of detection. New weed populations can't be eradicated if they're not detected! If you see a plant that you've never seen before, try to find out what it is by asking an expert such as King County Extension or county Noxious Weed Board staff, or keying it out. If it turns out to be an invasive plant and still occurs in relatively low numbers, eradicate the entire population.

Some agencies have instituted invasive plant patrols made up of volunteers who systematically search trails and other likely places for weed populations. All this work is really worth it. As two veteran weed workers put it, "preventing or stopping just one new invasive weed would be of greater conservation benefit in the long run than far more costly and difficult efforts to control an already widespread pest."

ERADICATE WHEN REALISTIC or REQUIRED

- **Eradication is mandatory for Class A noxious weeds.**
- **Aim for complete eradication of other non-natives only when the whole population can be removed and new populations can't seed in from outside sources**
- **Diligence and repetition are the keys to success**

Eradication means destroying every single plant in the population, not just most of them. Typically, even if caught in the early phases eradication will require more than one weeding. The key is diligence. If the site is weeded thoroughly enough and often enough, the weed seed in the site's seed bank will be exhausted and eradication will be successful.

THE KEY TO ERADICATION IS:

- detecting early
- responding quickly
- monitoring carefully
- repeating as necessary

An underlying assumption is that the invasive plant, once eradicated, is unlikely to reinvade. If it's likely to do so—for instance, if it occurs in great numbers on an adjacent property—try to keep it out of the park but don't mount an all-out effort to eradicate every last individual. The probability of re-invasion is too high. In such cases control and containment are better strategies. Seward Park is uniquely configured such that abutting weed-producing property is minimal. Eradication may prove more feasible here than in most Seattle parks.

CONTROL INVASIVE POPULATIONS EFFECTIVELY

- **Control is not an option for Class A noxious weeds – Eradication is mandatory**
- **Most of the time control strategies focus on containment**
- **Documenting your work and remaining in close contact with others is essential**
- **Visit the removal site regularly and weed until all re-sprouting ceases**

When a particular weed has become widespread—like English Ivy—eradication is no longer a sensible strategy. Instead, the most effective action is to contain and control the spread of the plant.

To contain the spread, focus on “outlier” populations—small patches in areas otherwise weed-free. At the same time, prevent additional seed from being dispersed by cutting back fruit-bearing plant parts. In the case of English ivy, cut the parts growing up into trees and bearing fruit. Following this strategy will limit the spread of the local population to the area it currently occupies.

Containment alone works best with plants that expand outward from the edge of their colony. When dealing with such plants – such as Field Bindweed – focus on containing the large infestations and eliminating all the outlier populations, rather than spending energy trying to eradicate the main population. It's easy to feel compelled to throw all your effort into working on a major infestation, but doing so is like sending fire fighters into the middle of a huge wildfire while ignoring its perimeter. The fire keeps spreading, as if you hadn't done a thing. If necessary, delineate a containment zone. This can be done by dividing the park into areas defined by the trail system.

Fruit-producing plants and plants which disperse seed over long distances are not effectively controlled using containment alone. The fruiting source must also be reduced. This should be done both 1) physically by eliminating populations – gradually over time – and 2) proportionally by replacing the removed vegetation with native fruit producers. To effectively eliminate invasives, not only the mature plant material needs to be removed. Re-sprouting rhizomes and roots, along with seedlings germinating from the weed seed bank in the soil, need to be pulled on a regular basis. Once you've decided to remove a population, a key to success is to return every winter or spring until no more resprouting and germination is occurring. Regular site monitoring will identify areas of regrowth before they re-establish.

BE ADAPTIVE

- **Know what is working and what isn't**
- **Identify how the current processes and procedures could be changed to better address the issue**
- **Alter the way work is performed based on the analysis**

GUIDELINES FOR CLEARING GROUND VEGETATION ON SLOPES

(Threshold: >750 square feet in any 10,000 square feet area in any one year)

Slope	Revegetation Guidelines	Bioengineering Guidelines
0-15%	Immediately after clearing, fence off bare ground and allow seed bank to sprout for one growing season. If native regeneration is not sufficient, plant to attain 100% foliar coverage within 5 years of first clearing.	None; no restrictions on volunteer involvement
16-40%	Use above strategy or immediate planting to provide 100% foliar coverage within 3 years of first clearing.	Install facines, wattles or native woody debris fastened perpendicular to the slope at intervals <10'; no restrictions on volunteer involvement
41-60%	planting or recruitment of native plants to provide 100% foliar coverage within 3 years of first clearing	Above requirements, plus coverage of bare soil by mulches within 30 days of clearing; geo-technical review of project required prior to any work; geo-textile coverage of bare soils strongly recommended; non-professional volunteers must be supervised by qualified professionals
>61%	Seeding with sterile annual grasses recommended; planting or recruitment of native plants to provide 100% foliar coverage within 3 years of first clearing; tree species are limited to shorter species (<30 feet mature height) on unstable slopes	Geo-technical design of project required with departmental review; geo-textile coverage of bare soils strongly recommended; nonprofessional volunteer labor not permitted

Recommended eradication and control methods (including herbicide use) are intended to be used in accordance with Parks' Landscape, Horticulture, and Urban Forestry BMPs (2002 and 2005 update). These "best management practices" focus on using an integrated pest management approach (IPM) characterized by establishing goals, determining thresholds for control, selecting from a combination of control and removal methods, implementing one or more of these methods, monitoring results, and evaluating outcomes.

The following text describes in detail how to remove each of the identified non-native invasive plants or noxious weeds identified as a significant presence in Seward Park. Other non-native invasive species encountered but not covered in these tables should be removed as appropriate. **All work with pesticides will ONLY be done by Seattle Parks staff (or approved**

contractors) who are licensed to apply pesticides by the Washington State Department of Agriculture. In wetland areas, the operator's license must include an aquatic endorsement. In accordance with state law, the applicator must keep records of all chemical applications.

Shrub and Vine Species (<20' tall at maturity)

English ivy (*Hedera helix*)

English ivy is a broad-leaved evergreen non-native invasive found throughout Seward Park in the forest ground layer and climbing up tree trunks in the forest. It is one of the biggest threats to forest health. It has no natural predators or pests. Ivy is shade-tolerant, and forms dense mats on the ground. In addition it climbs trees, weighing down the limbs, reducing air and nutrient flow, and creating a heavy sail in the canopy that increases the wind resistance of an already weakened tree making it susceptible to wind throw. English ivy is not a beneficial habitat for native wildlife, and reduces native plant diversity.

Hand-pulling appears to be the most effective removal method for this plant. Any efforts to control ivy should initially target vines climbing into trees. Vines should be cut at shoulder-height, and again at the base of the tree all the way around the circumference of the tree. Cut vines should not be pulled down out of trees. A radius of at least 5' from the base of the tree all the way around the tree should also be cleared of ivy – called a 'tree lifesaver'.

Patches of ivy on the ground are best removed by hand-pulling and rolling the vines into a mat or ball. Removal of ground layer ivy where there is still a fairly intact native shrub layer can be done without replacement planting. Removal of dense mats in the ground layer lacking native shrubs and herbs should only be done if subsequent replanting is an option. On slopes less than 40 percent, it may be productive to leave the ground bare and unplanted for one growing season. This gives the project manager a chance to recruit native plant regeneration from the existing seed bank in the soil. If this is executed, it is important to leave the soil surface scarified (lightly raked) and fence the area to prevent foot traffic. During the following three growing seasons, regeneration of invasive species must be carefully weeded from the desirable native regeneration. This takes a discerning eye and a sensitive touch. However, this is an ideal strategy for "adopt-an-area" sites.

On slopes greater than 15 percent, if native recruitment is not successful, high-density planting and intensive maintenance should be provided as a backup strategy so that 100% foliar coverage is achieved within three years. In addition, fascines, wattles or woody debris should be fastened perpendicular to the fall line to intercept surface water flow and prevent erosion on slopes between 15 and 40 percent. On slopes greater than 40 percent, immediate replanting and broadcast mulching are recommended to guarantee adequate foliar coverage under critical slope conditions.

New planting areas should have an additional 10'-wide cleared strip around the edge. More extensive instructions for manual ivy removal can be found at www.ivyout.org. If adaptive management and IPM protocols warrant, ivy may also be controlled by glyphosate herbicide with added surfactant selectively applied to new leaf growth in June by wiper applicator. This process requires careful material handling and patience and should only be done by licensed pesticide applicators. However, it may be a preferred strategy on steep slopes where ground disturbance is undesirable.

Laurel (*Prunus laurocerasus*, *Prunus lusitanica*), English holly (*Ilex aquifolium*)

Laurel and holly are broad-leaved evergreen shrubs that are spread readily by birds due to their prolific and tasty fruit. They also sucker and re-sprout vigorously. They prefer at least partial shade and are generally found in upland forest in the understory, or along forest edges. Holly is found throughout Seward Park and laurel near the southern end in the remnant and mixed native/nonnative forest areas.

Although laurel and holly do not pose as immediate of a threat to forest health as other invasives in the park such as ivy, removal of these species is important to prevent further spread. Fortunately, they occur mostly as individual plants rather than large thickets. Young plants that are small enough can be hand-pulled or weed-wrenched, but most removals of larger plants that cannot be removed with the roots intact will probably be done most effectively by IPM strategy that includes a combination of mechanical means and herbicide. A 25% solution of Garlon 3A is recommended in upland areas away from aquatic resources e.g. shoreline, wetlands. Within 100' of aquatic resources, a 50% solution of Rodeo in a water base (no surfactant) is recommended. Herbicide should be mixed with a water-soluble dye. Several cut and paint methods can be used. Any of these require careful material handling and patience and should only be done by licensed pesticide applicators.

1. Cut shrub to a stump at or near ground level and paint entire cut surface immediately with herbicide.
OR
2. Cut shrub to a stump at or near chest level and with a portable drill, make 1/8" diameter holes 1" deep into the stump from the outer sides all the way around the circumference of the stump every 2". Then inject herbicide with syringe directly into each hole. If standing dead brush is desired, this method can be used without cutting the plant to a stump.
OR
3. Girdle the standing plant by making a series of downward overlapping cuts all the way around the trunk (also called frilling), leaving the chips attached to the trunk at the base of the cut. Then paint herbicide onto fresh cuts. This technique should be used before fruit production so that standing dead plant does not have fruit on it.
OR
4. For larger plants >2" caliper, use a low volume high concentration basal application of Garlon 3A mixed with mineral oil or diesel fuel and apply it to the bark of the plant 2-3' up the trunk from the base around its entire circumference. Use a sponge applicator or squirt bottle to apply herbicide mixture. Squirt bottles must have oil-resistant o-rings or gaskets.

Treated cut stumps should be checked for resprouts every 2 to 6 months for the first year after cutting and re-treated if necessary. If no herbicide is used, repeated cutting will be required to weaken and eventually kill the plant over time. This is a more labor-intensive method and will require diligent follow-up visits over a period of at least several years to remove suckering growth resulting from initial cutting. However, IPM protocols may favor this method in certain situations.

Non-native hawthorn (*Crataegus sp.*) and mountain ash (*Sorbus aucuparia*)

Non-native hawthorn and mountain ash are large tree-like shrubs that spread by prolific fruit production that is excellent bird forage. It is distributed irregularly throughout the hillside. It occurs most frequently as seedlings that are small enough to remove by hand-pulling or weed-wrenching.

Because hawthorn is a suckering species, the most effective removal technique is to remove the entire plant with the roots intact. On larger plants, an IPM approach may include the use of an herbicide if IPM protocols warrant this action. Individual shrubs would be cut and herbicide would be applied directly to the cut surface to prevent re-sprouting. A 25% solution of Garlon 3A is recommended in upland areas away from aquatic resources e.g. shoreline, wetlands. Within 100' of aquatic resources, a 50% solution of Rodeo in a water base (no surfactant) is recommended. Herbicide should be mixed with a water-soluble dye. Several cut and paint methods can be used. Any of these require careful material handling and patience and should only be done by licensed pesticide applicators.

- 1) Cut shrub to a stump at or near ground level and paint entire cut surface immediately with herbicide.
OR
- 2) Cut shrub to a stump at or near chest level and with a portable drill, make 1/8" diameter holes 1" deep into the stump from the outer sides all the way around the circumference of the stump every 2" or one hole for every 1" dbh. Holes should be drilled at a slight downward angle. Then inject herbicide with syringe directly into each hole. If standing dead brush is desired, this method can be used without cutting the plant to a stump.
OR
- 3) Girdle the standing plant by making a series of downward overlapping cuts all the way around the trunk (also called frilling), leaving the chips attached to the trunk at the base of the cut. Then paint herbicide onto fresh cuts. This technique should be used before fruit production so that standing dead plant does not have fruit on it.

Treated cut stumps should be checked for re-sprouts every 2 to 6 months for the first year after cutting and re-treated if necessary. If no herbicide is used, repeated cutting will be required to weaken and eventually kill the plant over time. This is a more labor-intensive method and will require diligent follow-up visits over a period of at least several years to remove suckering growth resulting from initial cutting.

Himalayan blackberry and Evergreen blackberry (*Rubus procerus*, *R. laciniatus*)

Both of these non-native blackberries are found in the park though Himalayan blackberry is by far most prevalent. Eradication and control methods for these two species are the same. Blackberry is found in large thickets where there is low canopy closure – along hillside edges and interior areas where there is available sunlight caused by development or canopy gaps. Blackberry is shade-intolerant and opportunistic on disturbed sites, so long-term control is linked to successful establishment of healthy native plant communities that will create undesirable conditions for this species.

IPM control methods may include hand grubbing with root removal, repeated cutting, mowing, or grazing, cutting and dabbing stubs with herbicide (cut and dab), or combinations of two or more of these techniques with monitoring between treatments. Hand-grubbing is generally only a reasonable method for small areas, or for maintenance around trees or shrubs. If herbicide is used, a glyphosate herbicide is recommended – Roundup for upland areas and Rodeo for areas within 100’ of an aquatic resource. The method(s) chosen depend mainly on how extensive the infestation is and the available labor resources.

Removal, other than in areas with sparse occurrences and a relatively intact healthy existing plant community, should not be done unless subsequent replacement planting is planned. In many cases, re-planting of a site may not be done until control of re-sprouts over 2-3 years is complete. In other instances, planting in the fall immediately after summer removal work may be desirable. This will be site dependent, and must be determined at the time of project planning. On slopes less than 40 percent, it may be productive to leave the ground bare and unplanted for one growing season. This gives the project manager a chance to recruit native plant regeneration from the existing seed bank in the soil. If this is executed, it is important to leave the soil surface scarified (lightly raked) and fence the area to prevent foot traffic. During the subsequent three growing seasons, regeneration of invasive species must be carefully weeded from the desirable native regeneration. This takes a discerning eye and a sensitive touch. However, this is an ideal strategy for “adopt-an-area” sites.

On slopes greater than 15 percent, if native recruitment is not successful, high-density planting and intensive maintenance should be provided as a backup strategy so that 100% foliar coverage is achieved within three years. In addition, facines wattles or woody debris should be fastened perpendicular to the fall line to intercept surface water flow and prevent erosion on slopes between 15 and 40 percent. On slopes greater than 40 percent, immediate replanting and broadcast mulching are recommended to guarantee adequate foliar coverage under critical slope conditions.

For sparse occurrences, hand-grubbing is recommended. In general if herbicide is used, timing of its application should coincide with the time of year that the target plant is most actively growing and trans-locating resources to its roots to maximize herbicide effectiveness. For Himalayan blackberry, this is generally considered to be mid-summer during flowering. For removal of denser stands or thickets the following methods are recommended: Any herbicide application requires careful material handling and patience and should only be done by licensed pesticide applicators.

- 1) Mow, graze, or cut the plants to the ground repeatedly during the growing season (May-Oct) to reduce plant vigor. If combining with an herbicide treatment, do a late summer (July) cut and dab (herbicide) treatment on re-sprouts. Herbicide should be applied to fresh cuts immediately (within 30 min.) for most effective treatment. In fall, after final mowing, plant and apply double layer of cardboard sheet mulch covered with 4-6” of mulch.

OR

- 2) Mow, graze, or cut to the ground late in the growing season (after July 31st), and immediately cover entire area with heavy weed fabric firmly stapled to the ground. In fall, cut slits in the fabric to install plants. After 2-3 years, remove fabric, hand-pull any re-sprouts, and apply double layer of cardboard sheet mulch covered with 4-6” of wood chips.

OR

- 3) Mow, graze, or cut to the ground late in the growing season (after July 1st) and either dab cut ends at that time, or cut and dab resprouts late in the summer when they appear.

Scot's broom (*Cytisus scoparius*)

Scot's broom is found rarely in Seward Park, but occurs sporadically along the perimeter path. It produces large quantities of self-dispersed and long-lived seed. Removal of seed-producing age plants is the most labor intensive, but is important to reduce spread and seed accumulation. Removal and control of younger plants is easier because they can be hand-pulled or mowed, and is also important to keep the seed-producing population from expanding and becoming more widespread.

Removal can be done incrementally as resources are available. IPM strategies may include mowing, grazing, hand-cutting individual plants, or manual grubbing with shovels, weed wrenches or machinery. Methods involving grubbing may be the least desirable due to the soil disturbance and opportunity for improved broom seed germination and seedling emergence it causes.

Cutting should be done early in the summer when flowering has just started and may either be followed up by continued subsequent annual (or more often) cutting or by herbicide treatment (Roundup with water soluble dye) of cut stumps. Any herbicide application requires careful material handling and patience and should only be done by licensed pesticide applicators. Hand-pulling of smaller infestations of young plants (3' tall and smaller) should be done when soil is moist and loose (spring).

Scots broom that is not dense enough to be a monotypic thicket can be part of invasive control along edge habitat. In edge habitat where invasion is low and coverage is sparse it may be advisable to replant with native species to prevent re-colonization. This determination should be made on a site- specific basis.

Clematis (*Clematis vitalba*) and grape (*Vitis sp.*)

Clematis is a woody vine that climbs trees. It was found only sporadically at Seward Park in the mixed native/nonnative forest areas. Control of these species involves cutting the vine at the base near the ground in early summer before seed production occurs, and either grubbing out the root, or applying herbicide (Roundup with water soluble dye) directly onto the surface of the cut stump. Choice of method will determined by IPM protocols. Any herbicide application requires careful material handling and patience and should only be done by licensed pesticide applicators. Dead top growth can be removed in fall or winter when vines have become brittle. Cut vines should be flagged for follow up monitoring, as several treatments may be necessary.

Herbaceous Species

Japanese knotweed (*Polygonum cuspidatum*)

Knotweed, or false bamboo, is an herbaceous perennial that forms large monotypic clumps upwards of 6-8' in height. It reproduces by seed and by rhizomes, which are very large and impossible to remove effectively by grubbing. It prefers moist soil conditions, and is

typically found around wetlands, along stream banks, and in ditches. It was observed only rarely at Seward Park, but any new presence of it should be immediately eradicated. The most effective removal method is to exhaust its root reserves by repeated cutting during the growing season (at least 3 times between April and August), and then burying the entire area after the last cutting under well stapled heavy duty weed fabric or double layer industrial strength cardboard, overlain by a deep (8-12") layer of wood chips.

If warranted, selective application of Rodeo can be used on re-growth in late summer, and fabric/mulch installation can be delayed until late winter. Any herbicide application requires careful material handling and patience and should only be done by licensed pesticide applicators. Planting should not be done until after 2-3 years so that the fabric/mulch is not compromised while roots are still viable.

Reed Canary grass (*Phalaris arundinacea*)

Reed canary grass is a rhizomatous perennial grass that can reach three to six feet in height. The sturdy, hollow stems can be up to 1/2 inch in diameter, with some reddish coloration near the top. Leaf blades are flat and hairless, 1/4 to 3/4 of an inch wide. Reed canary grass forms dense, highly productive single species stands that pose a major threat to many wetland ecosystems. The species grows so vigorously that it is able to inhibit and eliminate competing species. In addition, areas that have existed as reed canary grass monocultures for extended periods may have seed banks that are devoid of native species. Unlike native wetland vegetation, dense stands of reed canary grass have little value for wildlife. Few species eat the grass, and the stems grow too densely to provide adequate cover for small mammals and waterfowl. The species is considered a serious weed and is listed as a Class C weed by the State of Washington.

IPM strategies will involve hand-pulling alternated and may include alternating this with application of glyphosate herbicide. Any herbicide application requires careful material handling and patience and should only be done by licensed pesticide applicators. Maximum control depends on the timing of application. Herbicides provide control for up to two years at the most. After this period, reed canary grass recolonizes a treated area from adjacent stands or from seed bank recruitment. Only glyphosate (Rodeo®) is licensed for use in aquatic systems in Washington.

Field bindweed (*Convolvulus arvensis*)

Bindweed is a pervasive and very invasive perennial vine that winds around and overtops woody vegetation, and forms strangling mats over the top of low shrubs and understory. It thrives in disturbed sites, especially in sunny locations with moderately dry soils. It can be a particular problem in areas that have been newly cleared of other invasives (e.g. Himalayan blackberry) and replanted. Control of this species will mostly be required in the course of carrying out 3-year maintenance care for newly planted sites. IPM strategies may involve combination of regular hand-pulling, spot treatment with Roundup, and/or mulching with wood chips during the 3-year establishment period to suppress this weed adequately. Less frequent follow-up weeding may also be needed after the three-year period.

Listed Noxious Weeds

Class A weeds are defined as follows: “*Class A weeds are non-native species which have a limited distribution in Washington. Because the infestations of these plants are small in number and limited in density, preventing new infestations and eradicating existing infestations is the highest priority.* Control and eventual eradication of Class A weeds is required by law in all of King County and Washington State.” (King County). Listed noxious weeds will be controlled as required by County Regulations and in accordance with Parks BMP’s.

Poison Oak

Poison Oak *Rhus diversiloba* is prevalent at Seward Park, between the loop trail and the forest areas and throughout the remnant and mixed native/nonnative forest areas. The goals and objectives of the VMP do not call for eradication, but rather of control of this obnoxious but native plant. Many people develop severe skin rashes when exposed to this plant, and in fact some may develop allergies simply by being near it at particular times of the year. In some areas at Seward Park, such as near the playground and where encroachment into picnic areas occurs, the following guidelines apply. Otherwise, simple cutting back of vines from trails is all that is recommended.

The following is excerpted from University of Californian Statewide IPM guidelines. Note that not all chemicals listed are approved for use in Seattle Parks.

The primary ways of managing poison oak are mechanical removal by hand-pulling (not recommended for individuals who are sensitive to poison oak) and treatment with herbicides. Maintaining a healthy cover of desirable vegetation will reduce the potential for invasion by poison oak. This is easiest where irrigation is available and the soil is regularly cultivated.

Poison oak is a native species with its natural control agents already present. Consequently, biocontrol is not an option for the control of poison oak. Burning is not recommended for the control of poison oak. It not only creates a serious health hazard, but does not effectively reduce infestations. Grazing by sheep and goats can be effective in small areas. Deer or horses will also graze poison oak when the foliage is young, before the plant flowers.

Mechanical

Hand-pulling or mechanical grubbing (using a shovel, pick, etc.) can be used to physically remove plants located in a yard or near houses. Remove plants in early spring or late fall when the soil is moist and the rootstalks are easily dislodged. Grubbing when the soil is dry and hard will usually break off the stems, leaving the rootstalks to vigorously resprout. Detached and dried brush can still cause dermatitis, so bury or stack the plant material in an out-of-the-way location, or take it to a disposal site. Never burn poison oak.

Ideally, persons engaged in hand-pulling poison oak should have a high degree of immunity to the allergen. Whether the individual is sensitive or believed to be immune, he or she should wear appropriate protective clothing, including washable cotton gloves

over plastic gloves, when handling the plants. Wash all clothing thoroughly, including shoes, after exposure.

Other forms of mechanical control have not proven to be successful. Brush rakes and bulldozers often leave pieces of rootstalks that can readily resprout. In some cases, brush removal late in summer, when plants are experiencing moisture stress, can slow their ability to recover. Mowing has little effect in poison oak control, unless it is performed repeatedly (at least four times during the growing season). Within 2 months of germination, young plants have usually produced underground rootstalks large enough to recover from mowing damage. A single plowing is of no value and often serves to propagate the shrub. However, good seedbed preparation and planting cultivated crops for a year or more will control poison oak infestations.

Chemical Control

Herbicides used to control poison oak in California include glyphosate (Roundup, etc.) and the auxinic herbicides triclopyr (Garlon, Ortho Brush-B-Gon, etc.), 2,4-D (Spurge & Oxalis Killer, etc.), and dicamba (Banvel, Spurge & Oxalis Killer, etc.). These herbicides can be applied as stump or basal applications, or as a foliar spray.

Glyphosate is one of the most effective herbicides for the control of poison oak. However, effective control depends upon proper timing of the application. Apply glyphosate late in the growth cycle, after fruit have formed but before leaves lose their green color. In hand-held equipment, glyphosate can be applied as a 2% solution in water. (Products or spray mixtures containing less than 2% glyphosate may not effectively control poison oak.) It is important to note that glyphosate is a nonselective compound and will damage or kill other vegetation it contacts.

Auxinic herbicides, such as triclopyr, 2,4-D, dicamba, and combinations of these herbicides, are also used to control poison oak. The application timing with auxinic herbicides is somewhat different than for glyphosate: applications can be made earlier than with glyphosate, when plants are growing rapidly from spring to midsummer.

Triclopyr is the most effective auxinic herbicide for control of poison oak. It has a wider treatment window than glyphosate and it often gives more consistent control. Two formulations of triclopyr are available. Triclopyr amine is the least effective of the formulations and requires relatively high rates. Triclopyr ester or triclopyr ester plus 2,4-D ester gives better herbicide absorption into the foliage and is more effective.

When 2,4-D is combined with dicamba, it provides much better control than if it is used alone in a 1% solution. Premixed combinations of these herbicides are available. Dicamba applied at 0.5% gives better long-term control of poison oak than 2,4-D.

A new herbicide in California, imazapyr, is also very effective for the control of poison oak, but is only available for application by licensed pesticide applicators. In forestry, there are two formulations. The water soluble formulation (Arsenal) is effective as a foliar treatment at 1% plus a 0.25% surfactant. A similar treatment with an emulsifiable concentrate formulation (Chopper, Stalker) will control poison oak at a 2% solution in water or a 1% solution plus 5% of a methylated or ethylated seed oil. The best timing is in either spring after full leaf expansion or in late summer (mid-August through September).

Stump Application. Stump treatments are most effective during periods of active growth. Cut stems of poison oak 1 to 2 inches above the soil surface and immediately after cutting, treat the stump. A delay in treatment will result in poor control. Apply an herbicide such as glyphosate, triclopyr, or combinations of triclopyr with 2,4-D (or 2,4-D and 2,4-DP) with a 1- to 2-inch-wide paint brush or with a plastic squeeze bottle that has a spout cap. Treatment solutions should contain either undiluted glyphosate (use a product that contains at least 20% glyphosate), triclopyr amine, or a 20 to 30% triclopyr ester solution mixed with 70 to 80% oil (methylated or ethylated seed oils).

Be sure to completely cover all surfaces of the stumps with the herbicide until it runs down the base of the stubs. Spray any regrowth from cut stumps with a foliar spray when the leaves fully expand.

Basal Application. Basal bark applications can be made almost any time of the year, even after leaves have discolored or dropped. Apply triclopyr to basal regions of poison oak by backpack sprayers using a solid cone, flat fan, or a straight-stream spray nozzle. Thoroughly cover a 6- to 12-inch basal section of the stem, but not to the point of runoff.

Foliar Sprays. The effectiveness of herbicides applied to poison oak foliage depends on three factors: (1) proper growth stage at time of application; (2) spray-to-wet coverage; and (3) proper concentration. To achieve spray-to-wet coverage, all leaves and stems should be glistening following herbicide application. However, coverage should not be to the point of runoff.

Foliar application of herbicides to poison oak is most effective after leaves are fully developed and when the plant is actively growing. This period is normally from April into June or July, when soil moisture is still adequate. The flowering stage is the optimum time to spray. Do not apply herbicides before plants begin growth in spring or after the leaves have begun to turn yellow or red in late summer or fall.

One application of an herbicide usually does not completely control poison oak. Re-treat when new, sprouting leaves are fully expanded, generally when the plants are about 2 feet tall. Watch treated areas closely for at least a year and re-treat as necessary

Garry Oak and Madrona

The Garry Oak / Madrona reclamation project (Zone # 39) should include shrub and ground cover plants typical for natural native oak range. A basic species list is included in Chapter 8 - Implementation under priority initiatives. Garry Oak plant associations and dominant species are found in the VMP Appendix 'Seward Park Plants. Grass and invasive removal should be done according to specific guidelines in this chapter.

Detailed information on the management of Pacific Madrona - *Arbutus menziesii* is included in Appendix 'Special Topics' and pertains to all madronas in the park, some very healthy, others declining severely. Death of madronas along the south bluff likely relates to excess water from broken irrigation (now repaired); regeneration planting in this area should be attempted and establishment irrigation avoided.

Reducing potential Mountain Beaver caused loss in reforestation projects

Long-term effects of mountain beaver activity on forest regeneration at Seward Park has not been documented. Control of Mountain beaver may become one of the challenges of forest regeneration and reclamation efforts however. It's recommended that barrier methods be used in restoration projects. This entails installation of solid plastic, high density barriers around individual plants. These barriers should be left in place for the 3-year establishment period, and then removed to allow root expansion.

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