Introduction

The Northeast Queen Anne Greenbelt is an area of approximately 35 acres. Within that area, roughly 9.3 acres is owned by the Seattle Department of Parks and Recreation. These Park properties provide important environmental and aesthetic benefits for the community and the city. This Forest Restoration Plan is intended to provide direction for stewardship of the living landscape so that future generations may enjoy its benefits.

This forest restoration plan presents the current conditions of the Queen Anne Greenbelt and recommendations for the restoration of the site to an assemblage of plants which will serve the public interest. Project goals and recommendations were developed through the Urban Forest Restoration Program, the Urban Wildlife and Management Plan and with contributions from the Queen Anne community. It is the intention of this plan to involve the community in the planning and stewardship for the conservation of this important public resource.

History of the Greenbelt System

Greenbelts were first identified and considered by the Seattle City Planning Committee in 1954 in a Park and Open Space Plan for Seattle. Sections of the current Northeast Queen Anne Greenbelt were one of the seven steep hillside sites proposed at that time to be included in the greenbelt system. Urban greenbelts are a part of the Parks, Recreation and Open Space Plan and the Comprehensive Plan of Seattle adopted in 1957. Greenbelts are defined as areas under public ownership or control or private ownership with some form of public interest or control left primarily in its natural state for a variety of purposes. The qualifying factors for the Northeast Queen Anne were: 1) it provides a buffer between a business strip, heavy traffic and a residential area, 2) it enhances the visual value of and for the Queen Anne community and foremost 3) it will prevent the development of an area unsuitable for building due to the steep topography and areas with a history of slides and sites with slide potential (Uhlman et al., 1977).

Following the identification of the proposed greenbelts, steps were taken to acquire tax delinquent land within the greenbelts. This produced a checkerboard pattern of property ownership along the proposed greenbelts. The Urban Greenbelt Plan and acquisition program was adopted in 1977 to use "Forward Thrust" money (a bond for parks and open space projects from 1968) to consolidate public ownership within the greenbelts. Fifteen priority sites for acquisition were determined and the Northeast Queen Anne Greenbelt was on the list (Stoops, 1981).

During 1978 and 1981, the Department of Parks and Recreation was given acquisition authority and found that the existing Forward Thrust monies were not adequate to

provide the complete purchase of the proposed greenbelt sites. An additional $100,000 of Forward Thrust funds were added to the greenbelt category and was earmarked for the acquisition of part of the NE Queen Anne Greenbelt (Stoops, 1981).

In 1989, voters approved a $117 million King County Open Space and Trails Bond Issue (Hollister, 1993). A majority of the current Northeast Queen Anne Greenbelt was purchased with these funds beginning in 1991.

In March of 1993, the King County Council allocated $15 million dollars to unincorporated King county and suburban cities as well as the city of Seattle. This was part of a $60 million dollar bond issue approved by the King County Council specifically for Open Space acquisition. Part of this allocation went to purchase an overlook site near 5th and Blaine Street allowing access to the Northeast Queen Anne Greenbelt and continuous public ownership in that area (Zabel, 1993).

The proposed greenbelt extends from Dexter Avenue/Fulton Street on the north to Lee Street on the south, a total of almost 35 acres. The current protected acreage is divided into small parcels extending from Wheeler Street to the north and Lee Street to the south, approximately 9.31 acres which is separated into Seattle Parks and Recreation property, undeveloped rights of way, City of Seattle (bond program) property and private yet preserved greenbelt property. (Figure 1).

Figure 1 - Northeast Queen Anne Greenbelt property ownership map

Land Use History

Queen Anne Hill has a rich and fascinating history. When settlers came to the area there were no permanent native villages on the hill (Reinartz, 1993). However, it was utilized as a hunting ground by Native Americans. Seasonal villages dotted the perimeter along Lake Union in the vicinity of Westlake and around Smith Cove. Between 1853 and 1859, land claims were noted within the northern Territory of Washington by the first Euro-American occupants of Queen Anne Hill. Thomas Mercer considered Queen Anne and the Lake Union area "Eden". His claim lay north of today's Mercer Street, south of today's Highland Drive, along the shoreline of Lake Union, and up the east side of the hill to Queen Anne Avenue. In the 1880's, the west side of Lake Union was logged and subdivided for development including the Ross and Fremont districts. This subdivision along with the Lake Union road stimulated the rapid development of the northeast side of Queen Anne Hill (Reinartz, 1993) (Figure 2). However, the steep slopes of the upper portion of the hill, where the present day greenbelt is located, was not built upon with permanent residences or platted for development. Kroll maps for the city of Seattle indicate that this site was left unplatted through the 1950's, where it was noted as a "Government Lot".

Figure 2 - The east side of "Eden" hill overlooking the Lake Union wilderness. 1870's
(Courtesy of Queen Anne Historical Society)

This section of Queen Anne Hill was one of the first proposed sites for greenbelt acquisition in 1954. Parcels were first purchased in 1991 and still continue to 1997 with the purchase of around 1 acre off of Taylor Avenue. Other than the timber removal, and one or two small homesteads, the site has been left undisturbed and undeveloped. The entire length of the greenbelt is prone to landslides and a large portion of the east side of the hill has had a history of landslides (Figure 3). In December of 1983, a large mass of saturated earth flowed down the east side of the hill just south of the greenbelt. This landslide blocked off Aurora Avenue and continued down to Dexter Avenue. Natural spring seepage was a contributing factor, as well as buried drain lines and fill which had been placed on top of the spring water (Reinartz, 1993). These natural disturbances are likely to continue and have been taken into consideration while developing the Reforestation and Management Plan for the Queen Anne Greenbelt.

In addition to protection from hazardous development, the Queen Anne Greenbelt provides a spectacular forest backdrop to Lake Union and the Aurora/Westlake corridor, as well as a buffer for the residents of east Queen Anne. It also provides community residents with a unique opportunity for hiking and other forms of recreation. This site serves wildlife, mostly song birds and raptors, as habitat in a very heavily populated section of Seattle. However, with this close proximity to the urban landscape, the greenbelt has been heavily invaded by exotic, ornamental and weedy vegetation. It has also been a dumping ground for trash and a transient camping area.

Figure 3 - Northeast Queen Anne Greenbelt. Landslide potential and history.
Shaded portions denote slopes over 40% which indicate landslide potential.

Circles denote past landslides.

Goals and Objectives of the Forest Restoration Plan

The Urban Reforestation program was created to perpetuate the forested landscapes within Seattle parks. This plan is not an attempt to develop a master plan or redesign the landscape. Instead, our purpose is to provide direction for the stewardship of the existing park landscape to insure its future well-being. The plan is limited to the management of vegetation, and has not attempted to address other property management issues.

Urban Forest Restoration goals include:

Conserve soil and water quality

Vegetative cover will be retained and planted to buffer runoff and reduce erosion.

Assist natural processes

Management activities will emulate the natural succession and regeneration that would be expected on an undisturbed site of similar habitat.

Protect and enhance wildlife habitat

Existing habitats will be managed for a healthy and diverse species composition as set forth in the DPR's *Urban Wildlife and Habitat Management Plan* (Miller 1994).

Promote native character

Outside the developed park landscape, management activities will encourage native species and control non-natives.

Buffer land uses

Trees and shrubs will be adapted to screen and separate the park from its neighbors.

Provide recreation and education

Park users will be encouraged to engage with the park landscape in a constructive and sensitive way.

Insure public safety

The status of declining trees will be evaluated for removal, retention or adaptation to a wildlife tree.

This management plan also includes established goals within the Urban Wildlife and Habitat Management Plan (Miller, 1994).
These include:

- continue and increase wildlife habitat protection and enhancement efforts

- protect and enhance wildlife populations
- promote volunteer involvement in wildlife and habitat protection and enhancement

Current Greenbelt Conditions

Geology and Soils

Geologists estimate that bedrock lies around 1,500 to 2,400 feet beneath Queen Anne Hill, and was buried by glacial and non-glacial sediments in the past two to three million years (Reinartz, 1993). The geologic materials exposed around the margins of the hill were deposited during the Vashon stade of the Fraser glaciation, the last incursion of continental glaciers into the Seattle area. The glacial remains around Queen Anne Hill are Lawton Clay, Esperance Sand, Vashon till and Vashon recessional deposits. All of these soils were deposited between 17,500 and 13,500 years ago. Older non-glacial deposits lie on the bottom of the hill and Lawton Clay is present below 200 feet on the east, north and west peripheries of the hill. The clay consist of a gray silt and clay layers with fine sand. Overlying the Lawton Clay is the highly erosive Esperance Sand which is found along the steep slopes and much of the top of the hill and is about 150 to 200 feet thick. This deposition of sand and gravel was laid down be streams issuing from the front of the advancing ice sheet and is called advance outwash. Vashon till is the youngest geologic unit and is found at the southern toe of the hill and on the top of the hill to the north. It was laid down as streams flowed over the area as glacial ice melted. The till consist mainly of a medium, dense, silty sand with a little gravel. After the recession of the glacial ice from Puget Sound around 13,500 years ago, geologic processes began to shape this area; erosion and gully formation, lowland filling, hillside weathering and landsliding (Reinartz, 1993;). These processes continue to this day.

Landslides were and continue to be a significant geologic process of Queen Anne Hill, especially on the east and west sides. The soil on these slopes is loosened by gravity, root action, freeze and thaw cycles and chemical changes. This loosened soil is called colluvium and can be up to 15 feet thick on the eastern slope of the hill off of Aurora Avenue. The bowing of the trees which can be easily observed on the east side of the hill are a result the downslope movement of the colluvial soil. This colluvium is commonly involved in landslides (Reinartz, 1993).

Figure 4. Map of Queen Anne District and Stratigraphic Cross-section of Queen Anne Hill
source: William J. Stark and Donal R. Mullineaux. The Glacial Geology of the City of Seattle.

Springs and Seeps of Queen Anne Hill

Springs are located around all sides of the hill and most flow throughout the year. The spring line on the east side of the hill lies generally between the elevations of 150 and 200 feet. Most are found at the contact between the Lawton Clay and Esperance Sand layers. The precipitation infiltrates the pervious Esperance Sand and flows down until it hits the more impervious Lawton Clay. The water then moves laterally and emerges from the side of the hill in seeps and springs (Reinartz, 1993). Many of these springs were used for drinking water by the early settlers of the Queen Anne area.

Back in the 1880's and 1890's, spring fed water supply systems were installed on Queen Anne hill yielding 80,000 gallons of water per day for residents around the hill. Today, most of the springs have been captured and fed into drainage trenches and tunnels and routed to the storm drainage system (Reinartz, 1993). Currently, there are two main seeps located within Unit 5 of Tract number 2 along Aurora Avenue and numerous seeps and springs within Unit 1 and 4 of Tract 2 feeding the wetland site and wet meadow of Unit 3 (former motel property).

The zone where the Lawton Clay and Esperance Sand meet is usually a factor in larger landslides. These slides appear to be related to an increase in the water table over the rainy season that is followed by an intense or prolonged period of precipitation. The sites of old slides and slumps are apparent by the topography forming large amphitheater type formations and are very common along the eastern side of the hill and within the greenbelt.

Vegetation Communities

Most of western Washington is considered to be a part of the *Tsuga heterophylla* zone by Franklin and Dyrness, (1988). Within this zone, the native vegetation for a late successional community would consist of *Tsuga heterophylla/Polystichum munitum* communities with overstories of and *Gaultheria shallon, Vaccinium parvifolium* and *Holodiscus discolor* in the dryer sites (Franklin and Dyrness, 1988).

The Northeast Queen Anne Greenbelt vegetation communities are defined as an immature deciduous forest habitat which is dominated by deciduous trees greater than 30 feet tall and fifteen to twenty inches diameter at breast height (DBH) (Miller, 1994). The overstory for the entire greenbelt is dominated by *Acer macrophyllum* (Bigleaf maple) and to a lesser extent, *Alnus rubra* (Red alder) . The seeps mentioned above provide six units within Tract 2 with vegetation common to wet sites where Red alder tends to dominate as the overstory within a few of these units. The understory for these wet sites are dominated by *Equisetum sp.,*(Horsetail) *Sambucus racemosa* (Red elderberry), *Polystichum munitum* (Sword fern), *Ranunculus repens* (Creeping buttercup),

Hedera helix (English ivy) and *Lysichiton americanum* (Skunk cabbage). In the dryer sites, Tract 1, Tract 2 (Unit 7, 8, 9, 10) and Tract 3, 4 and 5, *Prunus lauurocerasus* (Laurel cherry), *Ilex sp.* (Holly), *Rubus discolor* (Himalayan blackberry), *Convoluvuus arvensis* (Bindweed) and English ivy are common. Two units in Tract 2 do not have an overstory due to recent disturbance, the demolition of a hotel in Unit 3 and a house in Unit 10. Unit 10 is dominated by *Cytisus scoparius* (Scot's broom), Himalayan blackberry and exotic grasses while Unit 3 which is a very wet flat site along Aurora Avenue is dominated by Creeping buttercup, Horsetail, *Phalaris arundinacea* (Reed canarygrass) and other exotic grasses (Appendix C).

Invasive exotic vegetation is the biggest problem facing the vegetation community. The most common exotic species found within the greenbelt are English ivy, Bindweed, Himalayan blackberry and to a lesser extent Scot's broom. These exotic species tend to displace native vegetation and dominate the site, competing for space and nutrients prohibiting the natural succession of vegetation from occurring. As a result, the diversity of vegetation is lower and the site generally supports fewer wildlife species because most native wildlife have not adapted to utilizing exotic plants.

English ivy is an evergreen groundcover adapted to either sunny or shady sites. It is capable of weakening or killing trees by covering the tree. The vines compete with the tree for light, moisture and nutrients. The clinging vines also promote decay by trapping moisture next to the bark of the tree. Ivy is difficult to control due to it's long season of active growth, a rapid growth rate and the ability to root along the stem with adventitious roots (Derr, 1993).

Bindweed is a perennial native to Europe and western Asia introduced during the 1700's as a contaminant in farm and garden seeds. It is classified as one of the most noxious weeds found in the west and midwest regions and is considered to be one of the world's ten worst weeds (DeGennaro and Weller, 1984). It's vines can grow up to 1.8 m long and run along the ground or climb any available object. It's extensive root system (vertical depths of around 7 meters) competes very effectively for limited moisture in open areas. This plant can spread radially more than 3 m in a growing season and the rhizomes can cover 25 square meters in a season (Mitch, 1991).

Himalayan blackberry is a weedy species introduced from Eurasia. It is a weak-stemmed shrub that spreads up to 5 meters per year by tip-layering. It frequently spreads over other plants smothering them. The leaves and stalks are equipped with reflexed spines. The pale pink flowers blossom throughout the season and the prolific fruits are widely dispersed by many animals (Pojar and MacKinnon, 1994).

Scot's broom is a legume introduced from Europe. It is an extremely aggressive weed which is able to colonize nutrient-poor sites due to it's ability to fix nitrogen via bacteria

in the root nodules. Scot's broom also has ability to resprout from the root crown and produce long-lived seeds (Pojar and MacKinnon, 1994).

Recommendations for the eradication of the above mentioned species are discussed below in the Management Recommendation section. The eradication and control of these invasive plant species along with the establishment of a diverse native plant community will promote the biological integrity of the greenbelt and support a more diverse wildlife assemblage.

Tree Hazards

Trees fail for a variety of reasons. Predominately, tree failure is due to root and trunk decay fungi and other soil organisms and from structural problems such as trunk separation, a lack of dominate stems, branch pull out and breakage and tree crotch failure. While some potential for failure is present in any forest setting, many tree hazards in urban situations are initiated by mistreatment through topping the tree, poor pruning practices, soil compaction and injury from nearby construction. In some areas of the Northeast Queen Anne Greenbelt, trees have been topped previously to preserve the views for the residents up hill. Along the steeper slopes of the greenbelt, some trees have suffered from previous landslides and slumps and are either partially pulled out of the soil losing buttress roots or have grown with curved trunks and/or diagonally instead of vertically due to soil creep.

The greenbelt was surveyed for hazardous trees during the summer of 1997. A tree was determined to be hazardous based on its potential for failure and the probability of it hitting a target. Trees were marked for removal along Aurora Avenue, all occurring within Tracts 1 and 2.

Wildlife Habitat

Generally, the more complex a plant community, one with many vegetation layers and species, the more valuable the wildlife habitat. Bird species diversity tends to increase with increasing structural diversity: more canopy layers, greater foliage and a higher percentage of vegetative cover. Urban mammals have been found to prefer an increase in the vegetation density in the 8 to 20 inch height range (Miller, 1994).

Few wildlife species were observed during the course of the inventory period for the Queen Anne Greenbelt. Song birds such as the American Robin, the Common Sparrow, and the European Starling were observed or heard but there were no traces of urban mammals.

The lack of wildlife usage for the greenbelt was taken into consideration when recommending plants for the reforestation of the greenbelt. Plant species which will

supply food and cover for birds and small mammals will be recommended as well as varying species which will provide a diverse canopy. Standing and downed snags will be recommended in order to provide habitat for invertebrates, woodpeckers, owls etc. An increase in small mammals and other song birds may help augment the number of raptor's utilizing the site.

Soil conservation and slope stability

This site is a steep hillside subject to slope instability, surficial creep and erosion. This plan recognizes that control of geotechnical conditions cannot be achieved through vegetation management. The intent of the plan will be to manage the vegetation in a way that does not contribute to slope instability or exacerbate an existing condition.

The hillsides of Queen Anne are geologically active and subject to two naturally occurring processes: soil erosion and landslides. Soil erosion is the movement of individual soil particles across the surface of the soil. Landslides are mass movements of soil. Vegetative cover is known to be very important in preventing soil erosion. However, vegetation is generally a minor factor in the stability of a slope (Dept. of Ecology, 1993).

The characteristics that influence the stability of slopes include: geology, slope drainage, slope shape and steepness, the removal of soil or placement of fill on slopes, and undercutting in coastal areas. Furthermore, the addition of significant water to the slope as after an intense rainfall, and the increase in surface water and groundwater seepage associated with the rainfall may reduce the stability of the slope (Dept. of Ecology, 1995).

Diffuse water flow, also known as sheet flow can lead to excessive erosion of top soil. Sheet flow tends to concentrate into channels if the flow is substantial enough (Dept. of Ecology, 1995). Sheet flow occurs in Unit 4 within Tract 2; however, the volume and velocity appears to be low, partially due to the surrounding vegetation. The site is not suffering from soil erosion at this time.

The complex root network formed by trees and understory vegetation can help to stabilize and anchor the soil and reduces erosion (Dept. of Ecology, 1995). Plant species with deep fibrous roots which are known to stabilize slopes will be recommended for the steeper slopes within the greenbelt. The vegetation recommended for the sites with seeps will be those which thrive in wet conditions.

Development above the greenbelt may be increasing the concentration of the runoff as well as the intensity. If a site is undeveloped, much of the rainfall never reaches the ground. A large percentage is taken up by the vegetation and evaporates or is transpired back into the atmosphere. Multiple layers of vegetation decreases the

volume surface water, reducing the rate of soil erosion on the hillside below (Dept. of Ecology, 1993).

View issues

Queen Anne Hill is known for the spectacular views that the hill provides in every direction, especially to the east and west. Accordingly, views are valued by many neighborhood residents. In many areas, tree heights do not conflict with private views. For example, in Tract 2, there is at least 100 feet of elevation difference between Aurora Avenue and the property line to the west. This elevation difference is sufficient to accommodate many of our larger native trees. In other areas, especially higher on the slope, trees have been repeatedly topped for view clearance. Furthermore, part of Tract 1 has legal restrictions on the height of the vegetation that may grow there.

Topping of trees is not a viable solution for regulating tree height. It is widely recognized as being harmful to trees. Furthermore, rapid regrowth of new branches makes this a temporary solution at best. A more constructive approach would be the phased replacement of selected trees with lower growing species.

This approach must be balanced with several other considerations. There are fewer native species of trees, especially conifers, to select for the lower growing canopy. Lowering the canopy reduces the number of overstory layers, decreases the habitat value, increases the potential for invasive exotics, and decreases the interception of precipitation. Some of these results can be offset with more active management of the site. Conversion to a lower canopy must be carefully considered on a case-by-case basis.

Natural Resources Inventory

The Northeast Queen Anne Greenbelt was divided into five tracts and various management units determined by spatial distribution, topography, degree of exotic vegetation invasion and site ecology (Map #1). A complete list of the plant species found within the greenbelt is in Table 1. The field data sheets illustrating the site characteristics (slope, aspect, diameter at breast height (DBH), canopy type, habitat type, dominant species, unit problems and recommendations) are attached as Appendix C.

Tract and management units are depicted on map #1, vegetation type and site ecology (wet sites, seep locations) on map #2, anthropogenic impacts (trails , refuse and transient structure sites) on map #3 and project priorities on map #4.

Wet Sites

A total of six units are considered to be wet sites due to various seeps and springs along the length of the greenbelt. These are within Tract 2, Unit 1,2,3,4,5 and 6. Within these wet sites, Unit 3 is set apart by the recent disturbance and therefore the lack of a canopy.

Unit 3 has a very slight slope and is the recipient of a great deal of the ground water from the seeps within Unit 1. It is therefore, very muddy and has remained wet throughout the summer. Exotic grasses tend to dominate in this unit as well as Himalayan blackberry along the far northern edge where the unit is dryer and Creeping buttercup and Horsetail to the western edge where it is the wettest. This unit is the location of a previous building which was demolished in 1993 and covered with fill dirt and hydroseeded upon completion of the project. The most significant problem with this unit is the continuing spread of the exotic grasses and other species, specifically Himalayan blackberry which could potentially cover this entire unit if not removed.

Unit 2 of Tract 2 is also flatter than the remaining portion of the greenbelt and is the site of a wetland. This wetland is the recipient of two creeks from Unit 1 and sheet flow from Unit 4. The water gathers in this depression of around 5 by 4 feet which then appears to make its way into the ground water. This site is heavily disturbed by hikers and/or transients and is in need of revegetation. This unit has a large open patch occupied by Bindweed and to a lesser extent, Himalayan blackberry. The remaining portion of the unit is dominated by native species such as *Athyrium felix-femina* (Lady fern) and Skunk cabbage. The predominate issues for this unit is the revegetation of the wetland, the removal of the Bindweed and Himalayan blackberry and the removal of a pile of refuse which includes some furniture.

The remaining "wet" units are covered with a canopy of Red alder and Bigleaf maple and are on steep slopes of around 50%. Units 1, 4, 5 and 6 fall within this group. Units 1, 4 and 5 have two to three seeps each which flows over the ground as sheetflow as in 1 and 4 or surface water in small creeks as in Units 1 and 5. Unit 6 has a larger, deep ravine which provides outflow from a seep in this area. It then flows out onto Aurora Avenue. This ravine is also being used by transients. The greatest concerns for these units are 1) the English ivy, especially in Unit 1, 4 and 5) encampments and trash piles left in Units 1, 5, and 6.

Dry Sites

Tracts 1, 2 (Units 7, 8, 9, and 10), 3 (Units 1 and 2), 4 and 5 are upland areas that do not have seeps or wet spots. Within these dry sites, Unit 10 is set apart by the recent disturbance and the lack of a canopy. This unit is the latest addition to the greenbelt and allows access to the greenbelt from Taylor Avenue on the top of Queen Anne Hill. This is the site of the recent demolition of a house in 1993 and is sparsely covered by a

few small trees. The main concern for this unit is the exotic grasses and other exotic species, particularly Himalayan blackberry and Scot's broom.

Tract 1 is the southernmost site and is a small parcel which is separated from the main greenbelt. This area has a steep slope and is heavily invaded by Himalayan blackberry and Bindweed . This tract also is set apart by the presence of a few fruit trees, (cherry, pear and apple) which were planted years ago by a nearby property owner.

The remaining units in Tract 2 lie in the center portion of the main greenbelt and are much less steep than the rest of the dry sites. The understory is dominated by English ivy with very few native species present.

Tracts 3, 4 and 5 are also disconnected from the main greenbelt and are located north of the main tract. The slope for these sections are very steep, 60 to 65%. A large landslide occurred at the beginning of the year, just south of Tract 4 within the "undeveloped right of way" property. These sites are dominated by English ivy and a section of Tract 3, by Himalayan blackberry and Bindweed. A significant issue for these Tracts is the steepness of the slope. Any vegetation work in these areas must limit the amount of soil disturbance and vegetation removal to protect the soil from erosion.

Management Recommendations

Hazardous tree removal

Tract 1, Tract 2 - Unit 5

- Trees marked along Aurora Avenue as hazardous should be removed by professional arborist as soon as possible.

Exotic Plant Removal

Priority tracts and units are:
Tract 1
Tract 2 - Units 1, 2, 3, 5, 6, 7, 9, 10
Tract 3, 4, 5

- The four worst exotic plant invaders in the greenbelt are English ivy, Bindweed, Himalayan blackberry and Scot's broom. Each of these are located throughout the greenbelt. For the intensity of invasion for each species within the units, refer to the "Summary of Management Units" data sheets listed in Appendix C. Eradication recommendations for each species are listed in Appendix B.

Materials needed: string trimmer, gloves, wheel barrows, mower, Roundup herbicide, drill, pruners, dedication

Creating canopy gaps

Tract 2, Units 6, 7, 8, 9

- Canopy gaps can be created in the dense canopy of Bigleaf maple and Alder by seeking out trees that are already in decline and girdling the tree which will eventually kill the tree. This should be done by DPR staff or a professional arborist. These girdled trees are left in place to become wildlife snags. Canopy gaps should be created only in areas intended for new plantings.

Planting trees

Tract 2, Units 3, 5, 6, 7, 8, 9, 10
Tract 3
Tract 4, Units 1, 2
Tract 5

- Native conifer and other selected species should be planted in current and created canopy gaps. Mulch and/or burlap should be placed around the newly planted trees in order to inhibit the regrowth of English ivy and other exotics that may compete with the tree for space, light and nutrients. The species to be planted should be chosen from Appendix E for each particular unit. These species are either the natural late successional species for the Puget Sound area or have been selected as lower growing canopy for areas with height considerations.

  This activity should be done during the fall or in late winter / early spring (February - April).

  Materials needed: recommended trees, shovels, wheelbarrows, mulch

Revegetate understory

All Tracts

- Use shrubs, ground cover and wetland plants recommended for each unit in Appendix E. Erosion control matting, jute netting and/or coir fabric is recommended for all slopes over 40%. Mulch should be placed around the plants in order to inhibit the influx of exotics which may compete with the new native vegetation for space, light and nutrients.

This activity should be done during the late winter / early spring (February - April).

Materials needed: mulch, burlap, gloves, shovels, wheelbarrows, jute netting and/or coir fabric, plants

Remove trash

Tract 1
Tract 2 - Units 1, 2, 6, 7, 9
Tract 3
Tract 5

- Refuse sites will need to be removed from the greenbelt. Boots and gloves should be worn and a medical waste container should be on hand. Any drums or containers with unidentified contents should be left alone and a DPR staff person should be notified immediately. However, most of the trash is food container waste and should not cause any sanitary problems.

Project Priority List

The projects and locations listed below are considered to be those projects with the highest priority for the Northeast Queen Anne Greenbelt.

Tract 1
Remove invasives and hazardous trees
Plant trees listed in Appendix E (or below in Site Specific Recommendations)

Tract 2 / Unit 5
Remove hazardous trees
Replant trees in newly created canopy gaps
Remove exotic plants

Tract 2 / Units 3
Remove exotic plants
Plant trees listed in Appendix E (or below in Site Specific Recommendations)

Tract 2 / Units 6,7
Plant trees in canopy gaps

Tract 2 / Units 4,7,9,10
Remove exotic vegetation

Tract 2
Revegetate understory with native species

Tract 2 / Unit 10
Develop Landscape Plan

Tract 3, 4, 5
Remove exotic vegetation
Revegetate understory with native species

Site Specific Recommendations

Tract 1
A Queen Anne resident who lives above this site has expressed interest in helping with the maintenance of the exotics. A large work party should clear out the entire understory and replant with species recommended for this site in Appendix E or below. Erosion control, jute netting, coir fabric etc., may be needed on the steeper part of the slope for erosion control. Adopt-a-Park volunteers can then assist with he maintenance and monitoring of the site. The removal of shrubs should help eliminate hiding places for transient encampments and therefore help with the trash and security issues expressed by residents.

Recommended plants
Acer circinatum
Amelanchier alnifolia
Corylus cornuta var. californica
Cornus nuttalii
Cupressus bakeri
Holodiscus discolor
Oemaronia cerasiformis
Rhamnus purshiana
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Taxus brevifolia
Thujopsis dolobrata
Torreya californica
Vaccinium ovatum
Vaccinium parvifolium

Tract 2 / Unit 1
Removal of trash from wetland. Numerous small work parties with experience working on steep slopes needed to remove the understory of exotic vegetation. Replant with recommended shrubs, groundcover and wetland plants from Appendix E or below. May need to provide erosion control matting on the steeper sections of the hill until vegetation becomes established. Enhancement of the wetland site with native wetland vegetation may improve this area for wildlife habitat.

Recommended plants
Alisma plantago-aquatica
Acer circinatum
Amelanchier alnifolia
Cornus nuttalii
Cornus stolonifera
Fraxinus latifolia
Juncus effusus
Lonicera involucrata
Lysichitum americanum
Polygonum sp.
Rhamnus purshiana
Ribes sanguineum
Rubus parviflorus
Rubus spectabalis
Scirpus microcarpus
Taxus brevifolia
Thuja plicata (lower section of unit)
Tsuga heterophylla (lower section of unit)
Vaccinium ovatum
Vaccinium parvifolium

Tract 2 / Unit 2
Remove trash and exotic vegetation along creek and behind wet area. Replant with wetland species recommended for this site in Appendix E or below. Signs asking for no trespassing into this wetland site may be necessary.

Recommended plants
Acer circinatum
Alisma plantago-aquatica
Cornus stolonifera
Epilobium sp.
Fraxinus latifolia
Juncus effusus
Lonicera involucrata
Lysichitum americanum

Polygonum sp.
Potentilla fruticosa
Ribes sanguineum
Rubus parviflorus
Rubus spectabalis
Salix sp.
Scirpus microcarpus
Thuja plicata
Tsuga heterophylla
Vaccinium ovatum
Vaccinium parvifolium

Tract 2 / Unit 3
Remove Himalayan blackberry. Place permanent trail in this location. Residents suggested planting wildflowers around the trail. Residents also suggested a bike rack in this location. Signs may help to invite hikers into the greenbelt.
Remove exotic grasses and replant with wet meadow species and conifers suggested in Appendix E or below.

Recommended plants
Acer circinatum
Arbutus menziesii
Betula occidentalis/glandulosa
Cornus stolonifera
Fraxinus latifolia
Salix sp.
Thuja plicata
Lonicera involucrata
Ribes sanguineum
Epilobium sp.
Juncus effusus
Potentilla fruticosa
Polygonum sp.

Tract 2 / Unit 4
Remove transient structure.
The steep, wet slopes could pose a problem for exotic vegetation removal. Additionally, a large work party may do more harm than good to the native vegetation in this unit. Small, experienced work parties should be used to remove the English ivy and Bindweed. Replant with species noted in Appendix E or below. Add canopy breaks and plant with conifers.

Recommended plants
Acer circinatum
Thuja plicata
Tsuga heterophylla
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Rubus parviflorus
Rubus spectabalis
Lysichitum americanum

Tract 2 / Unit 5
Easy access for work parties along Aurora Avenue. Remove trash.
Remove Clematis and English ivy vines from trees. Remove Himalayan blackberry.
Have hazardous trees removed by professional arborist. Replant with long lived, deep rooted, yet smaller conifers. (see Appendix E for this unit)
Close social trails with new vegetation. (Appendix E or below) May need signs in these restoration sites to prevent trampling.

Recommended plants
Acer circinatum
Amelanchier alnifolia
Arbutus menziesii
Corylus cornuta
Cupressus bakeri
Fraxinus latifolia
Lonicera involucrata
Rhamnus purshiana
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Rubus parviflorus
Rubus spectabalis
Taxus brevifolia
Thuja plicata
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla

Tract 2 / Unit 6
Remove trash throughout unit. Remove exotics, particularly English ivy and English holly. Create canopy gaps for by girdling Bigleaf maples and Red alders that may be in decline. Replant with late successional conifers species in these newly opened locations. Revegetate with understory and canopy species recommended in Appendix E or below.

Recommended plants
Abies grandis
Calocedrus decurrens
Oemaronia cerasiformis
Picea sitchensis
Pseudotsuga menziesii
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Taxus brevifolia
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla

Tract 2 / Unit 7
Remove English ivy and other exotics.
Create canopy gaps and snags by killing Bigleaf maples and Alders that are in decline.
Replant canopy gap sites with late successional conifer species. (consult Appendix E)
Revegetate understory with species recommended for this unit in Appendix E or below.

Recommended plants
Abies grandis (lower section of unit)
Calocedrus decurrens (lower section of unit)
Oemaronia cerasiformis
Picea sitchensis (lower section of unit)
Pseudotsuga menziesii (lower section of unit)
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Taxus brevifolia
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla (lower section of unit)

Tract 2 / Unit 8
Remove exotics.
Replant bare area with species recommended for this unit in Appendix E or below.
Open canopy by creating snags from Bigleaf maples. Plant late successional conifers in these gaps. (Appendix E)

Recommended plants
Calocedrus decurrens (lower section of unit)
Cornus nuttalii
Corylus cornuta var californica
Juniperus communis / scopulorum
Oemaronia cerasiformis

Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Taxus brevifolia
Thujopsis dolobrata
Torreya californica
Vaccinium ovatum
Vaccinium parvifolium

Tract 2 / Unit 9
Remove encampment to eliminate fire and waste hazards. Remove trash. Remove English ivy with numerous large work parties of volunteers and park staff. Plant late successional conifers in present canopy gaps. Revegetate understory with species recommended for this site in Appendix E or below.

Recommended plants
Abies grandis (lower section of unit)
Calocedrus decurrens (lower section of unit)
Corylus cornuta var. californica
Oemaronia cerasiformis
Picea sitchensis (lower section of unit)
Pseudotsuga menziesii (lower section of unit)
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Taxus brevifolia
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla (lower section of unit)

Tract 2 / Unit 10
Easy access to unit from Taylor Avenue.
Recommend removing entire vegetative cover leaving only the large Bigleaf maple and Madrona.
May need to use heavy machinery for removal. Will need to provide erosion control netting on steeper section of slope as replanted vegetation becomes established.
Revegetate overstory with low growing trees in order to eliminate any view problems from Taylor Avenue. Replant understory species with species from the recommended plant list for this unit. (Appendix E or below)

Recommended plants
Amelanchier alnifolia
Arbutus menziesii
Cornus nuttalii
Corylus cornuta var. californica
Holodiscus discolor

Juniperus communis / scopulorum
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Taxus brevifolia
Thujopsis dolobrata
Torreya californica

Tract 3
This unit is accessible by above mentioned trail. Steep slopes may inhibit restoration of Himalayan blackberry thicket. Section under canopy has small terraces. English ivy can be removed from this portion of the tract. Replant with native species listed in Appendix E or below.
Individual plantings of long lived, low growing, deep rooted conifers needed in order to provide erosion control for the future.

Recommended plants
Acer circinatum
Amelanchier alnifolia
Arctostaphylos uva-ursi
Calocedrus decurrens (lower section of unit)
Corylus cornuta var. californica
Cupressus bakeri
Holodiscus discolor
Oemaronia cerasiformis
Rhamnus purshiana
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Rubus parviflorus
Rubus spectabalis
Symphoricarpos albus
Taxus brevifolia
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla (lower section of unit)
Vaccinium ovatum

Tract 4 / Unit 1
Due to the steep slope in this unit, removing the exotic vegetation may cause considerable disturbance. Any exotic vegetation removal and replanting should be done with technical expertise and advanced planning. Erosion control matting will need to be used. Recommend the individual planting of low growing, long lived, and deep rooted conifers to help provide slope stability in the future.

Recommended plants

Acer circinatum
Amelanchier alnifolia
Arctostaphylos uva-ursi
Calocedrus decurrens (lower section of unit)
Corylus cornuta var. californica
Holodiscus discolor
Oemaronia cerasiformis
Rhamnus purshiana
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Rubus parviflorus
Rubus spectabalis
Symphoricarpos albus
Taxus brevifolia
Thuja plicata (lower section of unit)
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla (lower section of unit)
Vaccinium ovatum

Tract 4 / Unit 2

Due to the steep slope, again, this site would be difficult and unsafe for inexperienced volunteers to work on. The upper portion, accessible from 5th Avenue, requires removal of Himalayan blackberry and other exotics (particularly, Bindweed) from this portion of the unit. This section has a steep slope as well but an experienced work party should not have a problem due to the easy access from 5th Avenue. Revegetate with recommended species in Appendix E or below.

Recommended plants

Acer circinatum
Calocedrus decurrens (lower section of unit)
Corylus cornuta var. californica
Holodiscus discolor
Oemaronia cerasiformis
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Rubus parviflorus
Rubus spectabalis
Symphoricarpos albus
Taxus brevifolia
Thuja plicata (lower section of unit)
Thujopsis dolobrata
Torreya californica

Tsuga heterophylla (lower section of unit)
Vaccinium ovatum

Tract 5
Again, due to the steepness of the hill in this unit, removing the exotic vegetation could promote soil erosion. Do not recommend large work parties in this unit. Projects with technical expertise and advanced planning can plant deep rooted, low growing and long lived conifers in the understory and in the canopy breaks in order to promote native canopy vegetation and control erosion. Need to monitor the understory vegetation for increase in exotics.

Recommended plants
Acer circinatum
Calocedrus decurrens (lower section of unit)
Corylus cornuta var. californica
Holodiscus discolor
Lonicera involucrata
Oemaronia cerasiformis
Ribes sanguineum
Rosa gymnocarpa, R. nutkana
Rubus parviflorus
Rubus spectabalis
Symphoricarpos albus
Taxus brevifolia
Taxus brevifolia
Thuja plicata (lower section of unit)
Thujopsis dolobrata
Torreya californica
Tsuga heterophylla (lower section of unit)

Topics for Further Attention

- Drainage from adjacent streets and residences.
- Transient encampment removal in Tract 2 - Unit 2, 4, 6, 9

(Transient encampments need to be evacuated and removed according to City of Seattle policy.)

Appendix A: References

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Appendix B: Plant Species List for the Northeast Queen Anne Greenbelt

Latin Name	Common Name	Native / Exotic
Acer macrophyllum	Bigleaf maple	
Aesculus hippocastanum	Horsetail	
Agropyron repens	Quackgrass	X
Agrostis alba	Redtop	X
Agrostis capallaris	Colonial bentgrass	X
Agrostis tenuis	Colonial bentgrass	X
Ailanthus altissima	Tree of Heaven	X
Alnus rubra	Red alder	
Arbutus menziesii	Pacific madrone	
Athyrium felix-femina	Lady fern	X
Bromus rigidus	Rip-gut brome	
Buddleja davidii	Butter-flybush	X
Buxus sempervirens	Boxwood	
Calamagrostic sp.	Nootka reedgrass	
Centranthus ruber	Juipiter's beard	
Cirsium arvense	Canada thistle	X
Clematis vitalba	Virgins-bower	X
Convolvulus arvensis	Bindweed/Morningglory	X
Cytisus scoparius	Scot's broom	X
Dactylus glomerata	Orchard grass	X
Daphne laurela	Spurge laurel	X
Dropteris expansa	Shield Fern	
Elymus glaucus	Blue wildrye	
Epilobium ciliatumm	Purple-leaved willowherb	
Equisetum arvense	Common horsetail	
Galium aparine	Cleavers	
Hedera helix	English ivy	X
Holcus lanatus	Common velvet-grass	X
Holiscus discolor	Oceanspray	
Ilex sp.	English holly	X
Juniper sp.	Common juniper	
Lactuca ludoviciana	Western lettuce	X
Lactuca muralis	Wall letuce	X
Lapsana communis	Nipplewort	X
Lolium multiflorum	Perennial ryegrass	X
Lunaria annua	Honesty	X
Lysichiton americanum	Skunk cabbage	
Mahonia nervosa	Oregon grape	
Malus sp. (Apple)	Apple tree	X
Oemleria cerasiformis	Indian plum	

Phalaris arundinacea	Reed canary grass	X
Poa pratensis	Kentucky bluegrass	X
Polygonom sp.	Knotweed	X
Polystichum munitum	Sword fern	
Populus deltoides	Carolina popular	X
Populus sp.	Cottonwood	
Populus trichocarpa	Black cottonwood	
Prunus laurocerasus	Laurel cherry	X
Prunus sp. (Cherry)	Cherry laurel	X
Pteridium aquilinum	Bracken fern	
Pyrus communis	Pear tree	X
Quercus sp.	Oak	
Ranunculus repens	Creeping buttercup	
Rorippa nasturtium-aquaticum	Watercress	X
Rubus discolor	Himalayan blackberry	X
Rumex crispus	Curled dock	
Salix sp.	Willow	
Sambucus racemosa	Red elderberry	
Solanum dulcamara	Nightshade	X
Stachys cooleyae	Cooley's hedge nettle	
Trifolium repens	White clover	X
Urtica dioica	Stinging nettle	X
Urtica gracilis	Stinging nettle	X
Urtica urens	Dog nettle	X
Veronica americana	American brooklime	

Appendix C: Summary Of Management Units

Tract: 1	**Unit:** 1
Aspect: East	**Average Slope:** 48%
Canopy Type: Dominated by Acer macrophyllum and Alnus rubra to a lesser degree. Fruit trees present. DBH 9 - 33”	**Habitat Type:** Immature Deciduous

Site Description:
The understory of this tract is heavily invaded by Himalayan blackberry, Bindweed, and Stinging nettle.
Steep slope along Aurora Avenue, with one small flat terrace about half way up the hill, where fruit trees that were planted many years ago can still be found.
A few of the fruit trees are in poor health. The cherry tree has been topped at some point in the past and has numerous trunks. From the terrace up to the residences above, Himalayan blackberry and Bindweed dominate again. Additional fruit trees present in this section as well.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Alnus rubra	3	Pteridium aquilinum	2
Acer macrophyllum	5	Stachys cooleyae	2
Prunus sp. (Cherry)	1	Sambucus racemosa	3
Pyrus communis	1	Equisetum arvense	3
Malus sp. (Apple)	1	Prunus laurocerasus	2
INVASIVE EXOTICS			
Hedera helix	3		
Rubus discolor	5		
Lactuca ludoviciana	2		
Ilex sp.	2		
Convolvulus arvensis	5		
Urtica gracilis	3		
Solanum dulcamara	2		
Cirsium arvense	3		

ISSUES:
Heavily invaded with Himalayan blackberry, Stinging nettle and Bindweed (Morning Glory).
Unhealthy fruit trees, with numerous trunks.
Refuse site
History of transient problems, poses security issues (fires, theft etc)

RECOMMENDATIONS:
A Queen Anne resident who lives above this site has expressed interest in helping with the maintenance of the exotics. A large work party should clear out the entire understory and replant with species recommended for this site in Appendix E or below. Erosion control, jute netting, coir fabric etc., may be needed on the steeper part of the slope for erosion control. Adopt-a-Park volunteers can then assist with the maintenance and monitoring of the site. The removal of shrubs should help eliminate hiding places for transient encampments and therefore help with the trash and security issues expressed by residents.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 1
Aspect: East	**Average Slope:** 45 - 50%
Canopy Type: Dominated by Acer macrophyllum and Alnus rubra. DBH 10 -25”	**Habitat Type:** Immature Deciduous

Site Description:
This unit is quite steep and provides the water that flows into unit 2 & 3 from a few seeps which move down the hill in small creeks and as sheet flow. Transients use one of the springs as a source of fresh water. A few large pieces of wood have been placed in front of the spring on the mud. There is a broken pipe near the spring supplying additional water to this site. A large wet area lies hidden in the vegetation at a higher elevation near the top of the hill just below the condominiums. This site is covered with Himalayan blackberry and Bindweed. It has also been a dumping ground for trash in the past.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Alnus rubra	3	Polystichum munitum	4
Acer macrophyllum	5	Holiscus discolor	2
		Sambucus racemosa	4
		Equisetum arvense	4
		Athyrium felix-femina	3
INVASIVE EXOTICS			
Hedera helix	4		
Rubus discolor	4		
Lactuca muralis	3		
Ilex sp.	3		
Prunus muralis	4		
Convolvulus arvensis	2		
Cytisus scoparius	1		
Phalaris arundinacea	1		
Urtica gracilis	4		
Solanum dulcamara	2		
Clematis vitalba	1		

ISSUES:
Exotic vegetation
Trash in wetland area and exotic vegetation smothering wetland.
Some social trails used by transients, causing some erosion problems.

RECOMMENDATIONS:
Removal of trash from wetland. Numerous small work parties with experience working on steep slopes needed to remove the understory of exotic vegetation. Replant with recommended shrubs, groundcover and wetland plants from Appendix E or below. May need to provide erosion control matting on the steeper sections of the hill until vegetation becomes established. Enhancement of the wetland site with native wetland vegetation may improve this area for wildlife habitat.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 2
Aspect: East	**Average Slope:** 8%
Canopy Type: Alnus rubra dominates. DBH 12 - 27”	**Habitat Type:** Immature Deciduous

Site Description:
This is the first recipient site for the water from the seeps in unit 1. The water gets channelized at this point and flows into a small wetland area where the water dissappears to the groundwater. This wetland is surrounded by sand or fill dirt and has some erosion problems from hikers, transient use, etc. This is a healthier site, in comparison with the remaining portion of the greenbelt insofar as percent cover of exotic species versus native vegetation. The Bindweed is predominately located in the small open canopy area behind the wetland.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Alnus rubra	5	Polystichum munitum	3
Acer macrophyllum	1	Sambucus racemosa	2
Juniper sp.	1	Equisetum arvense	3
		Athyrium felix-femina	3
		Lysichiton americanum	3
		Ranunculus repens	4
INVASIVE EXOTICS		Stachys cooleyae	2
Hedera helix	2	Rumex crispus	1
Rubus discolor	2		
Ilex sp.	2		
Convolvulus arvensis	4		
Phalaris arundinacea	2		
Solanum dulcamara	2		
Buxus sempervirens	2		
Agrostis alba	1		

ISSUES:
Trash pile - includes some furniture and carpeting.
Exotic vegatation along creek and behind wetland.
Small transient structure

RECOMMENDATIONS:
Remove trash and exotic vegetation along creek and behind wet area. Replant with wetland species recommended for this site in Appendix E or below. Signs asking for no trespassing into this wetland site may be necessary.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 3
Aspect: East	**Average Slope:** 4%
Canopy Type: Open canopy. Wetland weeds and grasses dominate.	**Habitat Type:** Wet

Site Description:
Unit 3 is the site of a previous building. It is somewhat flat and was covered with fill dirt upon completion of the demolition of the building and parking lot. The dryer section of the unit (the northernmost portion) is covered with Himalayan blackberrry and there is a social trail leading back to the greenbelt from Aurora Avenue. The remaining portion of the unit is dominated by exotic grasses and exotic wet meadow species.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
		Agropyron repens	2
		Veronica americana	2
		Epilobium ciliatumm	2
		Equisetum arvense	3
		Galum aparine	2
		Ranunculus repens	4
INVASIVE EXOTICS		Stachys cooleyae	1
Rubus discolor	4	Rumex crispus	1
Trifolium repens	4	Centranthus rubra	1
Convolvulus arvensis	3		
Phalaris arundinacea	4		
Solanum dulcamara	2		
Cirsium arvense	1		
Agrostis tenuis	4		
Lolium multiflorum	2		
Holcus lanatus	3		
Rorippa nasturtium-aquaticum	2		

ISSUES:
Exotic grasses
Himalayan blackberry invasion

RECOMMENDATIONS:
Remove Himalayan blackberry. Place permanent trail in this location. Residents suggested planting wildflowers around the trail. Residents also suggested a bike rack in this location. Signs may help to invite hikers into the greenbelt.
Remove exotic grasses and replant with wet meadow species and conifers suggested in Appendix E or below.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 4
Aspect: East	**Average Slope:** 50%
Canopy Type: Acer macrophyllum and Alnus rubra dominate. DBH 14 - 22	**Habitat Type:** Immature Deciduous

Site Description:
This unit is steep and wet. There are numerous seeps and most of the slope is covered with sheet flow. Sword fern dominates the understory vegetation along with an assortment of Oregon grape and skunk cabbage. This unit is perhaps the healthiest section with respect to the percentage of native vegetation versus the percentage of exotics. There is one permanent transient structure in this unit.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	5
Alnus rubra	5	Mahonia nervosa	4
		Pteridium aquilinum	3
		Oemleria cerasiformis	3
		Populus sp	1
		Equisetum arvense	2
INVASIVE EXOTICS		Lysichiton americanum	2
Rubus discolor	2	Elymus glaucus	2
Hedera helix	4		
Solanum dulcamara	2		
Daphenie laurela	2		
Ilex sp.	3		
Prunus laurocerasus	3		
Convolvulus arvensis	3		
Lactuca muralis	3		
Urtica urens	2		
Agrostis capillaris	1		

ISSUES:
English ivy
Transient structure

RECOMMENDATIONS:
Remove transient structure.
The steep, wet slopes could pose a problem for exotic vegetation removal. Additionally, a large work party may do more harm than good to the native vegetation in this unit. Small, experienced work parties should be used to remove the English ivy and Bindweed. Replant with species noted in Appendix E or below. Add canopy breaks and plant with conifers.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 5
Aspect: East	**Average Slope:** 53%
Canopy Type: Acer macrophyllum and Alnus rubra dominate. DBH 12 - 35”	**Habitat Type:** Immature Deciduous

Site Description:
This unit runs along the length of Aurora Avenue. Hazardous trees were found in this unit and marked for removal. Numerous trees indicated past soil slumps with curved trunks and diagonal growth. This unit is steep and has several seeps which flow down to Aurora Avenue. There are numerous refuse sites and trails used by transients leading from Aurora into the greenbelt. This unit has a fairly healthy native understory, yet is also heavily invaded with exotics species. Rubus discolor is a big problem along the sidewalk. Clematis vitalba and Hedera helix covering many of the trees along Aurora Avenue.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	4
Alnus rubra	5	Mahonia nervosa	4
Aesculus sp.	1	Equisetum arvense	4
		Quercus sp	1
		Veronica americana	2
		Dactylus glomerata	3
INVASIVE EXOTICS		Stachys cooleyae	2
Rubus discolor	4	Athyrium filix-femina	3
Hedera helix	4	Sambucus racemosa	3
Solanum dulcamara	2	Ranunculus repens	2
Ilex sp.	3		
Prunus laurocerasus	2		
Convolvulus arvensis	3		
Lactuca ludoviciana	2		
Lactuca muralis	2		
Clematis vitalba	4		
Polygonom sp.	2		

ISSUES:
Clematis vitalba and Hedera helix
Trash
Hazardous trees
Social trails; could be source of soil erosion during heavy rainfall.

RECOMMENDATIONS:
Easy access for work parties along Aurora Avenue. Remove trash.
Remove Clematis and English ivy vines from trees. Remove Himalayan blackberry.
Have hazardous trees removed by professional arborist. Replant with long lived, deep rooted, yet smaller conifers. (see Appendix E for this unit)
Close social trails with new vegetation. (Appendix E or below) May need signs in these restoration sites to prevent trampling.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 6
Aspect: East	**Average Slope:** 50%
Canopy Type: Alnus rubra and Acer macrophyllum dominate. DBH 11 - 38”	**Habitat Type:** Immature Deciduous

Site Description:
This site has a somewhat steep slope just below the main trail through the greenbelt. It is also accessible from Aurora Avenue. This wet area has a good percent cover of native vegetation, particularly Sword fern.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	4	Polystichum munitum	5
Alnus rubra	5	Equisetum arvense	2
INVASIVE EXOTICS			
Rubus discolor	2		
Hedera helix	3		
Solanum dulcamara	2		
Daphenie laurela	3		
Ilex sp.	3		
Prunus laurocerasus	3		

ISSUES:
Exotic vegetation
Small refuse site

RECOMMENDATIONS:
Remove trash throughout unit. Remove exotics, particularly English ivy and English holly. Create canopy gaps for by girdling Bigleaf maples and Red alders that may be in decline. Replant with late successional conifers species in these newly opened locations. Revegetate with understory and canopy species recommended in Appendix E or below.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 7
Aspect: East	**Average Slope:** 20%
Canopy Type: Acer macrophyllum dominates. DBH 15 - 22”	**Habitat Type:** Immature Deciduous

Site Description:
This unit comprises a large portion of the relatively flat terrace along the middle of the greenbelt. The heavy canopy inhibits most of the exotic plant species from thriving here. However, the shade tolerant exotics; English ivy and Cherry laurel are able to thrive. There is a somewhat healthy native understory population here as well. (Sword fern and Oregon grape) There are many social trails in this unit.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	4
Alnus rubra	2	Mahonia nervosa	3
INVASIVE EXOTICS			
Rubus discolor	2		
Hedera helix	4		
Solanum dulcamara	1		
Daphenie laurela	3		
Ilex sp.	3		
Prunus laurocerasus	4		
Convolvulus arvensis	2		
Clematis vitalba	2		
Phalaris arundinacea	2		
Lactuca muralis	3		

ISSUES:
English ivy
Smaller populations of various other exotic plant species interspersed with the Sword fern and Oregon grape.
Social trails leading to transient encampments and refuse sites within other units.

RECOMMENDATIONS:
Remove English ivy and other exotics.
Create canopy gaps and snags by killing Bigleaf maples and Alders that are in decline. Replant canopy gap sites with late successional conifer species. (consult Appendix E) Revegetate understory with species recommended for this unit in Appendix E or below.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 8
Aspect: East	**Average Slope:** 15%
Canopy Type: Acer macrophyllum dominates. DBH 11 -1 9”	**Habitat Type:** Immature Deciduous

Site Description:
The understory sets this unit apart from the surrounding area. It is predominately bare ground. Young Himalayan blackberry, Hedera helix and Stinging nettle plants are present. Good opportunity to replant site with native vegetation without the intense competition from exotics.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	3
INVASIVE EXOTICS			
Rubus discolor	3		
Hedera helix	2		
Lactuca muralis	2		
Lapsana commuunis	2		
Daphenie laurela	3		
Urtica urens	3		
Prunus laurocerasus	3		
Convolvulus arvensis	3		

ISSUES:
Several exotic species.

RECOMMENDATIONS:
Remove exotics.
Replant bare area with species recommended for this unit in Appendix E or below.
Open canopy by creating snags from Bigleaf maples. Plant late successional conifers in these gaps. (Appendix E)

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 9
Aspect: East	**Average Slope:** 23%
Canopy Type: Acer macrophyllum and Alnus rubra dominate. DBH 5 - 30”	**Habitat Type:** Immature Deciduous

Site Description:
There is a small brick foundation of an old home. This site has the most extensive invasion of English ivy. Ivy has been removed from the trees in the past but is ascending up the trees again. There is a small amount of trash located in this unit as well.
There is a large ravine here which drains a seep from the hill in this unit. The water flows down through unit 5, over the sidewalk and to Aurora Avenue. There is a transient encampment (with barbeque) and a few refuse sites located in this unit. The wet area in the the ravine is also used as a latrine.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	3
Alnus rubra	4	Pteridium aquilinum	3
		Ranunculus repens	1
		Sambucus racemosa	2
INVASIVE EXOTICS			
Rubus discolor	2		
Hedera helix	5		
Lapsana communis	2		
Daphenie laurela	3		
Prunus laurocerasus	3		
Convolvuulus arvensis	3		
Ilex sp.	3		
Solanum dulcamara	1		
Clematis vitalba	2		

ISSUES:
English ivy.
Transient encampment.
Refuse sites and fire hazard from transients.
Waste in ravine

RECOMMENDATIONS:
Remove encampment to eliminate fire and waste hazards. Remove trash. Remove English ivy with numerous large work parties of volunteers and park staff. Plant late successional conifers in present canopy gaps. Revegetate understory with species recommended for this site in Appendix E or below.

SUMMARY OF MANAGEMENT UNIT

Tract: 2	**Unit:** 10
Aspect: East	**Average Slope:** 22%
Canopy Type: Young Populus sp. and Salix sp. 1 large Acer macrophyllum DBH 3 - 8”	**Habitat Type:** Pole Deciduous

Site Description:
This site is the most recent addition to the greenbelt. A portion of the unit was the site of an old house that was removed in 1993. The predominate vegetation is Himalayan blackberry and Scot’s broom.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Arbutus menziesii	1	Calamagrostic sp.	3
Alnus rubra	1		
Acer macrophyllum	1		
Populus deltoides	2		
Populus trichocarpa	2		
Salix sp.	1		
INVASIVE EXOTICS			
Rubus discolor	4		
Ailanthus altissima	3		
Cytisus scoparius	4		
Buddleja davidii	3		
Cirsium arvense	2		
Convolvuulus arvensis	3		
Ilex sp.	2		
Solanum dulcamara	2		
Clematis vitalba	3		
Lunaria annua	1		
Agropyron repens	3		
Bromus rigidus	2		
Dactylis glomerata	3		
Poa pratensis	1		
Agrostis tenuis	2		

ISSUES:
Exotic species, particularly Himalayan blackberry and Scot’s broom.
Exotic grass species.

RECOMMENDATIONS:
Easy access to unit from Taylor Avenue.
Recommend removing entire vegetative cover leaving only the large Bigleaf maple and Madrona. May need to use heavy machinery for removal. Will need to provide erosion control netting on steeper section of slope as replanted vegetation becomes established. Revegetate overstory with low growing trees in order to eliminate any view problems from Taylor Avenue. Replant understory species with species from the recommended plant list for this unit. (Appendix E or below)

SUMMARY OF MANAGEMENT UNIT

Tract: 3	**Unit:** 1
Aspect: East	**Average Slope:** 60 - 65%
Canopy Type: Acer macrophyllum DBH 9 - 22”	**Habitat Type:** Immature Deciduous

Site Description:
This tract is located just off of a main trail which extends from 5th Avenue down to the Dexter Avenue underpass. Residences are located just below the site on Aurora Avenue. This site is very steep. The southern border of this tract is invaded with Himalayan blackberry and Bindweed within a large gap in the canopy. Hedera helix is the dominate understory species under the Bigleaf maples.
There is a transient refuse site located in the middle of this unit.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	2
Salix sp.	1	Pteridium aquilinum	2
		Ranunculus repens	1
INVASIVE EXOTICS			
Rubus discolor	4		
Hedera helix	4		
Lactuca muralis	2		
Ilex sp.	1		
Convolvulus arvensis	2		
Solanum dulcamara	2		

ISSUES:
Exotic vegetation
Trash

RECOMMENDATIONS:
This unit is accessible by above mentioned trail. Steep slopes may inhibit restoration of Himalayan blackberry thicket. Section under canopy has small terraces. English ivy can be removed from this portion of the tract. Replant with native species listed in Appendix E or below.
Individual plantings of long lived, low growing, deep rooted conifers needed in order to provide erosion control for the future.

SUMMARY OF MANAGEMENT UNIT

Tract: 4	**Unit:** 1
Aspect: East	**Average Slope:** 60%
Canopy Type: Acer macrophyllum and Alnus rubra DBH 12 - 28”	**Habitat Type:** Immature Deciduous

Site Description:
This unit is located just off of the Dexter Avenue underpass on Aurora Avenue. It is very steep and appears to have had a history of landslides. A few of the trees in this unit have curved tree trunks or diagonal growth patterns indicating past soil slumps. There is a recent large landslide just south of this unit which removed all of the surrounding vegetation. The remaining portion of the site is covered with Sword fern, Oregon grape and Hedera helix. The Bindweed and Nipplewort occur primarily near the slide. There is a small refuse site on this unit as well.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	4	Polystichum munitum	2
Alnus rubra	3	Mahonia nervosa	2
		Dropteris expansa	1
INVASIVE EXOTICS			
Rubus discolor	2		
Hedera helix	2		
Lapsana communis	3		
Convolvulus arvensis	3		

ISSUES:
Steep slope
Exotic vegetation

RECOMMENDATIONS:
Due to the steep slope in this unit, removing the exotic vegetation may cause considerable disturbance. Any exotic vegetation removal and replanting should be done with technical expertise and advanced planning. Erosion control matting will need to be used. Recommend the individual planting of low growing, long lived, and deep rooted conifers to help provide slope stability in the future.

SUMMARY OF MANAGEMENT UNIT

Tract: 4	**Unit:** 2
Aspect: East	**Average Slope:** 60%
Canopy Type: Acer macrophyllum and Alnus rubra DBH 12 -28	**Habitat Type:** Immature Deciduous

Site Description:
This unit has a denser canopy cover than unit 1 along with a larger percent cover of English ivy and an invasion of Stinging nettle. This unit extends up to the residences on Taylor Avenue. This upper portion is heavily invaded with Rubus discolor. However, there is a fair cover of native Sword fern and Oregon grape in the lower portion.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	4
Alnus rubra	5	Mahonia nervosa	4
		Equisetum arvense	1
INVASIVE EXOTICS			
Rubus discolor	3		
Hedera helix	4		
Lactuca muralis	3		
Ilex sp.	2		
Urtica dioica	3		

ISSUES:
Exotic vegetation
Steep slopes that are prone to landslides.

RECOMMENDATIONS:
Due to the steep slope, again, this site would be difficult and unsafe for inexperienced volunteers to work on. The upper portion, accessible from 5th Avenue, requires removal of Himalayan blackberry and other exotics (particularly, Bindweed) from this portion of the unit. This section has a steep slope as well but an experienced work party should not have a problem due to the easy access from 5th Avenue. Revegetate with recommended species in Appendix E or below.

SUMMARY OF MANAGEMENT UNIT

Tract: 5	**Unit:** 1
Aspect: East	**Average Slope:** 65 - 70%
Canopy Type: Acer macrophyllum DBH 11 - 30”	**Habitat Type:** Immature - Mature Deciduous

Site Description:
The slope on this site is very steep. The dominate understory species is Sword fern and English ivy. There are no trails leading up into this unit. Several curved tree trunks suggest past soil slumps. The landslide potential is high in this tract due to the steepness of the slope.

SPECIES DOMINANCE RATING (0-5)

CANOPY		UNDERSTORY	
Acer macrophyllum	5	Polystichum munitum	4
Salix sp.	1	Sambucus racemosa	1
Alnus rubra	3	Mahonia nervosa	1
Aesculus hippocastanum	1		
INVASIVE EXOTICS			
Rubus discolor	3		
Hedera helix	5		
Lactuca muralis	1		
Ilex sp.	1		
Convolvulus arvensis	3		
Clematis vitalba	2		

ISSUES:
Exotic vegetation.
Small refuse site.

RECOMMENDATIONS:
Again, due to the steepness of the hill in this unit, removing the exotic vegetation could promote soil erosion. Do not recommend large work parties in this unit. Projects with technical expertise and advanced planning can plant deep rooted, low growing and long lived conifers in the understory and in the canopy breaks in order to promote native canopy vegetation and control erosion. Need to monitor the understory vegetation for increase in exotics.

Appendix D: Invasive Weed Control - Research Summary

Hedera helix - English ivy is very tolerant of pre-emergence herbicides. The Arboretum has had success using a string trimmer to remove the foliage and then spraying an herbicide (Garlon 4 in this case) immediately thereafter. The site was clear of the ivy within 2 years. Smaller infestations may warrant brushing the herbicide directly onto the stems (Reichard, 1997).

The best mechanical method is hand removal of the vines from pruning the vines at the bottom of the trees and then removing the vines from base of the tree. This has already been done in the greenbelt in some sections. Another mechanical method that has shown some success is to repeatedly burn the plants with a blow torch. This method is not recommended due to the obvious potential hazards in such an urban setting (Randall and Marinelli, 1996).

Other methods noted from research studies were: hand remove the plants with a shovel (including the roots), which resulted in a score of 9.7 (1 = no effect, 10 = complete control), glyphosate (cut and then spray) with 25% concentrated glyphosate had a score of 10; 2, 4-D W.S. amine (cut and spray) 2% and 25% resulted in a score of 9.9 and 10 respectively (Costello, 1979).

Other research experiments resulted in the complete inhibition of regrowth of ivy after two treatments of Roundup (4.5 kg/ha), the second treatment having been applied 1 month after the first (Derr, 1993).

Another method using Roundup is to drill a hole in several stems of the vine and insert the herbicide directly into the stem.

Due to the heavy infestation of English ivy within the greenbelt, it is recommended to remove the foliage of the ivy with a string trimmer and applying Roundup on the stems either by spraying or brushing for the groundcover ivy. For the ivy that has infested the trees, use a drill to drill holes into the stems and insert the Roundup directly into the hole. The removal of the foliage and the drilling of the stems can be performed by volunteers and the actual application of the herbicide should be done by DPR staff.

This activity should be done in the fall and/or the wet season so that nesting birds will not be affected.

Convolvulus arvensis - (Bindweed, Morning glory) Research on chemical control of bindweed shows that 2, 4-D gave maximum control on various biotypes of the weed at a rate of 1.12 kilograms per hectare (DeGennaro and Weller, 1984).

Other non chemical methods were to cultivate the plants with a duckfoot sweep to try and cut the stems from the roots at 4" below the ground. After the new emergence in the spring, the weed would need to be cultivated (hoed) again every two weeks in June and July and every three weeks for August and September. These cultivations were shown to eradicate the bindweed in two years (Bell, 1990).

These methods are very labor intensive and a dependable group of volunteers would be needed in order to completely control of the bindweed in the greenbelt. Cultivation is not a suitable control method on steep slopes where soil disturbance contraindicated. The bindweed invasion is not as extensive as the English ivy, it is concentrated in a few canopy breaks in Tract 1, Tract 2 (Units 2, 3, 5, 9, 10) and a small section along Dexter in Tracts 4 and 5. Therefore, with a devoted group of volunteers, this species could potentially be controlled within the greenbelt in a couple of years. However, continuous maintenance would be needed due to the species surviving in surrounding private properties.

This activity should be done in the spring after the new emergence of this perennial.

Because bindweed was observed to correlate with an open canopy, tree plantings to provide canopy closure is an important long-term control strategy.

Rubus discolor (Himalayan blackberry) - Some eradication methods for this species are to use a shredder behind a tractor and mow the plants to the ground. After a month, Roundup should be used on the stems and new leaves or the stems should be brushed with Roundup immediately. This mowing and herbicide application may need to be repeated two to three times in order to completely kill the plants (Ewing and Reichard, 1997). Out of the three units with the worst blackberry invasion, two are flat enough for the use of heavy machinery (Tract 2, Units 3 and 10). Tract 1 will need large work parties with large pruning devices in order to eliminate the plants along the slope. Roundup should be applied by park staff on the bare stems after the foliage has been removed.

This activity should be done in the spring or summer when the plant is photosynthesizing the most, so that the roundup is translocated to the root system.

Cytisus scoparius (Scot's broom) - Unit 10 in Tract 2 has the worst invasion of Scot's broom in the greenbelt. The best mechanical method for removing broom thickets is with the use of the "Weed Wrench". This tool can be utilized by volunteers and is easy and fun to use. The jaw is placed around the stem of the plant, pump the lever a few times to fracture the soil and uproot the plant (Ness, 1989).

This activity can be performed during any season. Spring or early summer is recommended, before seed set.

Appendix E: Recommended Plants for the Northeast Queen Anne Greenbelt

*Latin Name	Light req.	Ornamental character	Size	Sp	Size at Maturity	Comments
TREES						
Abies grandis	Fs / Ps		5 gal	20′	100 +‘	good erosion control
Acer circinatum	Fs / Ps	FC	5 gal	10′	15 - 30′	winged seeds eaten by wildlife, deep, wide rooting, good erosion control
Arbutus menziesii	Fs / Ps	SB	2 gal	20′	> 60′	wildlife eat flowers and fruit, deep, wide rooting habitat, showy tree
Betula occidentalis / glandulosa	Fs	FC, SB	5 gal	10′	4 - 5 m 6 - 15′	good for wet sites wildlife eat seeds in the cones
Calocedrus decurrens	Fs / Ps		5 gal	20′	75 - 90′	fast growing, showy tree
Cornus nuttalii	Ps	SF	5 gal	20′	30 - 80′	wildlife eat fruit clusters
Cornus stolonifera	Fs	SF	5 gal	10′	6 - 20′	good in moist, open sites wildlife eat berries
Corylus cornuta var. californica	Fs / Ps	SF	5 gal	10′	15′	cover and nesting for birds, birds and small mammals use as food source
Cupressus bakeri	Fs		5 gal	15'	40 - 60'	grey-green foliage, drought tol.
Fraxinus latifolia	Fs / Ps		5 gal	20′	80′	moist sites, showy tree
Juniperus communis / Juniperus scopulorum	Fs		5 gal	10′	6 - 12′ 35′	low growing, fruits eaten by birds
Picea sitchensis	Fs / Ps		5 gal	20′	> 60′	wildlife eat seeds in the cones fast growing
Pseudotsuga menziesii	Fs		5 gal	20′	100′+	fast growing, long lived; wildlife eat seeds in the cones; good for nesting and perches; deep rooting habit
Salix sp.	Fs / Ps		5 gal	10′	20′	moist sites
Symphoricarpos albus	Fs / Ps	SF		10′	3 - 6′	provides wildlife shelter, deep, wide rooting, excellent erosion control
Taxus brevifolia	Fs / Ps		5 gal	10′	15 - 30′	wildlife eats seeds and scarlet, berrylike aril deep, wide rooting habitat, excellent erosion control

Thuja plicata	Fs / Ps		5 gal	20′	> 60′	shade tolerant, wildlife eats seeds and cones
Thujopsis dolobrata	Fs / Ps		5 gal	15'	30 - 50'	native-like, shrubby small tree, needs moisture
Torreya californica	Fs / Ps		5 gal	15'	30-50'	native-like, shrubby small tree, needs moisture
Tsuga heterophylla	Ps		5 gal	20′	100' +	long lived, moist sites
SHRUBS AND GROUNDCOVER						
Amelanchier alnifolia	Fs		2 gal	5′	6 - 30′	moist sites, birds and small mammals eat fruit, deep rooting, excellent erosion control
Arctostaphylos uva-ursi	Fs		2 gal	3′	< 1′	good groundcover for steep exposed slopes, wildlife eats berries
Gaultheria shallon	Fs / Sh		1 gal	4'	2'	evergreen native, edible berries; slow to establish
Holodiscus discolor	Fs	SF	2 gal	5′	6 - 10′	showy flowers, deep, wide rooting, good erosion control
Lonicera involucrata	Fs	SF	2 gal	5′	6 - 15′	wildlife eat fruit
Mahonia nervosa	Ps / Sh		1 gal	2'	2'	evergreen native, spreads; slow to establish
Oemaronia cerasiformis	Fs / Ps	SF	2 gal	5′	6 - 15′	showy white flowers., berries eaten by wildlife
Ribes sanguineum	Fs / Ps	SF	2 gal	5′	6 - 10′	flowers used by hummingbirds,; wildlife eat berries
Rosa gymnocarpa, R. nutkana	Fs / Ps	SF	2 gal	3′	3 - 10′	wildlife eat hips that are persistent into the winter
Rhamnus purshiana	Fs	SB	2 gal	5′	25′	black berries favored by Cedar Waxwings, moderately deep roots
Rubus parviflorus	Fs / Ps	SF	2 gal	3′	3 - 6′	wildlife eat fruit, needs ample moisture
Rubus spectabalis	Fs / Ps	SF	2 gal	5′	6 - 15′	flowers attract bees and hummingbirds, songbirds and wildlife eat fruit, good erosion control
Vaccinium ovatum	Ps	SF	2 gal	5′	6 - 15′	fruit eaten by humans and wildlife, attractive foliage moderate, wide rooting, excellent erosion control
Vaccinium parvifolium	Ps	SF	2 gal	5′	6 - 15′	likes moist woods; has bright red berries
WETLAND SPECIES						
Alisma plantago-aquatica	Fs / Ps	SF	2 gal	3′		shallow freshwater plant
Epilobium sp.	Fs / Ps	SF	2 gal	3′	3′	shallow fresh marshes,
Juncus effusus or Juncus sp.	Fs / Ps		2 gal	3′		wet meadows

Lysichitum americanum	Ps	SF	2 gal	3′		freshwater habitats, showy
Potentilla fruticosa	Fs	SF	2 gal	3′	3′	moist sites, showy flowers, flowers all summer
Polygonum sp.	Fs / Ps	SF	2 gal	3′		native spp only; freshwater areas, showy flowers
Scirpus microcarpus	Fs / Ps		2 gal	3′		shallow fresh marshes

Light requirement
Fs = Full sun
Ps = Part shade
Fs / Ps = Full sun / Part shade

Ornamental characteristics
SF = Showy Flower
SB = Showy Bark
FC = Fall Color

Sp = Spacing to be used when planting

Size = Size of transplanted vegetation
2 gal = 2 gallon containers
5 gal = 5 gallon containers