Cheasty Greenspace Vegetation Management Plan

Prepared For:

City of Seattle Department of Parks & Recreation
1600 South Dakota Street
Seattle, WA 98108-1546

Prepared By:

Sheldon & Associates, Inc

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July 2003

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The outline and format of this document are based on the Sand Point Magnuson Park Vegetation Management Plan, by Sheldon & Associates, Inc., (2001).

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SUMMARY

Cheasty Greenspace is located on the east slope of Beacon Hill directly above the Rainier Valley and Martin Luther King Way. The greenspace stretches along a 1.5-mile north-south axis between S. Bayview St. on the north boundary to S. Angeline St. at the south extent. The thirty-one parcels comprising the greenspace total approximately 43 acres – many are linked by undeveloped rights-of-way – property that is not owned by Seattle Parks. Inclusion of these rights-of-way increases the total acreage to be managed under the guidelines of this vegetation management plan to 57 acres.

Cheasty Greenspace is characterized by maturing upland deciduous forest consisting mainly of bigleaf maple with some red alder and black cottonwood in moister areas. Conifers are virtually absent. Tree size in the greenspace tends to be 15" dbh or less. Snags and coarse woody debris present in the greenspace generally reflect the small-medium tree size found there as well. Both non-native Norway and Sycamore maples are present in most of the greenspace both in the canopy as mature trees and more abundantly as saplings and seedlings in the understory/shrub layer.

The understory is also invaded to varying degrees by the typical suite of non-native species found in Seattle's urban forests, but English ivy is by far the most prevalent, followed by Himalayan blackberry. Despite the presence of these non-native species, Cheasty greenspace has a fairly intact native shrub layer, both in terms of diversity and cover. Common native understory dominants found in the greenspace include: hazelnut, indian plum, snowberry, vine maple, red elderberry, rose, low Oregon grape, and oceanspray. Three riparian corridors and associated wetlands were identified. Dump sites, encampments, and social trails are numerous.

Cheasty Greenspace has notable wildlife value. Although it has a relatively large amount of edge habitat due to the geometry of the greenspace, much of the wildlife habitat value of Cheasty Greenspace lies in the preservation of some forested interior habitat—a rarity in an urban landscape. Another important function provided by the greenspace is its potential to connect habitat fragments that might otherwise be isolated—possibly preserving persistence and increasing population sizes for some wildlife species.

Citizen stewardship activities in the greenspace have been limited in the past.

Actions recommended in the VMP can be summarized as follows:

- Increase native species diversity and conifer presence in the canopy with widespread planting throughout the greenspace.
- Remove non-native invasive species that threaten health of the greenspace – mainly Engish ivy, Himalayan blackberry, and invasive maple species with focused and long-term strategies for removal, control, and replacement of these species.
- Increase the size and number of snags and coarse woody debris by girdling selected trees and importing large woody debris.
- Clean-up and rehabilitate human impact sites that are detrimental to greenspace health (dumps, encampments, social trails).
- Increase community stewardship and volunteer base by establishing relationships with local schools, youth groups, local neighborhood residents, and the larger community of Seattle to participate in restoration and grant-seeking work for Cheasty Greenspace over the long term.

Implementation of the VMP will be done incrementally over time with the highest priority tasks done first. The majority of the work will likely be done by volunteers and youth environmental training groups. Establishing and maintaining a strong volunteer stewardship network in the community will be critical to the implementation success of this VMP.

CHAPTER 1.0 OVERVIEW

1.1 Site Location and Context

Cheasty Greenspace is located on the east slope of Beacon Hill directly above the Rainier Valley and Martin Luther King Way. It is comprised of thirty-one discreet parcels of land owned by the City of Seattle Department of Parks and Recreation (Seattle Parks). The greenspace stretches along a 1.5-mile north-south axis between S. Bayview St. on the north boundary to S. Angeline St. at the south extent. The parcels total approximately 43 acres and are distributed along both sides of Cheasty Boulevard – some are contiguous with one another and others are isolated. Many of the parcels are linked by undeveloped rights-of-way – property that is not owned by Seattle Parks. Inclusion of these rights-of-way increases the total acreage to be managed under the guidelines of this vegetation management plan to 57 acres. For the purposes of this document, references to the greenspace hereafter will assume inclusion of these adjacent rights-of-way.

Cheasty Greenspace is surrounded by single-family residential land along most of its western and southern borders as well as portions of the eastern edges, and lies directly above the commercial district of the Rainier Valley to the east. To the southwest, the greenspace is adjacent to the Jefferson Park Golf Course, and to the southeast lies a large property owned by the Seattle Housing Authority that is slated for re-development of up to 1,010 units.

1.2 Greenspace Description

The 57 acres comprising Cheasty Greenspace and adjacent rights-of-way are characterized by maturing upland deciduous forest consisting mainly of bigleaf maple (*Acer macrophyllum*), with some red alder (*Alnus rubra*) and black cottonwood (*Populus balsamifera*) in moister areas. Both non-native Norway and Sycamore maples (*Acer platanoides, Acer pseudoplatanus*) are present in most of the greenspace north of S. Columbian Way, both in the canopy as mature trees and more abundantly as saplings and seedlings in the understory/shrub layer. The understory is also invaded to varying degrees by the typical suite of non-native species found in Seattle's urban forests: English ivy (*Hedera helix*), Himalayan blackberry *(Rubus procerus*), laurel (*Prunus sp*), English holly (*Ilex aquifolium*), and Japanese knotweed (*Polyganum cuspidatum*). Common native understory dominants found in the greenspace include: hazelnut (*Corylus cornuta*), indian plum (*Oemlaria cerasiformis*), snowberry (*Symphoricarpos albus*), vine maple (*Acer circinatum*), red elderberry (*Sambucus racemosa*), rose (*Rosa sp.*), low Oregon grape (*Mahonia nervosa*), and oceanspray (*Holodiscus discolor*).

Cheasty Greenspace is a long, narrow greenbelt – generally no more than 200 feet wide between S. Bayview and S. Winthrop St, widening to 300 feet south to S. Andover St., and enlarging to approximately 700 feet wide in the southern end near S. Columbian Way. The greenbelt has a total of roughly 26,500 ft. or 5 miles of perimeter edge that is adjacent to developed land.

Cheasty Greenspace has no official trails (Parks constructed and sanctioned), but is criss-crossed by numerous social trails, many of which lead to encampments or dumping sites. Human abuse of the greenspace is evident in the number of encampments and quantity of yard waste and trash found. Roadside dumping is a common practice.

1.3 VMP Synopsis & User's Guide

This VMP is meant to provide direction for vegetation management actions in Cheasty Greenspace. It is anticipated that it will have a working longevity of up to 20 years. At that point it is hoped that enough

elements of the plan will have been implemented to require that an update or revision is done to the VMP to reflect the changed conditions in the greenspace. A brief synopsis of plan organization is given here to direct the user to the Chapters that are most relevant to the interests or management guidance needed. Chapters 1-3 provide background information on the foundation of the VMP – policies, goals, and context. Chapters 4 and 5 provide the qualitative and quantitative descriptions of the greenspace and its forest characteristics. Chapters 6-8 are meant to be used together, and contain management recommendations, explanations of how to perform them, and implementation strategies and priorities to direct the work. Finally, Chapter 9 provides information and field forms for monitoring of project sites to track implementation success and inform adaptive management. Chapter 10 includes all Appendices and project area maps for the VMP.

CHAPTER 2.0 GOALS AND OBJECTIVES

2.1 Overall Greenspace Goals

A number of existing documents outline the broad goals for managing Seattle's public parks. In addition there are adopted Park policies and guidelines for the management of natural areas under Parks ownership, such as Cheasty Greenspace. A brief summary of the most relevant goals, policies and guidelines from these documents is provided below.

2.1.1 Urban Wildlife and Habitat Management Plan (1994)

The UWHMP, developed by the Seattle Parks Department, provides a general "framework and guidelines for integrating natural and human systems in Seattle's parks and open spaces" (1994). Seven broad goals are presented in this document, which apply to the vegetation management in Cheasty Greenspace.

- Continue and increase wildlife habitat protection and enhancement efforts
- Protect and enhance wildlife populations
- Develop and maintain a wildlife resource inventory
- Provide environmental education, using wildlife resources
- Promote volunteer involvement in wildlife and habitat protection and enhancement
- Promote internal education and consistency in Department actions
- Promote interdepartmental and interagency cooperation to protect wildlife

More specific objectives are expressed in the UWHMP that refer to protection of wildlife corridors and sensitive habitats such as riparian and wetland areas, promoting native plant communities, controlling invasive plants, maintaining species diversity, using parks and greenspaces for educational purposes, promoting volunteer stewardship of wildlife resources, and integrating street tree programs with parks and greenspaces to promote wildlife habitat.

2.1.2 Seattle Parks COMPLAN (2000)

The COMPLAN is a comprehensive plan first put together by Seattle Parks Department in 1993 to guide policy and decision-making for parks and recreation facilities. The 2000 COMPLAN is an update to the original 1993 plan and reflects the intent to use the COMPLAN as a 'living document' to be adapted as needed. Goals and policy directions in the COMPLAN particularly relevant to the Cheasty Greenspace VMP are paraphrased and listed below. Greenspaces are defined in the COMPLAN as *"Areas designated for preservation because of their natural or ecological qualities, and their potential to contribute to an interconnected open space system"*.

With respect to General Park Management and Environmental Stewardship:

- Conserve and enhance wildlife habitat, watershed areas, and wetlands
- Manage forests for the benefit of present and future generations by implementing reforestation and forest community restoration projects.
- Maintain the living park inventory of plants and trees, focusing on reforestation, enhancement and restoration of native plant communities, plant replacement, and control of nuisance plants.

With respect to Boulevards and Trails:

- Prepare restoration plan and install a soft-surfaced pedestrian trail on Cheasty Boulevard (also listed under Early Implementation Fund Projects)
- Coordinate planning for boulevards and trails with planning for natural resources

- Park Historic Resource Areas will be managed to conserve natural resources within parks including the conservation and enhancement of wildlife habitat.

With respect to Urban Habitat:

- Outline reforestation plans in selected parks and undertake reforestation and vegetation management to restore native plant communities. Use volunteers where appropriate and institute park stewardship committees to provide long-term care of restoration sites.
- Update the UWHCP.
- Incorporate habitat restoration or enhancement measures in maintenance activities as well as capital projects.
- Improve and increase the inventory of natural areas by reclaiming, restoring, and enhancing greenspaces, creeks, and wetlands.

With respect to Maintenance:

- Develop open space maintenance strategies
- Clarify measurable objectives for maintenance of open spaces and parks
- Tree management and maintenance will include considerations of tree health, long-term reforestation needs, historical context, and tree impacts such as public safety, views, aesthetics, street or sidewalk damage, and maintenance requirements.

With respect to Safety:

- Work toward long-term solutions for security problems

2.1.3 Seattle Parks Tree Management, Maintenance, Pruning, and/or Removal Policy & Procedure (2001)

The purpose of the Parks Department Tree Policy is stated as

> *"to maintain, preserve, and enhance the urban forest within parks . . . to increase overall tree canopy, tree health, tree longevity . . . and to ensure that parks trees are managed in a manner that is consistent with other departmental and municipal policies"*

The Tree Policy describes in detail the circumstances under which tree and other vegetation removals may occur on Parks property, and how trees and other vegetation are to be replaced. Among the criteria used to consider a tree or vegetation removal are: hazard trees, or those that are dead, dying, or diseased; trees or vegetation that create visibility problems (e.g. along roadways); trees or vegetation that compromise public safety; trees that are crowded/over-planted; trees that can be removed to create light gaps, snags or other habitat features.

The Tree Policy also details the required components of a Vegetation Management Plan, which is required if proposed vegetation removal exceeds clearing thresholds also defined in the Tree Policy. Vegetation Management Plans must include specific elements defined in the policy such as, vegetation replacement plan, specifications for invasive control, and a maintenance plan.

2.2 Vegetation Management Plan Goals & Objectives

Goal 1: Improve overall forest health

Objectives:

1.a. Control invasives

1.b. Reduce human impacts to vegetation (encampments, social trails, dumping)

1.c. Increase native species richness in the shrub and tree layers
1.d. Coordinate with Cheasty Boulevard Plan (currently being developed by Seattle Parks) to ensure compatibility of tree removals and planting

Goal 2: Create and sustain over time a mixed deciduous/coniferous forest

Objectives:

2.a. Increase conifer density throughout the greenspace
2.b. Create canopy openings to allow diversity of conifer species to be planted
2.c. Increase species diversity of deciduous trees in the greenspace

Goal 3: Increase community stewardship

Objectives:

3.a. Coordinate with local school and youth groups to foster youth stewardship and school projects
3.b. Establish community relationships to increase neighborhood involvement in restoration and maintenance activities
3.c. Perform outreach to include broader community beyond the Beacon Hill neighborhood in ongoing projects in the greenspace

Goal 4: Improve wildlife habitat quality

Objectives:

4.a. Increase snag density
4.b. Increase quantity of down wood
4.c. Increase native plant species richness and structural complexity of forest
4.d. Protect and improve interior habitat
4.e. Protect and improve aquatic resources

CHAPTER 3.0 PLAN CONTEXT

3.1 History of Greenspace

The history of Cheasty Greenspace is tied to the history of Cheasty Boulevard, which received designation as a Seattle Landmark by the City of Seattle Landmarks Preservation Board in January 2003. Cheasty Boulevard was part of the original 1903 Olmsted plan for Seattle's boulevard system and was intended to provide a connection between Jefferson Park (then called City Park) and Mount Baker Boulevard. By 1911, Cheasty Boulevard (then called City Park Boulevard) was under construction, and was completed soon thereafter. Although there is very little specific information about what the Boulevard looked like in earlier times, there are aerial photos from as far back as the 1930's that do show evenly spaced trees along the eastern edge of the roadway (City of Seattle Landmarks Preservation Board, 2003).

Early acquisitions of parcels that make up the greenspace today occurred in the mid-to late 1950's, and were acquired from the federal Public Housing Administration, and King County Treasurer. In 1989 funds allocated through the King County Open Space and Trails Bond were used to purchase additional parcels in private ownership, and the idea of connecting the parcels by creating a protected greenspace took hold. The greenspace was officially designated and named in 1993. From the existing vegetation today, it is assumed that the east slope of Beacon Hill was logged during the development of Seattle, and merchantable timber (conifers) removed. The deciduous forest that now characterizes the greenspace has replaced the conifer-dominated forest that most likely existed until the early 1900's.

3.2 Citizen Activities and Concerns

Citizen stewardship activities in the greenspace have been limited in the past. Evidence of some patchy planting, mainly of conifers, has been observed, but there are no records of regular or significant stewardship activities. Parks does have a record of 200 cedar and 30 hemlock that were planted in the greenspace, in addition to 30 vine maple and 30 dogwood that were planted in the Boulevard right-of-way in the March 2000 Millenium planting. EarthCorps currently leads Saturday workparties in the greenspace.

Concerns voiced by neighborhood citizens during the public process for this project that are relevant to the VMP are summarized below and have mainly to do with vegetation management along edges where park property abuts landscaped yards, illicit activities and associated safety issues, and improvement of wildlife habitat.

- Ivy and hazard trees
- Perceived Parks neglect of greenspace in the past – invasives and trees
- Improvement of tree canopy health
- Improvement of greenspace interior health
- Improvement of wildlife habitat especially for birds
- Encampments and dumping
- Future increase in adjacent housing density associated with Rainier Vista redevelopment and increased human pressure on greenspace
- Safety of pedestrian corridors such as Hanford St. steps
- Minimal use of herbicides and clear policy statement
- Delineation of park boundary adjacent to Rainier Vista Housing

- Discouraging human use and trail development

3.3 Interested Organizations

Organizations interested in Cheasty Greenspace at the time of this writing are limited to: Seattle Parks Department (property owner), and EarthCorps (community youth training and environmental restoration group). The impetus for the creation of a VMP comes from Seattle Parks as well as EarthCorps, which has received a $100,000 Leadership Grant from the Seattle Foundation for a 2-year project in Cheasty Greenspace to work with Beacon Hill and Rainier Valley youth and residents to start restoration work in the greenspace.

Teachers from nearby elementary schools, Kimball Elementary on 23rd and Hanford, and Dearborn Park Elementary on S. Orcas, have expressed interest in participating in restoration and education opportunities in the greenspace, as has science faculty at Asa Mercer Middle School, located at 16th and S. Columbian Way.

The Friends of Cheasty is a citizen volunteer group involved to varying degrees in a number of planning projects that are ongoing in the neighborhood. Direct involvement in development of the VMP has been limited.

Members of the Cheasty Boulevard Project Advisory Team and the Friends of Seattle's Olmsted Parks are also interested in the development and implementation of the VMP, and attended public meetings during plan development.

3.4 Vegetation-related Uses

There are two primary human uses of the greenspace. Passive enjoyment of the forest setting by those who live adjacent to the greenspace and those who pass through it on foot, by bicycle, or in cars is clear. Wildlife viewing and enjoyment of the aesthetic benefits of the forest are probably the main elements of this passive use. In addition, there are some very 'active' human uses that compromise the aesthetic qualities and health of the forest – chiefly, dumping of garbage and yard waste, encampments, and a myriad of social trails that bisect the forest. Another detrimental effect of these particular uses is the toll taken on the community perception of safety and positive qualities of this forested area in the midst of their neighborhood.

3.5 Related Projects

Related projects in the area are numerous. Seattle Parks is currently working on a Cheasty Boulevard Restoration Plan to improve and enhance the boulevard itself including a pedestrian soft-surface boulevard trail, drainage improvements, and plantings. In a separate, but closely related project, the Property Management Division of Seattle Parks is working on resolving property encroachment issues, primarily along the Boulevard. Directly east of, and adjacent to the greenspace, the Seattle Housing Authority is working on redevelopment of the Rainier Vista Housing project, which is projected to have up to 1,100 housing units at the foot of the slope of Cheasty Greenspace immediately north of S. Columbian Way. Sound Transit plans a future light rail station at S. McClellan St., associated with commercial redevelopment of the area. Construction of the proposed tunnel alignment through Beacon Hill would result in temporary disturbance of the greenspace between S. McClellan and S. Forest and

possibly southwards. Development of the S. McClellan station as a gateway to the Rainier valley will likely result in increased use of the greenspace as a thoroughfare via Cheasty Boulevard.

CHAPTER 4.0 ASSESSMENT OF EXISTING CONDITIONS

This chapter provides a brief qualitative overview of the conditions in the Cheasty Greenspace. A more detailed quantitative summary of forest conditions is provided in Chapter 5.

4.1 Geology & Soils

The topography of the Cheasty Greenspace is characterized by gentle to moderate slopes, most of which are generally east facing. Steep slopes (exceeding 40%) are found only in a few isolated pockets. Some south-facing slopes occur along a stream corridor that lies to the north of the Parks maintenance yard, and also just to the north of S. Columbian Way. The greenspace has some north-facing slopes mostly occurring on the south side of S. Columbian Way. Essentially no areas within the greenspace slope to the west.

No soil maps were located for the Cheasty Greenspace area. The Natural Resource Conservation Service (previously the Soil Conservation Service) does not typically map soils in developed urban areas. Soil data from the University of Washington surficial geology mapping project is not yet complete for this sector of the city at the time of this writing. Information on soil type was collected in the field for this project. These data indicate that soil type is fairly uniform throughout the greenspace. Most areas were characterized as having mineral soils with either sandy loam or sandy clay loam. No organic soils were found. With the exception of wetlands and stream corridors, soils in the area tend to be fairly well drained; standing water was found only within the three wetland plots.

4.2 Slope Stability and Erosion

The City of Seattle records indicate that 11 landslides have occurred either within the greenspace or in its immediate vicinity. These are shown on Map F-1. Potential slide areas were also mapped by the City and cover most of the northern 75% of the greenspace. No recent or active slides were observed during data collection for this project. Addressing slope stabilization and landslide issues is beyond the scope of this VMP.

Soil erosion does not appear to be a major problem in Cheasty Greenspace. No significant erosion or downcutting was observed in any of the three small streams that were located during data collection.

4.3 Streams and Wetlands

Three riparian corridors and associated wetlands were identified and mapped during the data collection process (Map F-1). Two of these corridors lie within close proximity of each other on the west side of Cheasty Boulevard, to the south of a cluster of houses that lie south of S. Hinds Street. The third corridor lies in an east-west ravine to the north of the Parks maintenance yard, east of Cheasty Boulevard. Each system has a small-branched stream channel that is typically no wider than 3 feet and no deeper than one foot. Water for these systems appears to come from hillside seeps and drainage pipes and likely flows year round, as flows were observed in all three streams during the summer. These are not long stream systems – surface flow is only maintained through the narrow corridor of the greenspace. The flows return to underground pipes before leaving the greenspace. Their discharge point is not known.

Much of the length of the stream channels is surrounded by forested wetland. The wetlands are dominated by deciduous trees such as red alder (*Alnus rubra*) and, in one wetland, the invasive Norway

maple (*Acer platanoides*). Understory species richness is high in the wetlands in comparison to surrounding upland forest areas. Wetland understory dominants include beaked hazelnut (*Corylus cornuta*), salmonberry (*Rubus spectabilis*), invasive English ivy (*Hedera helix*), and lady fern (*Athyrium filix-femina*). The south wetland that lies above the boulevard has extensive invasion by Japanese knotweed (*Polygonum cuspidatum*) along the length of the stream channel, as well as English ivy. The wetland that lies downslope and north of the Parks maintenance yard has been invaded by numerous Norway maple saplings and extensive patches of Himalayan blackberry (*Rubus procerus*). Despite the extent of invasive plant species in the wetlands, native species richness is high.

The primary functions provided by the wetlands in the greenspace include wildlife habitat, natural system support (e.g., export of organic material to downstream or adjacent aquatic systems), water quality improvement, and groundwater recharge. The wetlands are on public lands and therefore have the potential to provide passive recreational and educational values such as bird watching and nature study.

4.4 Forest Character and Condition – Qualitative Description

Cheasty Greenspace is dominated by second- and third-growth forest that was logged presumably through the late 1800s and early 1900s. The general condition of this area indicates that it has received no large-scale forest management over the years (e.g., extensive replanting or thinning), and that the regrowth of the forest has been strongly influenced by the urban setting. As the surrounding area has undergone rapid and extensive urban development since logging, regrowth has been shaped by factors that include:

- fragmentation into small forest blocks;
- development that has resulted in restricting much of remaining forest remnants to slide-prone slopes;
- disturbance along forest edges for construction of roads, housing, commercial buildings, etc.;
- invasion of non-native plants progressing from the disturbed edges into forest interiors; and
- tree clearing for utility corridors and accompanying invasion of non-native plants.

As forest fragmentation increased due to spreading urban development in the area, the extent of forest edges increased. All forest edges differ in typical ways from the forest interior: there is increased potential for windthrow, more open tree canopy, decreased shading, decreased moisture in soil and microclimate, and encroachment by non-native plants. Forest edges in urban areas tend to have an even greater extent of disturbance, the effects of which are seen further into the forest interior than in more rural areas. Types of urban-related disturbances may include selective tree clearing, planting or encroachment of non-native species from landscaped areas, encroachment of invasive weeds from disturbed areas, networks of social paths, predation of wildlife by domestic pets, piping creeks underground or diverting flows thus eliminating or decreasing riparian corridors, and increased storm water flows resulting in slides of steep slopes. This higher level of disturbance, when combined with the extensive fragmentation and smaller forest blocks of urban areas, results in the degraded condition of the forest edge extending further into the forest and greatly reducing the effective forest interior. In Cheasty Greenspace, for example, invasive plant species are not just limited to disturbed forest edges, but occur and even dominate the understory throughout some forest stands. The urban nature of the greenspace is reflected in the following description of the forest condition in the area.

Cheasty Greenspace includes primarily forested areas that are dominated exclusively by deciduous species. Small areas of mowed lawn and shrubland also occur in the greenspace. Vegetation Zones were defined for this project using existing vegetation data mapped by the Seattle Urban Nature Project (SUNP, 2000) that was ground-truthed in the field and checked against data collected during the course of

developing this VMP (Map F-2). SUNP assessments were made by qualitative visual estimates made using a dichotomous key to determine vegetation type during a site walk-through. Vegetation classes used are consistent with those used by the Washington State Gap Analysis Project and the Interagency Committee for Outdoor Recreation, as well as the Seattle Parks UWHMP and SUNP. Cheasty Greenspace consists of three Vegetation Zones based on vegetation type: pole deciduous forest, immature deciduous forest, and shrubland. These are defined in Table 1.

Table 1. Vegetation Types in Cheasty Greenspace

Vegetation Type	***Definition***	***Area within greenspace***
Deciduous Forest 5-15" (Pole)	• 5-15" diameter at breast height (dbh) • Trees greater than 30 ft in height • Dominated by big-leaf maple • Some red alder	41.7 acres
Deciduous Forest 15-20" (Immature)	• 15-20" diameter at breast height (dbh) • Trees greater than 30 ft in height • Dominated by big-leaf maple • Some black cottonwood	13.7 acres
Shrubland	• Greater than 25% shrub cover • Less than 10% tree cover • Dominated by Himalayan blackberry	1.9 acres

4.4.1 Deciduous Forest 5-15"

Pole deciduous forest covers the majority of the greenspace, which reflects the young age of the forest in this area. This type is almost entirely dominated by big-leaf maple (*Acer macrophyllum*) with patches of red alder typically occurring in areas of moister soils. There is virtually no coniferous component to this forest; only five western red cedar trees (*Thuja plicata*) were noted in the sample plots.

In general, trees are small and stem density (trees per acre) is relatively high, as is canopy closure. Understory plants reflect the high degree of shading, except in those areas where tree deaths have caused canopy openings. English ivy is the most frequently occurring invasive in the shadier areas, while Himalayan blackberry dominates in the canopy openings and along some of the forest edge. However, native shrub cover was observed to be high in most of the greenspace, with the exception of canopy openings and disturbed areas that were dominated by blackberry.

Invasive cover in the pole deciduous forest is high. English ivy is the most commonly occurring species in the area and also has the highest percent cover. For frequency of occurrence, ivy is followed by Himalayan blackberry, English holly (*Ilex aquifolium*), and cherry laurel (*Prunus laurocerasus*), although the latter two species generally do not have high percent cover in most areas. Japanese knotweed is dominant in one wetland, but does not occur in other parts of the greenspace. Other invasive species that are present but are not particularly problematic at this time in terms of percent cover include bindweed (*Convolvulus arvensis*), climbing nightshade (*Solanum dulcamara*), and bamboo.

The most common plant associations observed in the pole deciduous forest are shown in Table 2. Two of the wetlands described previously (those located to the west of Cheasty Boulevard) are located within this vegetation type.

Table 2. Common Plant Associations in Pole Deciduous Forest in Cheasty Greenspace

Plant Associations	
Big-leaf maple/Hazelnut/Indian plum	Big-leaf maple/Red alder/Himalayan blackberry
Big-leaf maple/Ivy/Hazelnut/Sword fern	Big-leaf maple/Sycamore maple/Ivy/Indian plum
Big-leaf maple/Ivy/Indian plum/Sword fern	Red alder/Ivy
Big-leaf maple/Himalayan blackberry	Red alder/Himalayan blackberry
Big-leaf maple/Hazelnut/Holly/Ivy	

The presence of tree saplings, indicating forest regeneration, was observed frequently throughout the greenspace. All of the natural regeneration is deciduous. The most common native species observed among regenerating saplings was big-leaf maple, but these were significantly out-numbered by two non-native, invasive maple species – Norway maple and Sycamore maple (*Acer pseudoplatanus*). These saplings originate with the seed source from street trees planted along Cheasty Boulevard.

4.4.2 Deciduous Forest 15-20"

The immature deciduous forest is very similar to pole deciduous forest except that average tree diameter is bigger. Areas of immature deciduous forest occur primarily in the south end of the greenspace. This vegetation type has a canopy of big-leaf maple. Common plant associations are similar to those found in the pole deciduous forest except that red alder is not a dominant in the immature deciduous forest (Table 3). Of all the invasive species, ivy occurs in the highest percent cover in this vegetation type. There are fewer canopy gaps and less edge in these areas, thus precluding establishment by Himalayan blackberry. The wetland that lies to the east of Cheasty Boulevard is located within this vegetation type. Forest regeneration in the immature deciduous forest is comprised of native big-leaf maples and invasive maples, with no natural regeneration by conifers.

Table 3. Common Plant Associations in Immature Deciduous Forest in Cheasty Greenspace

Plant Associations	
Big-leaf maple/Hazelnut/Indian plum	Big-leaf maple/Ivy/Indian plum/Sword fern
Big-leaf maple/Ivy/Hazelnut/Sword fern	Big-leaf maple/Sycamore maple/Ivy/Indian plum

4.4.3 Shrubland

Shrubland covers a very small percentage of the greenspace. This vegetation type occurs in areas where the tree canopy has been removed, primarily along Cheasty Boulevard to the south of the Parks maintenance yard. This area is almost entirely dominated by invasive shrubs, mainly Himalayan blackberry and Scot's broom (*Cytisus scoparius*). Scattered trees (mostly non-native cherry) occur in this vegetation type, but canopy cover is quite low. Native species richness and tree regeneration are also very low in this vegetation type.

4.5 Wildlife Habitat

Cheasty Greenspace represents a rather unique habitat from a wildlife perspective: a relatively large island of forest, with smaller, proximal forested islands nearby, in the midst of an urban landscape. Much

of the value of the greenspace to wildlife lies in the size of the contiguous forested tracts, as well as the habitat complexity that the plant community can potentially provide. The structural complexity and geometry of Cheasty Greenspace, as well as the role of the greenspace as wildlife habitat, are briefly discussed below.

4.5.1 Structural Complexity

Structural complexity of the environment is an important component in determining wildlife species diversity. Structurally complex and heterogeneous habitat correlates with increased wildlife species diversity and abundances (August, 1983). In forested systems, structural complexity is both vertical and horizontal. Vertical structural complexity refers to the changes in distribution and physical features of the plant community in the vertical plane, from the herbaceous layer at the forest floor to the treetops. Horizontal complexity refers to patchiness in the distribution of plant species and habitat features across the landscape along the horizontal axis. Cheasty Greenspace may be characterized as a relatively young forest whose canopy predominantly consists of a single tree species, and where many of the trees are approximately the same age. The structural complexity of habitat for wildlife is more simplified at the greenspace relative to mixed-aged stands of coniferous/deciduous forest, and species adapted to such more complex forest systems are expected to be rare or absent at Cheasty.

Some notable features that contribute to structural complexity—course woody debris, and dead and dying trees (collectively known as "snags")—have been correlated with high wildlife diversity, abundance, and maintenance of key wildlife species (Thomas, 1979; Neitro *et al*., 1985; Swanson and Franklin, 1992; Knutson and Naef, 1995). Snags have been defined as any dead or partially dead tree with a diameter at breast height (dbh) of at least 4" and a height of at least 6' (Thomas *et al.*, 1979). Course woody debris (CWD) has been defined as "sound and rotting logs and stumps, and coarse roots in all stages of decay, that provide habitat for plants, animals and insects and a source of nutrients for soil structure and development. Material [is] generally greater than 7.5 cm (3") in diameter" (Stevens, 1997).

In the Pacific Northwest, more than 100 vertebrate species are known to use snags during some point of their life cycle (Thomas 1979, Neitro et al. 1985), and 57 species in Washington and Oregon are known to use snags specifically for breeding, roosting, or denning (Weikel and Hayes, 2001). Bird species such as pileated, downy, and hairy woodpeckers use dead and dying trees as both roosting and nesting sites. Other birds utilize snags for cavity nesting, including various owl species, chickadee species, nuthatch species, brown creepers, wood ducks, warbler species, wren species, and numerous others. Many other bird species use snags as feeding sites—foraging for insects that are associated with the snags—and many raptors use snags as roost sites and hunting perches. Mammals also use snags for denning, including squirrel species, opossums, raccoons, martens, fishers, and numerous bat species. Generally, the larger the diameter of the snag, the higher the quality of habitat it provides—as many mammal and bird species will not utilize snags below a certain dbh. Richter (1993), for example, evaluated literature concerning snags and concluded that the mean dbh of snags utilized by wildlife ranged from 22" to 46", and large snags (> 10" dbh) are considered to be more valuable than small snags because they can be used by a wider variety of species (Jones, *et al*., 1995). Thus, larger snags result in an increase in wildlife species diversity.

Downed wood (CWD) is also an important component of a forested system and adds structural complexity to the habitat. Similar to snags, CWD plays an important role in the life history cycles of many wildlife species; 179 vertebrate species utilize CWD for purposes of foraging, cover, or reproduction in Washington and Oregon (Spies *et al*., 1988). Amphibians, particularly the terrestrial salamanders (family Plethodontidae) such as Western red-backed salamanders and ensatinas, make extensive use of downed logs and stumps for nesting and refuge habitat. Many bird species also forage on downed wood—Bull and Holthausen (1993) found that pileated woodpeckers spent the same amount of time foraging on downed logs compared to snags. Hollow logs may provide refuge or denning

opportunities to many wildlife species, including shrew species, deer mice, chipmunks, wood rats, voles, skunks, and some weasel species. Trees uprooted due to windthrow or slide events may result in exposed root-caps and disturbed soil that provide den sites for ground squirrels, foxes, raccoons and others (Cantrell *et al*., 1994). Smaller mammal species such as squirrels, mice, and chipmunks frequently use downed logs as "highways" through the understory or over streams, moving quickly along the surfaces of the logs (Stevens, 1997). Coarse woody debris also serves as refugia and escape cover for many smaller species of wildlife.

Cheasty Greenspace contains relatively low numbers of both large snags and CWD greater than 20" diameter (see Chapter 5.1). Furthermore, most of the CWD consistsof smaller branches and branch fragments, whereas the habitat and structural value of CWD to wildlife increases as CWD size increases. The structural complexity of Cheasty Greenspace, with respect to snags and CWD, is rather low compared to other forested systems. Habitat complexity, and by extension wildlife species diversity, could potentially be increased by introducing additional snags and CWD into the system.

4.5.2 Edge Effects

Edge habitat occurs between two distinct habitat types, and incorporates aspects of both bordering habitats. Edges exist throughout nature in many forms, and are often areas of high biological diversity because two or more natural communities come together and influence each other. Plants and animals that live in each community utilize edge habitat, as does a distinct set of species specifically adapted to ecological edges. Species diversity and abundance have long been thought to be higher in edge habitat (e.g. Leopold, 1933), and for years forested ecosystems have been managed to increase and enhance edge habitat. Edge habitat that results from human activity, however, can be disruptive. Non-native pest species, both plants and animals, can invade edge habitat from nearby bordering habitats, particularly in areas dominated by human activity. Creation of edge habitat can alter the amount of light, the amount of wind, the amount of water, and the temperature that an animal in such habitat would experience. While some species are adapted to edge habitat, there are many species which require interior spaces, shielded from the influence of surrounding lands. Certain wildlife species are more successful in edge habitat, and their population densities are higher in edge habitat—examples include species such as red-tailed hawks, great horned owls, brown-headed cowbirds, American robins, white-tailed deer, etc. Often, these edge-adapted species are predators or parasites—the edge habitat allows easier access to potential prey or hosts—or are generalists that can utilize a wide variety of food resources (Wilcove, 1985; Winter *et al*., 2000).

Other species, however, do poorly in edge habitat; such species require large tracts of interior habitats at some physical remove from edge habitat, and are referred to as "area-sensitive" species. These species are dependent upon conditions in the interior habitat, and are often not tolerant of the dryer conditions or the predators and parasites that occur in edge habitat (Tewksbury *et al*., 1998; Goosem, 2002). Others may experience increased predation or competition in edge habitat, due to the presence of species that would not otherwise occur in core habitat. Examples include species such as pine martens, brown creepers, and many neotropical songbirds such as warblers and tanagers.

Cheasty Greenspace has a relatively large amount of edge habitat, due to the geometry of the greenspace. In general, the greenspace tracts tend to be long and narrow or small and fragmented, maximizing edge habitat relative to interior habitat. There is, however, a relatively large portion of the south end of the greenspace that contains interior habitat. Area-sensitive species are expected to utilize the interior habitat in the southern portion of the greenspace, but are not as likely to be present in the portions of the greenspace dominated by edge habitat. Thus, much of the wildlife habitat value of Cheasty Greenspace lies in the preservation of some forested interior habitat—a rarity in an urban landscape.

4.5.3 Wildlife Corridors and Stepping Stones

In fragmented landscapes, so-called wildlife corridors—habitat that serves to link isolated habitat fragments—have come to be recognized as potentially important components of the landscape for maintaining wildlife species diversity and abundances (Noss, 1987; Gilbert *et al*., 1998; Perault and Lomolino, 2000). Corridors may allow for movement of wildlife between fragmented habitat patches, allow for recolonization of patches in which a local extinction event has occurred, and provide increased foraging area and escape cover for many species. Further work has suggested that a network of small patches in close proximity to one another (habitat "stepping stones") can also increase wildlife population sizes and persistence (Webb and Thomas, 1994; Schultz, 1998).

Cheasty Greenspace is composed of a number of smaller and larger forested patches in relatively close proximity to one another, similar to the habitat stepping stones mentioned above. In addition, Cheasty Greenspace contains a larger, contiguous forest habitat that might serve as a corridor between some of the smaller, discrete habitat patches. Part of the value of the greenspace, then, is its potential to connect habitat fragments that might otherwise be isolated—possibly preserving persistence and increasing population sizes for some wildlife species.

4.6 Human Impacts

Human impacts are evident throughout the greenspace. Direct impacts to vegetation are caused primarily by one or more of the following:

- encampments where people have established long-term camps
- social trails weaving throughout the greenspace
- dump areas where garbage and yard waste have been piled, primarily near roads

A number of encampments were noted near or in sample plots during the data collection process, but no systematic inventory of camps was undertaken. Those that were found are shown on Map F-1. These locations may change over time, as it is likely that encampments are abandoned and then re-established in different locations. Many of the social trails found in the greenspace appear to be associated with the encampment locations. The trails are generally narrow and the entrances to them are somewhat obscure. Dumped refuse was frequently observed in the greenspace, particularly adjacent to and downhill from roads where there is room enough to pull out from traffic. In some areas, garbage is strewn across entire slopes where it has rolled downhill from the edge of the road. It is apparent that a number of areas have received repeated dumping. As expected, the amount of refuse observed generally decreases in the forest interior as one gets further from roads. However, where encampments are located in the forest interior, concentrations of refuse also occur.

CHAPTER 5.0 FINDINGS – QUANTITATIVE DESCRIPTIONS OF ZONES AND MANAGEMENT AREAS

This chapter summarizes the vegetation data that were collected for this study. A qualitative description of the existing conditions is provided for the greenspace overall, and for each of the designated management areas. The greenspace was divided into management areas based on major characteristics that dictate the types of management actions required. For example, areas with high cover of ivy on the ground and in the trees were placed in the Ivy Management Area (MA). Areas that had high ecosystem diversity, good canopy cover, and low invasive cover were assigned to the Quality Habitat MA. Table 4 lists the MAs and provides the defining characteristics. Map F-3 shows the locations of the management areas within Cheasty Greenspace.

Table 4. Management Areas within Cheasty Greenspace

Management Area	***Definition***	***Extent of Greenspace (acres)***
Blackberry MA	• >50% cover by Himalayan blackberry	5.7
Ivy MA	• >50% ivy cover on the ground ***and*** • minimum of 1/3 of trees in plots have ivy in them	25.4
Ivy/Blackberry MA	• >50% ivy cover on the ground ***and*** • >50% cover by Himalayan blackberry	1.0
Patch MA	• <50% ivy cover on the ground ***and*** • <50% cover by Himalayan blackberry ***and*** • small patch size, ***and*** • moderate native shrub cover (30-60%)	5.7
Quality Habitat MA	• wetland/riparian corridor ***or*** • <25% ivy cover on the ground ***and*** • <25% cover by Himalayan blackberry ***and*** • high native shrub cover (>60%) ***and*** • wide bands of interior habitat	19.2
Edge MA	• all of the perimeter of the greenspace as well as interior edges along roads, Hanford steps, and Parks maintenance yard	NA

5.1 Data Collection Methods

In order to accurately assess existing conditions in Cheasty Greenspace, data on the forest condition were collected by trained volunteers from EarthCorps. Sample plot locations were determined and marked on maps of the greenspace by Sheldon & Associates staff. Field teams located the plots on the ground by estimating distances from the nearest landmarks shown on the aerial photographs that were provided.

Data were recorded directly on field data forms, which were later transferred to an Excel™ spreadsheet for analysis. EarthCorps volunteers were trained in the field on data collection methods. Data were collected during April and May of 2003. Following data collection, biologists and a Parks volunteer did spot checks of a sub-sample of plots for quality control.

The sample plot size selected for the inventory was 1/10th acre, each plot having a diameter of 74.5 feet. A total of 43 plots were sampled. The area of the greenspace, including right-of-ways that cross the greenspace, is 57 acres. Since each plot represents 1/10th acre, 43 plots would cover roughly 4.3 acres, or 7.5% of the total area, and 10% of Park-owned property. Plots were located to sample representatively throughout the greenspace and to include the various vegetation types observed (Table 5).

Table 5. Distribution of Data Plots by Management Area

Management Area	*# of data plots*	*Size of MA*	*Ttl acreage of data plots*	*% of MA sampled*
Blackberry MA	6	5.7 acres	0.6 acres	10.5%
Ivy MA	18	25.4 acres	1.8 acres	7%
Ivy/Blackberry MA	2	1.0 acres	0.2 acres	20%
Patch MA	5	5.7 acres	0.5 acres	8.8%
Quality Habitat MA	12	19.2 acres	1.2 acres	6.3%
totals	43	57 acres	4.3 acres	7.5%

To identify on-the-ground the exact area in which to sample, field teams located and flagged the center of the sample plot and then measured out 37.5 feet from the center in all four cardinal directions, flagging each point at the edge of the plot.

The following data were collected at each sample plot (see Appendix C for example data form):

- team and plot identifiers
- aspect and slope
- percent canopy closure
- occurrence of saturated soils or standing water
- soil texture/type
- occurrence of special features – power lines, slides, encampments, creeks, wetlands, erosion, refuse, trails, roads, and others
- occurrence of snags of varying decay classes
- occurrence of large woody debris of varying decay and size classes
- percent cover by woody debris
- tree species present
- height, diameter and stem count for each tree
- rating of tree condition (health)
- occurrence of tree seedlings or saplings indicating regeneration
- shrub and herb (non-woody) species present and percent cover
- Indication of whether species are native or not

Visual estimates were used for determining dominant plant species, species percent cover and canopy closure. The tree diameter and height were determined by either visual estimates or by measuring using a forester's cruise stick (Biltmore stick). Tree health was based on a subjective assessment of extent of canopy cover and any evidence of tree decay.

Data recorded in the field were transferred by EarthCorps volunteers into a Microsoft Excel™ spreadsheet, which was used to sort and analyze the data. Maps in this report that represent existing conditions and data trends in the greenspace were prepared by Parks staff using ArcView™.

5.2 Cheasty Greenspace Overall

5.2.1 Overall Findings/Data

Forest Composition
Cheasty Greenspace includes mostly forested areas that are exclusively dominated by deciduous species. Of the 647 trees observed in sample plots, 58% were big-leaf maple, 17% were red alder, 8% were invasive maples, and the remaining 17% were spread over 17 species, with no individual species accounting for more than 4% of the total trees. Coniferous species account for less than 1% of the total trees in the greenspace. Non-native trees comprise 16% of the total trees that were recorded. These are primarily Norway maple, Sycamore maple, common hawthorn, and a cherry species.

A broad diversity of understory and groundcover species is represented in Cheasty Greenspace. A total of 77 shrub, herb and vine species were noted. Table 6 provides a list of the most frequently occurring species; note that the majority of the 77 species were observed infrequently. Among the top ten most common species, six are native and 4 are non-native. Of the five most common species, English ivy and Himalayan blackberry have the highest percent cover (Figure 1). Spatial distribution of native species diversity (shrub and herb) within the greenspace is shown on Map F-4.

Table 6. Most Frequently Occurring Understory Species in Cheasty Greenspace

Common Name	***Scientific Name***	***Tall Shrub (TS), Short Shrub (SS), Herb (H), Vine (V)***	***Non-native?***	***(to be filled in)***
Sword fern	*Polystichum munitum*	H		
Indian plum	*Oemleria cerasiformis*	TS		
Himalayan blackberry	*Rubus procerus*	V	Yes	
English ivy	*Hedera helix*	V	Yes	
Beaked hazelnut	*Corylis cornuta*	TS		
English holly	*Ilex aquifolium*	TS	Yes	
Bracken fern	*Pteridium aquilinum*	H		
Oregon grape	*Mahonia nervosa*	SS		
Cherry laurel	*Prunus laurocerasus*	TS	Yes	
Fringecup	*Tellima grandiflora*	H		
Field horsetail	*Equisetum arvense*	H		
Trailing blackberry	*Rubus ursinus*	V		
Vine maple	*Acer circinatum*	TS		
Salmonberry	*Rubus spectabilis*	TS		
Red elderberry	*Sambucus racemosa*	TS		
Red huckleberry	*Vaccinium parvifolium*	SS		

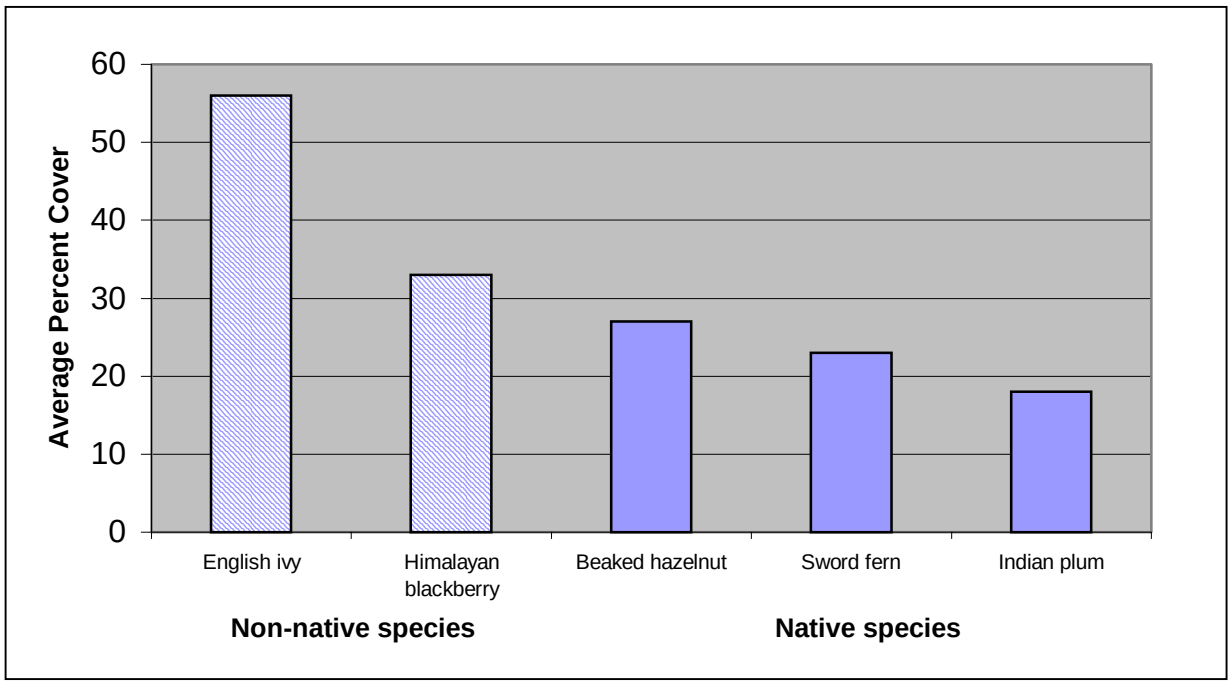

Figure 1. Average Percent Cover of Five Most Frequently Occurring Understory Species

Despite the frequent occurrence of non-native species, 63% of the plots sampled have greater than 50% cover by native shrubs. Many of the plots with less than 25% native shrub cover occur in areas of disturbance where blackberry is dominant. The distribution of plots per coverage class is shown in Figure 2. Spatial distribution of native shrub coverage is shown on Map F-5.

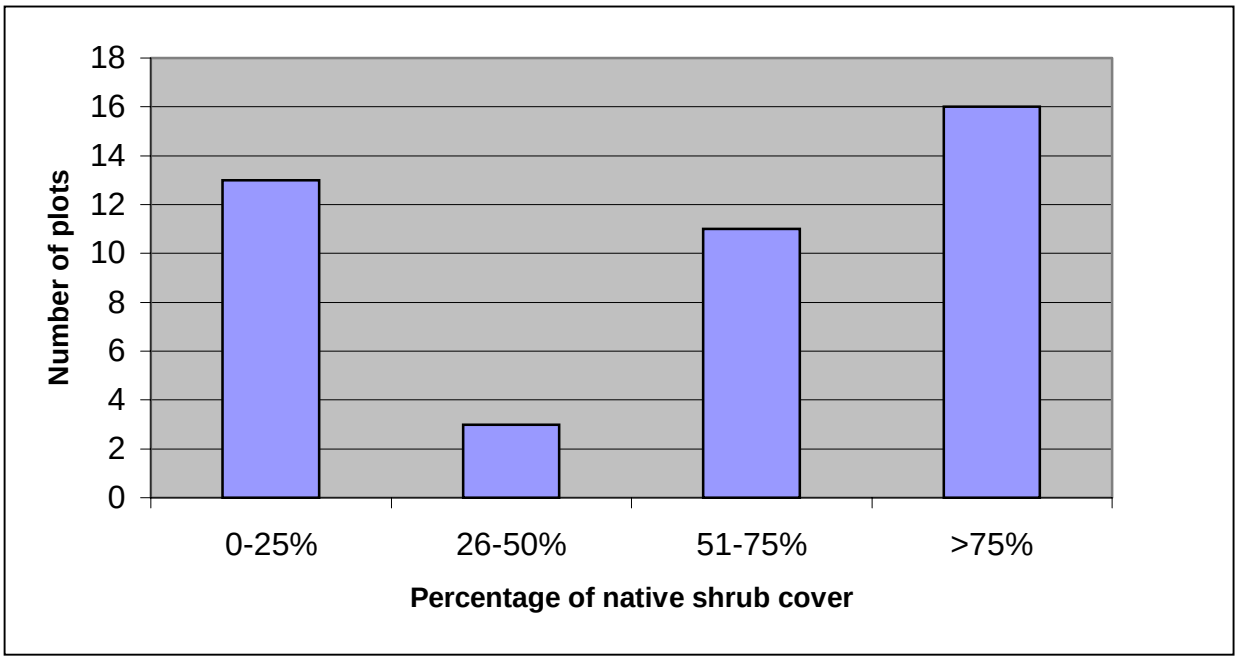

Figure 2. Number of Plots in Each Native Shrub Cover Range

Tree Density, Size and Health

The number of trees in a given area determines density. Figure 3 shows the distribution of the plots falling into specific tree count ranges. Map F-6 shows the spatial distribution of tree density in the greenspace. Typically, the dynamics of plant physiology result in a decrease in density of trees as tree size increases. Therefore, a low count of trees per plot does not necessarily reflect low canopy cover or an unhealthy forest; both tree count and size must be considered together to determine whether an area is lacking in canopy cover. Table 7 shows the percent of plots that fall into each diameter and tree count range. Tree sizes were in the 5-15" diameter range in 37 out of 43 plots, while tree densities in 25 plots were over 100 trees per acre.

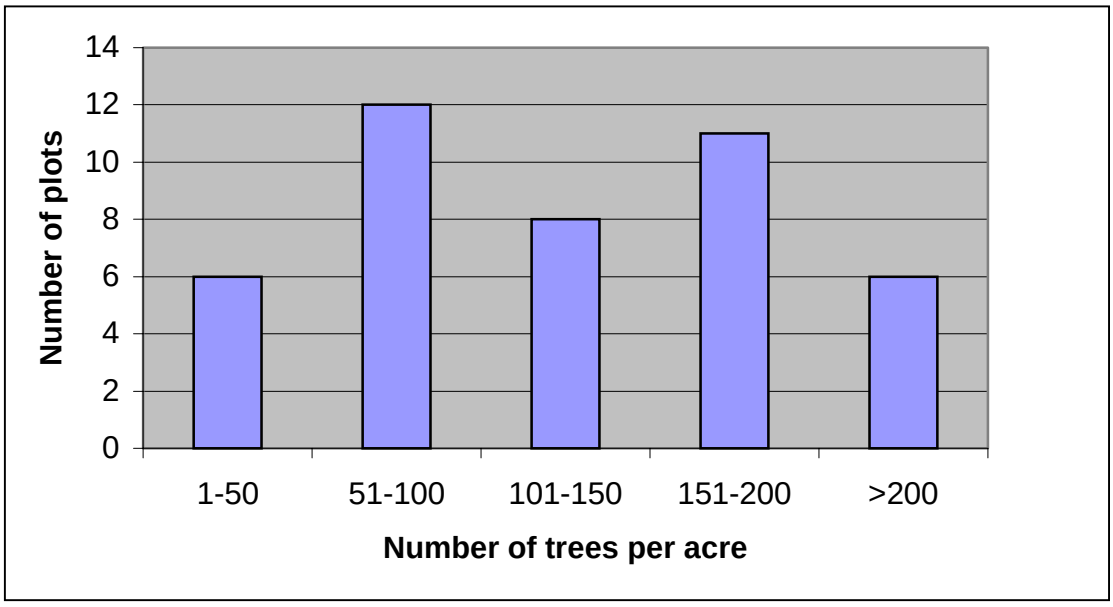

Figure 3. Number of Plots in each Tree Density Range

Table 7. Percent of Plots by Number and Diameter of Trees

Trees Per Acre	*Tree Diameter Range (inches)*					*Count of Plots in Each Tree Density Range*
	<5	*>5-10*	*>10-15*	*>15-20*	*>20*	
1-50		2	2	2		6
51-100		5	4	2	1	12
101-150		4	4			8
151-200		8	3			11
>200	1	4	1			6
Count of Plots in Each Tree Diameter Range	1	23	14	4	1	

In terms of tree density, 120 trees per acre is typically considered a healthy density for urban forests in the Puget Lowlands (pers. comm. Mark Mead, Seattle Parks, 2003). Approximately 58% of the Cheasty Greenspace has a density of greater than 100 trees per acre. However, the remaining 42% of the area has densities that fall below the healthy benchmark. When compared to the more rural forests of the Puget Lowlands, which have fewer disturbance indicators than urban forests, Cheasty Greenspace has relatively small trees. Approximately 98% of the greenspace area has trees that average 20 inches in diameter or less, and 56% of the area has trees that average 10 inches in diameter or less. This indicates a fairly young forest. Figure 4 shows the average tree diameter for each data plot. The data plot numbers were assigned in ascending order from north to south in the greenspace, so the chart indicates that average tree size is generally larger near the south end.

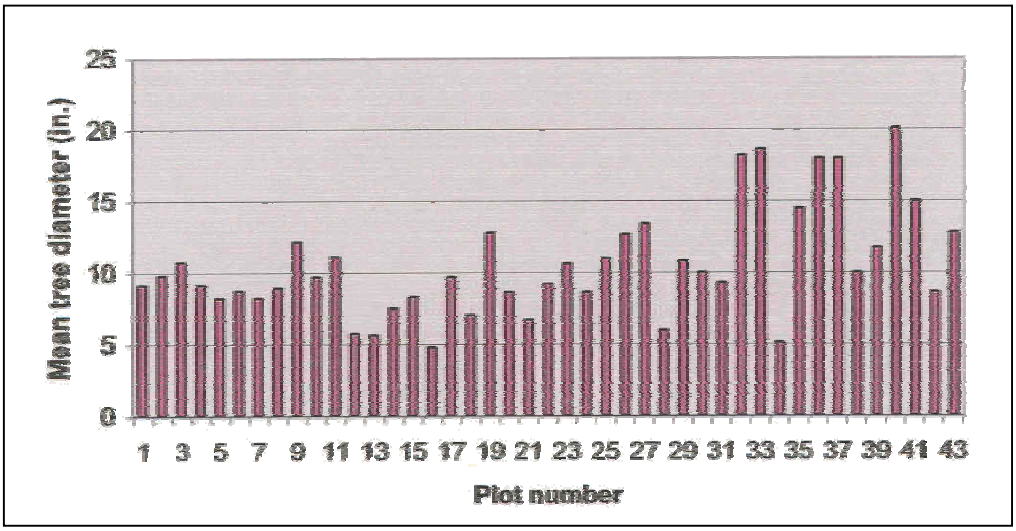

Figure 4. Average Tree Diameter by Plot

Forests with high canopy closure are generally considered to be in fair to good health. Canopy closure in Cheasty Greenspace generally averages quite high, as shown in Figure 5. Map F-7 indicates that canopy closure is particularly high throughout the southern end of the greenspace.

A relatively subjective determination of forest health was made by volunteers during data collection. Table 8 summarizes the tree health data by diameter class. Only 11% of the greenspace was judged to have "good" tree health. The majority of forested plots rated fair for tree health, but 30% rated poor. There is no discernible pattern where tree health either increases or decreases with canopy closure; the majority of areas with high canopy closure rated either fair or poor. This may be a reflection of the effects of ivy because areas of high canopy closure in the greenspace are also those that have high ivy cover and problematic ivy in the trees. Similarly, the data do not reflect a clear trend between tree health and density, as one might reasonably expect. Table 9 shows how tree health varies with the number of trees per acre.

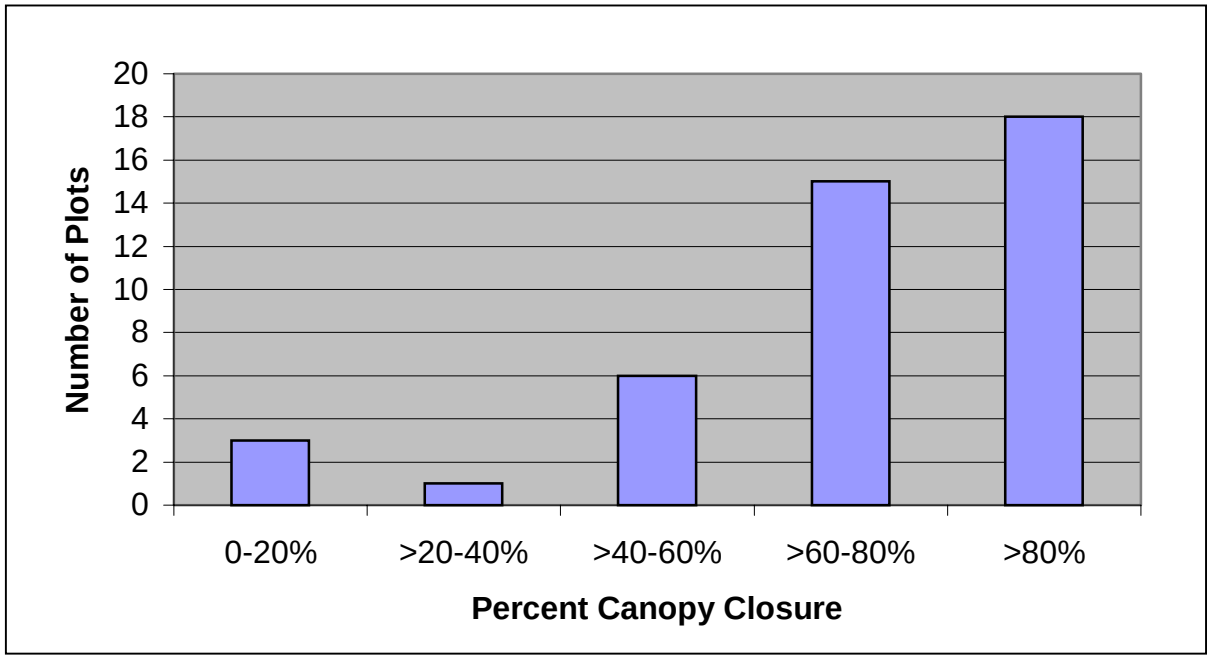

Figure 5. Number of Plots in Each Percent Canopy Closure Range

Table 8. Tree Health by Canopy Closure

Canopy Closure Range (% cover)	*Percent of Total Plots with Good Tree Health*	*Percent of Total Plots with Fair Tree Health*	*Percent of Total Plots with Poor Tree Health*	*Total Percent of Plots in Each Canopy Closure Range*
0-20	0	5	2	7
>20-40	0	2	0	2
>40-60	2	12	0	14
>60-80	7	14	14	35
>80	2	26	14	42
Percent of all Plots in Each Tree Health Rating:	11	59	30	

Another component of forest health that was measured as part of this study is tree regeneration. Forests with few tree seedlings are in danger of dying out over time because there are no replacements for the aging trees. In Cheasty Greenspace, the data show that there is moderate tree regeneration – 51% of the area was observed to have tree seedlings present. However, 63% of all seedlings counted were non-native species. Thus native regeneration is low in the greenspace. All of the naturally regenerating seedlings observed were deciduous. The lack of natural regeneration of conifers reflects the lack of mature conifer forest in the area.

Table 9. Percent of Plots in Each Tree Density Range by Tree Health

Trees Per Acre	*Tree Health Rating*			*Total Percent of Plots in Each Tree Count Range*
	Good	*Fair*	*Poor*	
1-50	0	12	5	17
51-100	2	19	5	26
101-150	2	12	5	19
151-200	5	9	12	26
>200	2	9	2	13

Snags and Course Woody Debris

A total of 67 snags were identified in the 43 data plots (standing dead wood of unspecified diameter, not including stumps and downed snags). Although snag densities can be highly variable between and among sites, snag densities at Cheasty Greenspace are similar in number to snag densities in some managed deciduous forests in the Southeast U.S. (e.g. Carmichael and Gwynn, 1983). Although no data on snag diameter was collected, qualitative visual assessments indicated that most of the snags in the greenspace are less than 10" in diameter. Data on live tree diameters, representing a reservoir from which snags are created, further supports this conclusion (see Tree Density, Size and Health above). Similar to the case with large trees, large snags were noticeably absent in the greenspace, indicating that the forest is relatively young. Smaller snags do not provide as high quality habitat functions for wildlife, and many species will only use large snags for nesting and roosting (e.g. pileated woodpeckers).

Course woody debris was counted and categorized by size. Similar to the data on tree diameters, most of the CWD fell into the smallest size category, with 62% of the CWD measured as being less than 8" in diameter (Table 10). Large CWD (greater than 20") was especially infrequent. Qualitative assessments of CWD cover generally fell into the 0-5% cover range, with only 16% of the plots showing CWD cover within the 5-10% range, and only 2% of the plots with a CWD cover range of 25-50%. For purposes of wildlife use in Oregon and Washington forests, Spies and Franklin (1991) determined that CWD cover of between 15-20% was adequate for most small mammals—an important component in a forest ecosystem. Based on the data collected, Cheasty Greenspace contains a relatively low cover of CWD of relatively small sizes.

Table 10. Quantity of Coarse Woody Debris by Management Area

Management Area	*# of CWD units 4-8"*	*# of CWD units 8-20"*	*# of CWD units >20"*	*# of CWD units occurring as stumps or downed snags*	*Total acreage of data plots*	*CWD densities per acre*
Blackberry MA	3	2	0	2	0.6 acres	11.7
Ivy MA	61	40	6	26	1.8 acres	73.9
Ivy/Blackberry MA	2	0	0	0	0.2 acres	10
Patch MA	10	3	5	13	0.5 acres	62
Quality Habitat MA	31	10	0	19	1.2 acres	50
Totals	107	55	11	60	4.3 acres	54.2

Invasive Species Cover

Non-native invasive species are a severe problem in Cheasty Greenspace. Approximately 76% of the area has greater than 50% total cover by invasive species, while 48% of the area has greater than 75% cover. Figure 6 shows the number of plots in each category of total percent cover by invasive species. Based on the plot data, there are virtually no areas in the greenspace that do not have any cover by invasive species. Map F-8 shows the distribution of invasive cover by plot.

By species, English ivy is the most widespread of all the invasives and has the highest cover; followed closely by Himalayan blackberry. These are both creeping, woody vines that spread readily and grow up and over other plants, thus choking out competitors for space and sunlight. Ivy poses the additional threat of climbing into trees and compromising tree health, ultimately killing trees. Approximately 75 % of all plots have some ivy present, and 31% of all plots have over 50% cover by this one species. Himalayan blackberry is also present in 75% of all plots, and has over 50% cover in 16% of plots. With a few exceptions, those plots with high ivy cover were relatively low in blackberry cover, and vice versa. Figures 7 and 8 show the distribution of ivy and blackberry cover, respectively.

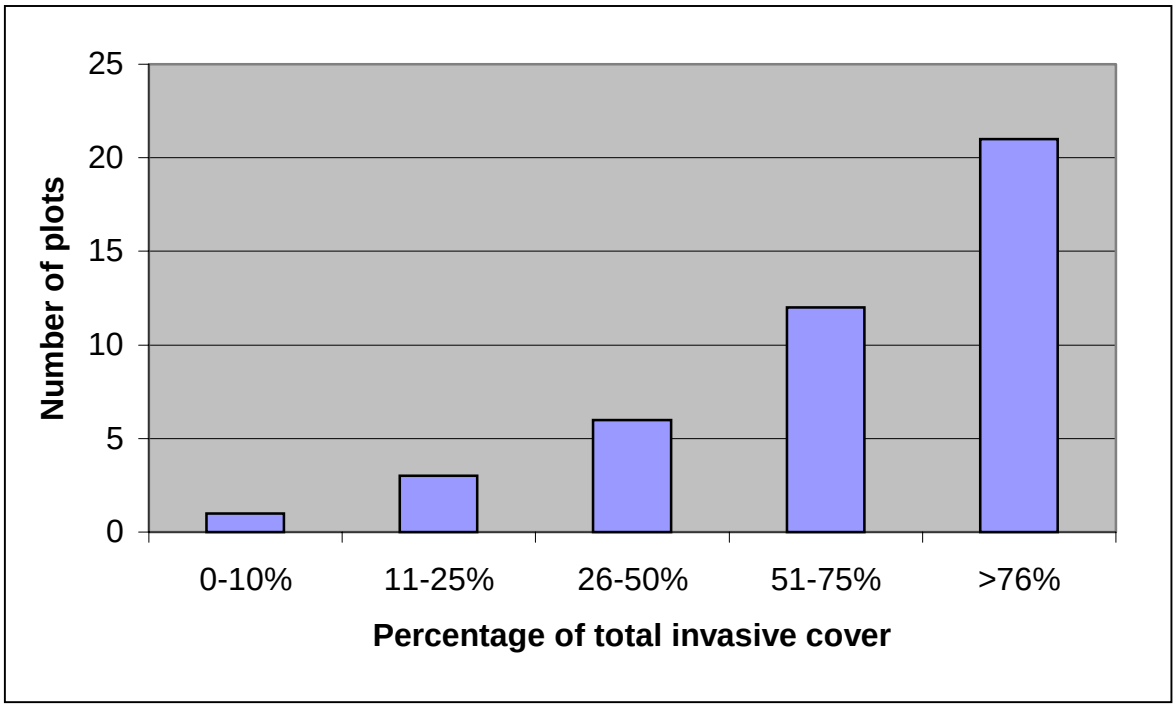

Figure 6. Total Invasive Cover

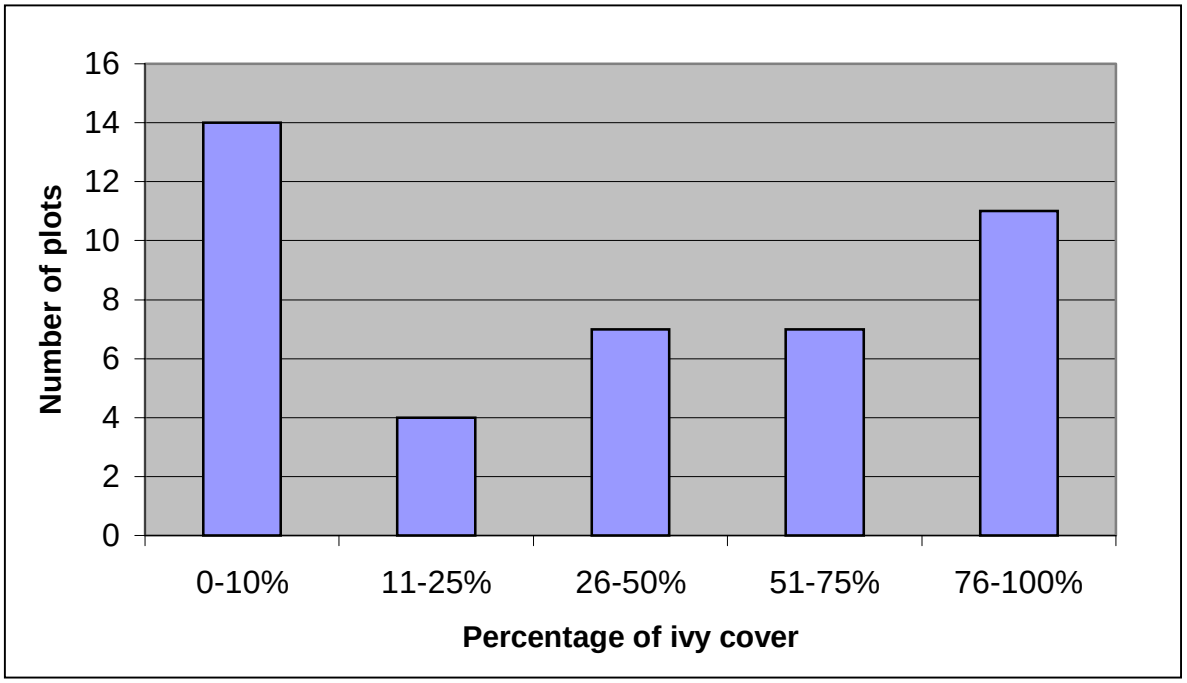

Figure 7. Number of Plots in Each Percent Cover Range for Ivy

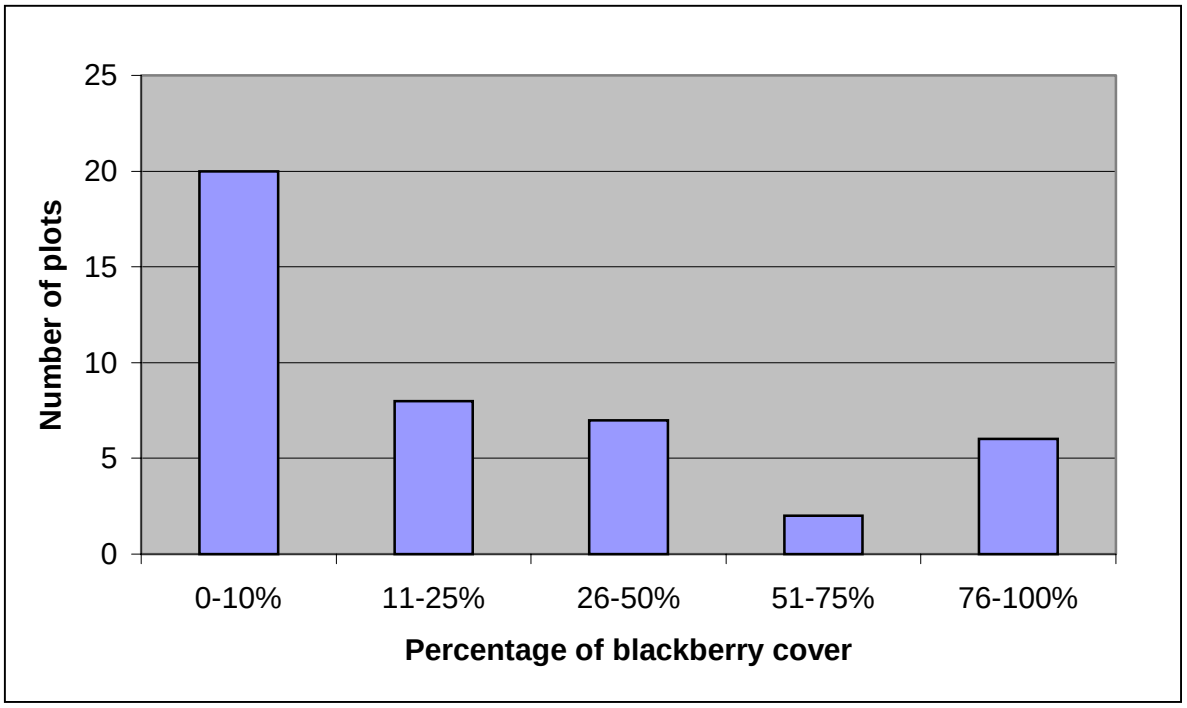

Figure 8. Number of Plots in Each Percent Cover Range for Blackberry

The remaining invasive species occur scattered throughout the greenspace and occur with less frequency and lower cover than ivy and blackberry. Table 11 shows the percent of sample plots with percent cover broken down for each invasive species.

Table 11. Occurrence of Invasive Plant Species

	Percent of Plots in Which Species Occurs in Cover Class								
Range of Percent Cover	***English Ivy***	***Him. Black -berry***	***English Holly***	***Cherry Laurel***	***Bind-weed***	***Scot's Broom***	***Japanese Knot-weed***	***Climbing Night-shade***	***Bam-boo***
None	25	25	23	49	77	95	93	95	95
1-25%	16	42	67	49	23	5	5	5	5
26-50%	19	14	5	2	0	0	2	0	0
51-75%	14	5	0	0	0	0	0	0	0
76-100%	26	14	2	0	0	0	0	0	0

5.2.2 Overall Issues/Opportunities

The primary issues that have been identified for the greenspace as a whole are as follows:

- Lack of native species diversity in tree canopy – majority is dominated by bigleaf maple
- Lack of coniferous trees – only 5 cedar trees counted in plots
- Significant invasion by non-native maple seedlings – occur in 28% of plots
- Low native regeneration – majority of saplings are non-natives
- High percent cover by invasive shrubs and herbs – 76% of plots have >50% total invasive cover
- High proportion of greenspace has significant ivy problem – 75% of plots have ivy; 40% of plots have >50% cover
- Low levels of down wood and snags
- Human impacts detrimental to greenspace health are siginificant (dumping, encampments, social trails)

5.3 Management Area Comparison Matrices

Table 12 is a summary of the data presented in the tables within each Management Area description that follows. This summary is provided for ease of comparison among the MAs. Summary information for the MAs is also shown on Map F-9.

Table 13 provides a summary of the problems or constraints in Cheasty Greenspace that were identified by this study. Ratings for each constraint are listed by Management Area. Each MA is rated by severity: severe, moderate, or low, or by presence or absence. The severity of the ratings was determined by comparing the data among the MAs, as well as by comparison with healthy lowland forests in the Puget Sound area. Some ratings were determined based on qualitative observations made during fieldwork.

Table 12. Summary of Selected Data for Management Areas

Characteristic	*Management Area*				
	Blackberry MA	***Ivy MA***	***Ivy/ Blackberry MA***	***Patch MA***	***Quality Habitat MA***
Percent of Greenspace Area (%)	10	44.6	1.7	10	33.7
Average Tree Density (trees per acre)	88	125	200	147	177
Average Canopy Closure (%)	40-60	>80	40-60	60-80	>80
Average Tree Diameter (inches)	9.3	12	9.9	9.5	9.6
Average # of All Native Plant Species	6.2	9.8	8	10.8	11.2
Average # of Native Shrub Species	1.7	4.1	2.5	4.2	5.2
Avg. Percent Cover by Native Shrubs	5	72	37	58	81
Avg. Percent Cover by Invasive Species*	104	95	169	37	50
# of Plots w/Invasive Maples	1	3	1	1	6
Total Count of Snags in Plots	2	55	8	17	28
Snags/Acre	0.35	2.2	8	3.0	1.5
Total Count of CWD in Plots	7	133	2	31	60
Pieces of CWD/Acre	11.7	73.9	10	62	50

*cover >100% can occur when coverage exists in more than one vegetation layer

Table 13. Summary of Severity of Identified Problems by Management Area

Constraints	***Blackberry MA***	***Edge MA***	***Ivy MA***	***Ivy/ Blackberry MA***	***Patch MA***	***Quality Habitat MA***
Small Tree Size	Mod	Mod	Mod	Mod	Mod	Mod
Low Tree Density	Sev	Mod	Low	Low	Low	Low
Low Native Tree Diversity	Sev	Sev	Sev	Sev	Sev	Sev
Low Conifer Cover	Sev	Sev	Sev	Sev	Sev	Sev
Low Overall Regeneration	Sev	Sev	Sev	Sev	Sev	Sev
Low Conifer Regeneration	Sev	Sev	Sev`	Sev	Sev	Sev
Poor Tree Health	Mod	Mod	Mod	Mod	Mod	Mod
Low Native Understory Cover	Sev	Sev	Mod	Sev	Mod	Low
Low Native Understory Diversity	Sev	Mod	Low	Mod	Low	Low
High Total Invasive Cover	Sev	Mod	Sev	Sev	Low	Mod
High Blackberry Cover	Sev	Sev	Low	Sev	Low	Low
High Ivy Cover	Low	Mod	Sev	Sev	Low	Mod
Low Snag Density (large diam.)	Mod	Low	Mod	Low	Mod	Mod
Low CWD Density (large diam.)	Mod	Low	Mod	Low	Mod	Mod
Refuse	Mod	Sev	Mod	Mod	Mod	Mod
Encampments	Low	Low	Mod	Low	Mod	Mod
Social Trails	Low	Mod	Mod	Low	Mod	Mod

Sev=Severe, Mod=Moderate, Low=Low

5.4 Blackberry Management Area

The Blackberry MA is defined as including those areas that have greater than 50% blackberry cover. These thickets do not cover the entire M.A., but are present in enough abundance to characterize these areas. The largest part of this M.A. is at the south end of Cheasty Boulevard adjacent to the Parks maintenance yard. The remainder of this M.A. is found mostly in the central portion of the greenspace between S. Andover and S. Winthrop St. The Blackberry MA covers 5.7 acres, and comprises 10% of the greenspace (Map F-3).

5.4.1 Blackberry MA Findings/Data

This MA is characterized by high blackberry cover, low native species richness and cover, low tree density, and small tree size. As shown in Table 14, the average percent cover of all invasive species is very high for this MA. Tree density is the lowest for all the MAs in the greenspace and is below the range that is considered normal density for healthy forests. Average tree diameter is small, as is typical for most of the greenspace. Native shrub cover is very low in comparison to the other MAs. This reflects the growth habits of blackberry, which forms dense root masses and sends shoots sprawling over other plants, eventually out-competing them for sun and rooting space. In contrast to the Ivy MA, the native shrub layer in this MA is severely compromised, both in diversity and cover. Blackberry thickets in Cheasty Greenspace tend to occur in forest canopy openings, as indicated by the low tree density and small tree size. Plots in the Blackberry MA rate among the lowest in tree health in the greenspace, along with those in the Ivy/Blackberry MA. This MA has very low quantities of coarse woody debris (CWD) – only the Ivy/Blackberry MA has less.

Table 14. Selected Characteristics of the Blackberry MA

Percent of Greenspace Area	10%
# of Plots and Plot Acreage in MA	6 – 0.6 acres
Average Tree Density	88 per acre
Average Canopy Closure	40-60% closure
Average Tree Diameter	9.3 inches
Average # of All Native Species	6.2 species
Average # of Native Shrub Species	1.7 species
Average Percent Cover by Native Shrubs	5% cover
Average Percent Cover by Invasive Species	104% cover*
# of Plots w/Invasive Maples	1 plot
CWD/Acre	11.7 pieces/acre
Most Common Plant Associations	Bigleaf maple/ blackberry Bigleaf maple/ alder/ blackberry Bitter cherry/ blackberry

*cover >100% can occur when coverage exists in more than one vegetation layer

5.4.2 Blackberry MA Issues/Opportunities

The primary issues that were identified for the Blackberry MA are as follows:

- High percent cover by blackberry
- Lack of native tree diversity
- Lack of conifers
- Small tree size
- Low tree density

- Low canopy cover
- Low native understory species richness and cover
- Low CWD count
- Small patch size

5.5 Ivy Management Area

The Ivy MA is defined as including those areas that have greater than 50% ivy cover and have ivy in at least 1/3 of the trees. This is the largest M.A. and is well-represented in the southern part of the greenspace – south of the Parks maintenance yard to S. Columbian Way and beyond along both sides of Mountain View Dr. S. It is also found in parcels throughout the middle part of the greenspace between S. Andover and S. Hanford St., and in a large area at the north end of the greenspace between S. McClellan and S. Bayview St. This MA comprises 25.4 acres, or 44.6% of the greenspace (Map F-3).

5.5.1 Ivy MA Findings/Data

As the name implies, a dense cover of ivy is the main feature that characterizes these areas. However, other indicators of forest health are relatively good for this MA. Native species richness is high in comparison with the other MAs, averaging 9.8 species per plot. Percent cover for native shrubs (72%) is lower than that for the Quality Habitat MA (81%), but higher than the other MAs, indicating that despite the smothering effect of ivy there is still a somewhat intact native shrub componenet in these portions of the forest. The average tree density of 125 trees per acre is low in comparison to some of the other MAs but still falls in a healthy range. The Ivy MA has the largest average tree diameter of all areas (12 inches), indicating the older age of the forest. Canopy closure in this MA is typically greater than 80%. The Ivy MA has the highest density of CWD/acre, though almost half of the pieces counted in his MA are less than 8" in diameter. This may reflect a large number of bigger tree limbs on the forest floor because trees in this MA tend to be of the larger size class and are affected by ivy; or it could reflect smaller maples that were out-competed as the stand developed and have since died and dropped. Table 15 summarizes some key features of this MA, presenting averages for the data from those plots assigned to the Ivy MA.

Table 15. Selected Characteristics of the Ivy MA

Percent of Greenspace Area	44.6%
# of Plots and Plot Acreage in MA	18 – 1.8 acres
Average Tree Density	125 per acre
Average Canopy Closure	>80% closure
Average Tree Diameter	12 inches
Average # of All Native Species	9.8 species
Average # of Native Shrub Species	4.1 species
Average Percent Cover by Native Shrubs	72% cover
Average Percent Cover by Invasive Species	95% cover
# of Plots w/Invasive Maples	3 plots
CWD/Acre	73.9 pieces/acre
Most Common Plant Associations	Bigleaf maple/ ivy Bigleaf maple/ ivy/ hazelnut/Indian plum Bigleaf maple/ ivy/ hazelnut/ holly Bigleaf maple/ ivy/ Oregon grape/sword fern

5.5.2 Ivy MA Issues/Opportunities

The primary issues that were identified for the Ivy MA are as follows:

- High ivy cover and frequent invasion of trees
- Lack of native tree diversity
- Lack of conifers
- Lack of large diameter snags
- Lack of large diameter CWD

5.6 Ivy/Blackberry Management Area

The Ivy/Blackberry MA is defined as including those areas that have greater than 50% ivy ***and*** greater than 50% blackberry cover. It is found in two small areas in the central portion of the greenspace between S. Hinds and S. Horton St. The MA includes one portion of the Boulevard right-of-way due to its unusual breadth on the west side of the Boulevard south of Horton St. The Ivy/Blackberry MA is the smallest MA, covering 1.0 acre, and comprises only 1.8% of the greenspace (Map F-3).

5.6.1 Ivy/Blackberry MA Findings/Data

This MA has some similar characteristics to the Blackberry MA – it has very high cover by invasives, low canopy closure, small tree size, and low cover by native shrubs. The high average tree density is skewed because one data plot in this MA has an unusually high tree count, and only two plots lie within this MA. These areas exhibit the worst of the invasive problem in the greenspace: dense blackberry thickets, ivy covering whatever ground can be seen among the blackberry, and ivy creeping high into the trees. The invasives have excluded native species and account for most of the cover in the understory. CWD density is the lowest of all the MAs and all CWD found in these plots was of the smallest size class (4-8" diameter).

Table 16. Selected Characteristics of the Ivy/Blackberry MA

Percent of Greenspace Area	1.7%
# of Plots and Plot Acreage in MA	2 – 0.2 acres
Average Tree Density	200 per acre
Average Canopy Closure	40-60% closure
Average Tree Diameter	9.9 inches
Average # of All Native Species	8 species
Average # of Native Shrub Species	2.5 species
Average Percent Cover by Native Shrubs	37% cover
Average Percent Cover by Invasive Species	169% cover*
# of Plots w/Invasive Maples	1 plot
CWD/Acre	10 pieces per/acre
Most Common Plant Associations	Bigleaf maple/ blackberry/ ivy

*cover >100% can occur when coverage exists in more than one vegetation layer

5.6.2 Ivy/Blackberry MA Issues/Opportunities

The primary issues that were identified for the Ivy/Blackberry MA are as follows:

- High cover by both ivy and blackberry
- Lack of native tree diversity
- Lack of conifers

- Low native shrub cover
- Small patch size

5.7 Patch Management Area

The Patch MA is defined as including those areas that have less than 50% ivy cover, less than 50% blackberry cover, moderate native shrub cover, and small patch size. Four small patches of this MA are located in the northern half of the greenspace, and one is located at the far southern extent of the greenspace. The Patch MA covers 5.7 acres, and comprises 10% of the greenspace (Map F-3).

5.7.1 Patch MA Findings/Data

The primary features of the Patch MA are that they tend to be small areas that are only moderately invaded by invasive species. These areas were not included in the Quality Habitat MA because they have virtually no interior habitat. While the indicators of forest health such as tree density, canopy closure, and level of invasives are all relatively positive, the small patch size decreases the value of these areas to wildlife. Small patch size also makes these areas more vulnerable to invasion by non-native plant species, and more attractive to generalist/opportunistic and often non-native, animal species. The Patch MA is potentially vulnerable to overall habitat degradation due to edge effect on a continuing basis, however, currently conditions in this MA are fairly good.

Tree size and native species richness are comparable to the Quality Habitat MA. Total invasive cover in the Patch MA is actually the lowest for the entire greenspace. Quality Habitat is higher than the Patch MA in tree density, canopy closure, native shrub cover, and CWD density. This area rates second to Quality Habitat among the six MAs in terms of forest health and habitat value. However, as its name indicates, the Patch MA is typically low in connectivity to other parts of the greenspace and has a high perimeter to interior ratio.

Table 17. Selected Characteristics of the Patch MA

Percent of Greenspace Area	10%
# of Plots and Plot Acreage in MA	5 – 0.5 acres
Average Tree Density	147 per acre
Average Canopy Closure	60-80% closure
Average Tree Diameter	9.5 inches
Average # of All Native Species	10.8 species
Average # of Native Shrub Species	4.2 species
Average Percent Cover by Native Shrubs	58% cover
Average Percent Cover by Invasive Species	37% cover
# of Plots w/Invasive Maples	1 plot
CWD/Acre	62 pieces/acre
Most Common Plant Associations	Bigleaf maple/ hazelnut/ sword fern/ ivy Bigleaf maple/ hazelnut/ Indian plum/ ivy

5.7.2 Patch MA Issues/Opportunities

The primary issues that were identified for the Patch MA are as follows:

- Lack of native tree diversity
- Lack of conifers

- Small tree size
- Small patch size
- High edge/interior ratio and edge effect

5.8 Quality Habitat Management Area

The Quality Habitat MA is defined as including those areas that are wetlands/riparian corridors, ***or*** have less than 25% ivy cover ***and*** less than 25% blackberry cover, ***and*** high native shrub cover, ***and*** wide bands of interior habitat. A large area of this MA occurs in the southern half of the greenspace to the east of Cheasty Boulevard between S. Andover St. and the Parks maintenance yard. A second smaller area lies in the central portion of the greenspace to the west of the boulevard south of S. Spokane St. The Quality Habitat MA covers 19.2 acres, and comprises 33.7% of the greenspace (Map F-3).

5.8.1 Quality Habitat MA Findings/Data

This MA includes some of the highest quality forest within the greenspace, as well as the greatest diversity of habitat types. This MA has high tree density, high canopy closure, high native species richness and cover, moderate invasive cover (in comparison to other MAs), and moderate CWD density. While not dominated by ivy or blackberry, these areas do still have a considerable total coverage by invasive species. Non-native maples occur with the highest frequency in this MA. Tree species diversity is low, as it is throughout the greenspace, and the average tree size is small. One of the main characteristics that contributes to the higher quality habitat of this MA is the large patch size which allows for more habitat for forest interior-dwelling wildlife and less edge-effect. Edge-effect refers to the higher level of disturbance to wildlife by humans that occurs along the forest edges (e.g., traffic, dumping) and the propensity for certain invasives to grow along the sunnier disturbed edges (e.g., blackberry).

There are three wetland/riparian corridors within this MA. These provide additional habitats for wildlife by the presence of water, movement corridors, higher plant species richness, and, typically, more snags and down woody debris. The invasive cover in the wetlands tends to be higher than most of the upland in the Quality Habitat MA, thus raising the average invasive cover for the entire MA. However, wetland/riparian corridors were included in this MA because they offer unique habitat and are protected as sensitive areas under the City of Seattle code.

Table 18. Selected Characteristics of the Quality Habitat MA

Percent of Greenspace Area	33.7%
# of Plots and Plot Acreage in MA	12 – 1.2 acres
Average Tree Density	177 per acre
Average Canopy Closure	>80% closure
Average Tree Diameter	9.6 inches
Average # of All Native Species	11.2 species
Average # of Native Shrub Species	5.2 species
Average Percent Cover by Native Shrubs	81% cover
Average Percent Cover by Invasive Species	50% cover
# of Plots w/Invasive Maples	6 plots
CWD/Acre	50 pieces/acre
Most Common Plant Associations	Bigleaf maple/ hazelnut/ Indian plum/ sword fern Bigleaf maple/ hazelnut/ Oregon grape

	Bigleaf maple/ sycamore maple/ hazelnut/ sword fern Bigleaf maple/ Oregon grape/ blackberry/ sword fern Red alder/ ivy

5.8.2 Quality Habitat MA Issues/Opportunities

The primary issues that were identified for the Quality Habitat MA are as follows:

- Lack of native tree diversity
- Lack of conifers
- Small tree size
- Moderate total invasive cover
- Frequent occurrence of invasive maples
- Lack of large diameter snags
- Lack of large diameter CWD

5.9 Edge Management Area

The Edge MA is defined as including those areas that occur along the greenspace edge, including forest edges adjacent to roads and walkways that cut through the greenspace. The width of the Edge MA varies depending on the characteristics of specific areas and the nature of the problem identified in those areas (e.g., invasive species, dumping), but is generally no more than roughly 20' in width. However, no area measurement was calculated for the Edge MA.

5.9.1 Edge MA Findings/Data

Data were not collected specifically along the edges of the greenspace, although some of the data plots overlap into the Edge MA. Field observations show that the Edge MA is characterized by moderate to high invasive cover, moderate canopy closure, and frequent signs of human disturbance such as dumping and vegetation clearing. However, all features considered, the Edge MA areas tend to be relatively low in forest health and in wildlife habitat functions. The Edge MA is also the most highly visible MA as, by definition, it presents itself along the exterior of the greenspace along the sidewalks, streets, and backyards of the neighborhood.

5.9.2 Edge MA Issues/Opportunities

The primary issues that were identified for the Edge MA are as follows:

- Moderate to high invasive cover
- Invasives creeping in both directions between greenspace and neighboring yards
- Frequent occurrence of dumps (yard waste, garbage)
- Unauthorized clearing of trees

CHAPTER 6.0 VEGETATION MANAGEMENT RECOMMENDATIONS

6.1 Long-term Targets for Each Management Area

The targets shown in Table 19 below were developed to provide some measurable targets for vegetation management activities in Cheasty Greenspace. To be useful, targets must represent achievement or progress towards stated goals, and must be attainable with reasonable implementation of recommended actions and tasks. Targets were assigned based on current conditions within each MA, and projected reasonable benchmarks that could be achieved within 20 years if VMP activities are implemented as described. Ultimately the long-term targets for each MA should be the same, and should represent a native, self-sustaining and regenerating, diverse, healthy urban forest. Such a forest would have a mixture of self-sustaining coniferous and deciduous canopy, a structurally and species diverse native groundlayer and sub-canopy, numerous snags and down wood in all stages of decay, and very little invasive cover. There would be few if any detrimental human impacts such as dumps and encampments, and good forest health would extend all the way from the forest interior to the outer edges. These are achievable goals, but only over a long timeframe on an order of magnitude of time to mature tree growth. However, a shorter timeframe of 20 years is suggested as a starting place that is reasonable for the lifespan of this VMP as a working document. After 20 years, it is hoped that conditions will have changed enough to warrant updating and revising of this VMP.

Table 19. Cheasty Greenspace Vegetation Management Targets (20 Year Outlook)

	Management Areas					
Parameters	***Blackberry***	***Ivy***	***Ivy/Blackberry***	***Patch***	***Quality Habitat***	***Edge***
Invasive cover	in trees: 0 on the ground: <20%	in trees: 0 on the ground: <20%	in trees: 0 on the ground: <20%	in trees: 0 on the ground: <15%	in trees: 0 on the ground: <5%	in trees: 0 on the ground: refer to target for specific MA which the edge borders
Native species diversity (shrub, herb)	minimum of 9 species present (avg. within MA)	minimum of 9 species present (avg. within MA)	minimum of 9 species present (avg. within MA)	minimum of 9 species present (avg. within MA)	minimum of 9 species present (avg. within MA)	minimum of 9 species present (avg. within MA)
Native species cover (shrub, herb)	>80%	>80%	>80%	>80%	>90%	refer to target for specific MA which the edge borders
Canopy diversity	at least 50% coniferous	at least 50% coniferous	at least 50% coniferous	at least 50% coniferous	at least 50% coniferous	at least 50% coniferous
Canopy closure	from existing, increase by an additional 50% of complete closure	maintain closure at existing levels	from existing, increase by an additional 50% of complete closure	from existing, increase by an additional 20% of complete closure	from existing, increase by an additional 10% of complete closure	refer to target for specific MA which the edge borders
Trees per acre	>75 trees/acre	>100 trees/acre	>75 trees/acre	>100 trees/acre	>100 trees/acre	refer to target for specific

	Management Areas					
Parameters	***Blackberry***	***Ivy***	***Ivy/Blackberry***	***Patch***	***Quality Habitat***	***Edge***
						MA which the edge borders
Large Snags per acre[1]	3	3	3	3	3	3
CWD Cover and Large CWD per acre[2]	15-20% cover including 2 large logs/acre	15-20% cover including 2 large logs/acre	15-20% cover including 2 large logs/acre	15-20% cover including 2 large logs/acre	15-20% cover including 2 large logs/acre	15-20% cover including 2 large logs/acre

[1] Large snags are defined as >10" dbh, preferably as large as possible

[2] Large CWD is defined as >12" dbh and at least 20' in length

6.2 Prescriptions by Management Area

6.2.1 Edge Management Area

Main Goals:

- Reduce invasive cover
- Establish dense native plant communities (particularly shrubs)
- Clean up dumps and plant densely to discourage repeated dumping
- Encourage stewardship by adjacent neighbors

The primary management actions in the Edge MA are removal and control of invasives, and clean-up of dumps. Controlling invasives along the greenspace edge poses a particular challenge because the edge is under constant siege as the frontline of invasion by non-native plants. The edge is also important as the most visible face of the greenspace to the community and immediately adjacent neighbors. Establishment of resilient native plant communities that can withstand threats from invasive species and intrusions from people (e.g. dumping) will require education of and help from adjacent neighbors. Invasion by non-native species occurs in both directions along the greenspace edge – from the greenspace into adjacent private property, and from neighbors' backyard gardens into the greenspace.

Neighbors abutting the greenspace can help reduce the problem of invasion from the outside by making sure that plants in their yards are not invasive. They can also help control invasive shrub and herbaceous species that are in the greenspace edge and creeping out, by applying to the Seattle Parks Department (Urban Forestry Unit) for a vegetation removal permit, or by joining the Adopt-a-Park program to adopt a particular portion of the greenspace edge. Seattle Parks will waive permit fees for private citizens who are interested in stewarding a portion of the greenspace edge in Park ownership to remove invasives and replant with native species as prescribed in this VMP. All removal actions must be followed by replanting and three-year establishment care as described in this VMP. Any actions in the Edge MA should follow management prescriptions for the specific MA which the edge borders.

6.2.2 Blackberry Management Area

Main Goals:

- Reduce blackberry cover
- Increase canopy closure
- Improve native species diversity in all layers
- Increase quantity of down wood

- Ameliorate effects of small patch size and edge on interior habitat

The primary management action to be done in the Blackberry MA is removal and control of blackberry. Its dominance in this MA is so complete that it determines and defines the overall health of the forest. Removal of these densities of blackberry found in this MA will require dense replanting with native species in all layers to establish shade as quickly as possible. In the long term, re-establishment of healthy forest in all layers that is currently lacking is key to successful control. Planted areas will require intensive follow-up weed control and plant establishment care. Mulching will help suppress weedy species, and supplemental watering should be done in all planted areas that are accessible.

Removal of invasive maples and ivy in trees is also important in this MA to preserve native tree health. Secondarily, removal and control of other invasives such as laurel, holly, and hawthorn should be done. Interior habitat that is not as badly degraded should be prioritized first before outer edges. Human impact sites can be cleaned up and restored as they are encountered in the course of other stewardship activities.

Edge in the Blackberry MA is similar in character to the 'interior' of the MA – disturbed and invaded, with poor forest health. Key edge areas in this MA that need attention are:

- Southern-most Blackberry MA parcel along east side of Cheasty Boulevard
    1. Encroachment issues in this area should be resolved by Parks Property Management Division and landowner(s). This area is also the south Boulevard 'entrance' to Cheasty Greenspace. Planting of Park-owned property should use guidelines of this VMP. Recommended plant community for this area is madrone/Douglas fir/grand fir with oceanspray/mock orange/tall Oregon grape/snowberry.
    2. Boundaries of disturbed edge along Parks maintenance yard should be defined prior to invasive control and planting.

- The Hanford St. steps is the only formalized pedestrian-only bisector of the greenspace. It is also a power-line corridor. Replacement of blackberry should focus on establishment of dense shrub community that is sustainable from the perspective of right-of-way maintenance and has a 'friendlier face' for pedestrians. Shorter shrubs should be planted closest to the steps, tapering to larger and taller species back into the forest on both sides of the steps. Teachers at nearby Kimball Elementary School have expressed interest in getting involved in stewardship of the greenspace – the Hanford St. steps could be an ideal project for elementary age students with some initial help from Parks Natural Area Crews to clear out nearby dump and encampment sites, and EarthCorps to help lead invasive removal and planting efforts.

Priority Action Areas within the Blackberry MA (in descending order):

1. Interior thickets caused by canopy gaps
2. Interior habitat that is not currently badly invaded
3. Trees with ivy anywhere in the MA
4. Exterior thickets in the Edge MA – Hanford St. steps
5. Human impact sites – as encountered during stewardship activities

Actions from Chapter 7 to perform in the Blackberry MA:

- Amending Soils – if at all only in Edge MA
- Creating Snags, CWD – interior areas only for snags, interior areas before exterior for CWD
- Mulching – all newly planted areas
- Planting – throughout
- Pruning – only in Edge MA where public safety is an issue

- Removing Plants – only in Edge MA where public safety is an issue
- Three Year Establishment Care – in all areas that are planted
- Watering – in Edge MA and all accessible newly planted areas
- Weeding and Invasive Control – throughout

6.2.3 Ivy Management Area

Main Goals:

- Reduce ivy cover and remove ivy out of all trees
- Increase conifer density
- Increase native shrub cover and density

Work in the Ivy MA will focus largely on ivy removal – initially from trees, and then including removal in the groundlayer. Groundlayer areas with some native shrub component should be targeted before those areas that have only sparse native shrub cover and low species diversity. Removal of ivy may be enough to release and stimulate the existing native shrub component without having to add plants. In all cases, conifers should be planted. Mesic to damp shady areas should be planted first with cedar, yew, and hemlock (if there are any pockets of more nutrient-rich/organic soils). Areas of existing canopy gaps with drier soils may support grand fir and/or Douglas fir. Otherwise, to plant firs, canopy gap creation will need to occur. This is not advised until the invasive problem is under control, as more sunlight will stimulate ivy, and may encourage other invasives to colonize the site. Establishment care for newly planted conifers will be needed. This care will probably be limited to weed control and mulching for interior areas, but could include watering closer to edges or if access permits.

Invasive maples should also be removed as a high priority. Dump sites, social trails, and encampments should be cleaned up and revegetated as they are encountered during other stewardship activities. Plant as needed. Finally, removal and control of other invasives such as laurel, holly, and hawthorn should also be done. Interior habitat that is not badly degraded should be worked on before outer edges. Down wood can be brought in anywhere in the MA – preferably first to areas where invasive control is being achieved so that it doesn't impede efficient work and movement of materials in areas that are not yet cleared of invasives and planted.

Edge in the Ivy MA is similar in character to interior, though there may be additional invasive coverage by blackberry in higher light areas. There is a substantial amount of Ivy MA edge adjacent to the Rainier Vista Housing project, that may potentially be stewarded by residents or on-site youth organization (e.g. Boys and Girls Club) in the future.

Ivy MA on both sides of S. Columbian Way is a high priority for action due to the larger size of the trees, fairly good native shrub condition, high level of human impacts, and relatively large area of interior forest. In addition, it lies adjacent to the largest patch of the Quality Habitat MA.

Priority Actions within the Ivy MA (in descending order):

1. Remove ivy from trees within the largest patches with the most connectivity – north and south of S. Columbian Way
2. Remove ivy from trees elsewhere in the MA
3. Plant conifers in areas with mesic to moist soils
4. Remove invasives in areas with intact and/or regenerating native shrub layer
5. Remove invasives from areas without intact native shrub layer and plant native shrubs
6. Add CWD throughout
7. Clean up and rehabilitate human impact sites as encountered during stewardship activities

8. Create trial canopy gaps and snags in areas with dry to mesic soils and low invasive cover under active control
9. Remove and control invasives and replant with natives in Edge MA – sites determined by private citizen permit application or public comment

Actions from Chapter 7 to perform in the Ivy MA:

- Creating Canopy Gaps, Snags, and CWD – canopy gaps only in dry to mesic areas with controlled invasives (do trials first), snags in interior areas only, CWD in interior before exterior
- Mulching – all newly planted areas
- Planting – throughout
- Pruning – only in Edge MA where public safety is an issue
- Removing Plants – only in Edge MA where public safety is an issue
- Three Year Establishment Care – in all areas that are planted
- Watering – in Edge MA and all accessible newly planted areas
- Weeding and Invasive Control – throughout

6.2.4 Ivy/Blackberry Management Area

Main Goals:

- Reduce ivy and blackberry cover
- Increase conifer density
- Increase native shrub cover
- Ameliorate effects of small patch size and edge on interior habitat

Actions in this MA must focus on removal of the two most prevalent invasives in the greenspace – ivy and blackberry. Ivy in trees should be removed first, and then groundlayer ivy in areas with any intact native shrub component. Invasive maples should also be removed as a high priority. Planting should focus on conifers throughout, and all layers in areas where blackberry thickets are removed. This MA is only 1 acre in size, so once work is initiated it may be desirable to simply tackle the entire MA. The narrowness of this MA dictates that it will always be susceptible to plant invasion and disturbance from the edge that will rapidly affect the entire area. Working to establish dense native shrub areas in the Edge MA that falls within the Ivy/Blackberry area is strongly recommended.

This MA is narrow and adjacent to Cheasty Boulevard, so access is good. Three-year establishment care for new plantings is expected. Invasive maples should also be removed as a high priority. Dump sites, social trails, and encampments should be cleaned up and revegetated as they are encountered during other stewardship activities. Plant as needed. Finally, removal and control of other invasives such as laurel, holly, and hawthorn should done. Down wood can be brought in anywhere in the MA – preferably first to areas where invasive control is being achieved so that it doesn't impede efficient work and movement of materials in areas that are not yet cleared of invasives and planted.

Priority Actions within the Ivy/Blackberry MA (in descending order):

1. Remove ivy from trees anywhere in the MA
2. Perform invasive control and planting in area on west side of Boulevard (due to better future connectivity to the north than potential connectivity of smaller area of Ivy/Blackberry on east side of Boulevard)
3. Clean up and rehabilitate human impact sites as encountered during stewardship activities
4. Remove and control invasives and replant with natives in Edge MA – sites determined by private citizen permit application or public comment
5. Add CWD throughout

Actions from Chapter 7 to perform in the Ivy/Blackberry MA:

- Amending Soils – if at all only in Edge MA
- Creating CWD – interior areas before exterior areas
- Mulching – all newly planted areas
- Planting – throughout
- Pruning – only in Edge MA where public safety is an issue
- Removing Plants – only in Edge MA where public safety is an issue
- Three Year Establishment Care – in all areas that are planted
- Watering – in Edge MA and all accessible newly planted areas
- Weeding and Invasive Control – throughout

6.2.5 Patch Management Area

Main Goals:

- Increase conifer density
- Remove ivy from all trees
- Ameliorate effects of small patch size and edge on interior habitat

Patch MA is in fairly good shape – not badly invaded, but also not exceptional habitat. Work here should focus first on improving the parts of this MA that are currently in good condition while also reducing the most imminent threats to forest health. Ivy in trees should be removed, as should all invasive maples. Groundlayer ivy should be removed, particularly where there is already reasonable native shrub cover and diversity. Conifers should be planted throughout, and put under three-year establishment care, which will include weed control and mulching, and watering for areas that are accessible.

Like the Ivy/Blackberry MA, narrowness dictates that these areas will always be susceptible to plant invasion and disturbance from the edge that will rapidly affect the entire area. Working to establish dense native shrub areas in the Edge MA that falls within the Patch area is strongly recommended. Dump sites, social trails, and encampments should be cleaned up and revegetated as they are encountered during other stewardship activities. Plant as needed. Finally, removal and control of other invasives such as laurel, holly, and hawthorn should be done. Down wood can be brought in anywhere in the MA – preferably first to areas where invasive control is being achieved so that it doesn't impede efficient work and movement of materials in areas that are not yet cleared of invasives and planted.

Priority Actions within the Patch MA (in descending order):

1. Remove invasives in all areas with ivy in trees and invasive maples
2. Remove invasives and plant as needed in interior habitat that is currently in good condition (not badly invaded)
3. Add CWD throughout
4. Remove invasives and plant as needed in interior badly degraded areas
5. Clean up and rehabilitate human impact sites as encountered during stewardship activities
6. Remove and control invasives and replant with natives in Edge MA – sites determined by private citizen permit application or public comment

Actions from Chapter 7 to perform in the Patch MA:

- Amending Soils – if at all only in Edge MA
- Creating CWD – interior areas before exterior areas
- Mulching – all newly planted areas
- Planting – throughout
- Pruning – only in Edge MA where public safety is an issue
- Removing Plants – only in Edge MA where public safety is an issue

- Three Year Establishment Care – in all areas that are planted
- Watering – in Edge MA and all accessible newly planted areas
- Weeding and Invasive Control – throughout

6.2.6 Quality Habitat Management Area

Main Goals:

- Improve native tree diversity by planting deciduous trees in riparian areas
- Increase quantity and species diversity of conifers
- Decrease invasive cover in riparian/wetland areas
- Remove ivy from trees
- Remove all invasive maple saplings
- Remove invasive maple seed source along Boulevard

Quality Habitat represents some of the best habitat in the greenspace under current conditions. It also has the potential to provide a higher level of habitat functions and to have better forest health than currently exist. Work here should focus on protection and improvement of the MA's highest existing habitat values (riparian corridors/wetlands, intact interior habitat) and concurrent improvements in secondary values (exterior upland forest, edges, invaded areas). Ivy removal from trees is a high priority because it is not prevalent at this time. Removal of invasive maples in the MA is high priority, as well as coordinating with the Cheasty Boulevard Restoration Project to prioritize removal and replacement of seed source maples along Cheasty Boulevard. Removal of holly, cherry laurel, hawthorn, and non-native maples should be done simultaneously with invasive maple sapling removal in a systematic sweep through the MA.

Protection and enhancement of valuable wetland and riparian habitat in this MA should be high priority. Remove and control invasives in wetland and riparian areas (knotweed, blackberry, giant coltsfoot, bamboo) and replant areas with appropriate native species. Plant black cottonwood, Oregon ash, cedar, and willow species in moist soil areas where canopy gaps currently exist (will include some blackberry control). This is particularly the case in the wetland in the bowl area just north of the Parks maintenance yard.

Plant shade-tolerant conifers (cedar, hemlock, yew) where soil conditions are species-appropriate. To plant conifers in drier soils areas, create trial canopy gaps and snags where invasive cover is very low or non-existent, and blackberry invasion risk is low (no blackberry nearby). Then plant with sun-tolerant conifers and shrubs. Start with a small number of gaps and monitor to ensure that the outcome is desirable and invasion by non-natives does not occur.

Import wood by hand-carrying logs into greenspace from Boulevard (majority of management area is downhill from access points along Boulevard) – size will be limited to what can be moved by hand labor. It is best to have longer pieces, >10'length, of at least 10"diameter rather than short pieces.

While Edge MA in the Quality Habitat area along Cheasty Boulevard is of immediate concern, in the longer term the Edge MA along the eastern border of the biggest portion of Quality Habitat is also important. This edge abuts the Rainier Vista Housing project, and affords an excellent opportunity to engage the residents of this site in greenspace stewardship right next door.

Priority Actions within the Quality Habitat MA (in descending order):

1. Remove invasives in areas with ivy in trees and invasive maples

2. Coordinate with Cheasty Boulevard Restoration Plan for removal and replacement of invasive maple seed source in Edge MA along Cheasty Boulevard
3. Remove and control invasives, and replant in wetland and riparian areas
4. Remove and control invasives, and replant in interior habitat areas that are currently not badly invaded
5. Add CWD throughout
6. Remove invasives and plant as needed in interior areas that are badly degraded
7. Clean up and rehabilitate human impact sites as encountered during stewardship activities
8. Create trial canopy gaps and snags in dry areas that are shady and are under invasive control
9. Remove and control invasives and replant with natives in Edge MA – eastern border of largest Quality Habitat area, and other sites determined by private citizen permit application or public comment

Actions from Chapter 7 to perform in Quality Habitat MA:

- Amending Soils – if at all only in Edge MA
- Creating Canopy Gaps and Snags – create canopy gaps only in dry to mesic areas with controlled invasives (do trials first), create snags in interior first and always away from edges/targets, add CWD throughout but in interior before exterior areas
- Mulching – in all newly planted areas
- Planting – throughout
- Pruning – only in Edge MA where public safety is an issue
- Removing Plants – only in Edge MA where public safety is an issue
- Three Year Establishment Care – in all areas that are planted
- Watering – in Edge MA and all accessible newly planted areas
- Weeding and Invasive Control – throughout

CHAPTER 7.0 VEGETATION MANAGEMENT & MAINTENANCE PRACTICES

The practices described below are those referenced in Chapter 6 of this document, and are meant to provide the greater level of detail needed to carry out maintenance and project-specific work outlined in this VMP. Chapters 6 and 7 are meant to be used together to describe what is to be done, when, and where (Chapter 6) and specifically how to do it (Chapter 7). The following practices for maintaining, improving, and restoring vegetation and habitat, as well as establishing or removing vegetation have been developed for this VMP with adaptation in some portions as noted from *Sand Point Magnuson Park VMP* (2001), *Seattle DPR Landscape, Horticulture and Urban Forestry Best Management Practices Manual* (1999) and *City Among the Trees* (1998). These practices have been written to address the conditions present in Cheasty Greenspace. Specific emphasis has been provided for control of non-native invasive species; and how to care for, establish, and maintain native vegetation in restoration and enhancement projects in the greenspace.

7.1 Amending Soils

[Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc., (2001)]

The soils in Cheasty Greenspace are generally well-drained mineral soils with sandy loam or sandy clay loam. Organic content is very low in these upland mineral soils. No organic soils were found except in the wetland areas, where there are limited areas of organic mucky soils that are poorly drained. These soil characteristics favor mesic to dry upland species throughout the majority of greenspace except in riparian corridors and wetlands. Planting projects should reflect this in the choice of species, as in most cases it will not be practical or cost-effective to amend the soil throughout an area to be planted. Plant species choices should reflect the existing micro-site conditions for optimal plant survival and success. Soil moisture and degree of canopy closure (e.g. sun/shade) will be the most important indicators influencing species selection for a particular site.

In the rare case where soil amendments are part of a planting project, amending should be done throughout a planting area, not by adding nutrient-rich soil to each individual plant pit. 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, and then spread amendment (e.g. Cedargrove compost or equivalent) on the surface throughout the planting area. If tilling is possible, this should be done to incorporate amendments into the existing topsoil layer. Seasonal timing of this should be such that bare soils are not exposed to winter rains. Therefore, if done in the fall after summer weed removal, soil should be seeded or covered with wood chips whether or not site is planted that season. For logistical reasons such as cost, access, or lack of machinery, amending in this way may not be feasible. In this case, limiting the plant palette and planting into existing soil, or choosing a different technique are recommended.

Simple application of wood chips and leaf mulch onto the soil surface may also be a way to effectively get organic content back into the soil.

7.2 Creating Canopy Gaps and Snags, and Coarse Woody Debris (CWD)

[*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"*]

Three interrelated elements of increasing habitat structural complexity at Cheasty Greenspace are involved in this section: creating canopy gaps by creating snags, and importing downed wood into the greenspace to increase availability of CWD as habitat for wildlife.

Creating Snags and Canopy Gaps

Richter (1993) indicated that the average recommendation for snag retention in managed forests was three large snags per acre. Larger snags are more valuable for wildlife, and Jones et al. (1995) recommended a 10" dbh as a minimum in order to provide greater habitat value for wildlife. Potential snag trees in Cheasty Greenspace should therefore be as large as possible, but no smaller than 10" dbh. Trees should be girdled at about 2-3' above the ground, with a 4" strip of bark removed in the process. Cuts into the sapwood should then 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 may be used by various birds and mammals. Temporary nest boxes may also be deployed at the time of snag creation, in order to attract cavity nesters to areas with newly created snags.

Canopy gaps are anticipated to be created in conjunction with snag creation. The girdling associated with snag creation disrupts vascular flow to the upper bole and canopy, and gradually kills the 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, and additional removal of nearby smaller trees may allow for a larger canopy gap, if desired. As noted in the previous section, canopy gaps will only be created in dry to mesic areas with controlled invasives, and on a trial basis initially.

Importing and Creating CWD

CWD currently available at Cheasty Greenspace can be supplemented with additional CWD imported from off-site. Some guidelines for CWD selection and placement follow.

- Spies and Franklin (1991) suggest that 15%-20% CWD cover is adequate for most forest mammals, and Thomas (1979) recommends that at least two large logs per acre (12"-17" in diameter and greater than 20' in length) within the total CWD cover for that area be retained for wildlife purposes.
- Larger pieces of CWD 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 CWD on every site — different functions and ecosystem processes require CWD 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 CWD likely provides significant short-term ecological benefits. Retention of a diversity of species is advantageous.

- A more even distribution of CWD across the landscape, rather than a clumped distribution, is considered to provide greater habitat value for wildlife.

7.3 Mulching

[*Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc. (2001); and Seattle Parks Landscape, Horticulture and Urban Forestry BMPs (1999) and 'City Among the Trees' (1998)]*

Mulching is one of the easiest and most important maintenance practices for protecting and nurturing all vegetation types. 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 organics to the nutrient-deficient soils. However, there may be some areas of Cheasty Greenspace that may not be accessible for transport of mulch into interior areas where planting will occur. Planting in these inaccessible areas should only be done if plant survival does not depend on mulch. Mulching is not necessary or appropriate in wetland areas with saturated soils or standing water.

In natural areas such as Cheasty Greenspace, the most desirable mulch material is a combination of cardboard sheet mulch overlain by 4-6" of wood chips. Compost, GroCo, or leaf mulch can be added either on top of or underneath the cardboard layer if soil amendments are desired. Where large areas of invasives have been removed (e.g. blackberry thickets), and there is good site access, the entire planting area should be sheet mulched and wood chipped to minimize re-invasion. In most cases, wood chips of recycled Parks Department plant material are available at no cost. Plastic, landscape fabric or inorganic mulch should be avoided, except as specified for highly invaded areas, where it may be the most effective strategy.

In cases where specific plants or groups of plants are to be mulched, use guidelines below. These procedures are particularly suited where conifers or groups of shrubs are being planted in dry uplands and follow-up watering is very limited or 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.
- Where weeds are very aggressive, use a "sheet mulch" of thick layers of newspaper or cardboard.
- Spread 6-8" 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 6-8"of mulch annually (during 3 year establishment period (or beyond as needed).

Shrubs

- Follow similar procedures as for trees, above.
- Spread layer of organic mulch 4-6" deep and 2-3' in diameter around shrub.
- Cover entire planting area with mulch where applicable (e.g. for group plantings).
- Keep mulch away from contact with crown of plant.

7.4 Planting

[Planting Instructions are adapted from DPR's Landscape, Horticulture and Urban Forestry BMPs (1999) and King County Water and Land Resources Bulletin titled "Live Stake Cutting and Planting Tips"]

Planting of trees and shrubs in Cheasty Greenspace will consist mainly of installing upland trees and shrubs. Underplanting within existing deciduous forest and in selected areas that will require extensive invasive removal prior to planting are the typical scenarios. Removal and control of invasives and enhancement planting within the three known wetlands and riparian corridors is also recommended. In all cases species selection will be critical to planting success, and also to creating a forest that has coherence and ecological integrity in terms of its plant communities. The forest of Cheasty Greenspace should have a species composition and distribution typical of our Puget lowland forests here in the Northwest.

Planting instructions below are followed by two tables that specify planting densities and plant spacing (Table 20), and recommended plant communities (Table 21) according to the two dominant microhabitat features in Cheasty Greenspace – soil moisture and canopy closure/light conditions.

Planting should only be done in areas where site conditions can support the chosen plant community and where establishment care can be performed adequately to guarantee plant survival.

Trees

The two basic steps in planting are preparing the site, and setting the tree or shrub. Proper preparation will encourage root growth rather than adding to the difficulties already challenging the newly planted trees or shrubs.

- Ideal planting hole is 2-3x the diameter of the root spread or the root ball (depending on existing soil conditions)
- Minimum planting hole is 12" wider than root spread or root ball
- Hole shall be no deeper than the ball and the ball shall sit firmly on the undisturbed subsoil
- Native soil shall be used to backfill the planting hole except in situations where the existing soil is contaminated or filled with rubble or pure clay
- Trees shall not be fertilized at the time of planting
- Backfill soil in lifts of 4-6" at a time with compaction of each layer. Do not compact muddy backfill. Water thoroughly after backfilling to settle the soil, eliminate air pockets and re-wet the root system.
- If feasible, watering soil rather than compacting is preferred. Backfill ½ the soil in the tree pit and thoroughly drench with water to settle. Complete backfilling and then thoroughly drench with water again. This method is preferred for removing air pockets and settling soil, but can be impractical on big jobs, jobs using volunteers, or where water and/or time are limited.
- Trees planted in sandy or loamy soils should have a 3" high berm erected just past the perimeter of the planting hole to funnel water to the root ball and wet the hole/sidewall interface.
- Berms should not be constructed in clay soils or on heavily compacted sites.
- Stake only in situations where normal planting procedures do not provide a stable plant; otherwise, staking is not generally required. Ties for stakes should be some biodegradable or flexible fastener that precludes girdling of the trunk if the ties are not removed in a timely fashion.
- Stakes must 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 *(refer to general guidelines for trees, above)*

- Do not incorporate fertilizer into soil at planting time.
- Plant at proper depth taking into consideration room for mulch.
- Plant shrubs with proper spacing to allow for spread at mature size.
- Plant bareroot stock at the same grade as grown in the nursery.

Planting density and spacing 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 below. These guidelines are intended to be adjusted according to the specifics of a project.

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 through out the growing season, such as riparian 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 >¾" diameter for willows and cottonwood, and >½" 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.

Table 20. Recommended Planting Densities for Projects in Cheasty Greenspace

Vegetation layer	*Spacing*	*Density*
Tree		
Conifer	8-15' o.c.	150-200 per acre
Deciduous	5-10' o.c.	200-400 per acre
Tall Shrub	4-8' o.c.	700-1800 per acre
Short Shrub	2-4' o.c.	1200-2500 per acre
Live Stake	3-5' o.c.	1000-2000 per acre

Table 21. Suggested Plant Communities for Revegetation and Enhancement Projects in Cheasty Greenspace

Instructions:

1. Assess soil moisture (in spring-early summer).
2. Assess light conditions (canopy closure) during growing season at full leaf-out of trees.
3. Determine which plant community is desired within those listed under the appropriate soil moisture and canopy closure. In most cases, conifer communities are preferred because conifers are scarce in the greenspace. However, in some cases, e.g. where invasives are a problem it may be desirable to establish a faster-growing deciduous-dominated plant community.
4. Plant all dominants listed for that plant community and choose any or all of the sub-dominants as desired.
5. If any of the suggested species are already present, then adjust plant species selection accordingly to include species already. e.g. If hazelnut is already present on a site as a dominant and it is listed in the plant community you are going to plant at that site, do not plant additional hazelnut.

Note: Assumes mineral soils (sandy loams) in all cases but saturated or standing water situations (wetlands). Species italicized in bold with asterisks are designated as dominants in the plant community; species in plain type are sub-dominants.

Soil Moisture	Canopy Closure	Vegetation Layer		
		TREE	**TALL SHRUB**	**SHORT SHRUB**
DRY	 **SUN**	**PLANT COMMUNITY A**		
		***Abies grandis – grand fir**	***Holodiscus discolor - oceanspray**	***Mahonia aquifolium – tall Oregon grape**
		***Arbutus menziesii – Pacific madrone**	***Prunus virginiana - chokecherry**	***Symphoricarpos albus - snowberry**
		***Pseudotsuga menziesii – Douglas fir**	Philadelphus lewisii – mock orange	Ceanothus sanguineus – redstem ceanothus
				Ceanothus velutinus - deerbrush
DRY	 **SUN/SHADE**	**PLANT COMMUNITY B**		
		***Abies grandis – grand fir**	***Holodiscus discolor - oceanspray**	***Mahonia aquifolium – tall Oregon grape**
		***Pseudotsuga menziesii – Douglas fir**	***Prunus virginiana - chokecherry**	***Symphoricarpos albus - snowberry**
			Corylus cornuta - hazelnut	Ceanothus sanguineus – redstem ceanothus
			Philadelphus lewisii – mock orange	Ceanothus velutinus - deerbrush
				Rosa gymnocarpa – wood rose

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
DRY	● **SHADE**	**PLANT COMMUNITY C**		
			***Corylus cornuta - hazelnut**	***Gaultheria shallon - salal**
			***Oemlaria cerasiformis – indian plum**	***Mahonia nervosa – short Oregon grape**
				Rosa gymnocarpa – wood rose
				Symphoricarpos albus - snowberry
				Vaccinium parviflorium – red huckleberry
DAMP	○ **SUN**	**PLANT COMMUNITY D** *(Choose if conifer community desired)*		
		***Abies grandis – grand fir**	***Acer circinatum – vine maple**	***Rosa nutkana – Nootka rose**
		***Pseudotsuga menziesii – Douglas fir**	***Holodiscus discolor – oceanspray**	***Rubus parviflorus – thimbleberry**
		Picea sitchensis – Sitka spruce	Ribes sanguineum – red flowering currant	***Symphoricarpos albus - snowberry**
			Sambucus racemosa – red elderberry	
		OR		
		PLANT COMMUNITY E *(Choose if deciduous community desired)*		
		***Alnus rubra – red alder**	***Acer circinatum – vine maple**	***Rosa nutkana – Nootka rose**
		***Populus balsamifera – black cottonwood**	***Cornus sericea – red osier dogwood**	***Rubus parviflorus – thimbleberry**
		Fraxinus latifolia – Oregon ash	Lonicera involucrata – twinberry	***Symphoricarpos albus - snowberry**
		Prunus emarginata – bitter cherry	Prunus virginiana – chokecherry	
			Sambucus racemosa – red elderberry	

Soil Moisture	Canopy Closure	Vegetation Layer TREE	 TALL SHRUB	 SHORT SHRUB
DAMP	 **SUN/SHADE**	**PLANT COMMUNITY F** *(Choose if conifer community desired)*		
		***Abies grandis – grand fir**	***Acer circinatum – vine maple**	***Gaultheria shallon – salal**
		***Pseudotsuga menziesii – Douglas fir**	***Corylus cornuta – hazelnut**	***Mahonia nervosa – short Oregon grape**
		***Thuja plicata – red cedar**	***Rhododendron macrophyllum – rhododendron**	***Rubus parviflorus – thimbleberry**
		Cornus nuttalli – Pacific dogwood	Holodiscus discolor – oceanspray	Vaccinium ovatum – evergreen huckleberry
		Picea sitchensis – Sitka spruce	Oemlaria cerasiformis – indian plum	Vaccinium parviflorum – red huckleberry
		Taxus brevifolia – Pacific yew	Sambucus racemosa – red elderberry	
			Sorbus sitchensis – mountain ash	
		OR		
		PLANT COMMUNITY G *(Choose if deciduous community desired)*		
		***Alnus rubra – red alder**	***Acer circinatum – vine maple**	***Rosa nutkana – Nootka rose**
		***Populus balsamifera – black cottonwood**	***Cornus sericea – red osier dogwood**	***Symphoricarpos albus - snowberry**
		Fraxinus latifolia – Oregon ash	***Salix scouleriana – Scouler willow**	Rosa pisocarpa – clustered rose
		Prunus emarginata – bitter cherry	Lonicera involucrata - twinberry	
			Prunus virginiana - chokecherry	
			Rhamnus purshiana – cascara	
			Sambucus racemosa – red elderberry	
DAMP	 **SHADE**	**PLANT COMMUNITY H**		
		***Thuja plicata – red cedar**	***Acer circinatum – vine maple**	***Gaultheria shallon – salal**
		***Tsuga heterophylla – western hemlock**	***Corylus cornuta – hazelnut**	***Mahonia nervosa – short Oregon grape**
		Taxus brevifolia – Pacific yew	***Rhododendron macrophyllum – rhododendron**	***Rubus parviflorus – thimbleberry**

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
			Cornus sericea – red osier dogwood	Rosa nutkana – Nootka rose
			Oemlaria cerasiformis – indian plum	Rosa pisocarpa – clustered rose
			Rhamnus purshiana – cascara	Symphoricarpos albus - snowberry
			Sambucus racemosa – red elderberry	Vaccinium ovatum – evergreen huckleberry
			Sorbus sitchensis – mountain ash	Vaccinium parviflorum – red huckleberry
SATU-RATED	○ **SUN**	**PLANT COMMUNITY I**		
		***Alnus rubra – red alder**	***Cornus sericea – red osier dogwood**	Rosa nutkana – Nootka rose
		***Fraxinus latifolia – Oregon ash**	***Rubus spectabilis – salmonberry**	Rosa pisocarpa – clustered rose
		OR		
		PLANT COMMUNITY J		
		***Populus balsamifera – black cottonwood**	***Salix lucida var. lasiandra – Pacific willow**	Oplopanax horridus – devil's club
		Picea sitchensis – Sitka spruce	***Salix sitchensis – Sitka willow**	Ribes bracteosum – stink currant
			Acer circinatum – vine maple	Ribes lacustre – prickly currant
			Lonicera involucrata - twinberry	
			Rhamnus purshiana – cascara	
			Sambucus racemosa – red elderberry	
SATU-RATED	◐ **SUN/SHADE**	**PLANT COMMUNITY K** *(Choose if deciduous community is desired)*		
		***Alnus rubra – red alder**	***Cornus sericea – red osier dogwood**	Oplopanax horridus – devil's club
		***Fraxinus latifolia – Oregon ash**	***Rubus spectabilis – salmonberry**	Ribes bracteosum – stink currant
		***Populus balsamifera – black cottonwood**	***Salix lucida var. lasiandra – Pacific willow**	Ribes lacustre – prickly currant
		Picea sitchensis – Sitka spruce	***Salix sitchensis – Sitka willow**	Rosa nutkana – Nootka rose

Soil Moisture	Canopy Closure	Vegetation Layer TREE	 TALL SHRUB	 SHORT SHRUB
			Acer circinatum – vine maple	Rosa pisocarpa – clustered rose
			Lonicera involucrata - twinberry	
			Malus fusca – western crabapple	
			Rhamnus purshiana – cascara	
		OR		
		PLANT COMMUNITY L *(Choose if conifer community is desired)*		
		***Picea sitchensis – Sitka spruce**	***Cornus sericea – red osier dogwood**	Oplopanax horridus – devil's club
		***Thuja plicata – red cedar**	***Rubus spectabilis – salmonberry**	Ribes bracteosum – stink currant
			Acer circinatum – vine maple	Ribes lacustre – prickly currant
			Malus fusca – western crabapple	
			Rhamnus purshiana – cascara	
SATU-RATED	● **SHADE**	**PLANT COMMUNITY M**		
		***Thuja plicata – red cedar**	***Acer circinatum – vine maple**	Oplopanax horridus – devil's club
			***Cornus sericea – red osier dogwood**	Ribes bracteosum – stink currant
			***Rubus spectabilis – salmonberry**	Ribes lacustre – prickly currant
			Lonicera involucrata - twinberry	Rosa nutkana – Nootka rose
			Rhamnus purshiana – cascara	Rosa pisocarpa – clustered rose
STAND-ING WATER	○ **SUN**		**PLANT COMMUNITY N**	**HERBS/EMERGENTS**
		***Populus balsamifera – black cottonwood**	***Salix lucida var. lasiandra – Pacific willow**	Athyrium filix-femina – lady fern
		Fraxinus latifolia – Oregon ash	***Salix sitchensis – Sitka willow**	Lysichiton americanum – skunk cabbage
				Scirpus microcarpus – small-fruited bulrush

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
STAND-ING WATER	 **SUN/SHADE**		**PLANT COMMUNITY O**	**HERBS/EMERGENTS**
		***Populus balsamifera – black cottonwood**	***Rubus spectabilis – salmonberry**	***Athyrium filix-femina – lady fern**
		Fraxinus latifolia – Oregon ash	***Salix lucida var. lasiandra – Pacific willow**	***Lysichiton americanum – skunk cabbage**
			***Salix sitchensis – Sitka willow**	***Stachys cooleyii – Cooley hedge nettle**
			Malus fusca – western crabapple	Carex obnupta – slough sedge
				Glyceria elata – tall mannagrass
				Scirpus microcarpus – small-fruited bulrush
STAND-ING WATER	 **SHADE**		**PLANT COMMUNITY P**	**HERBS/EMERGENTS**
			***Rubus spectabilis – salmonberry**	***Athyrium filix-femina – lady fern**
				***Carex obnupta – slough sedge**
				***Lysichiton americanum – skunk cabbage**
				Glyceria elata – tall mannagrass
				Stachys cooleyii – Cooley hedge nettle

7.5 Pruning

[*Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc., (2001)]*

As there are no official established trails in Cheasty Greenspace, pruning will be done mainly in the case of shrubs/brush or hazard trees on edges (along private property, streets, sidewalks) where there is a threat to public safety or compromised access to pedestrian areas, e.g. sidewalks. Pruning can produce strong, healthy, attractive plants, but only if done well. Poorly pruned plants often become bigger problems than when left alone. If plants are planted in the right place most future pruning problems can be eliminated.

Know the intent for which pruning is being done and the techniques appropriate to achieve the desired results. Begin with removing the three D's: Dead, Diseased or Damaged wood. Use clean, sharp pruning tools including handsaws, loppers, pruners, and chainsaws. In natural area such as Cheasty Greenspace, almost all pruning will be done for safety reasons. Pruning for health and aesthetics may only rarely be done for trees along edges or in high visibility areas.

Trees

Prune for Safety

- Remove branches that grow too low and could cause injury or property damage.
- Trim branches that interfere with sight lines on streets or driveways.
- Remove branches that grow into utility lines (utility arborists).
- Remove or trim branches in natural areas that are a hazard to public safety.
- Leave wood from trimming to decay on site.

Prune for Health

- Create a strong structure when tree is young.
- Remove dead, diseased or damaged branches to increase strength and longevity of trees.
- Thin crown to increase airflow and reduce pest problems.
- Remove crossing and rubbing branches.
- Do not apply dressing to pruning wounds, as this may invite disease problems.

Prune for Aesthetics

- Enhance the natural form and character of the tree.

Never 'top' trees. It severely compromises tree health, aesthetics, and safety, and is against Seattle Parks adopted Tree Policy (2001) to do so on public lands.

Shrubs

Prune for Safety/Access

- Enhance balanced, natural shape of shrub species.
- Remove crowded and crossing branches.
- Shearing or mowing may be done along greenspace edges (e.g. blackberry, rose/snowberry thickets)

7.6 Removing Plants

[*Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc., (2001)]*

Plant removal outside of non-native control efforts is done primarily for the following reasons: poor tree architecture, summer branch drop, increased exposure, root loss, unstable rooting, girdling roots, leaning trees, unfavorable soil conditions, cracks, cankers, conks, seams, decay, cavities, and root and butt diseases. Trees in particular may present a risk because of old age, storm damage, poor structure, past construction activities or death of the tree. Derelict trees in the greenspace that do not pose a hazard should be left standing as snags for wildlife, or let fall to leave down wood.

If the tree is defective AND has a target, it is considered a hazard.

- Remove derelict trees which cannot be made safe or functional by corrective pruning.
- Remove trees that constitute a high hazard if no other prescription will eliminate the risk.
- Alert the community before tree removal begins, to provide opportunity for comment.

Large woody debris and brush piles are critical elements that are lacking throughout the greenspace. When large trees have been removed, recycle as much of the parts of the woody debris on site as possible. Trunks and large branches that will not live sprout can be placed directly on the ground within the greenspace. Brush (non-sprouting limbs and branches from the tree tops) can be used for wildlife brush piles scattered throughout the greenspace. Placing brush piles and large woody debris is appropriate within any upland or wetland habitat in the greenspace.

Do NOT place trunks or large branches from any non-native species that will sprout from the trunk directly on the ground. To leave the remains of these species as habitat features in the greenspace, make sure they are not in direct contact with the ground or with water. Prop them off the ground (on both ends) by placing the log on several 6-8" thick pieces of wood from non-invasive species (e.g. red alder, big leaf maple). In that manner, the native softwood will rapidly decompose from direct contact with the soil while the potential live-sprouting log will dry out and become non-viable. It will eventually rest on the ground while the smaller pieces of wood decompose, resulting in large pieces of woody debris on the ground that pose no risk for sprouting and spreading unwanted invasive species. Smaller material can be used for brush piles.

7.7 Three Year Establishment Care

[Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc., (2001)]

Typically, all new plantings require follow-up care for a period of three years that is more intensive and frequent than plants that are already established. Ideally, the main components of this three-year care program are: mulching, watering, and weeding. One-time maintenance actions that are project-dependent are things like removing inorganic sheet or fabric mulch if it is used. A 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 practice, i.e. "Mulching" (Section 7.3). Once the three year period is over and the plantings have established, care of these planted areas should be incorporated into any regular ongoing maintenance that occurs within the management area that they are located.

In Cheasty Greenspace, many new plantings except those close to the outer edges of the greenspace or with reasonable access will probably not receive watering. All newly planted areas should be mulched at the time of planting. If a site that has been planted will not receive watering during the three-year establishment period, maintaining a heavy layer of mulch during plant establishment is advised. Weed control should absolutely be done with diligence at any planted site – in many cases it may be the most important part of three-year establishment care that is performed. Adjustments to the calendar, in terms of actions taken, should be made depending on the particular project site conditions.

Figure 9. Three Year Establishment Care Calendar

	Month											
Action	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 appropriate range of time/season to perform action as needed
● Indicates specific time to perform action

Mulching: See M&M Practice "Mulching".

Weeding: See M&M Practice "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. If site conditions allow, bi-weekly watering may be adequate. See M&M Practice titled "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 greenspace and therefore accessible for this intensive action.

7.8 Watering

[*Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc., (2001)]*

Watering is an important component of establishing new plantings with maximum success. Seattle gets an average of 39 inches of rain each year, but only 13 of those inches fall during the growing season. This is why summer watering for new plants, even those in natural areas such as the greenspace, is important, particularly for plant installations in the first three years of establishment. However, except for edge areas, the majority of the planting areas in Cheasty Greenspace will not be accessible to a watering truck.

Water management is the term for efficient use of supplemental irrigation water required for many landscapes in Puget Sound. By controlling the application of water for irrigation, water management conserves this resource, reduces urban runoff and saves money. For most efficient watering, establishment of an irrigation infrastructure for areas that require regular watering is ideal, but probably not practical for most areas in the greenspace due to distance from water sources. If supplemental watering is feasible and necessary, planning for temporary irrigation should be part of the planting plan for a particular site. For planted areas close to roads, water sources for temporary irrigation during 3-year establishment care of newly planted areas could be watering trucks or fire hydrants (permit required).

In general:

- Water new trees and shrubs thoroughly at planting if possible (not necessary in wetlands).
- If supplemental watering is feasible and necessary, water new trees and shrubs (weekly at least 1") during first two summers, tapering watering (to ½" weekly) in the third year. If site conditions allow, bi-weekly watering may be adequate. See M&M Practice titled "Watering".

See Planting (Section 7.4), and 3 Year Establishment Care (Section 7.7) for instructions on watering newly installed trees and shrubs.

7.9 Weeding and Invasive Control

[Adapted from Sand Point Magnuson Park VMP, by Sheldon & Associates, Inc., (2001)]

Weeding and controlling invasives are necessary as an ongoing maintenance action throughout the greenspace. Many planting projects will include initial removal and ongoing control of invasives as a major component of the project. Invasive control is also an important part of 3-year establishment care for all newly planted areas. The most commonly occurring and problematic non-native invasive species in Cheasty Greenspace are listed below with a brief description of their characteristics, some information about where each species is typically found, and some recommended eradication and control methods for that particular species. Recommendations and protocols (including herbicide use) are in accordance with Seattle Parks Landscape, Horticulture, and Urban Forestry BMPs (1999), and focus on using an integrated pest management approach characterized by a combination of control and removal methods.

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. To this end, weedy species and infestations that pose the greatest threat to healthy desirable plant communities are those that should be targeted. In addition, to keep the weed control workload at the most reasonable level possible, new infestations should be targeted for control before they become widespread or well-established, and the extent of current invasion should be controlled at or below existing levels for those species that threaten to spread.

Thus, invasive control should focus on those species and specific infestations that are: 1) the fastest growing, 2) the least established but potentially threatening, 3) the most disruptive to functional habitat, and 4) listed noxious weeds with mandated control.

Large woody debris and brush piles are critical elements that are often lacking in the greenspace. When large trees have been removed, recycle as much of the woody debris on site as possible. Trunks and large branches that will not live sprout can be placed directly on the ground anywhere within the greenspace, except for within the existing small wetlands on site. Brush (non-sprouting limbs and branches from the tree tops) can be used for wildlife brush piles scattered throughout the greenspace. Placing brush piles and large woody debris is appropriate within any upland or wetland habitat. Other plant debris not appropriate for wildlife features should be disposed of following current Seattle Parks protocol. In accessible areas, debris can be removed from the site. In more interior parts of the greenspace, debris can be piled or stacked off the ground and left on-site to decompose.

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 Cheasty Greenspace. Non-native invasive species that are not specified below can be removed as needed and appropriate.

<u>Tree Species</u> (canopy species >20' tall at maturity)

<u>Norway maple *(Acer platanoides)* Sycamore maple *(Acer pseudoplatanus)* and other hydrids</u>
Norway maple, Sycamore maple and various hybrids or cultivars from these two species are the most prevalent invasive tree species in Cheasty Greenspace. They are found mainly as saplings throughout the greenspace in both upland and riparian/wetland habitats. These species are known for their ability to establish in a variety of conditions from wet to dry soils, and from full sun to deep shade. In forests of the Eastern U.S., invasive maples, particularly Norway maple, have naturalized readily into urban woodlands with great success due to their shade-tolerance and adaptability. If seed sources are

present, which is the case along Cheasty Boulevard, seed dispersal and seedling recruitment will be continuous and ongoing.

Removal of existing seedlings within the greenspace, as well as mature seed-producing trees along the Boulevard to halt the spread of these species is a high priority. Seedlings smaller than 2" caliper can be removed with their roots using a weed wrench. Maples stump-sprout if cut, so removals of trees>2" caliper must include the use of an herbicide to be effective.

The recommended method for removal of trees >2" caliper is using a low volume-high concentration basal application of Garlon 3A mixed in mineral oil or diesel. The mineral oil or diesel will draw the herbicide into the bark. The herbicide mixture should be applied directly to the tree trunk 2-3' up from the base around the entire circumference of the tree with a sponge applicator or squirt bottle. Squirt bottles must have oil-resistant o-rings or gaskets.

All treated trees should be painted or flagged to indicate herbicide use, and to allow follow-up monitoring of treatment effectiveness 2-8 months after treatment. Standing dead trees can be left for wildlife snags, or cut and left as down wood as desired.

Shrub Species (<20' tall at maturity)

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. These species are found throughout Cheasty Greenspace.

Although laurel and holly do not pose as immediate of a threat to forest health as other invasives in the greenspace such as ivy, removal of these species is important to prevent further spread, and because currently 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 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:

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.

Non-native Hawthorne *(Crataegus sp.)*
Non-native hawthorne is a large tree-like shrub that spreads by suckering and by prolific fruit production that is excellent bird forage. It is distributed irregularly throughout the greenspace. It occurs most frequently as seedlings that are small enough to remove by hand-pulling or weed-wrenching.

Because hawthorne is a suckering species, the most effective removal technique for individual plants too large to allow removal of the entire plant with the roots intact will be to cut individual shrubs and apply herbicide directly to the cut surface to prevent resprouting. 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:

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 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.

Himalayan Blackberry and Evergreen blackberry *(Rubus procerus, R. laciniatus)*
Both of these non-native blackberries are found in the greenspace, 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 greenspace 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.

Removal methods 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. 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 depends mainly on how bad the infestation is, and the available labor resources. Grazing by goats is a method being used in trials by natural area managers in other areas (including here in King County), and may be promising as a method where blackberry is monotypic in thickets without native vegetation.

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.

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 translocating 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:

1) Mow, graze, or cut to the ground numerous times 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 resprouts. 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, handpull any resprouts, 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 in abundance in open dry shrubland in the greenspace, almost exclusively at the south end of Cheasty Boulevard at Beacon Ave. S. Scot's broom is shade-intolerant, so long-term control is linked to successful establishment of healthy native plant communities that will create undesirable conditions for this plant species. Scot's broom provides some cover and refuge for wildlife, but its habitat function is not high. 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.

Thicket removal can be done incrementally as resources are available, and should not be done unless subsequent replacement planting is planned. Plants can be removed by mowing, grazing, hand-cutting individual plants, or manual removal and 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.

If there is a substantial amount of seed present on the ground, it may be desirable to strip the duff layer of seeds from the ground as part of the removal strategy. If this is the case, the plant removal method with the least disturbance to the soil should be used. Cutting should be done early in the summer when flowering has just started and should either be followed up by continued subsequent annual (or more often) cutting or by herbicide treatment (Roundup with water soluble dye) of cut stumps. Hand-pulling of smaller infestations of young plants (3' tall and smaller) should be done when soil is moist and loose (spring).

Broom thickets could also be used as early establishment areas for later successional trees and shrubs. The basic concept is to underplant the thicket with desirable natives that will then form the foundation of the native community that will replace the broom. Once the installed plantings have established, broom can be removed by hand cutting and removal of the roots or a cut and dab herbicide treatment.

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.

English ivy *(Hedera helix)*

English ivy is a broadleaved evergreen non-native invasive found in Cheasty Greenspace in the forest groundlayer and climbing up tree trunks throughout the forest. It is one of the biggest threats to forest health in parts of the greenspace where it is found in abundance. 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 windage of an already weakened tree making it susceptible to windthrow. English ivy is not a habitat benefit 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 into a mat. Removal of dense mats in the groundlayer exclusive of native shrubs and herbs should only be done if subsequent replanting is to be done. New planting areas should have an additional 10'-wide cleared strip around the edge. Removal of groundlayer ivy where there is still a fairly intact native shrub layer can be done without replacement planting.

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

Clematis is a woody invasive vine that was not observed in Cheasty Greenspace but is likely to occur. Grape was observed in several locations, and was noted by citizens as a weed of concern during plan development. Clematis is usually seen up in the tree canopy and hanging below. Grape was observed

in similar conditions at sub and mid-canopy height. 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. Dead top growth can be removed in fall or winter when vines have become brittle.

Herbaceous Species

Japanese knotweed *(Polyganum cuspidatum)*
Knotweed, or false bamboo, is an herbaceous perennial which 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. In Cheasty Greenspace, it currently has a limited presence along the two stream corridors and associated wetlands west of Cheasty Boulevard in the Quality Habitat MA.

Removal of these patches is strongly recommended to prevent further spread of this species, and because it occurs in high value habitat area. 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 desired, selective application of Rodeo can be used on re-growth in late summer, and fabric/mulch installation can be delayed until late winter. Planting should not be done until after 2-3 years so that the fabric/mulch is not compromised while roots are still viable.

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. Regular hand-pulling and heavy mulching with wood chips during that 3-year establishment period should suppress this weed adequately. Less frequent follow-up weeding may also be needed after the three-year period.

Listed Noxious Weeds
Currently there are two known noxious weeds in Cheasty Greenspace that are listed as Class A weeds by King County. Garlic mustard *(Alliaria petiolata)*, and giant hogweed *(Heracleum mantegazzianum)* are known occurrences in Cheasty Greenspace and control actions are being taken by Seattle Parks. 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 these species 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 Seattle Parks BMPs.

CHAPTER 8.0 PLAN IMPLEMENTATION

8.1 Implementation Priorities

Implementation of the VMP should be done incrementally, focusing first on those tasks/actions that are the most urgent to protect and improve forest health, and those areas that are the most important to protect. Generally, the most important areas to protect are those that currently have the highest habitat value and forest health, and those that have the greatest potential to improve to a high level of function and health. Table 22 lists the primary management tasks that are proposed in this plan for Cheasty Greenspace. The tasks are divided into three priority groups based on which ones were judged to contribute most significantly to overall forest health. For example, removing ivy from the trees was given high priority because ivy infestation is seen as an immediate threat to tree health. Removal of ivy on the ground was only rated moderate because it does not pose as great a threat to tree health or to native understory species richness.

All management activities within each priority group should be considered equal in importance. However, within that group of tasks the importance of performing a particular management activity in a particular MA varies. Therefore, each activity is given a numerical ranking (1, 2, or 3) for each MA to reflect this. In other words, all of the activities given a 1 within each priority group should be completed before those given a 2 or a 3 within the same group are completed. For example, in the High Priority Tasks group, planting conifers in the Ivy and Quality Habitat MAs (both given a 1 for this task) should be done prior to planting conifers in the Patch MA (2) or removing non-native maples from the Blackberry MA (3). Generally speaking, tasks within the High Priority Tasks should be addressed before taking on those tasks in the Moderate Priority Tasks. However, in some instances it may be desirable to perform some of the moderate or lower priority activities concurrently with those that are most important. It is also not necessary to complete all high priority tasks before performing others of lesser importance. For example, it is not necessary to complete all conifer planting in all the MAs before performing ivy removal from the ground.

Table 22. Prioritization of Management Tasks by Management Area in Cheasty Greenspace

Management Task	*Order of Tasks by Management Area*					
						EXPERTISE
	Blackberry	***Ivy***	***Ivy/ Blackberry***	***Patch***	***Quality Habitat***	
HIGH PRIORITY TASKS						
Remove ivy in trees	3	1	1	1	1	Volunteers and/or contractors
Plant conifers	3	1	3	2	1	Volunteers and/or contractors
Remove non-native maples: Sycamore and Norway maple	3	1	3	2	1	Volunteers and/or contractors for saplings, Parks tree crew or contractor for mature trees
Coordinate w/Boulevard Plan on seed source tree removal for invasive species	1	1	1	1	1	Parks staff
MODERATE PRIORITY TASKS						
Plant deciduous trees and understory shrubs	3	1	3	2	1	Volunteers and/or contractors
Remove Himalayan blackberry and Scot's broom	1	2	1	3	2	Volunteers and/or contractors
Remove invasives from wetlands and riparian corridors: blackberry, Japanese knotweed, bamboo, giant coltsfoot	0	0	0	0	1	Volunteers and/or contractors
Remove ivy on the ground	3	1	3	2	1	Volunteers and/or contractors
Create trial canopy gaps	0	1	0	0	1	Parks tree crew
Create snags	0	1	0	3	1	Parks tree crew
Increase down woody debris	3	1	3	3	1	Volunteers and/or contractors
LOW PRIORITY TASKS						
Remove other invasives: laurel, holly, common hawthorne, non-native cherry, horse chestnut	3	1	3	2	1	Volunteers and/or contractors
Remove refuse	Priority based on location of other stewardship activities and/or citizen complaints					Parks Natural Area Crew and/or contractors
Coordinate w/Parks and SPD to remove and re-vegetate encampments	Priority at DPR discretion based on location of stewardship activities					Parks Natural Area Crew and SPD, volunteers for reveg.
Remove invasives from park edges where neighbors will complete the work	Will depend on location on interested party owners and community groups					Volunteers
Re-vegetate selected social trails	Will depend on location of other stewardship activities					Volunteers and/or contractors

Order of tasks: 0 = Does not apply to, or is not recommended for MA
1 = Should be done first within each priority group
2 = Should be done after No. 1 tasks in the priority group are completed
3 = Should be done after No. 2 tasks in the priority group are completed

8.2 Implementation Strategies

Implementation of the VMP will be done incrementally over time with the highest priority tasks done first. Some lower priority tasks may be done out of sequence due to community interest e.g. edge areas may receive early action due to school group or private citizen stewardship. The rate of implementation will depend on a number of factors – community stewardship, available funding, and the interest from the larger community of volunteers in the city. There is no ongoing maintenance at Cheasty Greenspace, with the exception of noxious weed control, encampment removal, and edge management such as mowing along the Boulevard or temporary invasive control to keep sidewalks clear. Aside from those minimal maintenance activities already occurring, the implementation of the VMP will be done as a series of projects that entail some or all of the following: invasive control, planting, establishment care of new plantings, rehabilitation of human impact sites. The majority of the work will likely be done by volunteers and youth environmental training groups. Parks Natural Area Crews may be involved in small portions of the work in Cheasty Greenspace. Seattle Police Department will be involved in assistance with removing encampments. Establishing and maintaining a strong volunteer stewardship network in the community will be critical to the implementation success of this VMP. Often community stewardship increases and builds momentum once implementation activities have started and results become visible.

Some recommendations to pursue in the effort to establish a strong volunteer base include, but are not limited to, the following:

- Coordinate with local school and youth groups to adopt portions of the greenspace near their schools – Kimball Elementary School, Dearborn Park Elementary School, future Boy's and Girls Club at Rainier Vista Housing, Asa Mercer Middle School, Franklin High School
- Establish community relationships through EarthCorps Leadership Grant activities in 2003-2004
- Involve local community college and university students who need practicums/projects for ecological restoration courses (e.g. University of Washington Restoration Ecology Network, UW Center for Urban Horticulture Sustainable Community Landscapes Courses).
- Encourage increased participation of existing Friends of Cheasty community group in planning and leading stewardship events, and seeking grant funding for greenspace restoration and community outreach

8.3 Budget Estimate

The table below summarizes the rough estimated cost of implementation of key tasks described in the VMP. Implementation costs assume a 20-year implementation period – estimates are made using 2003 labor costs. It is assumed that roughly 10% of the implementation work (calculated by MA) will be done by paid contractor, 10% by Parks staff, and roughly 80% of the work to be done will be performed by volunteers. Costs associated with volunteer labor include supervision/oversight, as well as plants and other materials. Other assumptions are listed at the bottom of the table.

Table 23. Budget Estimate for VMP Implementation (20 Year Plan)

	Management Area					
	Blackberry	***Ivy***	***Ivy/Blackberry***	***Patch***	***Quality***	***All***
Size of MA (acres)	5.7	25.4	1.0	5.7	19.2	57 acres
Key Tasks	Heavy invasive removal Dense re-planting High weed maintenance High plant estab. care Import of down wood	Heavy invasive removal Moderate re-planting High weed maintenance Mod. plant estab. care Import of down wood Trial canopy gaps	Heavy invasive removal Dense re-planting High weed maintenance High plant estab. care Import of down wood	Mod. invasive removal Moderate re-planting Mod. weed maintenance Mod. plant estab. care Import of down wood	Mod. invasive removal Moderate re-planting Mod. weed maintenance Low plant estab. care Import of down wood Trial canopy gaps	
% of work to be done by:						
Contractor	10%	10%	10%	10%	10%	
Parks staff	10%	10%	10%	10%	10%	
Volunteer	80%	80%	80%	80%	80%	
Implementation						
Contractor[1]	$100,000	$442,000	$17,000	$100,000	$335,000	$994,000
Parks Tree Crew[2]	$1,500	$32,500	$750	$3,000	$19,250	$57,000
Parks Staff[3]	NA	NA	NA	NA	NA	$88,000
Volunteer Hrs[4]						
Primary invasive removal	6,700	29,800	1,150	NA	NA	37,650
Secondary invasive removal	2,200	9,950	380	2,200	7,500	22,230
Planting	3,350	14,900	575	2,200	7,500	28,525
Materials	$90,000	$200,000	$15,000	$45,000	$152,000	$502,000
Volunteer oversight[5]	$30,625	$136,625	$5,260	$11,000	$37,500	$221,000
Implementation subtotal	***$222,125***	***$811,125***	***$38,010***	***$159,000***	***$543,750***	***$1,862,000***
Maintenance						
Contractor	$60,000	$265,000	$10,500	$60,000	$200,000	$595,500
Parks Tree Crew	$1,500	$32,500	$750	$3,000	$19,250	$57,000
Parks Staff	NA	NA	NA	NA	NA	$88,000

Volunteer Hrs[4]	20,100	89,400	3,450	10,050	34,000	157,000
Volunteer oversight[5]	$50,250	$223,500	$8,625	$25,125	$85,000	$392,500
Maintenance sub-total	***$111,750***	***$521,000***	***$19,875***	***$88,125***	***$304,250***	***$1,133,000***
TOTAL COST	**$333,875**	**$1,332,125**	**$57,885**	**$247,125**	**$848,000**	**$2,995,000**

* Assumes that for MAs that will require dense re-planting, planting densities and sizes are averaged as follows: Trees – 300 trees/acre @ 2 gal size, Shrubs – 2000/acre @ 50/50 ratio 1gal/2gal size. For MAs that require moderate replanting, planting densities will be at ½ the densities above. Plants costs are assumed as follows: 2 gal tree=$12.00, 2 gal shrub=$9.00, 1 gal shrub=$5.00

All labor costs are estimated at 2003 rates. Budget period estimated is for the 20-year life of the VMP.

1 Parks Tree Crews will perform tree removals, pruning, canopy gap/snag creation, delivery of woody debris and chip mulch. Costs are split evenly between implementation and maintenance. Parks Tree Crews or equivalent will perform these tasks in the entire greenspace.

2 Contractors will perform invasive removal that requires herbicide use, implementation activities such as invasive removal and planting in sensitive areas (steep slopes, wetlands, riparian areas), and three-year establishment care. Costs include materials and plants. Contractor costs are estimated at $4.00/sq. ft. for heavy invasive removal, mulching, and dense planting, and $3.00/sq. ft for moderate invasive removal, mulching, and planting. Contractors will perform work on 10% of the total area within the MA.

3 Parks staff includes Natural Area Crew and management staff. Work performed may include project management, volunteer coordination, and restoration work. Annual labor estimate is 10 days of 3-person Natural Area Crew, 3 days of management, and 2 additional general labor days at a total cost of $8,200/year. Total cost is split evenly between implementation and maintenance.

4 Volunteers will perform invasive removal, planting, and three-year establishment care. Assumes that plant materials costs are for the following planting densities and sizes: Trees – 300 trees/acre @ 2 gal size, Shrubs – 2000/acre @ 50/50 ratio 1gal/2gal size. Labor is not costed, but for the purposes of grant matches, volunteer labor is currently valued at $12.50/hr. Volunteer labor efficiency is estimated as follows: primary invasive removal = 30 hrs per 1000 sq.ft.; secondary invasive removal = 10 hrs per 1000 sq.ft; planting (dense) = 15 hrs per 1000 sq.ft; planting (moderate) = 10 hrs per 1000 sq.ft.; maintenance (for dense planting) = 30 hrs per 1000 sq. ft. per year; maintenance (for moderate planting) = 15 hrs per 1000 sq.ft. per year. Maintenance will be done for three years.

5 Oversight of volunteer labor is estimated to be needed for 10% of the total volunteer hours needed to perform work described. Oversight is costed at a rate of $25.00/hour.

CHAPTER 9.0 MONITORING

9.1 Project Monitoring Plan

Monitoring is a critical component to implementation of the VMP. Monitoring allows evaluation of whether or not VMP and project goals are being accomplished. Monitoring also allows for evaluation of implementation strategies, and guides adaptive management of a site or project area. Monitoring also helps ensure that a project or task that has been implemented receives follow-up care, boosting overall implementation success. To be successful, monitoring must produce usable and informative data. The most important parameters of concern must be identified, measured, and documented in a format that is simple and understandable.

Monitoring should be done before a project is implemented to generate baseline data, and then at 1 year, 3 year, and 5 year post-implementation intervals. Overall monitoring of the greenspace should be done 20 years after adoption of this plan, which will be at the end of the predicted lifespan of the VMP. The key parameters to measure at Cheasty Greenspace for the short-term monitoring (0-5 years post project implementation) relate to the 20 year targets established for each of the MAs (Table 19). These are:

- % cover of invasives by species
- % cover native understory (shrub, herb) by species
- native species diversity
- canopy closure
- survival of installed plants

The following pages provide monitoring forms for each MA to be used for short-term monitoring activities. The location (MA) of your specific project determines which form should be used for monitoring. Completed monitoring forms should be submitted to Parks Urban Forestry staff. Twenty-year monitoring should be done by replicating data collection methods described in Chapter 5 of this plan, and comparing the baseline data collected in 2003 to 20-year post-plan adoption data. Data collected will be used to inform appropriate short-term maintenance, and to understand and improve urban forest restoration practices throughout the parks system over time. Monitoring is a critical component of successful adaptive management both in the short and long term.

Monitoring Form for Projects in the Blackberry MA

Name:
Date:
Site Description Location:

Monitoring Year: Pre-Installation Year 1 Year 3 Year 5 Other _____
(circle one)

Parameters	***Plot 1***	***Plot 2***	***Plot 3***	***Plot 4***	***Plot 5***
% cover invasives (list by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Ivy in trees (count of trees with ivy in each plot)					
Native species diversity (list species by 4 letter code, and total for each plot)					
% cover native understory (list shrubs and herbs by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Canopy closure (check correct range for each plot)	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%

Parameters	*Plot 1*	*Plot 2*	*Plot 3*	*Plot 4*	*Plot 5*
Canopy diversity (list tree species and # of each in plot)					
Snags (count per plot)					
Down Wood (count per plot)					
Plant Survival (count and list by species)					
Plants installed (list totals by species)					

20 Year Targets for Blackberry MA							
Invasive cover	***Native species diversity (shrub, herb)***	***Native species cover (shrub, herb)***	***Canopy diversity***	***Canopy Closure***	***Trees per acre***	***Snags per acre***	***Down wood per acre***
in trees: 0 on the ground: <20%	minimum of 9 species present (avg. within MA)	>80%	at least 50% coniferous	from existing, increase by an additional 50% of complete closure	>75 trees/acre		
Target Met?	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***
Yes ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***

Monitoring Form for Projects in the Ivy MA

Name:
Date:
Site Description Location:

Monitoring Year: Pre-Installation Year 1 Year 3 Year 5 Other _____
(circle one)

Parameters	***Plot 1***	***Plot 2***	***Plot 3***	***Plot 4***	***Plot 5***
% cover invasives (list by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Ivy in trees (count of trees with ivy in each plot)					
Native species diversity (list species by 4 letter code, and total for each plot)					
% cover native understory (list shrubs and herbs by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Canopy closure (check correct range for each plot)	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%

Parameters	*Plot 1*	*Plot 2*	*Plot 3*	*Plot 4*	*Plot 5*
Canopy diversity (list tree species and # of each in plot)					
Snags (count per plot)					
Down Wood (count per plot)					
Plant Survival (count and list by species)					
Plants installed (list totals by species)					

20 Year Targets for Ivy MA							
Invasive cover	***Native species diversity (shrub, herb)***	***Native species cover (shrub, herb)***	***Canopy diversity***	***Canopy Closure***	***Trees per acre***	***Snags per acre***	***Down wood per acre***
in trees: 0 on the ground: <20%	minimum of 9 species present (avg. within MA)	>80%	at least 50% coniferous	maintain closure at existing levels	>100 trees/acre		
Target Met?	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***
Yes ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***

Monitoring Form for Projects in the Ivy/Blackberry MA

Name:
Date:
Site Description Location:

Monitoring Year: Pre-Installation Year 1 Year 3 Year 5 Other _____
(circle one)

Parameters	***Plot 1***	***Plot 2***	***Plot 3***	***Plot 4***	***Plot 5***
% cover invasives (list by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Ivy in trees (count of trees with ivy in each plot)					
Native species diversity (list species by 4 letter code, and total for each plot)					
% cover native understory (list shrubs and herbs by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Canopy closure (check correct range for each plot)	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%

Parameters	*Plot 1*	*Plot 2*	*Plot 3*	*Plot 4*	*Plot 5*
Canopy diversity (list tree species and # of each in plot)					
Snags (count per plot)					
Down Wood (count per plot)					
Plant Survival (count and list by species)					
Plants installed (list totals by species)					

20 Year Targets for Ivy/Blackberry MA							
Invasive cover	***Native species diversity (shrub, herb)***	***Native species cover (shrub, herb)***	***Canopy diversity***	***Canopy Closure***	***Trees per acre***	***Snags per acre***	***Down wood per acre***
in trees: 0 on the ground: <20%	minimum of 9 species present (avg. within MA)	>80%	at least 50% coniferous	from existing, increase by an additional 50% of complete closure	>75 trees/acre		
Target Met?	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***
Yes	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***	***Yes***
No	***No***	***No***	***No***	***No***	***No***	***No***	***No***

Monitoring Form for Projects in the Patch MA

Name:
Date:
Site Description Location:

Monitoring Year: Pre-Installation Year 1 Year 3 Year 5 Other _____
(circle one)

Parameters	***Plot 1***	***Plot 2***	***Plot 3***	***Plot 4***	***Plot 5***
% cover invasives (list by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Ivy in trees (count of trees with ivy in each plot)					
Native species diversity (list species by 4 letter code, and total for each plot)					
% cover native understory (list shrubs and herbs by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Canopy closure (check correct range for each plot)	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%

Parameters	*Plot 1*	*Plot 2*	*Plot 3*	*Plot 4*	*Plot 5*
Canopy diversity (list tree species and # of each in plot)					
Snags (count per plot)					
Down Wood (count per plot)					
Plant Survival (count and list by species)					
Plants installed (list totals by species)					

20 Year Targets for Patch MA							
Invasive cover	***Native species diversity (shrub, herb)***	***Native species cover (shrub, herb)***	***Canopy diversity***	***Canopy Closure***	***Trees per acre***	***Snags per acre***	***Down wood per acre***
in trees: 0 on the ground: <15%	minimum of 9 species present (avg. within MA)	>80%	at least 50% coniferous	from existing, increase by an additional 20% of complete closure	>100 trees/acre		
Target Met?	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***
Yes ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***

Monitoring Form for Projects in the Quality Habitat MA

Name:
Date:
Site Description Location:

Monitoring Year: Pre-Installation Year 1 Year 3 Year 5 Other _____
(circle one)

Parameters	***Plot 1***	***Plot 2***	***Plot 3***	***Plot 4***	***Plot 5***
% cover invasives (list by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Ivy in trees (count of trees with ivy in each plot)					
Native species diversity (list species by 4 letter code, and total for each plot)					
% cover native understory (list shrubs and herbs by species and cover class for each plot) ***Cover Class:*** ***1 0-25%*** ***2 26-50%*** ***3 51-75%*** ***4 76-100%*** ***5 >100%***					
Canopy closure (check correct range for each plot)	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%	0-20% >20-40% >40-60% >60-80% >80%

Parameters	*Plot 1*	*Plot 2*	*Plot 3*	*Plot 4*	*Plot 5*
Canopy diversity (list tree species and # of each in plot)					
Snags (count per plot)					
Down Wood (count per plot)					
Plant Survival (count and list by species)					
Plants installed (list totals by species)					

20 Year Targets for Quality Habitat MA							
Invasive cover	***Native species diversity (shrub, herb)***	***Native species cover (shrub, herb)***	***Canopy diversity***	***Canopy Closure***	***Trees per acre***	***Snags per acre***	***Down wood per acre***
in trees: 0 on the ground: <5%	minimum of 9 species present (avg. within MA)	>90%	at least 50% coniferous	from existing, increase by an additional 10% of complete closure	>100 trees/acre		
Target Met?	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***	***Target Met?***
Yes ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***	***Yes*** ***No***

PLANT SPECIES CODES

Trees/Saplings

Native species		Non-native species	
bigleaf maple (*Acer macrophyllum*)	ACMA	English hawthorne *(Crataegus laevigata)*	CRLA
bitter cherry *(Prunus emarginata)*	PREM		
black cottonwood (*Populus balsamifera*)	POBA		
cascara *(Rhamnus purshiana)*	RHPU		
Douglas fir (*Pseudotsuga menziesii*)	PSME		
Pacific dogwood *(Cornus nuttallii)*	CONU		
Pacific madrone (*Arbutus menziesii*)	ARME		
red alder (*Alnus rubra*)	ALRU		
western hemlock (*Tsuga heterophylla*)	TSHE		
western red cedar (*Thuja plicata*)	THPL		

Shrubs

Native species	Size		Non-native species	Size	
black twinberry *(Lonicera involucrata)*	T	LOIN	common laurel (*Prunus laurocerasus*)	T	PRLA
hardhack (*Spiraea douglasii*)	T	SPDO	English holly (*Ilex aquifoliu*m)	T	ILAQ
hazelnut (*Corylus cornuta*)	T	COCO	Scot's broom (*Cytisus scoparius*)	T	CYSC
Indian plum (*Oemleria cerasiformis*)	T	OECE			
mock orange *(Philadelphus lewisii)*	T	PHLE			
oceanspray *(Holodiscus discolor)*	T	HODI			
Oregon grape (*Mahonia nervosa*)	S	MANE			
red elderberry (*Sambucus racemosa*)	T	SARA			
red flowering currant *(Ribes sanguineum)*	T	RISA			
red osier dogwood *(Cornus sericea)*	T	COSE			
rose, baldhip *(Rosa gymnocarpa)*	S	ROGY			
rose, Nootka *(Rosa nutkana)*	S	RONU			
rose, peafruited *(Rosa pisocarpa)*	S	ROPI			
salal (*Gaultheria shallon*)	S	GASH			
salmonberry (*Rubus spectabilis*)	T	RUSP			
snowberry (*Symphoricarpos albus*)	S	SYAL			
thimbleberry (*Rubus parviflorus*)	T	RUPA			
trailing blackberry (*Rubus ursinus*)	S	RUUR			
vine maple (*Acer circinatum*)	T	ACCI			
willow, Pacific *(Salix lasiandra)*	T	SALA			
willow, Scouler *(Salix scouleriana)*	T	SASC			
willow, Sitka *(Salix sitchensis)*	T	SASI			

Herbs, Vines, Ferns, Grasses All species in this category are designated "H" for size on data form

Native species		Non-native species	
bracken fern (*Pteridium aquilinum*)	PTAQ	bindweed *(Convolvulus arvensis)*	COAR
deer fern *(Blechnum spicant)*	BLSP	clematis (*Clematis* sp.)	CLSP
false lily-of-the-valley *(Maianthemum dilatatum)*	MADI	climbing nightshade (*Solanum dulcamara)*	SODU
false Solomon's seal *(Mainthemeum racemosa)*	MARA	English ivy (*Hedera helix*)	HEHE
field horsetail (*Equisetum arvense*)	EQUA	evergreen blackberry (*Rubus laciniatus*)	RULA
foamflower *(Tiarella trifoliata)*	TITR	herb Robert (*Geranium robertianum)*	GERO
fringecup *(Tellima grandiflora)*	TEGR	Himalayan blackberry (*Rubus procerus*)	RUPR
lady fern *(Athyrium filix-femina)*	ATFI	grasses	GRAS
Pacific bleeding heart *(Dicentra formosa)*	DIFO	Japanese knotweed (*Polygonum cuspidatum*)	POCU
Pacific waterleaf *(Hydrophyllum tenuipes)*	HYTE	reed canarygrass (*Phalaris arundinacea*)	PHAR
Piggy-back plant *(Tolmiea menziesii)*	TOME		
skunk cabbage *(Lysichiton americanum)*	LYAM		
stinging nettle (*Urtica dioica*)	URDI		
sword fern (*Polystichum munitum*)	POMU		
water parsley *(Oenanthe sarmentosa)*	OESA		

CHAPTER 10.0 APPENDICES

Appendix A – References

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Appendix B – Public Involvement Process & Citizen Comment

Standard Parks public involvement process (PIP) was done during development of the VMP. Two public meetings were held – on June 5, and July 15, 2003. A summary of public comment from the first meeting compiled by Parks staff is included below. The second meeting was so poorly attended that no comments were taken after the presentation of the major components of the proposed draft plan. Four e-mailed comment letters were received subsequent to the first public meeting.

Cheasty Greenspace Reforestation Project
PIP Meeting - June 5, 2003
Jefferson Community Center - 7-8:30 pm

Summary of Public Comment

Note: Incorporates email/phone input responding to meeting announcement mailer.

Meeting was attended by 8 citizens (no overlap with 10 attending March 27, 2003 stewardship outreach meeting), plus 2 Seattle Parks staff (Eliza Davidson, Urban Forester and Carlie Doss, SC District Maintenance Laborer), and 2 consultants (Marcia Fischer, Sheldon & Associates and Chris LaPointe, EarthCorps).

Maintenance
Cheasty has a legacy of neglect by Parks Department. Invasive plants won't go away. Trees will continue to need trimming.

Cheasty Blvd trees should have received proper care years ago so they wouldn't need to be cut down now. Believe they may be war memorial trees which deserved better.

Encroaching invasives make it really difficult to maintain adjacent private yards.

Alley below 25th Ave. South above park not maintained, so no access exists to maintain sewer line there from potentially-invading tree roots. Affected owner has been told it's her responsibility: retired, worried about this and water flowing off her property down to boulevard uncontrolled.

When landslides occurred in recent years, Parks did nothing: the "City" took care of it.

Water pours off hills uncontrolled.

Habitat & Vegetation
Vegetation management plan is a good idea.

Invasive plants are a huge problem. Besides common species like ivy & blackberry these include: grapes, knotweed, sycamore maple.

Living next to the greenspace makes landscape maintenance extremely difficult because of all the encroaching invasives.

Some trees, especially with ivy up them, have fallen and damaged private property. Removing ivy and hazard trees should be top priority.

Isn't it overwhelming to actually succeed beating invasives and making the forest healthy?

Frink Park experience shows that volunteers working in blocks combined with persistent effort does yield results. Don't give up! Also, having a plan with clear priorities is crucial: unifies the community, serves as a reality check, helps generate outside support (grants, etc.).

Project should emphasize wildlife habitat, especially birds. Rich variety of species and great numbers use Cheasty. Bird surveys available from neighbors at north & south ends of greenspace *(received via emails after meeting*).

Avoid or at least minimize use of herbicides & pesticides when implementing project; concerns about wildlife and human health effects.

Saw newspaper article last Friday about pesticide reduction by Parks & wants to know what's been/being used in golf course adjacent to his organic landscape. *(Email followup provided by Andy Soden, Parks Director of Golf).*

Concerned that those hired to implement the plan be truly sensitive to the environment and have appropriate expertise. Unskilled, uncommitted people can and have done a lot of damage to the forest.

<u>Rainier Vista border</u>
Want Rainier Vista property line clarified: is it marked now, if so how, and will it be fenced in the future? *(Followup inquiry made with SHA staff managing project)*

Want to be sure no park vegetation is damaged or removed before, during or after Rainier Vista construction. Demarcation of park property very important for habitat preservation.

Oppose any trails being built from Rainier Vista directly into or through park.

Rainier Vista housing units will increase from 450 to 1010, so a big increase in density & population will occur. With mixed income residents, idea & potential demand for jogging trails in greenspace has come up.

<u>Trails & access</u>
Oppose any trails in greenspace, other than Boulevard trail already in the works.

Preserve habitat integrity; keep area natural & interior undisturbed by humans.

PAT (Project Advisory Team) for Blvd restoration project plan development phase opposed trails in park on two grounds: habitat disturbance and safety if Martin Luther King Way is connected to Boulevard.

Hanford stairs are potentially a great pedestrian link through greenspace, but overgrown vegetation combined with transients frequenting area makes unsafe-feeling. City departments are passing the buck on controlling this vegetation (Seattle Transportation & Parks). Need to keep vegetation back from stairs for visibility.

At Frink Park, issue arose of vegetation vs. user safety: need to address here as well.

Project Coordination
As member of PAT for boulevard, oncerned that Cheasty-related projects dovetail, for example dealing with greenspace vegetation impacts caused by retaining wall construction for new trail in boulevard right-of-way.

The VMP reforestation project should serve as a catalyst for other projects. Cooperate/collaborate with Sound Transit, Rainier Vista and other projects.

Community Involvement & Relations
Community has been meeting over past four years with Parks and feels politically taken-advantage of.

Fourteen years living in neighborhood and has seen little accomplished – now too old to really keep at it.

There's been a lot of talking by heavy-handed bureaucrats who are outsiders, don't live on the boulevard – dictating, not listening, holding puppet meetings which pretend to tap public input but plans are really a done deal. Totally dictatorial approach. This has been going on for 30 years. Sick of muckamucks telling us what they're going to do, not asking.

Past resentment in community is unresolved.

Need to go to Friends of Cheasty and include that organization, not just expect them to turn out for OUR public meeting. They need more inclusion/cultivation. *(Attendee was going to supply contact info & next meeting date – not received as of 6/25/03.)*

Good idea to do a survey in the neighborhood about the project. Neighbors could help hand them out.

Parks staff should go door-to-door and talk to everyone individually, really reach out.

Frink Park planning process included a survey to gather input. This broadened community investment in the project and largely reinforced comments received at public meetings. The Frink plan covered more than vegetation management: wasn't exactly equivalent to Cheasty situation.

Appendix C – Existing Plant Species & Sample Vegetation plot data sheet

Below is a list of the plant species occurring in data plots used in developing this VMP. It is not a comprehensive list of all species found in the greenspace.

Table C-1. Plant Species Occurring in Cheasty Greenspace

Scientific Name	Common Name	Native	Non-Native	Invasive
Trees				
Acer macrophyllum	Big Leaf Maple	X		
Acer platanoides	Norway Maple		X	X
Acer pseudoplatanus	Sycamore Maple		X	X
Aesculus hippocastanum	Horse Chestnut		X	
Alnus rubra	Red Alder	X		
Betula papyrifera	Paper Birch	X		
Cornus nuttallii	Pacific Dogwood	X		
Crataegus monogyna	Common Hawthorne		X	
Fraxinus latifolia	Oregon Ash	X		
Pinus sp.	Pine		X	
Populus balsamifera	Black Cottonwood	X		
Prunus emarginata	Bitter Cherry	X		
Prunus sp.	Cherry		X	
Robinia pseudoacacia	Black Locust		X	
Sequoia sempervirens	Coastal Redwood		X	
Sorbus aucuparia	European Mtn Ash		X	
Thuja plicata	Western Red Cedar	X		
	Sub-total	***8***	***9***	***2***
Shrubs				
Acer circinatum	Vine Maple	X		
Amelanchier alnifolia	Serviceberry	X		
Cornus sericea	Red Osier Dogwood	X		
Corylus cornuta	Beaked Hazelnut	X		
Crataegus douglasii	Black Hawthorne	X		
Crataegus monogyna	Common Hawthorne		X	
Cytisus scoparius	Scot's Broom		X	X
Gaultheria shallon	Salal	X		
Hedera helix	English Ivy		X	X
Holodiscus discolor	Oceanspray	X		
Ilex aquifolium	English Holly		X	X
Mahonia aquifolium	Tall Oregon Grape	X		
Mahonia nervosa	Oregon Grape	X		
Oemieria cerasiformis	Indian Plum	X		
Pachistima myrsinites	Boxwood	X		
Prunus laurocerasus	Cherry Laurel		X	X
Rhamnus purshiana	Cascara	X		
Rosa gymnocarpa	Baldhip Rose	X		
Rosa nutkana	Nootka Rose	X		
Rosa sp.	Rose		X	
Rubus parviflorus	Thimbleberry	X		

Scientific Name	Common Name	Native	Non-Native	Invasive
Rubus procerus	Himalayan Blackberry		X	X
Rubus spectabilis	Salmonberry	X		
Salix scouleriana	Scouler's Willow	X		
Salix sp.	Willow	X		
Sambucus racemosa	Red Elderberry	X		
Sorbus sitchensis	Mountain Ash	X		
Symphoricarpos albus	Snowberry	X		
Unknown	Bamboo		X	X
Vaccinium parvifolium	Red Huckleberry	X		
	Sub-total	***22***	***8***	***6***
Herbs				
Achlys triphylla	Vanillaleaf	X		
Athyrium filix-femina	Lady Fern	X		
Cirsium vulgare	Bull Thistle		X	X
Conium maculatum	Poison Hemlock		X	
Convolvulus arvensis	Bindweed		X	X
Epilobium watsonii	Watson's Willow Herb	X		
Equisetum sp.	Horsetail	X		
Galium sp.	Bedstraw/ Cleaver	X		
Geranium robertianum	Stinky Bob		X	
Holcus Lanatus	Velvetgrass		X	
Hydrophyllum sp.	Waterleaf	X		
Lamium sp.	Henbit	X		
Lonicera sp.	Honeysuckle	X		
Lysichiton americanum	Skunk Cabbage	X		
Muscari racemosum	Grape Hyacinth		X	
Myosotis sp.	Forget-Me-Not	X		
Oenanthe sarmentosa	Water Parsley	X		
Petasites sp.	Giant Coltsfoot		X	X
Plantago lanceolata	English Plantain		X	
Polygonum cuspidatum	Japanese Knotweed		X	X
Polypodium glycyrrhiza	Licorice Fern	X		
Polystichum munitum	Sword Fern	X		
Pteridium aquilinum	Bracken Fern	X		
Ranunculus repens	Creeping Buttercup		X	
Rorippa sp.	Cress	X		
Rubus ursinus	Trailing Blackberry	X		
Rumex obtusifolius	Broad-leaved Dock	X		
Solanum dulcamara	Deadly Nightshade		X	X
Stachys cooleyae	Hedge Nettle	X		
Taraxacum officinale	Dandelion		X	
Tellima grandiflora	Fringecup	X		
Trifolium pretense	Red Clover		X	
Trillium ovatum	Trillium	X		
Urtica dioica	Stinging Nettle	X		
Vicia sativa	Common Vetch		X	
	Sub-total	***21***	***14***	***5***
	Total Species	***43***	***31***	***13***

VEGETATION PLOT DATA SHEET

Park						**Date**						
Map Name						**Recorder**						
Plot #						**Team**						
GENERAL SITE CHARACTERISTICS:												
Aspect	N	NE	E	SE	S	SW	W	NW		Flat		
Slope	0 - 15%	15% - 40%	over 40%									
Canopy Closure	0 - 20%	20% - 40%	40% - 60%	60% -80%	over 80%	(estimate at center of plot)						
Soil Water	Standing	Saturated	Damp	Dry								
Soil Type	Sand	Loamy sand	Sandy loam	Silt loam	Loam	Sandy clay loam	Silty clay loam	Clay loam		Sandy clay	Silty clay	Clay
	Organic	Gravel	Bedrock	Hardpan	Eroded	Fill / rubble						
Special Features	Trail	Camp	Dump	Power line	Road	Mntn. beaver presence						
	Stream	Seep	Wetland	Gully	Slide	Other:						
Snags	Declining	Dead	Loose bark	Clean upright	Broken	Decomposed	Down mat'l	Stump				
(enter count by stage)												
Large Woody Debris	Log Class 1	Log Class 2	Log Class 3									
4 - 8"												
8 - 20"												
>20" diam												
Woody Debris Cover	0 - 5%	5% - 10%	10% - 25%	25% - 50%	over 50%							
Comments												

Soil Type: Circle one on first line if soil is mineral. If soil is organic, do not circle a texture on first line. Can also circle one on first line and one on second line if both apply.

Special Features: circle as many as are present in the plot.

Snag: enter count under each category of snag that occurs in plot

Large Woody Debris: enter count for each class and diameter that occur in the plot.

VEGETATION PLOT DATA SHEET

Park		**Date**	
Map Name		**Recorder**	
Plot #		**Team**	

TREES: Use a separate line for each tree in plot. For trees that are less than 15 ft tall, use one line per species and enter count for each species under regen column. Also enter average height, dbh, and condition.

Name (Common or Botanical)	**Species Code** (4 letters)	**Height** (feet)	**Stems** (number)	**Diameter** (inches)	**Core Taken** (**Y** or **N**)	**Condition** (**G**ood, **F**air, **P**oor, **D**ead)	**Regen-eration** (**P**lanted or **N**atural)	**Regen-eration** (Count)	**Crown Class** (**O**verstory, **U**nderstory, **R**egen.)	**Ivy up Tree Trunk** (**Y** or **N**)

VEGETATION PLOT DATA SHEET

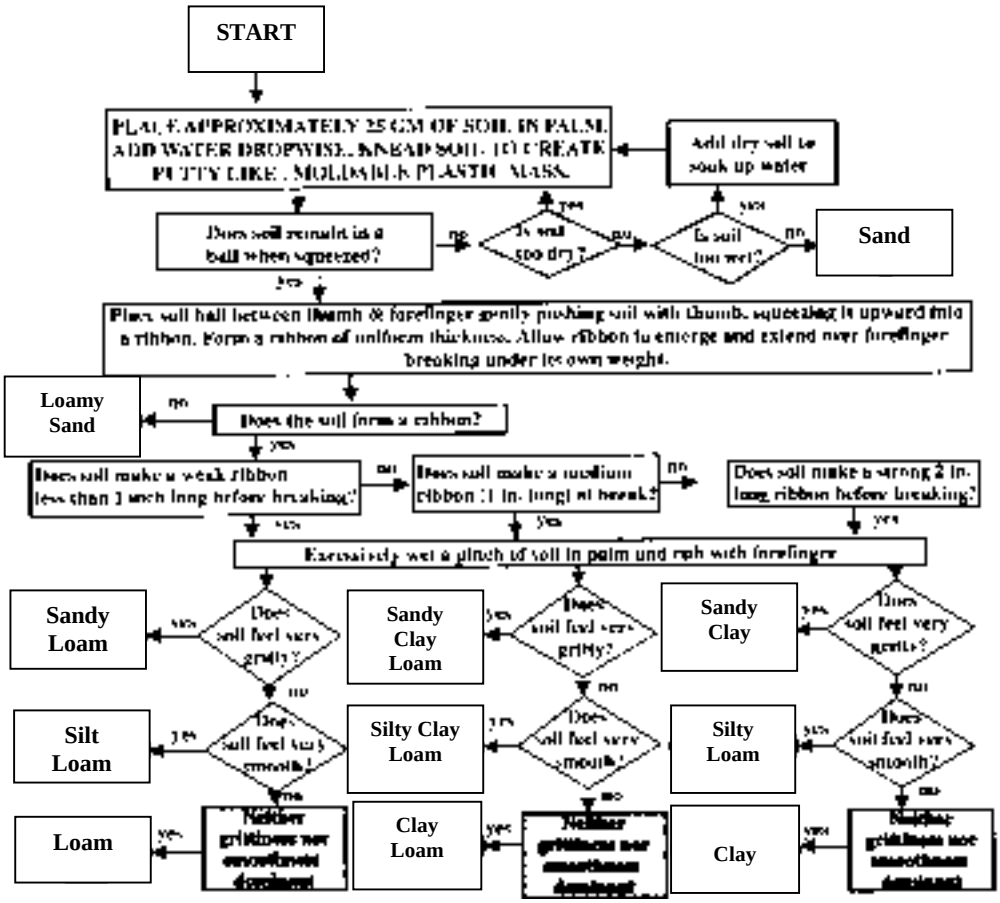
Park		**Date**	
Map Name		**Recorder**	
Plot #		**Team**	

SHRUBS & HERBS:

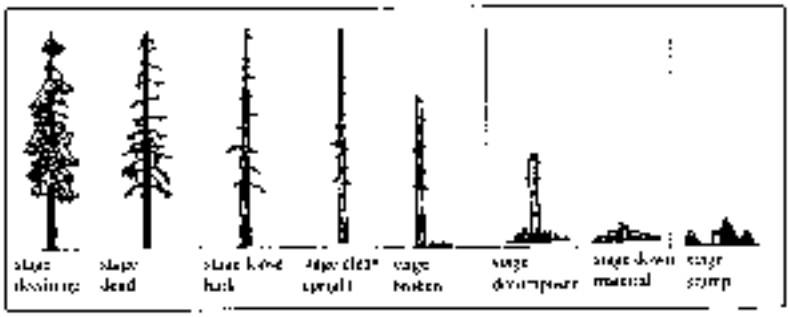
Name (Common or Botanical)	**Species Code** (4 letter)	**% Cover** (quarter 1)	**% Cover** (quarter 2)	**% Cover** (quarter 3)	**% Cover** (quarter 4)	**Total Plot % Cover**	**Plant Size*** (**TS**, **SS**, or **H**)	**Native** (**Y** or **N**)

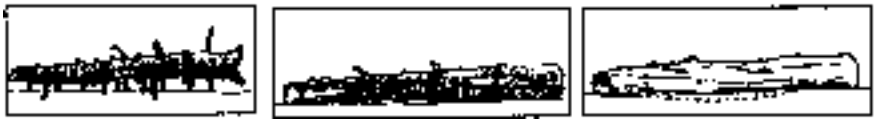
* TS = Tall shrub, SS = Short shrub, H = Herbaceous species, grasses, sedges, rushes, ferns, fern allies (see crib sheet for designation)

MINERAL SOIL TEXTURES



SNAGS and DWD





Log Class I Log Class II Log Class III

Diameter
10-20 cm (4-8”)
21-50 cm (8-20”)
>50 cm (>20”)

PLANT SPECIES CODES

Trees/Saplings

Native species		Non-native species	
bigleaf maple (*Acer macrophyllum*)	ACMA	English hawthorne *(Crataegus laevigata)*	CRLA
bitter cherry *(Prunus emarginata)*	PREM		
black cottonwood (*Populus balsamifera*)	POBA		
cascara *(Rhamnus purshiana)*	RHPU		
Douglas fir (*Pseudotsuga menziesii*)	PSME		
Pacific dogwood *(Cornus nuttallii)*	CONU		
Pacific madrone (*Arbutus menziesii*)	ARME		
red alder (*Alnus rubra*)	ALRU		
western hemlock (*Tsuga heterophylla*)	TSHE		
western red cedar (*Thuja plicata*)	THPL		

Shrubs

Native species	Size		Non-native species	Size	
black twinberry *(Lonicera involucrata)*	T	LOIN	common laurel (*Prunus laurocerasus*)	T	PRLA
hardhack (*Spiraea douglasii*)	T	SPDO	English holly (*Ilex aquifoliu*m)	T	ILAQ
hazelnut (*Corylus cornuta*)	T	COCO	Scot's broom (*Cytisus scoparius*)	T	CYSC
Indian plum (*Oemleria cerasiformis*)	T	OECE			
mock orange *(Philadelphus lewisii)*	T	PHLE			
oceanspray *(Holodiscus discolor)*	T	HODI			
Oregon grape (*Mahonia nervosa*)	S	MANE			
red elderberry (*Sambucus racemosa*)	T	SARA			
red flowering currant *(Ribes sanguineum)*	T	RISA			
red osier dogwood *(Cornus sericea)*	T	COSE			
rose, baldhip *(Rosa gymnocarpa)*	S	ROGY			
rose, Nootka *(Rosa nutkana)*	S	RONU			
rose, peafruited *(Rosa pisocarpa)*	S	ROPI			
salal (*Gaultheria shallon*)	S	GASH			
salmonberry (*Rubus spectabilis*)	T	RUSP			
snowberry (*Symphoricarpos albus*)	S	SYAL			
thimbleberry (*Rubus parviflorus*)	T	RUPA			
trailing blackberry (*Rubus ursinus*)	S	RUUR			
vine maple (*Acer circinatum*)	T	ACCI			
willow, Pacific *(Salix lasiandra)*	T	SALA			
willow, Scouler *(Salix scouleriana)*	T	SASC			
willow, Sitka *(Salix sitchensis)*	T	SASI			

Herbs, Vines, Ferns, Grasses

All species in this category are designated "H' for size on data form

Native species		Non-native species	
bracken fern (*Pteridium aquilinum*)	PTAQ	bindweed *(Convolvulus arvensis)*	COAR
deer fern *(Blechnum spicant)*	BLSP	clematis (*Clematis* sp.)	CLSP
false lily-of-the-valley *(Maianthemum dilatatum)*	MADI	climbing nightshade (*Solanum dulcamara)*	SODU
false Solomon's seal *(Mainthemeum racemosa)*	MARA	English ivy (*Hedera helix*)	HEHE
field horsetail (*Equisetum arvense*)	EQUA	evergreen blackberry (*Rubus laciniatus*)	RULA
foamflower *(Tiarella trifoliata)*	TITR	herb Robert (*Geranium robertianum)*	GERO
fringecup *(Tellima grandiflora)*	TEGR	Himalayan blackberry (*Rubus procerus*)	RUPR
lady fern *(Athyrium filix-femina)*	ATFI	grasses	GRAS
Pacific bleeding heart *(Dicentra formosa)*	DIFO	Japanese knotweed (*Polygonum cuspidatum*)	POCU
Pacific waterleaf *(Hydrophyllum tenuipes)*	HYTE	reed canarygrass (*Phalaris arundinacea*)	PHAR
Piggy-back plant *(Tolmiea menziesii)*	TOME		
skunk cabbage *(Lysichiton americanum)*	LYAM		
stinging nettle (*Urtica dioica*)	URDI		
sword fern (*Polystichum munitum*)	POMU		
water parsley *(Oenanthe sarmentosa)*	OESA		

Appendix D – Recommended Plant Species List by Plant Community for Cheasty Greenspace

Instructions:

6. Assess soil moisture (in spring-early summer).
7. Assess light conditions (canopy closure) during growing season at full leaf-out of trees.
8. Determine which plant community is desired within those listed under the appropriate soil moisture and canopy closure. In most cases, conifer communities are preferred because conifers are scarce in the greenspace. However, in some cases, e.g. where invasives are a problem it may be desirable to establish a faster-growing deciduous-dominated plant community.
9. Plant all dominants listed for that plant community and choose any or all of the sub-dominants as desired.
10. If any of the suggested species are already present, then adjust plant species selection accordingly to include species already. e.g. If hazelnut is already present on a site as a dominant and it is listed in the plant community you are going to plant at that site, do not plant additional hazelnut.

Note: Assumes mineral soils (sandy loams) in all cases but saturated or standing water situations (wetlands). Species italicized in bold with asterisks are designated as dominants in the plant community; species in plain type are sub-dominants.

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
DRY	 **SUN**	**PLANT COMMUNITY A**		
		***Abies grandis – grand fir**	***Holodiscus discolor - oceanspray**	***Mahonia aquifolium – tall Oregon grape**
		***Arbutus menziesii – Pacific madrone**	***Prunus virginiana - chokecherry**	***Symphoricarpos albus - snowberry**
		***Pseudotsuga menziesii – Douglas fir**	Philadelphus lewisii – mock orange	Ceanothus sanguineus – redstem ceanothus
				Ceanothus velutinus - deerbrush
DRY	 **SUN/SHADE**	**PLANT COMMUNITY B**		
		***Abies grandis – grand fir**	***Holodiscus discolor - oceanspray**	***Mahonia aquifolium – tall Oregon grape**
		***Pseudotsuga menziesii – Douglas fir**	***Prunus virginiana - chokecherry**	***Symphoricarpos albus - snowberry**
			Corylus cornuta - hazelnut	Ceanothus sanguineus – redstem ceanothus
			Philadelphus lewisii – mock orange	Ceanothus velutinus - deerbrush
				Rosa gymnocarpa – wood rose

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
DRY	● **SHADE**	**PLANT COMMUNITY C**		
			***Corylus cornuta - hazelnut**	***Gaultheria shallon - salal**
			***Oemlaria cerasiformis – indian plum**	***Mahonia nervosa – short Oregon grape**
				Rosa gymnocarpa – wood rose
				Symphoricarpos albus - snowberry
				Vaccinium parviflorium – red huckleberry
DAMP	○ **SUN**	**PLANT COMMUNITY D** *(Choose if conifer community desired)*		
		***Abies grandis – grand fir**	***Acer circinatum – vine maple**	***Rosa nutkana – Nootka rose**
		***Pseudotsuga menziesii – Douglas fir**	***Holodiscus discolor – oceanspray**	***Rubus parviflorus – thimbleberry**
		Picea sitchensis – Sitka spruce	Ribes sanguineum – red flowering currant	***Symphoricarpos albus - snowberry**
			Sambucus racemosa – red elderberry	
		OR		
		PLANT COMMUNITY E *(Choose if deciduous community desired)*		
		***Alnus rubra – red alder**	***Acer circinatum – vine maple**	***Rosa nutkana – Nootka rose**
		***Populus balsamifera – black cottonwood**	***Cornus sericea – red osier dogwood**	***Rubus parviflorus – thimbleberry**
		Fraxinus latifolia – Oregon ash	Lonicera involucrata – twinberry	***Symphoricarpos albus - snowberry**
		Prunus emarginata – bitter cherry	Prunus virginiana – chokecherry	
			Sambucus racemosa – red elderberry	

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
DAMP	 **SUN/SHADE**	**PLANT COMMUNITY F** *(Choose if conifer community desired)*		
		***Abies grandis – grand fir**	***Acer circinatum – vine maple**	***Gaultheria shallon – salal**
		***Pseudotsuga menziesii – Douglas fir**	***Corylus cornuta – hazelnut**	***Mahonia nervosa – short Oregon grape**
		***Thuja plicata – red cedar**	***Rhododendron macrophyllum – rhododendron**	***Rubus parviflorus – thimbleberry**
		Cornus nuttalli – Pacific dogwood	Holodiscus discolor – oceanspray	Vaccinium ovatum – evergreen huckleberry
		Picea sitchensis – Sitka spruce	Oemlaria cerasiformis – indian plum	Vaccinium parviflorum – red huckleberry
		Taxus brevifolia – Pacific yew	Sambucus racemosa – red elderberry	
			Sorbus sitchensis – mountain ash	
		OR		
		PLANT COMMUNITY G *(Choose if deciduous community desired)*		
		***Alnus rubra – red alder**	***Acer circinatum – vine maple**	***Rosa nutkana – Nootka rose**
		***Populus balsamifera – black cottonwood**	***Cornus sericea – red osier dogwood**	***Symphoricarpos albus - snowberry**
		Fraxinus latifolia – Oregon ash	***Salix scouleriana – Scouler willow**	Rosa pisocarpa – clustered rose
		Prunus emarginata – bitter cherry	Lonicera involucrata - twinberry	
			Prunus virginiana - chokecherry	
			Rhamnus purshiana – cascara	
			Sambucus racemosa – red elderberry	
DAMP	 **SHADE**	**PLANT COMMUNITY H**		
		***Thuja plicata – red cedar**	***Acer circinatum – vine maple**	***Gaultheria shallon – salal**
		***Tsuga heterophylla – western hemlock**	***Corylus cornuta – hazelnut**	***Mahonia nervosa – short Oregon grape**
		Taxus brevifolia – Pacific yew	***Rhododendron macrophyllum – rhododendron**	***Rubus parviflorus – thimbleberry**

Soil Moisture	Canopy Closure	Vegetation Layer TREE	 TALL SHRUB	 SHORT SHRUB
			Cornus sericea – red osier dogwood	Rosa nutkana – Nootka rose
			Oemlaria cerasiformis – indian plum	Rosa pisocarpa – clustered rose
			Rhamnus purshiana – cascara	Symphoricarpos albus - snowberry
			Sambucus racemosa – red elderberry	Vaccinium ovatum – evergreen huckleberry
			Sorbus sitchensis – mountain ash	Vaccinium parviflorum – red huckleberry
SATU-RATED	○ **SUN**	**PLANT COMMUNITY I**		
		***Alnus rubra – red alder**	***Cornus sericea – red osier dogwood**	Rosa nutkana – Nootka rose
		***Fraxinus latifolia – Oregon ash**	***Rubus spectabilis – salmonberry**	Rosa pisocarpa – clustered rose
		OR		
		PLANT COMMUNITY J		
		***Populus balsamifera – black cottonwood**	***Salix lucida var. lasiandra – Pacific willow**	Oplopanax horridus – devil's club
		Picea sitchensis – Sitka spruce	***Salix sitchensis – Sitka willow**	Ribes bracteosum – stink currant
			Acer circinatum – vine maple	Ribes lacustre – prickly currant
			Lonicera involucrata - twinberry	
			Rhamnus purshiana – cascara	
			Sambucus racemosa – red elderberry	
SATU-RATED	◐ **SUN/SHADE**	**PLANT COMMUNITY K** *(Choose if deciduous community is desired)*		
		***Alnus rubra – red alder**	***Cornus sericea – red osier dogwood**	Oplopanax horridus – devil's club
		***Fraxinus latifolia – Oregon ash**	***Rubus spectabilis – salmonberry**	Ribes bracteosum – stink currant
		***Populus balsamifera – black cottonwood**	***Salix lucida var. lasiandra – Pacific willow**	Ribes lacustre – prickly currant
		Picea sitchensis – Sitka spruce	***Salix sitchensis – Sitka willow**	Rosa nutkana – Nootka rose

Soil Moisture	Canopy Closure	Vegetation Layer TREE	 TALL SHRUB	 SHORT SHRUB
			Acer circinatum – vine maple	Rosa pisocarpa – clustered rose
			Lonicera involucrata - twinberry	
			Malus fusca – western crabapple	
			Rhamnus purshiana – cascara	
		OR		
		PLANT COMMUNITY L *(Choose if conifer community is desired)*		
		***Picea sitchensis – Sitka spruce**	***Cornus sericea – red osier dogwood**	Oplopanax horridus – devil's club
		***Thuja plicata – red cedar**	***Rubus spectabilis – salmonberry**	Ribes bracteosum – stink currant
			Acer circinatum – vine maple	Ribes lacustre – prickly currant
			Malus fusca – western crabapple	
			Rhamnus purshiana – cascara	
SATU-RATED	● **SHADE**	**PLANT COMMUNITY M**		
		***Thuja plicata – red cedar**	***Acer circinatum – vine maple**	Oplopanax horridus – devil's club
			***Cornus sericea – red osier dogwood**	Ribes bracteosum – stink currant
			***Rubus spectabilis – salmonberry**	Ribes lacustre – prickly currant
			Lonicera involucrata - twinberry	Rosa nutkana – Nootka rose
			Rhamnus purshiana – cascara	Rosa pisocarpa – clustered rose
STAND-ING WATER	○ **SUN**		**PLANT COMMUNITY N**	**HERBS/EMERGENTS**
		***Populus balsamifera – black cottonwood**	***Salix lucida var. lasiandra – Pacific willow**	Athyrium filix-femina – lady fern
		Fraxinus latifolia – Oregon ash	***Salix sitchensis – Sitka willow**	Lysichiton americanum – skunk cabbage
				Scirpus microcarpus – small-fruited bulrush

Soil Moisture	Canopy Closure	Vegetation Layer TREE	TALL SHRUB	SHORT SHRUB
STAND-ING WATER	 **SUN/SHADE**		**PLANT COMMUNITY O**	**HERBS/EMERGENTS**
		***Populus balsamifera – black cottonwood**	***Rubus spectabilis – salmonberry**	***Athyrium filix-femina – lady fern**
		Fraxinus latifolia – Oregon ash	***Salix lucida var. lasiandra – Pacific willow**	***Lysichiton americanum – skunk cabbage**
			***Salix sitchensis – Sitka willow**	***Stachys cooleyii – Cooley hedge nettle**
			Malus fusca – western crabapple	Carex obnupta – slough sedge
				Glyceria elata – tall mannagrass
				Scirpus microcarpus – small-fruited bulrush
STAND-ING WATER	 **SHADE**		**PLANT COMMUNITY P**	**HERBS/EMERGENTS**
			***Rubus spectabilis – salmonberry**	***Athyrium filix-femina – lady fern**
				***Carex obnupta – slough sedge**
				***Lysichiton americanum – skunk cabbage**
				Glyceria elata – tall mannagrass
				Stachys cooleyii – Cooley hedge nettle

Appendix E – Bird Species Lists

Below are two different bird lists that were provided by citizens/neighbors of Cheasty Greenspace.

Yard Birds – 2615 S DeLappe Pl
Seattle, WA 98144, which borders the Cheasty Greenbelt between S. Hinds Street and S. Horton Street.
Compiled by Neal Komedal, a birder who participates in the Seattle Audubon annual Christmas bird count and has written bird articles and lists for the Seattle Parks Department.

Table E-1. Bird Species List A

Green-backed Heron	Golden-crowned Kinglet
Killdeer	
Bald Eagle	American Robin*
Sharp-shinned Hawk	Varied Thrush
Red-tailed Hawk	Cedar Waxwing
Osprey	European Starling
Merlin	Orange-crowned Warbler
American Kestrel	Yellow-rumped Warbler
California Quail	Townsend's Warbler
Band-tailed Pigeon	Yellow Warbler
Rock Dove	MacGillvray's Warbler
Mourning Dove	Wilson's Warbler*
Western Screech-Owl	Rufous-sided Towhee*
Vaux's Swift	Song Sparrow*
Anna's Hummingbird*	Dark-eyed Junco
Rufous Hummingbird	White-throated Sparrow
Northern Flicker	White-crowned Sparrow
Red-breasted Sapsucker	Golden-crowned Sparrow
Downy Woodpecker*	Fox Sparrow
Pileated Woodpecker	Brown-headed Cowbird
Olive-sided Flycatcher	Black-headed Grosbeak
Western Wood-Peewee	Northern Oriole
Willow Flycatcher	Western Tanager
Pacific Slope Flycatcher	House Sparrow
Violet-green Swallow	Pine Siskin
Barn Swallow*	American Goldfinch
Stellars Jay*	House Finch
American Crow	
Black-capped Chickadee*	
Chestnut-backed Chickadee	
Bushtit*	*indicates nesting
Brown Creeper	
Red-breasted Nuthatch	
Winter Wren	
Bewick's Wren*	

CAROLEE COLTER'S YARD LIST

The following species have been observed in or flying over my property at 4451 33rd Ave. S.

Table E-2. Birds Species List B

Great Blue Heron Canada Goose Bald Eagle Sharp-shinned Hawk Cooper's Hawk Red-tailed Hawk California Quail Glaucous-winged Gull Rock Dove Band-tailed Pigeon Vaux's Swift Anna's Hummingbird Northern Flicker Downy Woodpecker Pileated Woodpecker Ash-throated Flycatcher Western Wood Pewee Warbling Vireo Hutton's Vireo American Crow Steller's Jay Barn Swallow Violet-green Swallow Black-capped Chickadee Red-breasted Nuthatch Brown Creeper Bushtit Bewick's Wren	Winter Wren Ruby-crowned Kinglet Golden-crowned Kinglet Hermit Thrush Swainson's Thrush American Robin Varied Thrush Cedar Waxwing European Starling Orange-crowned Warbler Black-throated Gray Warbler Townsend's Warbler Yellow-rumped Warbler Wilson's Warbler Western Tanager Spotted Towhee Lincoln's Sparrow Song Sparrow Golden-crowned Sparrow White-crowned Sparrow Dark-eyed Junco *(Oregon and Rocky Mountain races)* House Finch Common Redpoll Pine Siskin American Goldfinch Evening Grosbeak House Sparrow

Appendix F – List of Maps

F-1. Existing Conditions Map (slides, wet areas, streams)
F-2. Vegetation Zone and Sample Plots Location Map
F-3. Management Area Map
F-4. Native Species Diversity Map
F-5. Native Species Cover Map
F-6. Tree Stand Density Map
F-7. Canopy Closure Map
F-8. Invasive Species Cover Map
F-9. Management Area Summary Map