Central Woodland Park
Vegetation Management Plan

Draft December 22, 2003

For: The Seattle Parks and Recreation Department
Mark Mead, Senior Urban Forester, Project Manager

By: ***A Northwest Collaborative***
Davidya Kasperzyk, AIA, M.S. of Natural Resources

Tree Solutions Inc., Consulting Arborists
Scott D. Baker, Principal; Ann Hirschi, Environmental Horticulturalist

Seattle Urban Nature Project
Matthew Ramsey, Field Ecologist; Suzi Surbey, GIS Program Director

SB & Associates, Landscape Architects
Susan Black, Principal; Rachael Watland, Historical Analysis

Table of Contents **Pg. 1**

Executive Summary **Pg. 3**

Chapter 1 – Overview **Pg. 7**
Introduction to Central Woodland Park
Physical Description
Park History
Discussion of Historic Preservation
Public Process

Chapter 2 – Goals and Objectives **Pg. 8**
Overall Park Goals
Urban Forestry Program Objectives
Vegetation Management Plan Goals and Objectives
Wildlife Habitat Goals

Chapter 3 – Assessment of Existing Natural Resources **Pg. 10**
Vegetation Data Collection Methods
- Risk Tree Evaluation
- Vegetation Sampling Native Woodland Component
- Characterization of Landscaped Areas

Vegetation Zones
- Zone A –Ornamental Edge (s)
- Zone B – Southwest Lawn
- Zone C – West Greensward
- Zone D – Orchard
- Zone E – Bigleaf Maple/Western Red Cedar
- Zone F – Bigleaf Maple/Western Red Cedar/Ponderosa Pine Forest
- Zone G – Light Development
- Zone H – North Greensward
- Zone I – Dogwood/Spruce Mixed Grove
- Zone J – Mixed Deciduous forest
- Zone K – East Greensward
- Zone L – Heavy Development
- Zone M – Street Trees
-

Chapter 4 – Findings **Pg. 32**
Physical and Cultural Findings

Chapter 5 – Vegetation Management Recommendations **Pg. 34**
Management Zones
- 1. – Ornamental Edges
- 2. – Lawn and Greenswards
- 3. – Orchard

- 4. – South Loop Picnic Area
- 5. – Central Landscaped Forest
- 6. – Bowling Green
- 7. –Mixed Forest
- 8. – Parking Lots, Courts, and Road Margins
- 9. - Street Trees
- 10. – North Picnic Area
- 11. – Dog Off-Leash Area

References **Pg. 47**

Maps

Map 1. - Vicinity Map
Map 2. - Project Area Map
Map 3. - Olmsted Illustrated Plan
Map 4. - Vegetation Zones
Map 5. - Management Zones

Appendices

A. Public meetings & comment (10 pages)
B. Scott D. Baker – Arborists Perspective (3 pages)
C. Susan Black – Discussion of Historic Perspective at Woodland Park (3 pages)
D. Summary of Olmsted Correspondence & Graphics R.Watland (9 pages)
E. Management Area Photos and Objectives
F. Photo Gallery – Ann Hirshi
G. Hazard Tree Data Evaluation Sheet
H. Table of Risk Trees (10 pages)
I. Example of Sampling Plot Data

List of Tables and Figures

Executive Summary

Central Woodland Park is a highly valued component of the commonly known "Green Lake" anchor for the Seattle Parks and Recreation System. A quiet respite between the regional attraction of the Woodland Park Zoo and the beloved Green Lake Park it is the upland complement to the Lower Woodland Park Playfields.

The former Phinney Estate was reconceived by John Charles Olmsted in 1907 to provide a diverse park experience for the nascent Seattle urban park system. Central Woodland Park was seen as an interstitial forest area between the new formal Woodland Park Zoo and the Green Lake Park and Playfields. There was no detailed design for this forest, rather it was shown in the illustrated Olmsted plan as forest and a roadway/trail system connecting to the other park components via existing roads and yet be developed trails.

As developed, the Central Woodland Park has decided Olmsted "values" inherent in its character and usage. These include the open lawns, greenswards commonly recognized as picnic areas, mixed species planting areas including hardwood and ornamental trees, and significant native remnant forest and understory. There also are the inset recreational elements favored by Olmsted which in this case are a unique bowling green, tennis courts, and recently an off-leash dog area.

The task of the Vegetation Management Plan for such a diverse park is to recognize how best to match far-sighted forest maintenance and renewal practices with minimal disturbance to the cherished and emerging park usages. In our case the public has clearly demanded retention of the historic character of the Central Woodland Park, while also acknowledging the health challenge to an aging forest resource.

The consultant team coordinated by *A Northwest Collaborative* working with the Parks Senior Urban Forester, and participating in public forums has developed a set of comprehensive Central Woodland Park project goals as follows:

- Provide for the long term maintenance and regeneration of the forest and greenswards
- Manage the forest tp promote public safety
- Manage the vegetation to support diverse and appropriate human uses
- Provide landscape continuity with the original Olmsted values
- Enhance and expand native forest components within the Park.

During the Visual Tree Assessment (VTA) for Risk Trees by Tree Solutions Inc., our findings were that Bigleaf Maple throughout the park is almost uniformly mature and actively engaged in the process of aging and decline. Those trees that are in areas of high use and are in our two highest risk categories pose a potential risk to park patrons and require immediate further analysis and attention from the Parks Urban Forestry Team.

Soil conditions in many locations outside the native forest areas are poor and likely to deteriorate further due to heavy human use. Park trails are not well defined by natural borders and Parks maintenance vehicles are not confining their routes to a minimal path, further contributing to soil degradation and damage to the historical character of the park. In addition, a significant population of feral rabbits is distributed throughout the Park, creating obvious erosion problems in the root zone of the trees. Together, these factors contribute to the low level of natural regeneration of trees and the complete lack of understory species in many areas of the Park.

The overall character of Central Woodland Park is well defined, and it is blessed with a variety of natural and landscaped forest habitats that have high aesthetic and ecological value. The western slopes have Puget Lowland native forest remnants that were noted by Olmsted in his personal notes. These forests have little invasive species and native understory present, as well as a cohort grouping of Douglas Fir and Ponderosa Pine poised to regenerate. A central spine of Ponderosa Pine displays the qualities of an eastern Cascades forest, and the western edge is graced by a magnificent variety of ornamental hardwoods.

In addition to the specific recommendations for each management area found in Chapter Five we would like to put forward a broader general set of observations and recommendations gained during our time in the Central Woodland Park and meeting with constituents and concerned citizens:

- There is a demand for high quality public information at the project site and in a variety of media sources describing this urban forest plan and its implementation strategy. This information will be critical to public understanding and support for the VMP's goals and actions.
- Neighbors and constituent groups are concerned about how the plan is implemented so that the historic character is maintained and their usage conserved. They say they are ready to help in many ways and should be encouraged to form a stewardship organization to contribute to the implementation of Central Woodland Park's ongoing maintenance and restoration.
- There is considerable verbal support for the expansion of native forest and understory species. This includes strategic ideas for sustainable trail design and volunteer labor to plant, establish and maintain native understory.
- The Parks Department needs adequate funding to improve its maintenance practices for both urban forest best practices and human use impacts.

Initiating a broad and consistent Vegetation Management Plan specific to the Central Woodland Park is required to conserve this tremendous forest resource for the public to enjoy. This plan would focus on soil repair and root zone protection, risk tree management and the establishment of the next forest tree generation.

The Public, Parks Staff, and the leadership of the City of Seattle need to come together and implement the very best strategic plan they can conceive of to insure the wonderful quality of Central Woodland Park for the generations to come.

Chapter 1 – Overview

Introduction to Central Woodland Park

Central Woodland Park is an integral component of one of Seattle's most popular Park Anchors –the Green Lake Park. Though not formally designed by John Charles Olmsted, this park has a variety of uses and an aesthetic that represents the picturesque Olmsted traditional style. Its open grassy meadows are framed by both native forests with understory and landscaped greenswards characterized by open maintained understory..

At over 60 acres, the Park provides recreational uses such as tennis, lawn bowling, trails, and the combination of select plantings of ornamental hardwoods and Puget Lowland forest habitat. It provides a contrast to the compact highly designed Woodland Park Zoo connected to it to the west by three historically significant bridges which cross Aurora Avenue North/State Route 99 and the open Lower Woodland Park Playfields to the east. To the northeast lies the most popular park in Seattle –Green Lake.

Park History

Central Woodland Park was acquired by the City of Seattle from Guy Phinney in 1900. The former Phinney Estate was then part of the comprehensive system of parks and boulevards recommended by John Charles Olmsted (October 1903) nephew and successor principal of the noted landscape architecture firm founded by Frederick Law Olmsted.

Returning in 1907-08 to execute the more specific design of parks within his Comprehensive Plan, Mr. Olmsted articulates the significance of the "woodland" of lower Woodland Park when he wrote "...woodlands are very rarely created in public parks...(and) are almost invariably revolutionized into *a very smooth and somewhat unnatural and artificial appearing* open grove of trees. In many cases where large numbers of visitors have to be accommodated on a small area, such a treatment of natural woods is entirely reasonable, but in cases where the land is very rough and steep, the *woods should be left in a more nearly wild condition,* that is to say, with the natural undergrowth of shrubbery and wild flowers to be viewed from drives and walks upon which the public may pass without injury to the body of the woods. If *visitors* are to be allowed to range freely through a wild wood without regard to drives and paths, they will soon destroy most of the ground covering verdure and gradually injure, if *not ruin the growth of the trees by trampling the earth bare and hard.*

"In the case of Woodland Park, the wild beauty of the woods is very remarkable and every effort should be made to preserve it while making it conveniently accessible*....*the location of Stone Avenue...has been objected to because of its destruction of...what is perhaps the very best portion of the existing woods...Between this shore section of the park (south end) and the plateau meadow (the zoo meadow) the *original woods still remain to a great extent unartificialized"* (Emphasis added)
He further noted on January 10, 1910 that Woodland Park contained "...very fine woods with hemlocks and cedars among the first...and salal and ferns there are particularly fine."

Subsequent actions affecting the Park proper included:

- Construction of Picnic Shelters throughout the Woodland Park by WPA/CCC in the 1930's.
- Removal of the pre-existing Interurban rail line terminus from the Park (circa 1940). A remnant rock pier remains near the most northern pedestrian bridge.
- Use of the site as US Army Barracks 1941-1944.
- Construction of Aurora Avenue (Highway 99, later State Route 99) in the 1950's. This included the development of the three pedestrian bridges connection Upper Woodland Park to the Woodland Park Zoo.
- Installation of the Off-Leash area for local dogs in 2000.

Discussion of Historic Preservation

Seattle's Landmarks Preservation Ordinance establishes a Landmarks Preservation Board to review proposed actions. A Vegetation Management Plan does not require Planning and Development Review by the City therefore will not go before the Landmarks Preservation Board. However, the Lower Woodland portion of Green Lake and Woodland Park is known to have had significance to the renowned Olmsted Brothers Landscape Architecture firm. Lower Woodland Park was addressed in the 1908 Seattle Park Plan as one of many properties recommended for acquisition as part of the Seattle Park System. In response to this historical significance, the team looked to standardized historic preservation practices to craft a solution for the regeneration of the landscape.

A search of the Seattle Parks files and was conducted for planting plans or other indications of design in the portion of Woodland Park covered in this scope. The Friends of Seattle's Olmsted Parks provided an overview of their own files and findings relative to Woodland Park's acquisition and subsequent development. A long-standing member of the Parks staff who had managed Lower Woodland's park maintenance for many years provided clues as to the evolution of specific elements of the area. In addition, a preliminary search was conducted of the Sherwood Files from the Seattle Parks and Recreation Department. The findings noted in the Park History section above should be considered a preliminary survey of material for further, more extensive research to be completed before the removal or significant alterations to the ornamental vegetation in Woodland Park.

While the Olmsted Park system is not designated as an Historic Landmark at this time, and therefore is not subject to scrutiny or review by regulators with the jurisdiction, it is nevertheless a prized and beloved asset to the residents of the City. Many find that a change to the setting in any of the parks is alarming.

Preservation Brief #36 of the National Park Service Technical Preservation Services discusses Protecting Cultural Landscapes. This area of Woodland Park is likely to qualify as an Historic Designed Landscape, though no plans for the vegetation location or species have been found in the archive search.

Public Process

All Seattle Parks and Recreation Department projects, including VMP development involves a prescribed Public Involvement Process (PIP). For the Central Woodland Park VMP a Visual Tree Assessment and plot samples were authorized in early November 2003. Public Meeting #1 was held Nov. 20 at the Green Lake Community Center where the VMP project was presented, and some initial findings were shared with the public, and comment was received.

An additional meeting, Public Meeting #2 was created for Dec. 11th to respond to the public's desire for further information and concerns about the impact of the project on their treasured park character. The senior urban forester showed the "in progress" work of the consultant team assessing "risk trees", along with specific pictures of the types of tree disease and failure that are likely with this aged forest resource. The participants showed an interest in participating in the restoration of degraded park elements including trails, reforming maintenance practices considered harmful, and establishing new tree and understory generations to improve the forest resource over time. There was the obvious concern that all forest management decisions be necessary and conservative in their impact on the forest character of the park.

To be continued… (see Notes from Public Meetings #1, and #2 in the appendix)

Chapter 2 – Goals and Objectives

Overall Park Goals

No previously articulated overall goals for Central Woodland Park have been documented. This plan acknowledges and intends to respect the Olmsted values associated with the initial development in 1910, and subsequent Parks Department development and maintenance decisions. It is not the role of a VMP to frame or establish overall goals for Central Woodland Park, only to set goals that pertain directly to the management of park vegetation.

Urban Forestry Program Objectives

The following objectives were established to guide the Seattle Parks Urban Forest Restoration Program (1994) in the protection the forest resource that encompasses approximately half of Seattle's 6000 acre park system. Vegetation management and reforestation plans generated by the department support these objectives:

- Promote native character
- Assist natural processes
- Conserve soil and water quality
- Protect and enhance wildlife habitat
- Buffer land uses
- Insure public safety

Vegetation Management Plan Goals and Objectives

The Seattle Parks and Recreation Department Tree Policy (2001) stated as its purpose: "To maintain, preserve, and enhance the urban forest within parks. To increase overall tree canopy, tree health, and tree longevity within parks. To ensure that parks trees are managed in such a manner that is consistent with other departmental and municipal policies." The Tree policy includes guidance for what is to be included within a Vegetation Management Plan (VMP) for a City Park.

- Site Inventory and Assessment including a site map illustrating topography and vegetation.
- Trees that are proposed for removal and/or pruning.
- Planting design showing species, size, location and any needed erosion control/slope stabilization methods.
- Public Involvement Plan
- Maintenance Plan including tasks and frequencies.

Wildlife Habitat Goals

Because of the variety and cumulative breadth of habitat types in the Central Woodland Park and its neighboring public resource assets we feel the contribution of the park may be significant for wildlife. The goals of the City of Seattle Parks and Recreation Department Urban Wildlife and Habitat Management Plan (2000 Update) are:

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

Chapter 3- Assessment of Existing Natural Resource

Vegetation Data Collection Methods

The vegetation of Woodland Park was evaluated using a set of data collection methods that was best suited to gather accurate information within the allotted timeframe at a level of detail sufficient to address the Vegetation Management Plan goals and objectives. All data was collected by ASA certified arborists or professional plant ecologist. Data collection methods focused on collecting information about risk trees, native woodland forest dynamics, ornamental woodland dynamics, and trees of significance.

Risk Tree Evaluation

Woodland Park was inspected for potential risk trees between October 14th and December 16th, 2003 by Certified Arborists at Tree Solutions Inc. Seattle Parks and Recreation provided the consulting team with a standard data sheet which suggested the basic criteria for evaluation, (Appendix "Hazard Tree Condition Form, Seattle Parks and Recreation"). In order to survey the park's 60 acres of woodlands in the time allowed, the inventory effort focused on the most heavily used and most frequently occupied portions of the park first. Due to time and budget constraints trees were inspected using Visual Tree Assessment methods. These methods assess tree health visually from ground level only, without the use of more sophisticated methods of evaluation such as the Resistograph drill or crown inspection using climbing techniques. Six categories were used to indicate risk and each was scored on a range from 1 to 5 where 1 represented the highest risk condition for each category and 5 represented the lowest risk condition within categories.
The Six categories were:

- Occupancy of target area
- Crown symmetry
- Trunk integrity
- Structural condition
- Root problems

Levels of occupancy were derived using direct visual assessments of recreation activity during the observation period, for example, observed use of the dog off-leash area, or observed signs of recreation activity during other seasons such as, picnic tables, picnic shelters, parking lots near these facilities, or marked cross-country running courses. Parks records indicated that picnic shelters were occupied continuously during the summer months. (Appendix)

Crown symmetry entails an evaluation that equivalent number, diameter and length of main structural branches exists on all sides of the trunk. This was easily observable from ground inspections.

Trunk integrity was evaluated by inspecting the base of the tree visually and noting obvious decay columns or bark that was cracked or missing. Trunk integrity was also assessed using a simple metal probe to determine extent of internal decay.

Structural condition was assessed by visually observing the presence of dead branches that were either attached to the crown or detached and either hanging in the crown or fallen to the ground. Occasionally dead branches were not seen but wounds on the trunk or in the canopy crown were evident.

Root problems were assessed by observing the depth of the tree's crown relative to grade, as it should not be too high above or below grade. Root problems could also be inferred by observed evidence of decay or damage from vehicles, or obvious evidence of fungal infections near the root collar.

Categories used to evaluate risk contained on the Park's data sheet (Appendix__ "Hazard Tree Condition Form, Seattle Parks and Recreation,") that were not used to evaluate risk trees during this inventory include, Twig Growth, Foliage and Insect Disease. These criteria were not easily observable in the season of this evaluation period or were beyond the scope of time and budget.

A complete inventory of risk trees was conducted and all potential risk trees were documented carefully. Each potential risk tree was given a unique identification number painted discretely on the base of the east side of the tree's trunk. Each tree location was also documented using sub-meter GPS to aid relocation during future maintenance activities. Each risk tree was assigned a single rating, which was an aggregate of the scores within the six criteria described above. The resulting potential range of aggregate ratings was 6 to 30. Tree species and diameter at breast height were recorded for each specimen. In a few instances multi-stemmed trunks of a single species were rated as a single small grove.

Vegetation Sampling Native Woodland Component

Woodland Park contains some large areas (>5 acres) that have relatively uniform canopy structure and uniform dominant species composition. Within these areas vegetation was sampled using plots to gather detailed information and to make inferences about the overall areas. Habitat maps produced in 2000 by Seattle Urban Nature Project (SUNP) suggest that the park is generally composed of Landscaped Woodland, Landscaped Grassland, Developed areas, or Deciduous Forest. Through extensive site inspections, three areas of relatively uniform canopy structure and uniform dominant species composition emerged which span the SUNP designations (See map titled, *Vegetation Zones* and Appendix SUNP, 2000). These three areas were delineated by hand on color orthophoto maps at 1:2400 scale, 1"=200', and plots were located within them. Plot locations were subjectively evaluated to ensure that they were representative of overall conditions for the area and captured the full range of conditions as well.

Survey plots were 0.1 acre circular plots with a radius of 37.5'. The center point was marked with a metal stake and measuring tape was used to mark the cardinal directions with temporary markers. The center point of the plot was documented using sub-meter GPS and all other data were recorded by hand on data sheets. Each data sheet contains park name, plot number, date recorded, and the recorder's name on each page.

The following general site characteristics were recorded at each plot:

- Aspect
- Percent slope
- Canopy closure
- Soil moisture
- Soil texture
- A count of snags
- A count of large woody debris
- Percent cover of large woody debris
- Presence of trails, picnic areas, or trash
- Comments

The following site attributes were recorded for tree species located in each plot:

- Common name
- Four letter codes for genus and species
- Height
- DBH, Diameter at Breast Height
- The number of stems if tree was multi-stemmed
- A general rating of its condition
- Canopy position
- Count of seedlings regenerating
- Presence of English Ivy, *Hedera helix*, climbing the trunk
- Provenance

The following attributes were recorded for understory conditions:

- Common names of shrubs, herbs and grasses
- Four letter code for genus and species
- Percent cover of each plant species
- Percent cover of bare ground
- Growth form
- Provenance

Aspect was determined using a compass to determine the orientation of the slope or the orientation towards open access to sky and sunlight. A site's overall aspect indicates likely conditions for the vegetation pertaining to moisture regime, temperature regime and access to sunlight.

Percent slope was determined using an inclinometer and sighting down slope to a sight located at the height of the eye of the observer. Site slope indicates the potential effect of aspect; steeper slopes have more pronounced effects of aspect than flatter sites. Slope also indicates potential soil stability or soil moisture conditions where steeper slopes are more prone to erosion forces and typically shed surface moisture more quickly than flatter sites. However, soil moisture is also affected by soil stratigraphy and occasionally steep slopes are the sites of seeps due to impermeable exposed soil layers.

Canopy closure is a visual estimate for the entire plot area and accounts only for the cover provided by the tree canopy in the upper most strata. It is an indication of available light levels in the understory and the extent percent cover of the tree canopy.

Soil moisture and texture were determined by feel and by direct sight. Assessment of soil in the field is largely limited to physical characteristics of soil such as texture, structure, moisture, and color. Chemical characteristics such as actual nutrient status and pH were not evaluated during this assessment. Soil's physical characteristics provide some indication of their ability to support vegetation by providing stability for roots, available moisture and nutrients.

Snags were simply counted, not categorized into classes, nor were they measured in terms of height or DBH. Snags are an indicator of wildlife habitat value and forest health.

Large woody debris was counted and classified by size based on the diameter, but was not classified by degree of decay. Total percent cover for woody debris was estimated visually for the entire plot area. The presence and extent of large woody debris is also an indicator of wildlife habitat value and forest ecosystem dynamics.

Observable evidence of human use such as worn social paths, wide established trails, or picnic tables or shelters was noted. This information suggests levels of human use or impact to the vegetation as well as the potential risk posed to people by vegetation.

All trees greater than 15' tall were noted individually. Each of these was described using their common name and a four letter code for genus and species. Presence of each tree or each species was used to calculate total stem density for the plot or zone. Trees that were smaller than 15' were counted to indicate forest regeneration trends. Attributes of smaller trees were averaged together.

Total tree height from the ground level to the top of the crown was estimated using an inclinometer and measuring tape to determine distance from tree and angle to top of crown to calculate the following formula: height= (distance from tree)*(tangent of angle between observer's eye to top of tree crown) + observer's eye height. This method is known to introduce some error so it is considered merely an estimate. Tree height is an approximate indicator of tree age, and can indicate forest stand dynamics among various tree species.

Diameter at Breast Height, DBH, was determined by measuring the circumference of the tree trunk at 4.5' from ground level on the up hill side of the tree using a forester's DBH tape which converts circumference measures to diameter measures based on the formula, diameter=circumference/Pi. DBH can be an indicator of tree age, and when combined with tree height can indicate forest dynamics pertaining to site productivity.

Trees were visually inspected to determine whether more than one main leader stem was growing from a common crown and the total number of stems was noted. Stem density is based on the number of individual trees, counted at the trunk crown, not this count of stems. Multi-stemmed trunks are an indication of past land use, historical site conditions, and forest management practices.

A subjective rating of each tree's condition was assigned using terms such as good/fair/poor/dead. This evaluation was based on the presence of dead limbs in the crown, obvious decay in the trunk, or evidence of unstable structure. This evaluation is not as exhaustive or quantitative as the risk tree assessment method, but patterns within this category could suggest general trends in the condition of a particular tree species or conditions at a given site.

Canopy position was determined by observing the height of each tree specimen relative to the existing tree canopy created by adjacent trees. Canopy position suggests forest stand dynamics among species as well as past land use history.

All trees that were less than 15' tall were counted. Counts within species were recorded and height and DBH was averaged for the group. These counts and attributes indicate the current status of forest regeneration at the site and forest stand dynamics.

English Ivy, *Hedera helix*, was noted if it was climbing up tree trunks. Its percent cover was recorded separately along with other understory species. Climbing ivy represents a greater immediate management concern to the health of trees than ivy as a ground cover because it can compromise structural integrity of tree limbs during storms and because climbing ivy is more likely to begin reproducing via seed than ivy on the ground. Ivy that produces seed is more apt to spread further and represents a second means of expansion for this invasive species.

Provenance was noted for each individual tree as either native or non-native. Additionally, each species was rated as either invasive on not invasive. Taken together, this information can be used to determine the diversity of native species, the frequency and extent of non-native species, and the frequency and extent of invasive species. Native species diversity and invasive species frequency and extent are often related since the expansion of invasive species can result in the displacement of native species, which in-turn results in reduced overall biodiversity of a site.

All understory plant species that were observed and readily identifiable were noted using common names and a four letter code representing the genus and species. The observation period occurred between October 14th and December 16th, 2003, which is a

period of senescence for annual and perennial herbaceous species, therefore it does not represent all species that occur on-site. A follow-up visit to the survey plots during the growing season would be required to survey the plots for additional species to determine total species richness and extent with more certainty.

Percent cover of each understory plant species was estimated visually for the entire 0.10 acre plot. Percent cover is a measure of the extent of space that a plant's canopy occupies if viewed aerially and it can sum to greater than 100% due to multiple overlapping layers of vegetation. Percent cover indicates the extent of a given species and understory forest ecosystem dynamics or past land use history.

Percent cover of bare ground was estimated using the same method used for all other understory species. Bare ground can be an indication of disturbance such as human impacts or resource limitations of the soil such as light or moisture. Bare ground resulting from disturbance is frequently colonized by weedy species which can include invasive exotic species.

The growth form of each understory species was observed and noted. Plant species were categorized as, shrubs, vines, herbs, or grasses. Bare ground was assigned a value indicating bare ground. The growth form of understory species taken together with percent cover indicates understory structural diversity, which is an indicator of wildlife habitat value, forest health and forest ecosystem dynamics. Greater structural diversity generally provides a greater number of niches for wildlife, however, the individual requirements of particular wildlife species varies.

As with trees, provenance was noted for each understory plant species as either native or non-native. Additionally, each species was rated as either invasive on not invasive. Taken together, this information can be used to determine the diversity of native species, the frequency and extent of non-native species, and the frequency and extent of invasive species. Native species diversity and invasive species frequency and extent are often related since the expansion of invasive species can result in the displacement of native species, which in-turn results in reduced overall biodiversity of a site.

Characterization of Landscaped Areas

Unlike the areas of relatively uniform canopy structure and uniform dominant species composition, much of the park's vegetation appears to result from the landscape design process or perhaps haphazard planting of ornamental plant species over time. The understory of these areas was most often grass lawn. These areas are not conducive to a sampling approach because the high variability of species composition would not permit accurate inferences about the overall area made from localized samples. Therefore, in these areas vegetation was characterized by a census approach.

Individuals of each tree species, or in some cases each genus were counted and classified as either deciduous or coniferous. Ratios of deciduous to coniferous species were

computed for each discrete area by dividing the count of each group by the total census count for that area in order to give an account of the general composition of each area.

Each tree was also evaluated for potential risk using methods described earlier. For each discrete area the proportion of risk trees was calculated by dividing the number of risk trees by the total census count for that area. This proportion indicates which areas have the greatest concentration of risk trees.

Individual trees of significance were evaluated as Heritage Tree Candidates by using a threshold DBH of 36" or prior knowledge of cultural or historical significance. A few individuals have been included as candidates due to their uniqueness within this park although they did not reach the threshold diameter. Each candidate is listed by species along with its height and DBH. Locations of each candidate were documented using sub-meter GPS.

Topography, Slopes, Soils, and Erosion

Central Woodland Park comprises a portion of the east slope of Phinney Ridge as it slopes gently eastward to Green Lake Park. The overall topography of the project area is relatively flat with only a 60' change of elevation. The project area is bisected by five swales that each slope gently from west to east. One of the swales is currently the course of a road that bisects the park between East Green Lake Way and Aurora Avenue. Surface water generally drains from west to east across Central Woodland Park and surface flows concentrate within these swales. (See map titled, *Project Area*).

The Sherwood History files of the Seattle Parks Department describe the glacial activity in the vicinity of Green Lake Park as responsible for creating the depression of Green Lake and other small lakes in the north Seattle area. Central Woodland Park's soil parent material is likely to be a heterogeneous mix of compacted glacial till, un-compacted glacial till and/or urban fill. The only soil that was directly assessed within the park was within the sampled areas of the native woodland. The texture of the soil in these areas was mostly sandy clay loam. Surface organic matter varied among zones but was consistently higher in areas with understory vegetation that was not grass or lawn.

Only the extreme east and west edges of the project area contain steep slopes greater than 60%. Here slope distance is not usually greater than 50 feet but the tallest slopes are located along Aurora Avenue. During the observation period of this vegetation management plan no wetlands or active seeps were observed, however, likely places for seeps would be along the steep slopes at the east edge of the project area

Rills and gullies caused by concentrated surface water run-off were observed in the swales, despite the presence of storm drains. Erosion was also observed on the steep slopes of both east and west edges of the project area and was precipitated by burrowing activity of feral rabbits. In both instances understory vegetation cover was low. Increased vegetation cover facilitates rainwater interception, infiltration and transpiration, effectively reducing the forces of erosion. Habitat features such as down woody debris

and surface litter increase surface roughness, decreasing the velocity of surface water and reducing erosion.

Vegetation Zones

The vegetation zones of Central Woodland Park were delineated by using the existing habitat designations created by Seattle Urban Nature Project in 2000 and extensive site reconnaissance in order to discern discrete patches of vegetation within this Park of such high landscape diversity. (Appendix SUNP, 2000) Each zone can be identified by its dominant plant species, physiognomy, topographical location and boundaries created by human uses. Attempts were made to delineate patches of discrete vegetation that could be conveniently described, accurately assessed and in some cases, appropriately quantified.

Zone A - Ornamental Edges

Acres: 8
General Description:
This zone is comprised of two sections.

The first section is a long narrow strip with a steep west facing slope along Aurora Avenue. This section is characterized by a high diversity of tree species, native and ornamental, deciduous and coniferous. Also included in this area are numerous Heritage Tree Candidates. The understory is comprised of a mix of native shrubs, ornamental shrubs and some invasive species. The strip serves as a buffer to the noise and pollution of traffic on Aurora Avenue. Because the roadway is recessed, impact is somewhat lessened. Three bridges that cross Aurora to the Zoo are prominent features; however, actual Zoo access is limited to only the southern most bridge. The impact of feral rabbits is contributing to erosion at the north end of strip near the overpass.

The second section is a long narrow strip with a steep east facing slope along the southeast edge of the project boundary (see map titled, *Project Area*). This appears to be a remnant ornamental edge that now is a dense thicket. Tree species in this zone are a diverse mix of big leaf maple, madrone, and a mix of native and ornamental coniferous species. The strip is dominated by thicket forming mid-sized shrubs such as hawthorn and golden chain tree. This zone has the most extensive infestation of invasive species found throughout the entire park. Himalayan blackberry and English Ivy are present here in moderate sized patches.

Detailed description:
Approx. # of Trees over 4": 580
Percent Deciduous: 29 Percent Coniferous: 71

Tree species present:

168 deciduous trees comprised of 14 genera		409 coniferous trees comprised of 10 genera	
35	*Prunus*	149	*Picea*
32	*Acer*	118	*Pinus*
29	*Cornus*	48	*Abies*
19	*Sorbus*	39	*Thuja*
12	*Populus*	23	*Cedrus*
10	*Styrax*	11	*Sequoia*
9	*Quercus*	11	*Larix*
5	*Aesculus*	9	*Sequoiadendron*
5	*Parrotia*	6	*Chamaecyparis*
3	*Betula*	1	*Calocedrus*
3	*Fagus*		
2	*Platinus*		
1	*Ulmus*		
1	Unknown species		

Potential Risk Tree Summary:
See map titled, ***Management Zones***, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	0
11-15	2
16-20	8
21-25	7
26-27	0
Total	17

Heritage Tree Candidates:

Species	**ID Number(s)**	**DBH (inches)**	**Height (feet)**
Pinus ponderosa	# 192	37	101’
Pinus ponderosa	# 211	36	
Sequoia sempervirons Grove I	# 195	41*	106*
Sequoia sempervirons Grove II	# 200	42*	103*
Sequoia sempervirons Grove III	# 210	39*	103*
Sequoiadendron giganteum Grove I	# 201**	48*	98*
Sequoiadendron giganteum Grove II	# 202	57*	111*
Cedrus atlantica	# 191	37	
Fagus	# 199	31	
			*Average for individuals within grove **database shown different information

Understory species present:

Snowberry (*Symphorocarpus alba)*, Oregon grape (*Mahonia nervosa* and *M. aquifolium*), Rhododendron (*Rhododendron sp.*)

Invasive species present:

Scotch Broom (*Cytisus scoparius*), Portugal laurel (*Prunus lusitanica)*
Himalayan Blackberry (*Rubus discolor*), English Ivy (*Hedera helix*),
Golden Chain tree (*Laburnum anagyroides*),
Oneseed hawthorn (*Crataegus monogyna)*

Zone B – Southwest Lawn

Acres: 2.6
General Description:
The sweeping open quality of the south lawn, bordered by trees and crossed with formal paths, is universally liked by all users encountered, from bicyclist, strollers, frisbee golfers, or runners.

Detailed Description:

There are no trees in this zone.

Understory Species Present:

Vegetation consists entirely of lawn grasses.

Zone C – West Greensward

Acres: 7.4

General Description:

"Greensward" was the title of Frederick Law Olmsted's Plan for New York's Central Park. This term implies a landscape composed of informal groupings of trees placed in a grassy lawn with no significant shrub layer. This is very typical of the Olmsted Brothers Legacy in Seattle, and is especially visible at Woodland Park. It is one of the cherished components of the design, giving Woodland Park that prototypical "park-like" feeling. The West Greensward includes 2 sub areas including:

1. An ornamental oval along the east edge with large specimen hardwoods including Birch, Oak, Beech, Elm, Maple, Horse Chestnut, Linden and Ash trees, interspersed with Pines. This area has the quality of an arboretum.
2. A second grove that is a pure stand of pines near the entrance to the bridge over Aurora.

Detailed Description:

Approx. # of Trees over 4": 307

Percent Deciduous: 31 Percent Coniferous: 69

Tree Species Present:

95 deciduous trees comprised of 10 genera

- *Betula*
- *Acer*
- *Fagus*
- *Sorbus*
- *Ulmus*
- *Aesculus*
- *Quercus*
- *Populus*
- *Tilia*
- Unknown species

212 coniferous trees comprised of 4 genera

- *Pinus*
- *Cedrus*
- *Larix*
- *Abies*

Potential Risk Tree Summary:

See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	2
11-15	2
16-20	5
21-25	2
26-27	0
Total	11

Heritage Tree Candidates:

Species	**ID Number(s)**	**DBH (inches)**	**Height (feet)**
Fagus	# 197	35.5	
Fagus	# 196	35.5	
Thuja plicata	# 204*		
			* shown as # 205 on map

Understory Species present:

The understory in this zone is mostly lawn grass. There are occasional clumps of Oregon grape (*Mahonia aquifolium*) at the base of some trees.

Invasive species present:

Holly (*Ilex aquifolium*)

Zone D - Orchard

Acres: 0.4

General Description:

This appears to be the remains of an old grove of Cherry Trees that were in decline, cut, and have now re-sprouted. Some new small fruit trees appear to have been planted by neighbors on this grassy open knoll.

Detailed description:

Approx. # of Trees over 4": ~12

Percent Deciduous: 100 Percent Coniferous: 0

Tree Species Present:

~12 *Prunus sp.*

Acer macrophyllum

Potential Risk Tree Summary:

See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	1
11-15	0
16-20	1
21-25	0
26-27	0
Total	2

Heritage Tree Candidates:

There are no Heritage Tree Candidates in this zone.

Understory Species present:

The understory in this zone is entirely lawn grass.

Invasive species present:

There are no invasive species in this zone.

Zone E – Bigleaf Maple/ Western Red Cedar Loop

Acres: 6.7

General Description:

The Loop, with its picnic shelters and easy drive-by access, is one of the most highly used areas of Woodland Park. It consists primarily of a canopy of mature big leaf maple and western red cedar trees, actively engaged in a natural mortality spiral. (Harris,Clark, et.al, 2004) The total lack of understory allows open sight-lines through the entire area. In addition there are a few hemlocks and a string of Scots pine trees down the center of the loop. The soil is heavily compacted from both human and mechanical (maintenance vehicle) use. Most trees are the same age and in severe decline.

Detailed description:

Approx. # of Trees over 4": 284

Percent Deciduous: 65 Percent Coniferous: 35

Tree Species Present:

128 deciduous trees comprised of 2 genera	156 coniferous trees comprised of 3 genera
Acer	*Pinus*
Platanus	*Thuja*
	Tsuga

Potential Risk Tree Summary:

See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	1
11-15	13
16-20	57
21-25	19
26-27	2
Total	92

Heritage Tree Candidates:

No Heritage Tree Candidates in this zone.

Native Understory Species present:

In addition to species that were detected through sampling (see below), the following species were present in small clumps at the base of trees:
Oregon grape (*Mahonia aquifolium*)

Invasive species present:

There are no invasive species in this zone.

Plot Sampling Results:

Stem density:

Average stems per acre: 77
Average snags per acre: <1

Canopy species composition and structure:

Percent*	**Species**	**Height (ft)****	**DBH (inches)****
65	*Acer macrophyllum*	108	23
26	*Thuja plicata*	144	26
9	*Pinus ponderosa*	61	15.5
*Percent of canopy composition based on stem counts, not aerial cover			
**Average based on representative samples from 3 plots			

Understory species richness:

Average number of understory species: 2.3

Understory composition:

Average percent cover of native understory species: < 1%

Average percent cover non-native species: 26 %

Average percent cover invasive species: 0%

Understory species list:

Agrostis sp., Festuca sp., Dactylis glomerata.

Ivy status:

0 out of 23 trees have climbing Ivy

Understory structural diversity:

Average percent cover of Grasses: 26 %
Herbs: 0%
Shrubs: <1%
Vines: 0%
Bare ground: 38 %
Woody debris: 2.5%

Zone F - Bigleaf Maple/ Western Red Cedar Ponderosa Pine Forest

Acres: 10

General Description:

Walking on the trails north of the Loop, past the former quarry currently inhabited by feral rabbits, the topography becomes more varied and the understory more diverse. Along with the native conifers, there is a sizable representation of ponderosa pine, seen more often in the dryer eastern Washington climate. Overall canopy cover is high, and the understory remains relatively open preserving long sight lines. As yet it is a mystery how the mature ponderosa pine became established in Woodland Park. There are some extremely large hemlock (by city today's park standards) and a cohort of young Douglas fir emerging.

Detailed description:

Plot Sampling Results:

Stem density:

Average stems per acre 90

Average snags per acre: <1

Canopy proportions:

Percent deciduous 17 Percent coniferous 83

Canopy species composition and structure:

Percent*	**Species**	**Height (ft)****	**DBH (inches)****
44	*Pseudotsuga menzeisii*	53	11.3
19	*Pinus ponderosa*	91	22
17	*Acer macrophyllum*	71	26.6
11	*Thuja plicata*	59	19.8
8	*Tsuga heterophylla*	108	30.3

*Percent of canopy composition based on stem counts, not aerial cover
**Average based on representative samples from 4 plots

Potential Risk Tree Summary:
See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	0
11-15	6
16-20	10
21-25	1
26-27	0
Total	16

Heritage Tree Candidate:

Species	**ID Number(s)**	**DBH (inches)**	**Height (feet)**
Arbutus menziesii	# 257	28*	
*while below the threshold dbh of 36", it is the largest Madrone in the park and therefore locally unique			

Understory species richness:
Average number of understory species: 3.0
Understory composition:
Average percent cover of native understory species: 5%
Average percent cover non-native species: 30 %
Average percent cover invasive species: 0%
Understory species list:
Grasses: *Agrostis tenuis, Dactylis glomerata, Carex sp.*
Herbs: *Trifolium repens,*
Shrubs: *Gaultheria shallon.*
Ivy status:
0 out of 36 trees have climbing Ivy
Understory structural diversity:
Average percent cover of Grasses: 30%
Herbs: 6%
Shrubs: 2%
Vines: 0%
Bare ground: 30 %
Woody debris cover: 2.5%

Zone G - Light Development

Acres: 2.42
General Description:
This Zone is made up of the Lawn Bowling grounds and the Horseshoe pits. It consists of managed turf and a Comfort Station.

Detailed Description:
There are no trees in this zone.

Understory Species Present:
Vegetation consists entirely of lawn grasses

Zone H - North Greensward

Acres: 10
General Description:
The north picnic area is located in this area of open grass and trees. There is some large Douglas fir is this zone that are not seen in most other areas of the Park. Also a row of aging Lombardy poplar lines the parking lot edge. Aging big leaf maple and western red cedar are prevalent throughout the zone.

Detailed description:
Approx. # of Trees over 6": 222
Percent deciduous: 28 Percent coniferous: 72

Tree species present:

63 deciduous trees comprised of 6 genera		159 coniferous trees comprised of 7 genera	
50	*Acer*	56	Pseudotsuga
17	*Unknown species*	48	*Pinus*
15	*Cornus*	26	*Picea*
8	*Populus*	15	*Thuja*
8	*Juglans*	8	*Chamaecyparis*
2	*Betula*	6	*Calocedrus*
1	*Ulmus*	3	*Tsuga*

Potential Risk Tree Summary:
See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	4
11-15	13
16-20	15
21-25	3
26-27	0
Total	35

Heritage Tree Candidates:

Species	**ID Number(s)**	**DBH (inches)**	**Height (feet)**
Sequoiadendron giganteum (5)	# 220	12***	
Acer macrophyllum	# 251	52	
Acer macropyllum	# 253	38	
			*Average for individuals within grove **database shown different information ***historically significant memorial grove

Understory Species:

The understory in this zone is mostly lawn grass. There are occasional clumps of Oregon grape (*Mahonia aquifolium*) at the base of some trees.

Invasive species present:

Himalayan Blackberry (*Rubus discolor*), Scotch Broom (*Cytisus scoparius*),

Zone I- Dogwood/ Spruce Mixed Grove

Acres: 1.5 acres

General Description:

There is a significant representation of gnarled old *Cornus nutallii*, the flowering dogwood native to our region. Because they are often infected with various diseases, it is rare to see so many large ones. There are distinct also groves of Spruce in this area. The zone is bisected by a swale that slopes from west to east forming a connector trail between Green Lake Park and the north picnic areas of Woodland Park.

Detailed description:

Potential Risk Trees summary:

No risk trees in this zone.

Heritage Tree Candidates

No Heritage Tree Candidates in this zone, but Dogwoods could become candidates in the near future.

Understory Species present:

The understory in this zone is mostly lawn grass. There are occasional clumps of Oregon grape (*Mahonia aquifolium*) at the base of some trees.

Invasive species present:

Himalayan Blackberry (*Rubus discolor*)

Zone J –Native Deciduous Forest

Acres: approx 10.53

General Description:

This zone slopes to the east and is characterized by big leaf maple, various conifers and a diverse understory. This zone has the greatest structural diversity and highest species diversity in the understory compared to all other parts of the park. The forest has both towering conifers and a cohort of young Douglas fir and ponderosa pine emerging. Invasive species cover is presently relatively low, and could therefore be easily managed here.

The Green Lake Vegetation Management Guidelines recommends that the connection with Green Lake could be strengthened at the northern section of this Zone. The southern section buffers the park from the ball fields (not part of this plan) along Green Lake Way to the east.

Detailed description:

Plot Sampling Results

Stem density: Average stems per acre 136

Average snags per acre: 16

Canopy proportions:

Percent deciduous 55 Percent coniferous 45

Canopy species composition:

Percent*	**Species**	**Height (ft)****	**DBH (inches)****
46	*Acer macrophyllum*	69	21
27	*Pseudotsuga menzeisii*	26	5
6	*Pinus ponderosa*	45	11
5	*Prunus emarginata*	25	5
5	*Tsuga heterophylla*	135	30.6
5	*Sequoia sempervirons*	30	10.6
2	*Thuja plicata*	39	18.5
1	*Ulmus sp.*	41	11
1	*Cornus nutallii*	35	8

*Percent of canopy composition based on stem counts, not aerial cover

**Average based on representative samples from 7 plots

Potential Risk Tree Summary:

See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	1
11-15	7
16-20	4
21-25	5*
26-27	0
Total	17*

*zone has some root disease infected areas which could result in higher numbers in affected areas. See chapter 5 for more information.

Heritage Tree Candidates:

No Heritage Tree Candidates in this zone.

Understory species richness:

Average number of understory species: 7.1

Understory composition:

Average percent cover of native understory species: 19 %
Average percent cover non-native species: 17 %
Average percent cover invasive species: 11%

Understory species list:

Grasses: *Dactylis glomerata, Elymus glaucus, Festuca sp., Agrostis sp.,*
Herbs: *Pteridium aquilinum, Polistichum munitum,*
Shrubs: *Philadelphus lewisii, Symphorocarpus alba, Mahonia nervosa, Rubus ursinus, Oemlaria cerasiformis, Corylus cornuta, Holodiscus discolor, Vaccinium parviflora, Rubus discolor, Ilex aquifolium, Daphne odorata,,*
Vines: *Hedera helix*

Ivy status:

5 out of 94 trees have climbing Ivy

Understory structural diversity:

Average percent cover of
Grasses: 25%
Herbs: 13%
Shrubs: 18%
Vines: 18%
Bare ground: 15 %
Woody debris: 3.2%

Zone K – East Greensward

Acres: 3.73

General Description:

This zone stretches from the grassy areas visible from 50th St. north along the edge of east sloping deciduous forest and along the east side of the loop drive. Its character is much like the west and north greenswards, although diversity of tree species is not as high here.

Detailed description:

Tree species present:

deciduous trees comprised of 2 genera	coniferous trees comprised of 2 genera
Acer	*Pinus*
Quercus	*Thuja*

Potential Risk Tree Summary:
See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	0
11-15	2
16-20	11
21-25	3
26-27	0
Total	16

Heritage Tree Candidate:

Species	**ID Number(s)**	**DBH (inches)**	**Height (feet)**
Acer macrophyllum	# 269	42.5	

Understory Species present:

The understory in this zone is mostly lawn grass. There are occasional clumps of Oregon grape (*Mahonia aquifolium*) at the base of some trees.

Invasive species present:

There are no invasive species present in this zone.

Zone L - Heavy Development

Acres: 3.8
General Description:
There are 4 parking areas, 2 different banks of tennis courts and two vehicular roads with pull-off parking falling into this designation. These are all impervious surfaces and concentrated use areas.

Detailed description:

No trees located in this zone.

Understory is impervious surface.

Zone M - Street Trees

Acres: 0.8 acres
General Description:
This Zone runs along North 50th St. forming the south edge of Woodland Park, between Aurora Ave. N. and Green Lake Way There are 28 aging Red Maple street trees buffering the park.
Noted empty spaces for replacement trees: 2

Detailed description:
Approx. # of Trees over 4": 28
Percent Deciduous 100 Percent coniferous 0

Potential Risk Tree Summary:
See map titled, *Management Zones*, for spatial distribution of risk trees within zones

Rating Class	Count
8-10	0
11-15	0
16-20	0
21-25	1
26-27	0
Total	1

Heritage Tree Candidates:

There are no Heritage Tree Candidates in this zone.

Understory species present:

Vegetation consists entirely of lawn grasses.

Invasive species present:

There are no invasive species present in this zone.

Wildlife Habitat

Central Woodland Park consists of a patchwork of areas each with different vegetation structure and species composition. Such a high degree of landscape diversity contributes to the high wildlife value of Central Woodland Park. Although exhaustive systematic study of wildlife species was not conducted during this vegetation management plan process, numerous bird species were observed in the park during data collection activities. Sharp-shinned hawks were seen on two occasions in flight through the park, Bald Eagles were seen perching in treetops within the park, numerous perching birds such as Ruby-Crowned Kinglets, Brown Creepers, Juncos and Chickadees were observed and of course the Crow is abundant. Mammals that were observed include Opossum, Rat, and Eastern Gray Squirrels. Eastern Gray Squirrels were introduced into Woodland Park in 1925 and feral Rabbits have been introduced as well. No amphibians or reptiles were observed. Particular wildlife concerns include the protection of a Bald Eagle nest abandoned in 2001 and appropriate management of the feral Rabbit population.

The first account of Bald Eagles nesting in Woodland Park was in 1999 when they nested in a large Douglas fir tree in Central Woodland Park. The pair did not nest there in 2000, but a pair returned to the same site in 2001. In 2002 and 2003 Eagles nested on the Zoo grounds. During these 4 years three fledglings have been born. Although it is not known whether it has been the exact same pair using the site in Central Woodland Park, it does appear to be used in alternating years. The abandoned nest has fallen apart and cannot be seen.

The Bald Eagle is currently protected from disturbance or molestation by the 1940 Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and the federal Endangered Species Act. It was first listed as Threatened in Washington State under the Federal Endangered Species Act in 1978. Washington State law WAC 232-12-011 protects Bald Eagles as Threatened Species under provisions for protecting wildlife. In particular regard to vegetation management activities in Central Woodland Park Washington State Law RCW 77.12.650 describes the rules for habitat buffer zones for Bald Eagles and requires site management plans to consider the timing, duration, and extent of activities in order to minimize disturbance to eagle habitat. Washington Department of Fish and Wildlife has developed template site management plans with the assistance of local counties around Puget Sound. These plans typically designate buffer zones of 800’ from a nest or roost site and include particular timing restrictions for activities such as forest management.

The feral rabbit population is concentrated among the old quarry rocks located near the top of the loop drive, and along the northwest and southeast edges of the project area. Burrowing activity is extensive in the northwest and southeast zones contributing to soil erosion and undermining tree roots. Although some park visitors leave human food such as bread or lettuce for the feral rabbits they have been seen browsing understory herbaceous vegetation. Such intensive herbivory impact poses a significant threat to the existence of understory vegetation, both native and ornamental.

Chapter 4 - Findings

Physical

1. Big leaf maple, located throughout the park, is almost uniformly mature and actively engaged in the process of aging and death. While decline is a normal stage for this species, the result is that 54% (146 out of 270) of trees that pose a potential risk to park patrons in areas of high use are big leaf maples.

2. Many Western Red Cedar examined in the south end of the Park, have significant decay that could possibly date from a single storm event during the last half century. While most have responded with healthy growth, many of these trees are now at the age where they will need some active management. 76 out of 270 potential risk trees are Western Red Cedar.

3. There are excellent examples of regenerating native conifers, located mainly in Zones F and J, poised to grow and provide future mature canopy cover.

4. Invasive species, such as the notorious English Ivy and Himalayan blackberry, while present in the Park in small quantities, are still at the stage where active removal can be accomplished reasonably.

5. There is a surprising representation of Ponderosa Pine, a species most often associated with the dryer climate of eastern Washington, and not often seen in Seattle Parks

6. There is complete lack of understory species in many areas of the park

7. There are 19 magnificent Heritage Tree Candidates.

8. Slope stability and erosion are issues at both the east and west edges of the park.

Cultural

1. Bicycling and cross country running are existing activities found in the park and they are contributing to soil compaction and root zone damage of vegetation.

2. The Dog Off-Leash area is the most heavily used part of the Park on a year-round basis. This represents a major impact to long-term health and viability of nearby trees and understory; however the user group is taking actively mitigation steps. It will continue to be a delicate balance, and all efforts on the part of the user group should be encouraged and supported by Parks staff. Off leash activities outside the designated area has been identified as an increasing problem.

3. The feral rabbits, while serving as an active draw for certain population of park users, also contribute to soil erosion and they are undermining root zones of many trees due to burrowing activity.

4. There are apparent impacts to Park vegetation by uses associated with large urban areas, such as temporary shelter for the homeless, illegal drug activity and sexual activity.

Chapter Five-Vegetation Management Recommendations

Management Areas

Eleven Management Areas have been identified for the purposes of implementing this plan. In some cases they correspond with the Vegetation Zones (see Chapter 3 - descriptions of the vegetative resource) although this is not always the case. Some management areas are not physically contiguous, but share similar management requirements and have been grouped together. The map delineating boundaries of Management Areas is located in the Appendix.

Included for each Management Area is a brief description and a broad, general **Goal**. There follows a list of bulleted **Objectives** and specific **Action Items** tailored to each Management Area. Finally there is a list of **Suggested Plant Palettes** to provide guidelines for appropriate replacement plant species.

It is our hope that the recommendations included in this Vegetation Management Plan will galvanize some dedicated neighbors to take up the challenge of stewarding Woodland Park well into this century. Establishment of a Friends of Woodland Park Group, backed by some seed money for restoration from Parks and Recreation, would be an important first step. This could go hand–in-hand with the management of risk trees (pruning, removal and snagging).

Important information on selecting healthy plant material, planting techniques to ensure longevity, establishment care and maintenance practices (including planting calendars) are available from numerous sources including Parks Department staff. The following is a list of Central Woodland Park's Vegetation Management Areas:

1. Ornamental Edges
2. Lawn and Greenswards
3. Orchard
4. The South Loop Picnic Area
5. Central Landscaped Forest
6. Bowling Green
7. Mixed Forest
8. Parking Lots, Courts and Road Margins
9. Street Trees
10. North Picnic Area
11. Dog Off-Leash Area

1- Ornamental edges

Size: 8 acres

This area corresponds with vegetation Zone A, and A-1. It runs from N.50th St. to the northern- most tip of the park where Aurora meets Green Lake. In addition, it includes the southeastern strip of mixed species where the highest counts of invasive species have been found. The narrow slopes above the ball fields to the east are a high priority site for restoration. Refer to Chapter 3 for more information.

Goal:

Provide a vegetative buffer to protect the Park from the noise, pollution and visual impacts of high traffic volumes associated with Aurora Avenue to the west and the ball fields to the east, while maintaining the legacy of the Olmsted aesthetic.

Objectives:

- Reduce user risk from large, aging and damaged trees
- Plan for next generation of trees to provide future canopy
- Increase 4 season vegetative screen, especially where openings exist and Aurora rises to become level with the Park
- Prevent spread of invasive plant species
- Enhance plantings at bridges that cross Aurora
- Mitigate potential erosion on slope areas
- Discourage use by temporary campers

Action Items:

- Increase native under-story plantings utilizing thicket-forming shrub species broadleaf evergreen and others, where openings exist in vegetative screen.
- Remove invasive species, prioritizing Vegetation Area A1, and return to native character
- Plant groups of coniferous trees, extending Heritage Tree species
- Manage erosion from feral rabbits
- Provide special maintenance care for Heritage Trees, including cabling co-dominant Sequoia Redwood (Heritage Grove II.)
- Continue management of Portuguese laurel to contain spread into lawn areas
- Strengthen connection to Woodland Park Zoo at existing bridges, with ornamental plantings

Suggested Plant Palettes

TREES		SIZE	QUANTITY	NOTES
Douglas Fir	*Pseudotsuga menziesii*			
Western Red Cedar	*Thuja plicata*			
Pacific Madrona	*Arbutus menziesii*			
Redwood	*Sequoia sempervirons*			
Giant Sequoia	*Sequoiadendron giganteum*			
UNDERSTORY				
Silk-tassel Bush	*Garrya eliptica*			
Wax Myrtle	*Myrica californica*			
Snowberry	*Symphoricarpos albus*			
Salal	*Gaultheria shallon*			
Sword fern	*Polystichum munitum*			

2- Lawn and Greenswards

Size: 21.3 Acres

From the perspective of historic and cultural landscapes, these open spaces of trees and lawn are key to defining the character of Woodland Park. This Management Area encompasses Vegetation Zones B, C, H and K. These greenswards have significance as part of the Olmsted legacy of the larger Seattle Park system. Policy recommendations for the Treatment of Cultural Landscapes established by the Secretary of the Interior (see Chapter 2 on historical preservation issues) should be considered while managing these well-loved and heavily used portions of the park.

Goal:

Maintain and enhance the Olmsted design tradition of open lawn with areas of treed canopy

Objectives:

- Protect open quality of south lawn
- Protect lawn and tree root zones from vehicular and human impact
- Maintain and enhance arboretum quality of hardwoods located in the “Ornamental Oval” and the Pine groves
- Prevent spread of invasive plant species
- Manage to mitigate spread of root disease

Action Items:

- Encourage funding for a pilot project utilizing Cycle Cross user group to plan and implement a dedicated bicycle course
- Replace and maintain bollards separating southern edge of the lawn from SE Parking area
- Remove Goldenchain Trees (*Laburnum x watereri*) from Ornamental Oval
- Diagnose and treat stressed Pines (*Pinus spp).*
- Limit service vehicle access to specified areas of developed roadway
- Continue practice of mulching stands of ornamental trees with leaves and wood chip mulch
- Resist temptation to plant trees in areas that encroach on the south lawn
- Consider transplanting young Beech, Ironwood and Cedar, with buried root crowns, from lawn and into groves to block views of Aurora traffic (Area 1- Ornamental Edge)
- Manage turf at moderate intensity, in a manner that minimizes compaction of tree root zones and avoids damage to trunk and root crown
- Should canopy openings exist in Ornamental Oval, replant with large, ornamental hardwoods to retain arboretum-like quality

Suggested Plant Palettes:

TREES		SIZE	QUANTITY	NOTES
Red Oak	*Quercus rubra*			
Elm	*disease resistant cultivar*			
Beech	*Fagus americana*			
Tulip Tree	*Liriodendron*			

3- Orchard

Size: 0.4 acres

This old grove of ornamental cherry trees in decline, have been cut, and have now re-sprouted. There are 18 multi-stemmed, approximately 10 ft. tall trees in various states of decline. Some new small fruit trees appear to have been planted by neighbors on this grassy open knoll above the "Bunny Rocks." Three large Bigleaf Maples form the edges of this area.

Goal:

Maintain as an ornamental Orchard.

Objectives:

- Plan for future low maintenance, ornamental flowering trees

Action Items:

- Assess existing aging cherry trees over spring bloom period
- Provide specialized pruning to encourage tree health
- Replace severely damaged trees with appropriate, disease resistant cultivars of flowering ornamentals
- Mulch around each tree to protect from mower damage
- Encourage "Friends" group to adopt Orchard and maintain new apricot trees

Suggested Plant Palettes

TREES		SIZE	QUANTITY	NOTES
Cherry	*Prunus*			
Pear	*Pyrus*			
Apple	*Malus*			
Get cultivars from Susan Black!				
UNDERSTORY				
NA				

4- **South Loop Picnic Area**

Size: 6.7 acres

This Management Zone corresponds with Vegetation Zone E (Bigleaf Maple/ Western Red Cedar Loop.) For many patrons, this loop around the picnic shelters provides the main entrance to Woodland Park from the south edge. The shelters are fully booked during spring and summer and there is almost constant casual use by dog-walkers, bicyclers, joggers and kids.

The primary challenge in this area is to begin reduction of risk posed by aging maples and cedars, and to start planting the trees that will provide a healthy canopy for future generations. Building healthy soils and protecting new plantings during their establishment period will present additional challenges.

Goal:

Maintain the existing character of a deciduous/ coniferous canopy cover above a visually open forest floor, while addressing challenge posed by John Charles Olmsted in 1908 when he sought to reintroduce "big picturesque stumps and mossy… large logs."

Objectives:

- Reduce user risk from large, aging and damaged trees
- Plan for next generation of trees to provide future canopy
- Mitigate soil compaction from heavy use
- Encourage a constituency of Park patrons to begin stewardship opportunities
- Enhance sense of entry to the Park
- Replant appropriate tree and understory species
- Manage existing older trees to encourage improved health
- Protect and enhance existing habitat potential
- Utilize downed wood on site

Action Items:

- Establish system of designated paths to contain foot traffic delineated by downed woody debris (DWD) as per Olmsted quote above
- Install Parks Department Informational Kiosk
- Remove highest priority hazard trees on a phased approach over the next 3-5 years, to mitigate risk and to create openings in the canopy for replanting
- Plant replacement trees for any risk tree removed
- Prune for dead wood, all trees throughout the area
- Create planting areas of durable, native understory along with new trees, to protect root zones and help build healthy soil. Protect with barriers where necessary, during 3 year establishment period
- Limit service vehicle access to Specified areas of developed roadways
- Establish wood chip mulch areas around the base of all trees to protect from basal impacts
- Create wildlife snags from trees scheduled for removal, where possible and practical
- Provide interpretive signage to explain natural forest cycles
- Plant ornamental vegetative screening for comfort station

Suggested Plant Palettes

TREES		SIZE	QUANTITY	NOTES
Bigleaf Maple	*Acer macrophyllum*			
Western Red Cedar	*Thuja plicata*			
Douglas Fir	*Pseudotsuga menziesii*			
Western Hemlock	*Tsuga heterophylla*			
UNDERSTORY				
Sword Fern	*Polystichum munitum*			
Salal	*Gaultheria shallon*			
Evergreen Huckleberry	*Vaccinium ovatum*			
Low Oregon grape	*Mahonia nervosa*			

5-Central Landscaped Forest

Size: 10.8 acres

As you walk the trail from the top of the Loop Road, north to the Dog Off-Leash Area, park users can experience both mature and regenerating tree species including Douglas fir, bigleaf maple, and hemlock that are typical of Pacific NW forest remnants. This area corresponds to Vegetation Zone F (Bigleaf Maple, Western Red Cedar Ponderodsa Pine Forest). To keep things interesting and remind us that all urban forests have been touched by human hands, there are some examples of large Ponderosa pine as well. We would do well to heed these following words:

> *"In the case of Woodland Park, the wild beauty of the woods is very remarkable and every effort should be made to preserve it while making it conveniently accessible…"* Letter to Board of Park Commissioners on Jan.8, 1908 from John Charles Olmsted.

Goal:

Maintain easy access along the central spine of the landscaped forest, where park users can experience large trees in a relatively open forest floor, with patches of native understory and a high wildlife component.

Objectives:

- Reduce user risk from large, aging and damaged trees
- Plan for next generation of trees to provide future canopy
- Enhance and expand native understory in appropriate locations
- Prevent spread of invasive plant species
- Contain spread of invasive animal species
- Provide for protection of endangered species

Action Items:

- Remove highest priority hazard trees on a phased approach over the next 3-5 years, to mitigate risk and to create openings in the canopy for replanting
- Plant replacement trees for any risk tree removed
- Plant native understory species
- Prune for dead wood, all trees throughout the area
- Schedule tree work to minimize disturbance to nesting eagles
- Facilitate non-lethal removal of feral rabbits

Suggested Plant Palettes:

TREES		SIZE	QUANTITY	NOTES
Bigleaf Maple	*Acer macrophyllum*			
Western Red Cedar	*Thuja plicata*			
Douglas Fir	*Pseudotsuga menziesii*			
UNDERSTORY				
Sword Fern	*Polystichum munitum*			
Salal	*Gaultheria shallon*			
Evergreen Huckleberry	*Vaccinium ovatum*			
Low Oregon grape	*Mahonia nervosa*			

6- Bowling Green

Size: 2.4 acres

Carefully manicured lawns make up 2 lawn bowling areas, the first established in 1932 with adjacent clubhouse, and the second in 1962. Nearby are 14 horseshoe courts. Use is primarily seasonal. This Management Area corresponds to Vegetation Zone G (Light Development).

Goal:

Continue park upkeep of these quaint sport-fields, and identify new user groups to expand popularity and provide stewardship, justifying Parks Department maintenance dollars.

Objectives:

- Reduce risk from aging trees near fenced perimeter
- Expand user groups
-

Action Items:

- Partner with Youth and Singles groups
- Remove highest priority hazard trees on a phased approach over the next 3-5 years, to mitigate risk and to create openings in the canopy for replanting

Suggested Plant Palettes:

TREES		SIZE	QUANTITY	NOTES
NA				

7- Mixed Forest

Size: 6.9 acres

This area buffering the east edge of the park is the best example of a northwest native woodland as identified by John Charles Olmsted in 1908:

> *…the woods should be left in a more nearly wild condition, that is to say, with natural undergrowth of shrubbery and wild flowers to be viewed from…walks upon which the public may pass without injury to the body of the woods…"*

Goals:

Maintain a healthy forested ecosystem of diverse native species with high habitat value

Objectives:

- Reduce user risk from large, aging and damaged trees
- Plan for next generation of trees to provide future canopy
- Prevent spread of invasive plant species
- Minimize erosion on slopes and trails
- Expand native understory species
- Promote slope stability
- Buffer natural areas from lower Woodland Park ball fields
- Prune dead wood from all trees within reach of the trails
- Remove highest priority hazard trees on a phased approach over the next 3-5 years, to mitigate risk and to create openings in the canopy for replanting

Action Items:

- Remove invasive species including blackberry, Cherry laurel and holly
- Increase ratio of native species to ornamental species
- Promote understory planting to extend into Area 5 - Central Landscaped Forest
- Diagnose and treat hemlock root disease
- Reduce social trails
- Provide dedicated bicycle paths
- Encourage bicyclers and runners to form constituency groups to organize volunteer stewardship opportunities

Suggested Plant Palettes:

TREES		SIZE	QUANTITY	NOTES
Western Red Cedar	*Thuja plicata*			
Douglas Fir	*Pseudotsuga menziesii*			
UNDERSTORY				
Sword Fern	*Polystichum munitum*			
Salal	*Gaultheria shallon*			
Evergreen Huckleberry	*Vaccinium ovatum*			
Low Oregon grape	*Mahonia nervosa*			

8- Parking Lots, Courts and Road Margins

Size: 6.6 acres

While encompassing Zone L, Heavy Development, this management area includes the vegetated margins adjacent to the following 3 sectors:

i. SW gravel lot and 2 additional lots across from Greenlake
ii. 2 banks of tennis courts and Bike Jump area
iii. Loop road, Cross Park road and paved parking areas

Goal:

Maintain vegetation along roads and parking areas to minimize risk and to buffer auto impacts from active and passive uses in the Park.

Objectives:

- Reduce user risk from large, aging and damaged trees at edges of parking areas
- Plan for next generation of trees to provide future canopy
- Improve chances for tree health within SW Gravel Lot

Action Items:

- Remove highest risk trees, especially in areas used by school busses
- Pruning for dead wood, all trees throughout the area
- Create wildlife snags where possible and practical
- Utilize downed wood from hazard trees to provide barriers around existing maples in SW Gravel Lot to discourage parking on root zones
- Begin long-term planning process for SW Gravel Lot parking area renovation
- Replace and maintain bollards at southern edge of the lawn to eliminate vehicular traffic
- Mulch tree root zones

Suggested Plant Palettes:

TREES		SIZE	QUANTITY	NOTES
Western Red Cedar	*Thuja plicata*			
Garry Oak	*Quercus garryana*			

9- Street Trees

This management area corresponds with Vegetation Zone M and consists of 28 street trees located along North 50th St. at approx. 25 foot centers.
The gravel path (as opposed to a formal sidewalk) that runs north of the planting strip gets lots of foot traffic as well as use by Parks maintenance vehicles. This presents severe impact to the root zones of the street trees.

Goals:
Maintain street trees as formal southern Park edge

Objectives:
- Provide infill planting where necessary to provide consistency.

Action Items:
- Eliminate service vehicular use of gravel "sidewalk"
- Plant a minimum of 4 trees to buffer edge of gravel parking lot at SW corner of the Park
- Mulch tree root zones with arborist chips
- Crown clean existing street trees
- Crown raise where necessary to maintain 15' clearance for vehicular passage

Suggested Plant Palettes:

TREES		SIZE	QUANTITY	NOTES
Red Maple	*Acer rubrum*			

10- North Picnic Area

Size: 1.4 acres

The north end picnic area is seasonally heavily used, both formally and informally. It contains several structures, including WPA-era picnic shelters, picnic tables and the Pink Palace comfort station. The aging Bigleaf Maples that surround the picnic tables present the same risks as in other areas of the park.

Goal:

Provide a safe picnic user area with high tree canopy and mowed turf

Objectives:

- Reduce user risk from large, aging and damaged trees
- Plan for next generation of trees to provide future canopy
- Manage trees to extend life of mature canopy
- Protect and enhance existing habitat potential
- Mitigate soil compaction from heavy use

Action Items:

- Remove highest priority hazard trees on a phased approach over the next 3-5 years, to mitigate risk and to create openings in the canopy for replanting
- Plant replacement trees for any risk tree removed
- Prune for dead wood, all trees throughout the area
- Create wildlife snags where possible and practical
- Replant some areas of native understory with new trees, to protect root zones and help built healthy soil
- Limit service vehicle access to improved roads
- Provide wood chip mulch at the base of each tree or group of trees
-

Suggested Plant Palettes

TREES		SIZE	QUANTITY	NOTES
Bigleaf Maple	*Acer Macrophyllum*			
Western Red Cedar	*Thuja plicata*			
Douglas Fir	*Pseudotsuga menziesii*			
UNDERSTORY				
Sword Fern	*Polystichum munitum*			
Salal	*Gaultheria shallon*			
Evergreen Huckleberry	*Vaccinium ovatum*			
Low Oregon grape	*Mahonia nervosa*			

11- Dog Off - Leash Area

Size: 1 Acre

Dog use eliminates vegetation on the forest floor. To accommodate the dog owners' demand, this area was established in 2001, as a specialized area for dogs and owners off-leash. During our assessment period, this was the most consistently used area of the Park. It was recently contained with chain-link fence and a series of gates. In addition, a cedar split rail fence blocks off the steepest portion of the site to protect it from further dog damage. The soils are highly compacted from intense use, exacerbating the risk posed by several aging Bigleaf maples and large conifers.

Goal:

Provide a safe, dedicated place for dog owners to utilize the park while accepting major resultant impacts to the existing vegetation

Objectives:

- Contain damage to vegetation, associated with dog use
- Reduce user risk from large, aging and damaged trees
- Attempt to mitigate soil compaction from heavy use
- Rely on volunteer maintenance stewardship opportunities

Action Items:

- Continue Parks Dept. support of official Off-Leash Area user group
- Remove highest priority hazard trees over the next 2 years, to mitigate risk
- Create wildlife snags where possible and practical
- Replant some areas of native understory with the hardiest of species, to protect root zones and help build healthy soil
- Mulch mulch mulch!

Suggested Plant Palettes

TREES		SIZE	QUANTITY	NOTES
Western Red Cedar				
UNDERSTORY				
Sword Fern				

References

Arbutus Design. 1996. Green Lake Park Vegetation Management Guidelines.

Davidson, Eliza, ed. 2002. Lincoln Park Vegetation Management Plan. Seattle Parks and Recreation.

Dirr, Michael. 1990. Manual of Woody Landscape Plants. Stipes Publishing Co, Champaign, IL.

Gilkey and Pakard. 2001. Winter Twigs, Oregon State University Press, Corvallis, OR.

Harris, Clark & Methany 2004. Arboriculture. Fourth Edititon, Prentice Hall, NJ.

Kruckeberg, Arthur R. 1982. Gardening with Native Plants of the Pacific Northwest. University of Washington Press, Seattle, WA.

Leigh, Michael. 1999. Grow your Own Native Landscape. Native Plant Salvage Project, WSU Cooperative Extension- Thurston County, Olympia. WA.

Rybcynski, Witold. 1999 A Clearing in the Distance: Frederick Law Olmsted and American in the 19th Century.

Shigo, Alex L. Tree Basics. Durham, NH.

Stinson, D. W., J. W. Watson, and K. R. McAllister. 2001. Washington State Status Report For The Bald Eagle. Washington Dept. Fish and Wildlife, Olympia. 92 pp. http://www.wdfw.wa.gov/wlm/diversty/soc/status/baldeagle/finalbaldeaglestatus.pdf

Washington Administrative Codes
WAC 232-12-011. Wildlife classified as protected shall not be hunted or fished and
WAC 232-12-014 Wildlife classified as endangered species
WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.

Washington Department of Fish and Wildlife. 1984. State Bald Eagle Protection Law and Rules:
Revised Code of Washington 77.12.650 Protection of bald eagles and their habitats--cooperation required.
Revised Code of Washington 77.12.655 Habitat buffer zones for bald eagles -- Rules.
Washington Administrative Codes 232-12-292. Bald eagle protection rules.