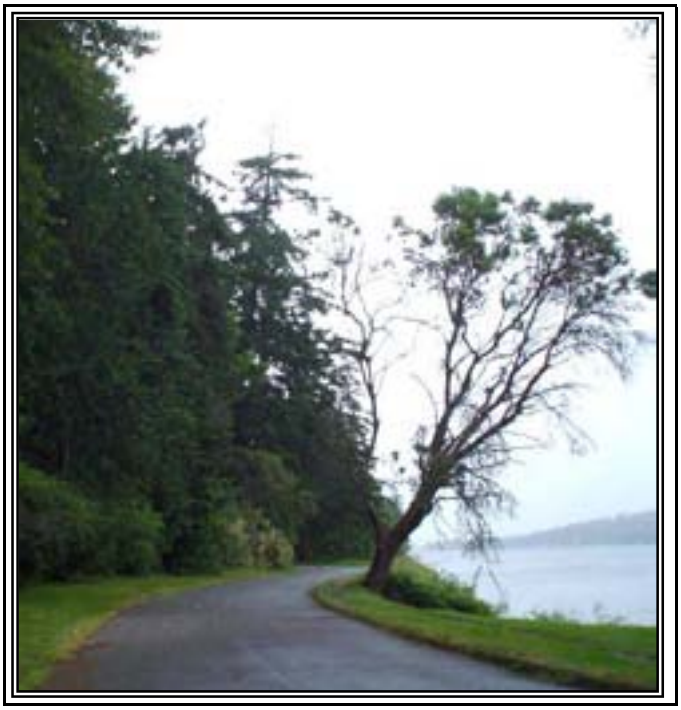
SEWARD PARK
VEGETATION MANAGEMENT PLAN
FINAL



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ACKNOWLEDGEMENTS

Historic postcard circa 1900 - Courtesy Private Collection

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> *Golden Gardens Park, Vegetation Management Plan*, prepared by Elizabeth Walker (Sound Tree Solutions) and Paul West (Arboriculture and Restoration).
>
> *Cheasty Greenspace Vegetation Management Plan*, prepared by Sheldon and Associates.

Thanks to all additional SPR staff that provided information, insight and perspective.

CHAPTER 1: INTRODUCTION

Overview

Vegetation Management Plans, as developed by the Parks Urban Forestry Program are intended to act as guidelines for community-based stewardship activities, district staff maintenance objectives and future Capitol Improvement Projects. This document provides long-term goals and intermediate, 20-year objectives for managing vegetation within Seward Park. In large parks issues such as usage, safety, conservation and maintenance are intertwined. This document focuses on the primary vegetative resources of the Park and will address those issues which have a direct relation to protecting and enhancing these vegetative resources. The plan is grounded in related planning documents, among them the Seattle Parks COMPLAN, the Urban Wildlife and Habitat Management Plan, and Seattle Parks and Recreation Tree Policy. It extracts long-term goals from these sources and develops related objectives based on the condition of the forest resource, historical context, ecological trends, and the potential contribution of community and management resources.

The Seward Park Vegetation Management Plan addresses the vegetative resources of one of Seattle's finest green spaces, home to the largest remaining conifer forest in the city. Because Seward Park encompasses both a unique, 212-acre peninsula in Lake Washington, and richly varied landscapes and native vegetation, it is considered one of the jewels of our region. Seward Park also serves as the southern anchor for a comprehensive park and boulevard system planned by the Olmsted Brothers in 1903, a key part of Seattle's landscape heritage.

The core agenda of this plan is to conserve Seward Park's increasingly rare native plant communities by arresting past and latent habitat loss and enhancing survival of the park's indigenous flora and fauna. Hand-in-hand is the intent to strengthen park stewardship by an ever-widening array of users, and to encourage engagement in this unparalleled natural environment. This VMP especially aims to give concrete, consistent guidance to everyone who cares for park vegetation in decades to come. The plan's ultimate agenda is to inspire and organize support for ongoing park resource preservation.

Seward Park includes a largely undeveloped native forest in the northern portion as well as a more developed, heavily used area at its southern end. The park provides a broad range of landscape types and recreational opportunities. Significant interactions between users and park vegetation, as well as the inherent needs of plants and wildlife drive this Vegetation Management Plan. Seward Park offers a unique opportunity to manage stands of native and non-native trees in both forested and open settings, for future generations of park users to enjoy.

Chapter 2 – lays out goals and objectives for vegetation management in Seward Park. User safety and native forest health are emphasized, along with maintenance of the park's current landscape character and functions. These goals and objectives derive from research and analysis contained in Chapters 3 and 4, and findings summarized in Chapter 5.

MANAGEMENT GOALS (from page 12):

1. Preserve and enhance forest health
2. Enhance vegetation to better provide habitat for native wildlife and endangered species
3. Foster environmental education through stewardship
4. Manage vegetation consistent with habitat, park landscape heritage and established uses

Chapter 3 – describes overall park character and identifies factors influencing the management of park vegetation, namely: relevant plans and policies, historic landscape evolution, current uses, staff maintenance and vegetation-related concerns, boundary encroachments, and interested organizations and constituencies. This chapter also describes the public involvement process conducted during plan development, with a summary of public comment received.

Chapter 4 – gives an overview of known issues concerning park vegetation, evaluates park habitat potential and limitations, and describes direct impacts of human use on the park's vegetation. Chapter 4 also analyzes the plant data that consultants collected from 60 sample plots distributed throughout the park, as well as separate studies documenting hazard and significant trees, shoreline vegetation and non-native and noxious native plants. Ten Vegetation Areas are identified and distinguished according to vegetative cover and species composition.

Chapter 5 – presents key findings derived from the resource analysis and contextual factors explored in Chapters 3 & 4. These findings bring into focus the main issues that determine suitable vegetation management goals and objectives (as listed in Chapter 2). Management issues are discussed in terms of need and issues related to taking action to achieve a desired goal and the consequences of non-action. Primary emphasis issues are identified and management objectives, actions and locations described as necessary. Some management issues are broad in scope; others focus on particular sites or vegetation categories. Management issues and their related goals as presented in Chapter 2 are as follows:

MANAGEMENT ISSUES:	***RELATED GOALS:***
5.1 Forest Health	(*Goal One*)
5.2 Wildlife Habitat	(*Goal Two*)
5.3 Environmental Education	(*Goal Three*)
5.4 Retention of Park Character	(*Goal Four*)
5.5 Vegetation Monitoring	(*Goals One, Two, & Four*)
5.6 Preservation of Rare, Sensitive Plant Communities and Significant Trees	(*Goal One, Two, Three, & Four*)
5.7 Shoreline Vegetation Restoration	(*Goal Two, Three, & Four*)
5.8 Un-managed grassy areas	(*Goals One, Two, Three, & Four*)
5.9 Poison Oak	(*Goal 4*)

Chapter 6 – presents management objectives are identified for each Vegetative Area, and for specific zones within those areas. Primary emphasis issues are identified and management objectives, actions and locations described for each. Some management issues are broad in scope; others focus on particular sites or vegetation categories. The emphases are:

- Grasslands
- Poison Oak
- Forest Invasives
- Forest Regeneration and Regeneration Gaps

- Forest Reinstatement
- Hatchery Vegetation Encroachment
- Garry Oak Preservation
- Shoreline
- Wildlife Habitat
- Soil Compaction
- Significant Trees

This chapter also lays out implementation priorities by Management Area, and discusses implementation responsibilities, strategies, budget, and priority project details, to help VMP users complete management recommendations in the most strategic possible way. Included is a menu and individual descriptions of first priority Implementation Initiatives with range-of-magnitude costs. Although no budget increases have been authorized for Seward Park, detailed budget information is included in the Appendix and was used to develop the estimated 20-year implementation cost for critical forest management priorities. The estimated cost to complete first-tier implementation work is $550,000 and for 20-year plan implementation, just over $1,500,000.

Chapter 7 – outlines the specific types of monitoring needed to fulfill this plan, and provides information on why and how to undertake monitoring, who should perform respective types and at what intervals. Project monitoring is distinguished from special-purpose monitoring of hazard and significant trees, noxious weeds and poison oak, and from long-range monitoring of vegetative change park-wide using sample plots established in 2004. Plot monitoring done at five or ten-year intervals will indicate the degree of positive change achieved, and alert VMP users to needed course corrections. Vegetation management in Seward Park will need to be adapted and refined over the years in response to monitoring results.

Appendices include useful reference material and maps essential to fully using the VMP.

Figure 1

Seward Park Vicinity Map

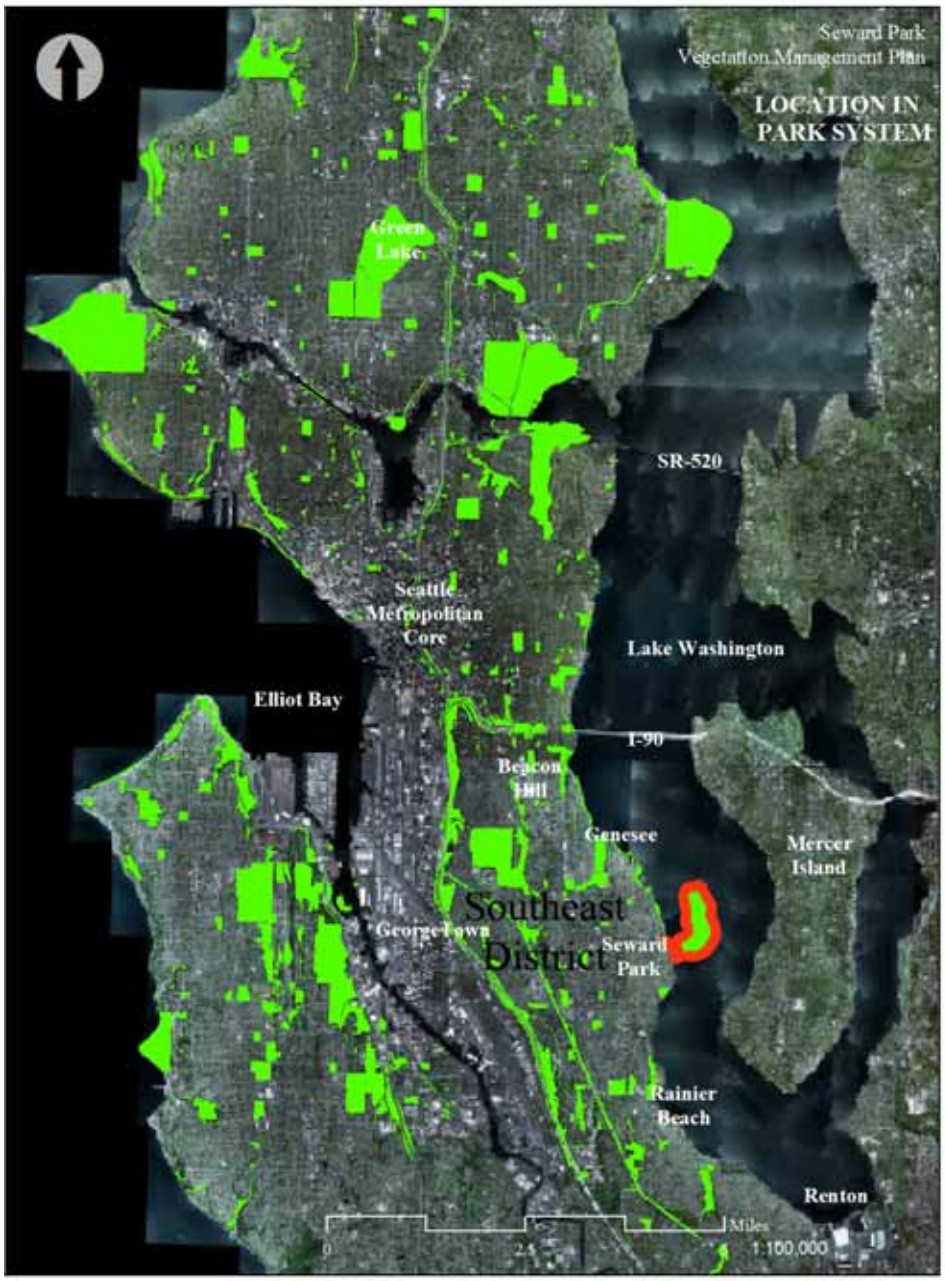


Figure 2
Seward Park

CHAPTER 2: GOALS AND OBJECTIVES

Goals for vegetation management in Seward Park derive from overarching plans and policies, as well as findings about the character, condition and intended uses of park resources. Policy and planning documents that dictate overall VMP goals are described in Chapter 3. Findings particular to Seward Park point to more specific goals and objectives, and are summarized in Chapter 5.

Goals and objectives:

1. Preserve and enhance forest health.
   - Control invasive, non-native plant species
   - Reduce negative, human-induced impacts to vegetation and soils
   - Increase native species diversity and density where lacking
   - Encourage multiple forest canopy layers
   - Leave woody debris and snags in place when and where ever possible
   - Encourage natural forest regeneration
   - Convert clearings to native gradient where appropriate
   - Diminish presence of non-native trees over time
   - Extend native vegetation to path- and road edges where appropriate
   - Protect and enhance rare forest types

2. Enhance vegetation to better provide habitat for native wildlife and endangered species.
   - Maintain or increase snag density
   - Retain downed wood in forest and near shore
   - Foster native species richness and structural complexity of forest
   - Enhance shoreline vegetation for juvenile salmon
   - Maximize unbroken, undisturbed natural areas

3. Foster environmental education through stewardship.
   - Integrate service-learning with environmental education
   - Cultivate volunteer stewardship through direct contact with nature
   - Nurture existing partnerships
   - Strengthen connections with diverse, under-engaged constituencies
   - Empower staff to initiate and manage stewardship activities

4. Manage vegetation consistent with habitat, park landscape heritage or established uses.
   - Maintain vegetation to support and enhance native wildlife habitat
   - Manage vegetation consistent with established uses
   - Preserve historic character and specific landscape elements
   - Modify vegetation that does not support native habitat, public use or heritage values.

CHAPTER 3: MANAGEMENT CONTEXT

Seward Park is dominated by its lakeshore and native forest habitats, but encompasses a broad range of landscape types, human activities, and maintenance needs. Objectives for the park's diverse environments are noted by Management Area in Chapter 5, to define more specifically how the overall VMP goals and objectives laid out in Chapter 2 apply within delineated areas. Chapter 3 summarizes the many factors that affect park vegetation and influence future management direction. The resource itself is characterized in the next chapter.

3.1 Site Character

Seward Park comprises the largest park in Southeast Seattle, and at 300 acres is one of the largest forested parklands in the city. The site encompasses an entire peninsula that projects into Lake Washington, plus its isthmus and some mainland acreage paralleling the shore. The city's twenty-odd mile, scenic boulevard system originates at Seward Park and runs north for several miles along the lake. Both park and boulevard are key elements of Seattle's 1903 Olmsted Brothers plan. (See Addendum A)

Seward Park's character is defined above all by its unique geography. The park also is distinguished by its location within one of the United States' most ethnically- and socio-economically diverse neighborhoods, from which it draws an array of users. The park attracts region-wide visitors as well, especially for special events and in summer when the three-mile shoreline proves particularly inviting. Land access to the park is via a single entry across the isthmus, once a seasonal channel that made the peninsula an island.

Seward Park is remarkable for the extent, variety and quality of native forest it contains. A mature conifer and mixed conifer-deciduous forest occupies the northern two-thirds of the peninsula. The south third contains additional patches of this forest, plus remnants of Garry oak – Madrona stands extremely rare in Seattle. Although highly disturbed historically, the lake edge now hosts intermittent stands of native willow, ash, cottonwood and associated species. An open forest wetland community lies in the south-central portion of the "Magnificent Forest" and a small heavily forested wetland south of the old hatchery along the park's east side.

Vegetation incorporating varying degrees of ornamental, non-native plants dominates the park perimeter and south end, both heavily used areas. Landscape composition ranges from open lawn to unmowed grasses and thickets, to ornamental beds in both English and Asian styles, to formal tree rows and groves, to mixed native-exotic greensward (lawn plus scattered canopy trees), to native forest heavily inter-planted with non-native trees. Open and closed canopy, exotic and native, formal and informal landscape types are interspersed with one another in a varied, somewhat-indeterminate blend. Invasive species occur most heavily in these substantially modified landscapes, and abutting the main forest stand.

3.2 Relevant Policies & Plans

3.2.1 Seattle Parks COMPLAN (2000)

The COMPLAN is the comprehensive plan developed by Seattle Parks to guide policy and decision-making for parks and recreation facilities. The original 1993 COMPLAN was updated in 2000 and is to

be “a living document through which changing conditions as well as ongoing public involvement can be considered in decisions affecting the future of Seattle’s park and recreation system.” The revision also includes a six-year action plan for specific tasks to be accomplished.

Parks revised their mission statement in COMPLAN 2000 to state that they “will work with all citizens to be good stewards of our environment, and to provide safe and welcoming opportunities to play, learn, contemplate and build community.”

Among the policy statements and action plan elements in the COMPLAN, “Steward of Park Resources” and specifically “Park Management & Environmental Stewardship” directly relate to the Seward Park VMP, based on the following:

- Tree management and maintenance will include consideration of tree health, long-term reforestation needs such as the role of trees in providing wildlife habitat and other environmental benefits, historical context, and tree impacts such as public safety, views, aesthetics, street or sidewalk damage, and maintenance requirements.
- Provide for forest community restoration in Seattle’s parks and open spaces with appropriate, site-specific reforestation projects. Undertake restoration and enhancement of grasslands, wetlands and other natural landscape types as appropriate. Involve the use of volunteers and other community organizations in such efforts.
- Park horticulture practices and maintenance procedures will include consideration of the following:
    - Integration with natural and historic resource management
    - Replanting with native species for wildlife habitat enhancement and/or drought-resistant plants for water conservation.
    - Other factors related to water conservation.
    - Pruning or thinning for safety, utility lines, and views from private property, consistent with more specific policies for such pruning or thinning.
    - Coordination with the community and Seattle police for security visibility.

In the Six-Year Action Plan, specific activities relevant to this VMP are to:

- ♦ Foster a feeling of community ownership and pride, focusing on community participation in planning, design development, programming, and maintenance.
- ♦ Maintain the living park inventory of plants and trees, focusing on reforestation, enhancement and restoration of natural communities, plant replacement, turf restoration, control of nuisance plants, and provision of proper conditions for growth.
- ♦ Designate and protect natural and historic resources (including wildlife habitat) within parks, focusing on sensitive resource management, public information, staff training, and maintenance procedures.

3.2.2 Wildlife Habitat Goals

The variety and breadth of habitat types in Seward Park make it a significant resource for wildlife, from salmonids to raptors, birds, amphibians, small (and historically, large) mammals. In 2000 the City of Seattle Parks and Recreation Department released a report titled “Urban Wildlife and Habitat Management Plan” (Miller, 2000). This plan was part of the department’s comprehensive plan update (COMPLAN 2000). Its intention was to further the goals and policies of COMPLAN 2000 with concern for wildlife.

The goals specifically outlined by the Park's Urban Wildlife and Habitat Management Plan include:

- 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.

3.2.3 Urban Forestry Objectives

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

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

3.2.4 Seattle Parks Tree Policy

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.

The Seward Park VMP adheres to these requirements.

3.2.5 Endangered Salmon Recovery

The park-specific Seward Park Rehabilitation Study: Juvenile Salmonid Use of Shoreline Habitats in Seward Park (2001) paired with Seattle's Urban Blueprint for Habitat Protection and Restoration (2003) and background reports concerning juvenile Chinook salmon, documents the importance of Seward Park to survival of this endangered species. Very little Lake Washington shoreline remains unaltered or available for restoration to high-quality salmon habitat. Seattle Parks owns the majority of Seattle lakefront, and provides the only significant sites to make such enhancements. Seward Park's proximity to South Lake Washington's Cedar River out-migration route makes its extensive lake edge especially valuable.

Although this VMP focuses primarily on Seward's upland vegetation, provision of overhanging, native littoral plants is a key management objective. The rehabilitation study indicates which shoreline reaches are most favorable for habitat restoration. On this basis, Parks recently has undertaken a series of substrate improvement projects including native plantings along the modified lake edge.

3.2.6 Seward Park Plans

It is not the role of this plan to frame or establish overall goals for Seward Park, only to set goals that pertain directly to the management of its vegetation. No adopted master plan for Seward Park dictates such overall goals. Landscape architects created park plans in 1912 (Olmsted Brothers), in 1926 (Glenn Hall), in 1950 and in 1970 (Jones & Jones). Not all are well documented today, nor were most substantially (or for the Olmsted plan, even partially) realized. These plans represent contrasting visions, colored by the eras in which they were made.

The many improvements and alterations Seward Park has undergone over the near-century it has belonged to the City consist mostly of specific projects, incrementally undertaken. Private interests, shifting uses and obsolete forest management practices have threatened Seward Park's landscape integrity at times, but the over-riding reasons for the park's existence have rarely been questioned. Clear themes, articulated since before park acquisition, provide the unofficial vision for which vegetation should be managed, consistent with above policies. These can be summarized as follows:

- To fully preserve for all time the park's exceptional native forest.
- To offer visitors a restorative, inspiring experience of nature.
- To provide diverse recreational opportunities focused near the lakeshore.

3.3 Park History

Eons of geological activity, centuries of indigenous use, and decades of post-settlement transformation have yielded the vegetation seen in Seward Park today. Events that far predate human presence still influence the park's plant communities. Although development largely bypassed the peninsula and preserved its forest, both direct and indirect environmental interventions have shaped its current vegetative character. History relevant to vegetation management includes pre-human, pre-settlement and considerable post-settlement influences.

This section summarizes historical and pre-historical influences affecting Seward Park's present landscape character and its future management. A detailed history and analysis of vegetative change is found in the Appendix. This builds upon substantial material prepared by Al Smith and Paul Talbert,

based on their extensive original research. Friends of Seattle's Olmsted Parks and Seattle Municipal Archives also have contributed useful documentation.

3.3.1 Geological History

Seward Peninsula is a drumlin, shaped by glaciers. The park's native soil is glacial till. Organic matter has accumulated only in the topsoil horizon. The importance of this region's glacial history to evolution of Seward Park's vegetation is threefold:

1. The till soil substrate is both hard to cultivate and nearly impossible to percolate. Perched water tables can create damp conditions, regardless of topography.
2. Soil development is limited, due to the geologically-recent end of glaciation. Processes of plant growth and decay and natural weathering have not accrued enough to build deep, fertile soils.
3. In our region, plant introduction has been recent, and species diversity limited, compared to places untouched by glaciers.

3.3.2 Forest Evolution

As the first native trees to evolve after glaciers retreated, Douglas firs de facto grew in open locations. Replacement canopy species evolved that were shade-tolerant, including Western red cedar and hemlock. Additional species adapted to varying conditions of light, moisture and fire developed through time and grow in Seward Park today.

In unmanaged Pacific Northwest forests, wildfire usually occurs at 200 – 300 year intervals; evidence suggests that fire last swept the Seward Peninsula circa 1800. After 200 years, the forest today is mature but not yet "old growth." Natural forest evolution is subject to a continuous series of destructive cycles like fire. In urban forests where fire is suppressed, this process is fundamentally altered, with cumulative effects that remain to be known.

3.3.3 Native American Use

Vegetation in the park includes mainstay plants eaten and used by indigenous people. The park's small Garry oak and shrub stand suggests the possibility of intentional burning for camas meadow, although evidence of permanent habitation on the peninsula has not been found.

3.3.4 Pioneer Settlement 1850-1900

Land near Seward Park was among the first to be inhabited by white settlers, yet the peninsula itself never was homesteaded or clear-cut for farming. The whole peninsula was acquired by investor William E. Bailey in 1889. Superintendent Edward O. Schwagerl's unimplemented 1892 park and boulevard plan proposed four large parks at the corners of the city, the Seward site among them. Schwagerl established a city nursery to grow both native and ornamental plants.

3.3.5 Olmsted Brothers Plans 1903-1913

In 1903, the City of Seattle commissioned famous landscape architects, the Olmsted Brothers, to develop a comprehensive park and boulevard plan. Senior partner John C. Olmsted noted that Bailey Peninsula "forms the most available large tract of land that is uniformly and beautifully covered with woods, and

should be secured…before the woods are injured" and recommended it be made the anchor for a new boulevard system.

The still-untouched property was secured from Mr. Bailey by condemnation in 1910. In 1911, Park Commissioners stated clear intent that Seward Park remain in a substantially unaltered state, and that its natural character be compromised as little as possible: "This magnificent park…retains its original growth of virgin timber and vegetation, and can be converted into one of the most unique and beautiful natural parks in the world"

Olmsted's 1912 Seward Park Preliminary Plan recognized this intent and proposed to preserve nearly 95% of the forest, incorporating in park historian Donald Sherwood's words, "improvements fitted into the natural setting". Inadequate funding prevented the firm from proceeding with detailed plans. Had Olmsted's preliminary design been realized, Seward Park most likely would have a more consistent landscape character than now exists. Nonetheless, its essential roles as both boulevard system terminus and major naturalistic park have survived intact. The core values Olmsted and civic leaders articulated for Seward Park suggested a vegetation management approach that is regaining dominance today.

3.3.6 Early Park Development

In 1916 Lake Washington was permanently lowered by approximately nine feet, resulting in dramatic change at Seward Park. The water table fell, new shore acreage emerged, and the peninsula's isthmus became dry year-round. . Certain native trees are thought to have died from water stress, while a new plant community developed along the shoreline.

Landscape architect Glenn Hall's 1926 improvement plan recommended that "the main portion of the park should be preserved intact in its natural state" but 1926 construction based on his plan transformed the park entrance, adding 10,000 yards of fill to the isthmus and "beautifying with grass, trees, shrubs, and flowers." Mowed lawn became an established landscape element. Introduced non-native grasses have since proven so invasive that today few native grasses remain.

3.3.7 Forest Conversion to Landscape

With the advent of park "improvements" landscape management veered increasingly away from the original conservationist perspective. Initiatives included an attempt to bisect the park for toll bridge access between the park and Mercer Island, construction of fish hatchery ponds and a full perimeter road, and aggressive clearing of trees and understory vegetation to expand recreational facilities.

The tension between intervening in natural processes and leaving park vegetation alone grew particularly passionate during the late 1920's and 1930's. A 1928 plan noted, "The existing picnic grounds, tennis courts, privy's, etc. on the high ground above the bathing beach, should be discontinued, and the area reforested. It was a mistake to put them there and there is no reason why the error should be perpetuated." The plan also suggested "that a nature museum be established and that nature study classes be instituted." Seventy years later, realization of both goals is at hand.

Jacob Umlauf was Seattle Park Department's Head Gardener from 1914-1941, and de facto Superintendent for more than half that time. His horticultural hand and interventionist approach to vegetation management are evident in Seward Park in:

- Varied non-native trees, planted in both developed and forested areas (some, like horse chestnut and holly now invasive).
- His direction to grub out forest understory to encourage park users to venture into the woods (destroying wildlife habitat and spreading exotic grasses).

- His adherence to then-current gospel that forest fires must be prevented at all cost (altering vegetative structure and species diversity in the great forest).
- His endorsement for putting the fish hatchery in Seward Park (which destroyed significant native forest and introduced invasive ivy to surrounding woods).

3.3.8 Forest Management 1930's

The issue of forest management proved highly controversial throughout the 1930's and beyond. A 1931 Ten Year Park Plan bluntly states,"…dead timber and logs should be removed." Umlauf defended grubbing out of underbrush in order "to get the dead limbs and logs underneath" which "constituted a fire hazard." Civic leader Josiah Collins ignited a firestorm in 1934 by observing that too many good trees were being cut down, while concurring with objectives of "beautification" and fire prevention:

> …it was all right and desirable to clear up the ground of windfalls, fallen trees and kinds of thick brush which prevented people from walking through the timber….and when grass and clover are planted on the cleared land…as has been done at the north end of the peninsula, we will have a beautiful park wherein the people can roam at will and feel that they are in an undisturbed forest.

Relief workers, as many as 700 at one time, flooded Seward Park during the 1930's. A local journalist observed, "After viewing the trout rearing pools we were most disagreeably surprised to find that the peninsula is being rapidly denuded of its virgin forest by over zealous WPA workers." Another said, "It is too late now to undo the damage…Seward Park was intended as a last untouched natural timber area. Instead, we now have something that looks like a Spokane pine forest."

With news of "800 to 1000 cords of fuel wood taken out of Seward Park," Mayor John Dore decreed that no tree be cut in any park without the superintendent's recommendation and his own approval, noting, "This system of cutting down trees to make artificial parks is all right for Boston or New York where they have no natural beauty, but out here, it's just like getting false teeth when you have good ones." Resulting damage to the natural forest ecosystem, although slowly healing itself, has persisted for decades.

3.3.10 Road Construction

Glenn Hall in 1926 cautioned, "I do not believe that the natural character can be preserved long if automobiles are permitted to encircle the peninsula." A full perimeter road was completed a decade later, a shift in policy. It endangered pedestrians and created a barrier between forested upland and shoreline vegetation, and disrupted wildlife movement. Far more damaging, and very nearly built, was a proposed road traversing the peninsula to access a Seattle – Mercer Island toll bridge. The proposal pitted conservation against "progress," and the City Council (pro-road) against the Park Board. Had the project succeeded, the forest would have been divided, its health degraded, wildlife disturbed, and visitors' experience of nature greatly marred.

3.3.11 Introduction of Invasive Plants

Seward Park is protected by water from direct invasion by undesirable species from adjacent property. Invasive plants nonetheless reached the peninsula by land (on feet and tires), by water, by wind or and by animals and birds. The most destructive invasive species in Seward Park were deliberately planted: English holly and ivy.

English ivy now infests woods surrounding the fish hatchery, likely introduced with grounds landscaping in 1936. Whether ivy was intentionally planted in other park beds or in the forest is unknown but definitely possible, given ivy's enormous popularity and durability.

Intentional promotion of holly for planting in the park woodland began in 1922, to replace fern and huckleberry taken for holiday greens. In 1930 the Seattle Times encouraged a project by "Juniors…to design and plant a conservation garden…hedged about with holly." Referring to holly berries Seattle children saved at Christmas and which he planted in the park, Umlauf said, "There's a regular holly berry kindergarten out there now where those berries have sprouted into little trees." Further promotion came in 1931 to insure "…that as this state's own natural shrubs inevitably disappear, the holly may take their places…" Progeny of all this introduced holly continue to proliferate throughout Seward Park's forest, so much so that holly is now the park's second most prevalent tree.

Problems with other invasive plants have been documented for many decades:

- Scot's broom - 1929
- "noxious weeds, wild blackberry vines" - 1941
- "wild brushy areas" adjacent to the Boulevard – 1960

Invasive species continue to find their way into Seward Park and will always require control. Unwitting introductions like holly and ivy in the past can be curtailed.

3.3.12 Landscape Management 1950 to Present

1950 brought vegetation disturbance back to Seward Park on a grand scale, following a new master plan:

> The plan calls for construction of an outdoor amphitheater with a seating capacity of 4,000 persons, parking spaces for 2,500 automobiles, 25 additional acres of picnic areas and two-and-a-half miles of new roads….It will not be necessary to destroy any virgin timber to make room for the amphitheater.

While the amphitheater itself required no forest removal because of blow-downs cleared two decades earlier, other facilities were carved out of intact native forest. After construction of the amphitheater and a grass parking lawn adjacent, funding dried up and implementation ceased. The result has been forest fragmentation in the park's south uplands. Had the plan been fully realized, half of Seward Park's acreage would have become a backdrop for recreational activities, its forest eroded at both ends by vast clearings.

After mid-century, the trend has gradually returned to more conservation-oriented landscape management. Around 1970 the perimeter road was closed to vehicles and rock concerts were banned from the amphitheater, due to severe disruption of the park's natural setting. The fish hatchery also closed, now being transformed into an environmental learning center. This change in use offers an opportunity to re-unite the grounds with the native forest from which it was carved out seventy years ago.

Beginning circa 2000, Seward Park has seen a dramatic increase in environmental education programming, initiation of volunteer-driven invasive plant control and reforestation, and founding of Friends of Seward Park, a community organization that supports, advocates for, and fosters appreciation for the park. In the past three years, endangered salmon habitat has been planted along the lakeshore and bald eagle nests have increased. Vegetation management guided by this VMP should further the park's return to its original intended character, a "Magnificent Forest" preserved for Seattle's people and wildlife.

3.4 Vegetation-related Uses

Estimates are that at least 90% of park usage at Seward occurs around its perimeter and in developed areas in the southerly third of the peninsula. This concentration leaves the majority of the park relatively unaffected by direct human impacts, and helps protect the forest's integrity. Seward Park's unique geography creates this condition. It also protects park vegetation from multiple destructive impacts often associated with human activity on surrounding property: encroachment clearing, social trails from yards, illegal dumping, and direct invasion by exotic plants, erosion and pesticide-laden runoff, domestic animal damage and predation, light- and noise pollution affecting wildlife, etc.

Lakeshore uses vary in their effects on vegetation. Activities include swimming at the designated beach and informally where accessible, plus small boat launching and landing (and occasional seaplane and motorboat beaching). Fishermen cast lines from the fishing pier and many points along the shore. With others seeking direct access to the water, they create social trails that can cause compaction, erosion and dispersal of weeds. Recent lakeshore alterations for salmon habitat have involved regarding and replanting margins with overhanging native vegetation. Such restoration has and will increasingly affect human use of the water's edge, altering both access and views.

The paved perimeter path receives heavy use that minimally affects vegetation. Sight line clearance of shoulders allows users to trample path-side vegetation but is no longer needed for vehicle safety. Grass planted along the roadside for this purpose constantly encroaches on adjacent native forest. The one-time road creates an artificial barrier between upland forest and lakeshore habitat, interrupting a normal gradient of vegetative communities. Vegetation management will continue to support the perimeter path's accessibility to persons of widely disparate ages and mobility, and the sequence of vistas across the water it provides. Intimacy with nature could be heightened by reducing verges and strategically planting for habitat, while preserving valuable views with which Seward Park is uniquely endowed.

The main forest north of the park loop road does show evidence of human activity, although far less so than in most forested parks. Exploration and enjoyment of the mature forest is its primary, largely positive use. Related to trail use is development of expanded, informal trail networks that increase edges, reduce forest continuity, denude under-story, displace wildlife, and provide avenues for weed colonization (via shoes and clothing). Trail delineation and signage help minimize these adverse impacts. Off-leash dogs, while often observed, are dispersed enough that at current levels their damage to forest vegetation is not highly evident. Mountain bikes, party sites and transient encampments are far rarer in Seward than other park woodlands; its isolation cannot be counted on to insulate the park as user population inevitably increases. The indirect human impact of planting ornamental species that have proven invasive cannot be overstated, indirect and unintentional as this disturbance may be. Intermittent off-trail activities that affect the forest include wilderness-awareness shelter construction, geo-caching and orienteering, as well as reforestation work that can be seasonally disruptive to wildlife.

Developed landscape areas include lawns, ornamental planting beds, swim beach, picnic shelters, playground, tennis courts, Amphitheater, Environmental Learning Center, the bathhouse arts center, and segments of the lakeshore path. Both active and passive recreation occurs in these areas, predominantly in warm weather. Impacts associated with developed landscape areas are trampling and compaction, which cause under-story denuding, erosion and tree root-zone stress. In large areas of turf, these effects are less serious than locations where popular facilities and circulation routes create heavy traffic.

Vegetation management above all must address user safety from defective trees; conversely, management needs to minimize user impacts on trees (that can render them hazardous). Poison oak control is a major issue where found adjacent to such high-use areas, especially where children play. Because of high demand, picnic shelters are seasonally full and visitors bring small grills to cook elsewhere. Fires have

started where grills are used outside designated shelters. The potential exists for fire to destroy significant vegetation and park facilities. This danger especially needs to be recognized when siting any future meadows in the park.

3.5 Current Maintenance and Concerns

Seward Park's entire acreage is maintained by one full-time maintenance laborer, one mower operator and the SE District senior gardener whose responsibilities include multiple parks in addition to Seward. Variable numbers of seasonal workers supplement this core crew. This staff cares almost-exclusively for the park's sizable developed landscape, plus external forest edges along the road and perimeter path. Primary tasks include: basic turf care, very occasional rough slope mowing to discourage invasives and poison oak from encroaching on high use areas, and caring for ornamental trees and planting beds located mostly near the park entrance. Pesticide use is limited to target treatment of poison oak where its presence poses a public safety hazard. The senior gardener periodically monitors for and attempts to eradicate identified noxious weeds like false bamboo.

In addition to park resource employees, two environmental stewardship staff and intermittent contract naturalists are based in the park. Although their primary focus is environmental education, they provide some of the only staff regularly visiting and leading stewardship activities in natural areas of the park. District staff supports volunteer events by delivering woodchips and hauling debris.

Although there is and active volunteer "Friends of Seward Park" group at Seward, volunteer labor has been sporadic over the last 20 years. Efforts at creating an "Ivy Free" Seward Park have been underway for the last four years, contributing an average of 2,000 volunteer labor hours to the park per year.

In terms of vegetation management, the obvious concern is inadequate staffing levels to maintain the park landscape as well as its extensive forested and shoreline areas. Only in the past decade has it become clear that park forest acreage is neither maintenance-free nor self-sustaining. Volunteer-driven restoration efforts, while impressive and sustained at Seward Park, cannot at current levels meet the basic needs of park natural areas.

3.6 Encroachments

Because park boundaries mostly abut open water, few private encroachments have occurred. Four are currently documented along the west side of Seward Park and at the south end of Lake Washington Boulevard, which is the wooded hillside just north of South Juneau Street. Two off these could affect long-term vegetation management, depending on their extent. One is at Seward Park's extreme south end near the lake, the other above the north end of the forested slope. Seattle Parks Property Management is responsible for identifying and addressing encroachment issues.

3.7 Interested Organizations

Several organizations take an active interest in, and make use of Seward Park, representing multiple perspectives relevant to vegetation management. Primary groups are described below.

Friends of Seward Park for half a decade has been "working in cooperation with park visitors and the Seattle Parks Department to preserve and enhance:

- Solitary pursuits and active recreation.

- Environmental education and park stewardship.
- Forest and lake habitats for wildlife diversity and human enjoyment."

The group's overall mission is to "preserve, protect, and provide for this unique park, ensuring the enjoyment of future generations." It has obtained grants to further forest restoration and environmental education, has sponsored regular tours and community-building events, and has developed a comprehensive website with extensive information about the park's history and natural resources.

Both local and national Audubon Society tap Seward Park for its uniquely-rich habitats within the city. Local birders frequent the park. National Audubon has entered into partnership with Seattle Parks to develop and maintain an environmental education center and program aimed at drawing diverse populations into closer contact with the natural environment. A department-run naturalist program is already firmly established, including the youth service and adventure group T.R.E.C. (Teens for Recreation and Environmental Conservation) based in the park.

Washington Native Plant Society, in collaboration with Earth Corps and Seattle Parks Urban Forestry program, has established IvyOUT (Ivy Off Urban Trees). This ongoing program aims to free Seward Park of all English ivy and to date has reclaimed 15 acres and 675 threatened trees. WNPS also sponsors restoration planting and helps find and identify flora throughout the park, some represented nowhere else in Seattle. Although no longer active at Seward Park, the local Starflower Foundation sponsored creation of the maturing native plant garden beside the Environmental Learning Center.

Friends of Seattle's Olmsted Parks is a city-wide organization "dedicated to preserving Seattle's unique Olmsted landscape heritage and raising awareness of the Olmsted philosophy of providing open space for all people." FSOP maintains an interest in Olmsted-influenced elements of Seattle's park and boulevard system, for which Seward Park forms the southerly anchor. In addition, the original Olmsted plan for Seward Park, while unimplemented, represents vision that remains relevant.

People from extremely diverse backgrounds frequent the park, primarily for developed-landscape-oriented recreation. Ethnic communities with particularly strong and enduring connections to Seward Park include Hispanics, Japanese and Filipinos. The Japanese influence is visible in historic gifts including the island garden and ornamental cherries near the park entry.

Among others informally or sporadically interested in the Seward Park environment are orienteers, cyclists, runners and triathletes, boaters, wilderness awareness programs, scout and school groups, arborists, fish advocates and Canada geese activists.

3.8 Public Process and Citizen Concerns

VMP (Vegetation Management Plan) development has included both formal and informal opportunities for community involvement. Volunteers have contributed directly to plan creation, providing substantial research and writing as well as hours of field help collecting tree and forest data. Intimate knowledge of the park shared by individuals (Al Smith, Paul Talbert and others) has proven especially valuable.

Urban Forestry staff has conducted two widely-publicized meetings, one to introduce and gather comments about VMP scope, the second to summarize findings, management recommendations and implementation priorities contained in the draft document prior to its public review. Feedback received in person and by phone, email and letter have added meaningful content and perspective to this VMP. The extent of comment regarding the initial Draft Plan extended the comment period by two weeks. A third public meeting was held to present the revised final plan.

Public concerns are documented in Appendix J. Major themes included:

- Maintaining and enhancing the park's varied much-valued forest.
- Reducing behaviors and maintenance practices destructive to native vegetation.
- Preserving the park's strongly-contrasting landscape types.
- Effectively controlling invasive, weedy species, thwarting new introductions and re-vegetating with native plants.
- Recognizing non-native grasses as invasive plants, particularly if un-mowed.
- Providing adequate resources for plan implementation and long-term maintenance without depending unrealistically on volunteers.
- Enhancing the park's role as an experiential learning & stewardship environment.
- Reduce emphasis on hazard tree removal **in the forested areas.**

CHAPTER 4: EXISTING CONDITIONS

This chapter provides a brief qualitative overview of the conditions in Seward Park. Information is drawn from multiple sources, including the Seattle Urban Nature Project "(SUNP) Assessment of Existing Vegetation Condition" (Addendum B), The Friends of Seward Park" (Addendum G), and various Seattle Parks Department Staff reports (Addenda D, E and F).

In this VMP, plant names used are common names except where scientific or code names are needed for clarity. Addenda G contains a list of the plants found in Seward Park including common, scientific names and Species Codes.

4.1 Geology & Soils

The present shoreline was created in 1916 when the Montlake cut of the Lake Washington Ship Canal was opened, lowering the lake by about 9 ft. This created a permanent connection to the mainland. Subsequently the shoreline was graded to make the loop road.

The topography of the Seward Park is characterized by gentle to moderate slopes, most of which are facing east and west from a central higher elevation spine. Steep slopes (exceeding 40%) are found only in a few isolated pockets, particularly near Andrews Bay. The park has some north-facing slopes mostly occurring at the north end and near the dock storage area.

The Park is blanketed with glacial till or "hardpan", a mix of silt, sand, gravel and clay with occasional cobbles and boulders that was deposited under or in contact with the prehistoric glacial ice sheet that formed Lake Washington. Much of this material was transported long distances: the gravels seen along the lakeshore are more likely to contain glacially transported rock from British Columbia than local bedrock. The same transport explains the scattered larger rocks (glacial erratics) seen on the northeast shore and other places in the park. Several such erratics are visible across Andrews Bay at Ferdinand Street Park. Major troughs in the Puget Lowland such as the Lake Washington basin were probably carved by subglacial meltwater channels. Drumlins such as the Bailey Peninsula were probably formed under the edge of the ice as it retreated. Lake and meltwater deposits similar to those of the advance outwash formed as the ice receded, but these recessional outwash deposits are much smaller than the advance outwash and are confined mainly to the troughs. *(Friends of Seward Park)*

The Seattle Earthquake fault passes through Seward Park and may be visible as escarpments near Andrews Bay.

Bed rock exposures, rare in the Seattle area occur near the dock storage area at Andrews Bay.

4.2 Slope Stability and Erosion

No recent or active slides were reported during data collection for this project. Addressing slope stabilization and landslide issues is beyond the scope of this VMP; however soil erosion does not appear to be a major problem in Seward Park. No significant erosion or down-cutting was observed during the site inspections or recorded during data collection efforts.

4.3 Streams and Wetlands

No riparian corridors or associated wetlands were identified and mapped during the data collection process. Site inspection for preparation of this VMP found two forested wetland areas; one incorporated into vegetation zone 9 and another just south of the hatchery site along the east side.

4.4 Forest Character and Condition – Qualitative Description

Seward Park is dominated by a naturally generated forest with tree ages varying generally from 100 to 200 years in age. There is evidence of forest fire (charred stumps). However there is no evidence of any large scale timber removal that might replicate stand replacement catastrophes. The general condition of this area indicates that it has received no large scale forest management. (e.g., stand harvest, extensive replanting or thinning). Anecdotal information refers to firewood cutting and blown down tree removals during the 1930's. It has been suggested that this has led to reduced understory tree cover; however plot data are not conclusive. Attempts at clearing for farming were made around the turn of the century. It has been said that those attempts were thwarted, in part, by the presence of poison oak.

The bulk of the forest has been essentially untouched for 150 or more years. Trees along the lake shore edges are wind firm and the forest is essentially stable. Pockets of root disease are found occasionally, and Madrone decline is prevalent only near the southeast park edge.

There are scattered trees with "old-growth" characteristics throughout the zone as well as patches of 30 year old trees mostly around the edges. However, the dominate tree in the zone is Douglas-fir, about 150 years in age but with older individuals and younger groups. The zone does not meet the criteria of "old growth" (Franklin)

In Franklin, the classic definition of "old growth" is "an ecosystem distinguished by the presence of populations of old trees that is not necessarily in a late successional condition or free from evidence of human activity. In this definition , "a population of old trees" means the presence of at least several trees that are close to their maximum age for the particular site and climatic conditions and exhibit characteristics of old trees , such as crown and bole senescence, relative slow growth, and relative large size for site, species and climate" ,"old growth forests are generally considered to exceed 200 years of age".

At Seward Park, there are scattered remnant "old growth" trees, but generally not in concentrations or quantities to meet the definition. Further, the overall forest area is generally not more than 150 years in age. However, the forest is considered "old growth" by some users. The definition is not necessarily important to achieving vegetation management goals. Those goals as described in chapter one, do not, for instance advocate the acceleration of late seral stage forests, but rather to maintain forest health. By so doing, future generations will enjoy the onset of "old growth" characteristics as they develop naturally within Seward Park. This is not to say that maintenance of the forest character by proactive actions will not accelerate late successional forest stages.

The developed portion of the park was created over the last century as described in section 2, Park History. There are elements of the larger mature forest area in patches throughout the south portion of the park. Some of these patches are very similar to the north forested portion, but often there are non-native trees planted at the edges.

Because park boundaries mostly abut open water, few private encroachments have occurred. Four are currently documented along the west side of Seward Park and at the south end of Lake Washington Boulevard, which is the wooded hillside just north of South Juneau Street. Two off these could affect

long-term vegetation management, depending on their extent. One is at Seward Park's extreme south end near the lake, the other above the north end of the forested slope. Seattle Parks Property Management is responsible for identifying and addressing encroachment issues.

In 2004 the Seattle Urban Nature Project developed a "Vegetation Assessment" report for Seward Park. That assessment is utilized in part to describe vegetation zones and vegetation management areas.

The SUNP vegetation assessment is based on 60 sample plots distributed over the Park area within the paved path that separates the shoreline from the interior of the Peninsula. The plots were established to assess current conditions and to develop baseline data for future re-measurement and monitoring. The assessment identified 55 vegetative zones, although not all zones were sampled by the data collection process. The plots were not evenly nor randomly distributed across the park.

4.4.1 Vegetative Sample Summary

The SUNP assessment data is detailed and useful to describe park-wide vegetation conditions, as well as the conditions found at plot locations. The report is reproduced in total, in Addendum B. That assessment reports;

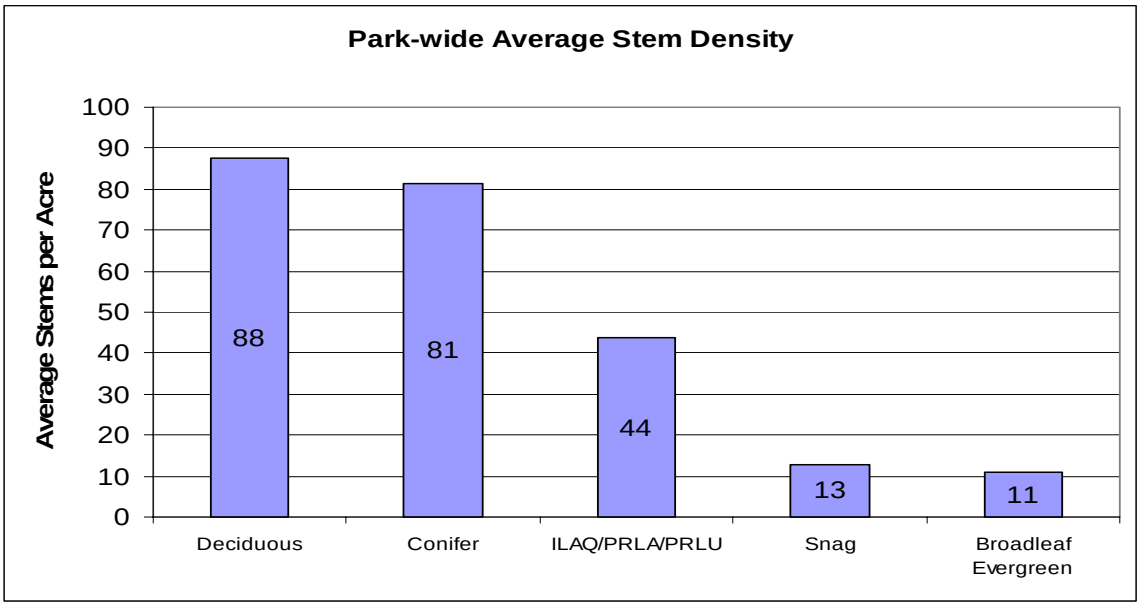
> "The results of the park-wide vegetation trends for Seward Park are derived from 60 sampling plots that were well interspersed across the park and therefore can be used to make inferences about overstory dynamics, understory dynamics, and the structural diversity of the forest park-wide (see Appendix A-2, *Map of Vegetation Zones and Plot Locations*). These sampling plots were also grouped into 27 (55 identified on maps) vegetation zones defined by 1) relatively homogeneous dominant vegetation and 2) geographic location within Seward Park. Inferences can be drawn to the individual vegetation zones in order to describe their character. Variation among zones can be used to characterize the diversity and range of conditions that exist within the park. Overstory dynamics include patterns of dominant tree species in terms of both density and cover, patterns of tree regeneration, size class distributions, forest composition according to canopy type, species composition and presence of invasive species. Understory dynamics include patterns of shrub and herb species composition, cover, and frequency as well as invasive species cover and frequency. Structural diversity of habitats includes such attributes as cover within different canopy layers, quantities of snags or coarse woody debris, and cover according to different categories of life form (tree, shrub, herb etc.)

The report continues with discussions of park-wide tree density and vegetation frequency, including a summary of invasive plant cover. Most notably the assessment produced a series of descriptive graphs depicting the nature of the vegetative cover on a park-wide basis, based on the plot data. Although there is concern that the plot distribution may not have adequately sampled the breadth of vegetation complexity in the park, the data provides a broad indication of the park vegetative variation. The report provides detail for various vegetative zones within the park; however this VMP re-casts the plot data into a different array in order to simplify zone identification and description. It is useful to provide vegetative information by zone in order to describe and monitor the condition of Park vegetation in discreet areas. Vegetative zones with similar characteristics but separated geographically are combined into larger areas in order to get the most out of plot data and to simplify vegetative zone descriptions. These zones are described further in this section.

The general perception of Seward Park is that of a native forest area. The flavor of that forest is depicted in the SUNP data, but influenced by plots taken in the more developed south end, including meadow and landscaped areas.

A total of 180 tree stems and 44 woody shrubs per acre, on average are estimated from the plot data. The distribution of tree stems is approximately 50/50 conifer to deciduous. Woody shrubs, including English Holly (ILAQ), Laurel (PRLA) and Portugal Laurel (PRLU) contribute significantly (19-percent) to the woody stem density.

Figure 3
Stem Density



A more detailed descriptive indication is the frequency of stems per acre by species. The SUNP report states;

> Thirty-three species of trees were identified in the sampling plots. Douglas fir, *Pseudotsuga menziesii*, appears to be the most abundant species of tree park-wide (Table 3). Western red cedar, *Thuja plicata*, and western hemlock, *Tsuga heterophylla*, are the second and third most abundant native conifer tree species.
>
> The most abundant native deciduous tree species park wide is big leaf maple, *Acer macrophyllum*, followed by Oregon ash, *Fraxinus latifolia*, and red alder, *Alnus rubra*. Madrone, *Arbutus menziesii*, is among the top ten most abundant tree species in Seward Park. Three native tree species with relatively low densities park wide are Grand fir, *Abies grandis*, Garry oak, *Quercus garryana*, and western yew, *Taxus brevifolia*.

Table 3 in the SUNP report provides a summary of tree and vegetative stems park-wide. That table is included in the Addenda G.

The character of the park is further described by understory vegetation.

32 species of shrubs, 47 species of herbs and 20 species of graminoid were found in Seward Park within sample plots. Of these, 75% of the shrub species, 47% of the herb species and 35% of the graminoid species are native to the Pacific Northwest flora.

The most abundant shrub species in terms of percent cover are beaked hazelnut, *Corylus cornuta*, with 27% cover and trailing blackberry, *Rubus ursinus*, with 17% cover park-wide (Table 4). The non-native invasive shrub species, Himalayan blackberry, *Rubus discolor*, is the third most abundant shrub species at 12% cover and the native shrub species salal, *Gaultheria shallon*, is fourth most abundant at 11% (Fig. 7). Sword fern, *Polystichum munitum* is the most abundant herb at 23% cover park-wide. The non native invasive species English ivy is presently the second most abundant herb species in terms of cover at 8%. Bentgrass, *Agrostis sp.*, and lawn comprise the next most common herbaceous species at 5-6% cover.

Of note, a significant population of native poison oak is found in the park; however quantitative information from the SUNP report is insufficient to properly account for its distribution and extent. Park volunteer efforts at quantifying Poison Oak are reported in the appropriate sections, following and reproduced in Addendum I.

Non-native invasive species park-wide are significant. The SUNP data are summarized graphically. The most prevalent invasive species are Himalayan blackberry (RUDI), English Ivy (HEHE) and English Holly (ILAQ). The data indicate that 27-percent of the park area is affected by non-native invasive species.

Figure 4
Invasive Species Cover

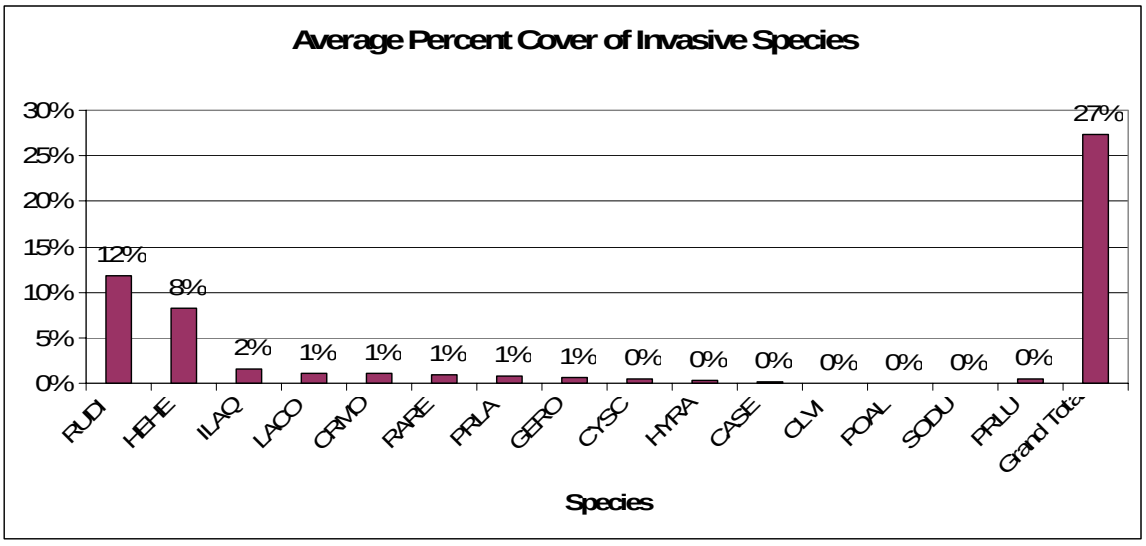


Figure 7. Average percent cover of non-native invasive species in Seward Park based on sampling between 6/14/04 and 7/31/04, (N=60). (See Table 4 for species names and codes)

A list of species names and codes used in the SUNP report is provided in the Addendum C2.

The sample found that, in general less than 15-percent of the ground has no vegetative cover. Bare ground was thought to be mostly due to the activities of Mountain Beaver and foot trails. The assessment

did not sample hardscape which, if added to the mix would slightly increase the percentage of non-vegetated ground.

The data also sampled for snag density and size. Overall, 11 snags per acre are found. These, along with coarse woody debris on the ground provide valuable wildlife habitat, and eventually add to soil complexity and richness. Snag distribution by diameter class is depicted in the SUNP in the chart following.

The majority of the snags found are in the 5-14-inch size class. This is an indication of a forest condition where snags are developing from suppressed trees as opposed to larger snags from over mature trees.

Figure 5
Snag Density

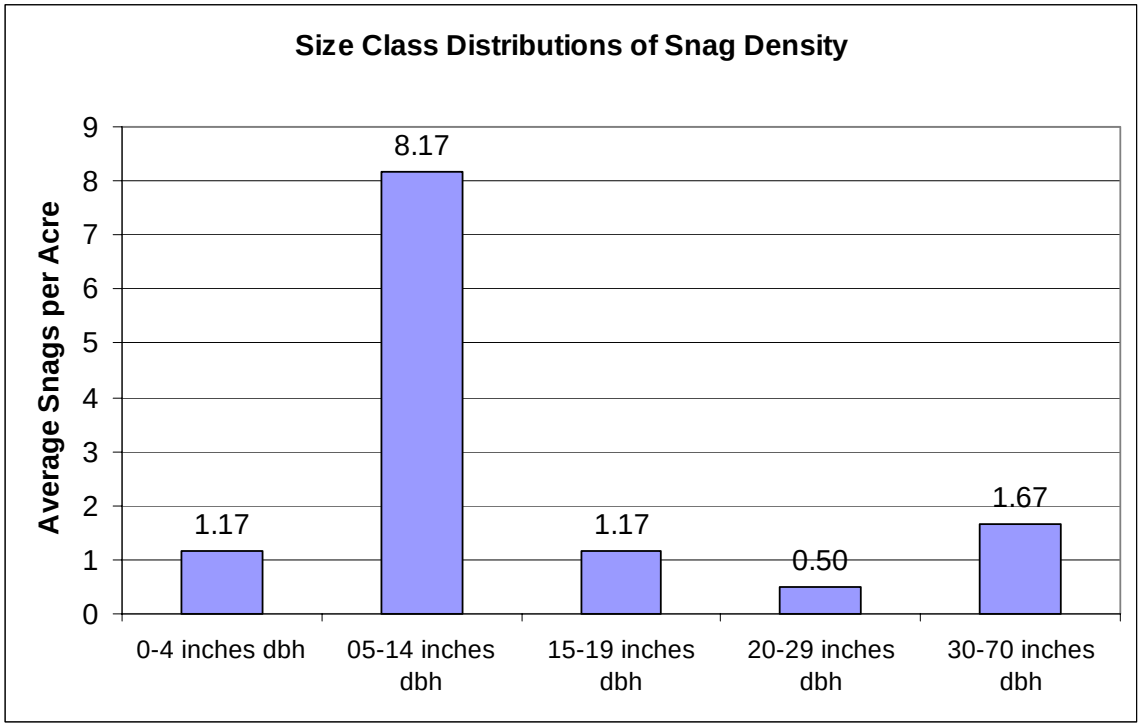


Figure 14. Average density of snags within 5 size classes is shown for Seward Park based on sampling conducted between 6/14/04 and 7/31/04, (N=60).

Coarse woody debris was found in 81-percent of the area sampled. Most of this is highly decomposed.

Overall the SUNP report found;

- The species composition of the tree canopy is dominated by native tree species. However, density and frequency of holly is very high, even though its cover value is low. Holly occurred in 37% of sample plots and it was the third most abundant species of tree in the park behind Douglas fir and big leaf maple. *(Note that although Holly was frequently encountered, it accounts for less that 2-percent of canopy cover)* Mountain ash and English hawthorn are present at lower densities (5-7 trees per acre).

- English ivy cover averaged 8% park-wide and it was found in 53% of the sample plots. Himalayan blackberry cover averaged 12% and it was found in 63% of sample plots. So, in terms

of both cover and frequency, Himalayan blackberry appears to be more abundant than English ivy in the park. Himalayan blackberry had the third highest percent cover among shrub species, behind native trailing blackberry and beaked hazelnut. English ivy had the second highest percent cover among herbaceous species, after native sword fern.

- King County noxious weed inventory data from 2003 indicates that giant hogweed and Spanish broom were both found in the park. This assessment did not find any hogweed nor Spanish broom in the park in 2004.

- Estimates of poison oak cover and frequency are not accurate in this report, due to the difficulty of working within this plant species (causes severe rash in most people). This species was seen extensively along the edges of the forest. It climbed up to 40' in to tree canopies and attained a diameter of up to 3" or 4". It was not observed very often in the forest interior (more than 200' away from edges.) *(A separate report of Poison Oak frequency is included in this VMP)*

- Most of the shrub species in the park are native species and native plant species diversity is quite high compared to other urban natural areas. However, most of the herbaceous species and grasses are not native. Most zones have more native species present than non-native. Areas with a predominance of non-native species are landscaped areas or have multiple species of Eurasian pasture grasses.

- Levels of bare ground are moderate to low, remaining below 15% in most areas. Bare ground in excess of 10% is often the result of mountain beaver activity (feeding and burrowing). Social trails and generally depauperate lower canopy herbaceous layers contribute to the present levels of bare ground cover. Although bare ground was observed, fortunately it was not accompanied by observable gully erosion. Some sheet erosion is occurring in areas with bare ground.

- Most zones have an even distribution of cover in all canopy layers. A few zones lack plant cover in the lower canopy layer and a few are lacking cover in the mid-canopy layers. These may be due to a legacy of shrub-removal. Zones with less than 50% cover in the mid-story are lacking diverse forest structure.

4.5 Vegetative Zone Descriptions

The SUNP assessment report provides a detailed description of methodology and reasoning behind the sample design. By recombining the data the sample is strengthened, not only statistically but by simplifying the vegetative zones to finally define management areas.

The vegetation at Seward Park is categorized in seven primary Vegetation Areas composed of from one to fifteen individual zones that are distinguished by discreet boundaries or variations in vegetative cover. *See Addendum M for a map of the Vegetation Zones.*

The Vegetation Areas are:

A.) The mature **North Native Forest**, comprising the majority of the park. There are eight zones within this contiguous Management Area. Thirty-seven sample plots were located in these zones.

B.) Immediately south, separated more or less by the Loop Drive is the Native **Remnant Forest** composed of eight isolated separate zones with data represented by 10 plots.

C.) Laying within the Native North Forest is an isolated **Deciduous Native Forest** zone represented by 5 plots. This area may have supported a small open water pond in years past.

D.) Lying generally along the slope above the lake on the southerly and southeast exposure is the **Mixed Native/ Non-native Forest** composed of nine zones. This management area includes zone 5a at the north tip of the park that contains both mature native and non-native trees. This area has few sample plots and vegetation inventory depends heavily on ground inspection.

E.) Interspersed in areas B and C are six zones of generally mature native trees over mowed and unmowed grasses designated **Greensward** areas. Three plots were located in these areas.

F.) The **Landscaped Entry** area at the southwest edge of the park is composed of five distinct zones. A single plot was taken in this area.

G.) Fifteen areas of **Grass** zones were distinguished. Some of these are mowed regularly and others periodically. Two plots fall in this zone group.

H.) **The fish hatchery site.** (Not in included in this plan)

I.) **Hardscape,** including roads, paths and parking areas

J.) **Shoreline.** Data regarding Shoreline vegetation is provided by Staff Report and included in Addendum F.

The SUNP assessment did not sample each vegetative zone as delineated, and in some cases the sample was limited to one or two plots in a zone. In order to develop meaningful descriptions the plot data was reorganized from the SUNP report into management areas by similar vegetative cover types or zones. The vegetative zones are defined using plant layer hierarchy of upper layer (primary), mid layer (secondary) and lower (tertiary). The vegetative zones, as defined from aerial photo examination and ground truthing are verified using the plot data. In those instances were more than one plot fell into a zone, the data is averaged and compiled into summaries. In those instances where only one plot was installed in a zone, or in those instances with no plots, ground truthing is used to verify the plot data to the extent that the vegetation was visible and identifiable at the time of site visits. When no or insufficient plot data is available vegetative descriptions are developed by inspection, however, lacking other information, the plot data is reported. Data is presented to the extent that the general character of the zone is presented. For instance, in most cases vegetation by canopy layer is presented for the greatest three vegetation types based on canopy cover.

4.5.1 Methodology

The revised vegetation zones are developed using available data, aerial photographic inspection and ground inspection. For this VMP the zones were defined from aerial photo inspection, using 1-inch to 1,000-foot stereo pairs. This technique allows the viewer to see species and crown density changes on relatively large areas in "3-dimensional" view. Discrete vegetation zones less than ½ acre are generally difficult to identify. Ground truthing, essentially a walk-through inspection, confirmed zone polygons. In the case of the SUNP data, ground truthing was followed by plot installation. No additional plots were installed for this VMP. Some vegetation zones were traversed by SUNP using Global Positioning (GPS)

techniques in order to define boundaries that are not clear from aerial photo inspection. Plots were placed in "representative areas" within each zone. However this placement does not result in a statistically sound sample. Further, zones as small as ½ acre were defined within much larger forest areas. There is no certainty that all discrete zones were located. As well, many defined zones were not sampled at all.

The revision for this VMP remixes the SUNP data into broad zones, using the most significant criteria. The plots are assigned to vegetative zones differently in order to simplify the management process. The basic plot detail is retained in files and can be checked periodically for monitoring purposes. The plots in similar zones were combined. For instance plots in zones 7 and 8 are combined and used collectively to describe these two zones which are found to be very similar from ground inspection. Further, that plot data is applied to zone 8a, a similar vegetative type with no plots, but in close proximity. When only one plot is found in zone, the plot data is reported, however the data is valid only for the plot, and not the zone despite the effort by SUNP to sample representatively. In the case of zones with no plots, and no similar sampled zones, the description is based on ground inspection and aerial photo examination only, such as zone 10.

Zone descriptions are essentially based on the vegetative cover percentage, in order:

- Upper layer crown species and density
- Mid layer crown species and density
- Lower layer cover species and density

Individual vegetation zones are depicted on the maps in Addendum M.

The zones are grouped into Vegetation areas based on vegetative cover, current use, geo-proximity and other similarities.

Table 1
Vegetation Area Acres

Area	Description	Acres	% of total	# plots
A	North Native Forest	118.5	55.8	39
B	Remnant Native Forest	29.3	13.8	9
C	Deciduous Native Forest	4.6	2.2	3
D	Mixed Native/Non-Native Forest	6.2	2.9	5
E	Greensward	6.4	3.0	
F	Landscaped Entry	5.7	2.7	3
G	Grass	13.8	6.5	1
H	Hatchery	2.1	1.0	
I	Hardscape	16.2	7.6	
J	Shoreline	9.5	4.5	
K	Playground	.1		
		212.4	100	60

For forested zones, the descriptive layer is the tree canopy or upper layer cover percentage. For non-forested zones, the descriptive layer is the most prevalent layer. The canopy layers are defined in the SUNP report as follows in Table 2.

Table 2
Canopy Layers

Canopy Layer	Height Range
Ground Surface	N/A
Lower	5 cm >0.5 meters
Mid	0.5 cm > 5 meters
Upper	>5 meters

Table 3 following, summarize the plot data (where available) for each zone within each Management Area. Vegetation is reported by common names to aide in readability. Plot numbers in parentheses indicate those zones where plot data is combined for areas geographically separated but with essentially the same characteristics. Where no plot data is available, vegetation zones are extrapolated from adjacent zones or from inspection. Occasionally, no data is available.

4.6 Vegetation Zones

The descriptions of forest zones, following are grouped into vegetation areas based on percentage of cover by species. (* denotes estimate)

Tables 3-5 following summarize the vegetative cover by layer.

Table 3
Upper Vegetation Layer
Percentage Cover by Species

Plant Type		Native Conifer or Broad Leaf Evergreen Tree					Native Deciduous Tree						Non-Native Tree						Other	
		Douglas Fir	Western Red Cedar	Western Hemlock	Pacific Yew	Pacific Madrona	Bigleaf Maple	Oregon Ash	Black Cottonwood	Garry Oak	Western Hazel	Scouler's Willow	Coast Redwood	Pine species	Maple (non-native)	Lombardy Poplar	London Plane	Hawthorn species	Native Shrubs	Non-native Shrubs
Vegetation Area	**Zone**																			
Native North Forest (A)																				
	5	25%		10%			41%													
	7/8/8a	52%				26%	25%													
	10	50%				40%	10%													
	11							63%				40%		22%						
	12																			100%
Native Remnant (B)																				
	22	53%					45%				25%									
	23	20%				50%														
	24	53%					45%				25%									
	28	50%				16%	50%													
	32					16%								15%						
	34	26%	16%			64%														
	37	67%				13%								49%						
	38	29%										17%								
Deciduous Native Forest (C)																				
	9		17%				29%		13%											
Native/Nonnative Forest																				
	15/16	37%					28%							16%						
	33*													100%						
	39*									52%								9%		
	41*									10%							50%			
	44*	26%					16%						64%							
	47*	67%				13%								49%						
Greensward																				
	4*	20%																		
	21*	30%																		
	25a*	20%																		
	26a*	40%																		
	27a*	30%																		
	29a*	20%																		
	36a*	40%																		
Landscaped Nonnative																				
	14															20%				
	17														50%					
	18						30%								30%					
	19																40%			
	20															100%				
	32a																			40%
	100						50%													
	101						50%													

Table 4
Mid Layer Vegetation
Percentage Cover by Species

Plant Type		Native Tree			Non-native Tree			Native Shrub / Fern						Non-Native Invasive			Other	
		Pacific Madrona	Douglas-fir	Bigleaf Maple	Redwood	Pine sp.	Ornamental species	Hazel Nut	Snowberry	Indian Plum	Salmonberry	Salal	Sword Fern	H. Black berry	Common Hawthorn	Nipplewort	Grass	Other
Vegetation Area	**Zone**																	
Native North Forest (A)																		
	5							14%					14%	4%				
	7/8/8a							49%				25%		4%				
	10																	
	11							10%				15%	47%					
	12													100%				
Native Remnant (B)																		
	22							27%		16%			6%					
	23							50%		50%								
	24							25%		15%								
	28							41%		22%		15%						
	32						20%										25%	
	34							20%					17%	16%				
	37							13%		11%			34%					
	38						11%								14%			13%
Deciduous Native Forest (C)										16%	30%			12%				
Native/Nonnative Forest																		
	15/16									20%				16%		15%		
	33*									50%								
	39*								18%					10%	8%			
	41*									50%	50%							
	44*		26%	16%	64%													
	47*	13%	67%			49%												

Table 5

Lower Level Vegetation

Percentage Cover by Species

Plant Type		Native Shrub		Ground Cover		Invasive Shrub/Vine			Other Non-Native		
		Salal	Oregon Grape	Moss	Creeping Blackberry	H. Black berry	English Ivy	Night shade	Grass	Other	Open (no vegetation)
Vegetation Area	**Zone**										
Native North Forest (A)											
	5			3%			2%		3		
	7/8/8a	5%			20%						
	10										
	11			11%					7	4	
	12										
Native Remnant (B)											
Deciduous Native Forest (C)											
	9				18%	11%	10%				
Native/Nonnative Forest											
	15/16		4%			2%	24%				
	33*										
	39*						1%	10%		2%	
Greensward											
	4*								50%		
	21*								100%		
	25a*								100%		
	26a*								100%		
	27a*								100%		
	29a*								100%		
	36a*								100%		
Landscaped Nonnative											
	14								100%		
	17									80%	
	18								100%		
	19								100%		
	20								100%		
	32a										60%
	100										50%
	101									50%	
Grasses											
	13					20%			80%		
	21a					20%			80%		
	25								100%	33%	
	26								100%		
	27								100%		
	29								90%		
	30								100%		
	31					24%			90%	15%	
	35								90%		
	36								90%		
	40								90%		

4.6.1 Native North Forest (A)

The overlying characteristic of the north vegetation zones is the presence of a mixed Douglas-fir/Big leaf maple forest with Pacific madrone along the west side. The individual zones are described following:

Zone 5: This is the largest vegetative zone in the park. It is generally described as a Douglas-fir/big leaf maple stand. Although maple dominates both stem count and crown cover based on plot data, Douglas-fir is clearly the largest tree on the site and provides the most descriptive characteristic. Tree age varies greatly through out the zone. The SUNP data does not include age information beyond broad generalizations.

Zone 5 is gradually converting to a more primarily Douglas-fir forest as the maple reaches its life span and begins to die out. Douglas-fir was found on 66-percent of the plots and maple on 74-percent. The mid layer canopy is overwhelmingly dominated by sword fern which appeared on 85-percent of the plots and hazel nut which appeared on 70-percent of the plots. Indian plum and salal appeared on 18 and 25-percent of the plots, respectively. The lower level vegetation survey found creeping black berry on an overwhelming number of plots with English Ivy concentrated in certain areas.

Invasive cover species are dominated by Himalayan Blackberry that covers 13-percent of the area and English Ivy on 10-percent. Other invasives were found scattered throughout the zone.

Zone 7, 8 and 8a These zones are similar to each other. Plot data for zones 7 and 8 are combined to describe the 3 discrete areas. They are composed primarily of Douglas-fir Pacific Madrone and Big leaf maple. They are generally characterized by west slope aspect adjacent to the lake on the west side of the park although zone 8a is found at about the highest point in the park along the park "spine". The dominate trees appear to fall in the 150 year age class. In general, tree health, including madrone is good. The mid layer is dominated by hazel nut which appeared on 83-percent of the plots and salal which appeared on 67-percent of the plots. Interestingly, sword fern was found on half of the plots under the madrone canopy. Creeping blackberry, moss and salal dominate the lower level.

Invasive cover is dominated by English Holly on 16 percent of the area, English Ivy on 14-percent, Himalayan Blackberry on 13-percent and Hawthorn on 10 percent of the area.

Zone 10 is an area Douglas-fir, madrone and maple. In general, these trees are younger than the others nearby, being dominated by trees in the 30-50 year age class. Soils appear thin and dry, explaining the presence of madrone. No plot data is available.

Zone 11 is dominated by ash, willow and planted pine. The mid layer is dominated by sword fern, twin berry and salal. English ivy dominates the lower layer.

Zone 12 is an area with no measurable upper layer, but the site is dominated by evergreen blackberry.

4.6.2 Native Remnant (B)

Zone 22: The remnant forest is a mix of native and planted trees. The native trees are typically in the 150 year class with both older and younger planted and native specimen found throughout. The zone is

crossed by several foot trails. Hazel nut, Indian Plum and salal are found in the mid layer. English Ivy and Creeping Blackberry dominate the lower level. Twenty-eight percent of the area is covered with Ivy.

Zone 23: This is an open grown, exposed south slope native Douglas-fir and madrone forest remnant. Trees are 150 year age class. Dead and dying madrone are prominent. Hazel nut dominates; Indian Plum and salal dominate the mid layer while invasive blackberry and ivy dominate the lower level.

Zone 24: The remnant forest is a mix of native and planted trees. The native trees are typically in the 150 year class with both older and younger specimen found throughout. The zone is crossed by several foot trails. Planted redwood and native western red cedar are also found. Hazel nut, Indian Plum and salal are found in the mid layer. English Ivy and Creeping Blackberry dominate the lower level.

Zone 28: The remnant forest is a mix of native and planted trees. The native trees are typically in the 150 year class with both older and younger specimen found throughout. The zone is crossed by several foot trails. Hazel nut, Indian Plum and salal are found in the mid layer. English Ivy and Creeping Blackberry dominate the lower level. Besides blackberry and ivy, Bay laurel is found in the invasive survey.

Zone 32: This area is a mixed planted pine and native madrone forest remnant with mowed and unmowed grass areas. The mid layer contains planted cherry trees. The lower layer is dominated by English Ivy and Poison oak along with grasses. Ivy blackberry and bindweed are invasive species.

Zone 34: Madrone and Douglas-fir with planted pine and redwood around the edges. Hazel nut and English Ivy are found in the mid and lower layers. Besides Ivy and Blackberry, invasive species include English Holly.

Zone 37: Madrone and Douglas-fir with planted pine around the edges. Hazel nut salal and grasses are found in the mid and lower layer. Invasive species include Ivy, Holly and blackberry.

Zone 38: An open grown Douglas-fir and planted pine stand on a south slope. Plot does not represent stand. Ivy, grasses and creeping blackberry dominate the mid and lower layers. Holly and Ivy are the primary invasive species.

4.6.2 Deciduous Native Forest (C)

Zone 9 is dominated by big leaf maple, western red cedar, and black cottonwood with red alder. Soils appear poorly drained. The mid layer is dominated by salmon berry Indian plum and black berry. Surprisingly, wetland species do not dominate the lower layer, but rather creeping blackberry, English ivy and Himalayan blackberry were found.

4.6.3 Native/Nonnative Forest (D)

Invasive species include Himalayan blackberry which was found on 36-percent of the area and English ivy on 18-percent of the area.

Zones 15 and 16 are remnant forest strips at the southwest edge of the park. They have had the occasional tree planted, as evidenced by the presence of Port Orford cedar, Spruce and other non-native

species. The zones are narrow with exposed edges, inviting non-native species to take root within the stands. They serve as buffers (and perhaps view obstructions) between the residential area and the Park. The upper layer vegetation component is primarily Douglas fir with Spruce and Pine. Mid and lower layers are a composition of several species, including invasive nipplewort, Himalayan blackberry and ivy. The plot information does not necessarily capture the essence of the rather heavy percentage of invasives such as Himalayan blackberry, and Ivy.

Zone 33 was not sampled. It is a mix of pine species, Douglas fir and madrone.

Zone 39 is composed primarily of Garry Oak and Sycamore. The stand is unique in that it is one of a few natural appearing oak groves in Seattle. Hazel nut and Oregon grape dominate the mid layer and grasses are found at the lower layer. A low invasion of Scotch Broom, Himalayan Blackberry and Ivy is found.

Zone 41 is a planted Sycamore (London Plane) area with Garry Oak scattered throughout. No plot data is available.

Zone 44 is a unique Coast Redwood plantation with scattered Douglas-fir and maple. No plot data is available but the lower layers are dominated by grasses.

Zone 47 is a planted Douglas-fir and pine area. The trees in this zone are decidedly younger than most park trees, about 30 years. The area may have been planted to separate the amphitheater in zone 29 from the parking lot area in zones 30 and 31. No plot data is available.

4.6.4 Greensward (E)

No plot data is available for the majority of these areas. (A single plot in zone 4 may not present a valid representation of the vegetative cover.) They are generally characterized by a tree cover of native species, primarily Douglas-fir standing over mowed and unmowed grass areas.

Zone 4: This zone is essentially the fringe area between the shoreline path and the forest and includes a larger area located at the north end of the park. The area is partly maintained for clearance, picnic and rest areas and partly non-maintained. This is a wooded brush/grassland area. The single plot installed in this zone did not find upper canopy cover, however scattered Douglas-fir in the 150 year old category are found in the zone. Planted and native Douglas-fir ranging from 2 to 20 years in age are found also. The mid layer is dominated by velvet grass and lower layer by a variety of grasses.

The single plot in this zone found 39 native trees per acre, 71-percent of which are under 0.5-inch diameter. This composition is generally verified by inspection. The area is clearly regenerating, either from natural or artificial means with Douglas-fir and western red cedar.

Inspection of the area found Himalayan Blackberry and English Ivy encroaching from forest edges into the unmowed areas along the trail.

4.6.5 Landscaped Non-native (F)

A single plot taken in the entry garden was taken. The plot does not adequately represent the zone.

4.6.6 Grasses (G)

Fifteen open grassy areas are delineated. They are zones 13, 14, 21a, 25, 27,29,30,31,35,36,40,42,43,45 and 46. Two plots in zones 25 and 31 were taken. Those plots found very low percentages (under 5%) of upper and middle layer canopy. Lower level canopy consists of various native and non-native grasses. Invasive plants include Creeping buttercup, Himalayan Blackberry and English Ivy are found in unmowed areas.

Mowed areas are used heavily for passive recreation. Unmowed areas are used regularly for dog walking and other occasional passive recreation.

4.6.7 Hatchery Site (H)

The fish hatchery site is currently being rehabilitated. This activity includes removing buildings, fish holding tanks and parking areas. Much of the site is being revegetated with grasses. A separate Vegetation Management Plan should be prepared for this site after the rehabilitation work is complete.

4.6.8 Hardscape (I)

This is the paved trails, parking areas and access roads.

4.6.9 Shoreline (J)

A vegetation assessment of the shoreline is taken in August, 2004 by the Seattle Parks Department. The assessment was initiated primarily to determine shoreline vegetation quality for salmon recovery. This assessment led to a rehabilitation plan implementation which is currently in process. The full assessment, including maps is included in this report as Appendix C-3.

4.7 Wildlife Habitat

Seward Park represents a rather unique habitat from a wildlife perspective: a relatively large island of forest in the midst of an urban landscape, protected on three sides by water.

Much of the value of the park to wildlife lies in the size of the contiguous forested tract, as well as the habitat complexity that the plant community can potentially provide. The structural complexity and geometry of Seward Park, as well as the role of the park as wildlife habitat, are briefly discussed below. Note, that a wildlife survey was not undertaken as part of this VMP, however the following discussion points out the potential for wildlife use.

4.7.1 Structural Complexity

Much of the following is excerpted from the "Cheasty Greenspace Vegetation Management Plan" prepared by Sheldon & Associates, July 2003.

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 tree tops. Horizontal complexity refers to patchiness in the distribution of plant species and habitat features across the landscape along the horizontal axis. Seward Park may be characterized as a relatively mature forest whose canopy predominantly consists of a multiple tree species, and where many of the trees are approximately the same age.

The structural complexity of habitat for wildlife is fairly complex. 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 wind throw 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.

Seward Park contains significant numbers of both large snags and CWD greater than 20" diameter (see Chapter 5.1). Furthermore, most of the CWD consists of smaller branches and branch fragments, whereas the habitat and structural value of CWD to wildlife increases as CWD size increases. The structural complexity of Seward Park, with respect to snags and CWD, is rather high 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.

4.7.2 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.

Seward Park has a relatively large amount of edge habitat at the south end due to the geometry of the park there, but less in the north ¾. Overall, there are over 40,000 feet or seven miles of forested edge. In general, the park vegetation zones at the south end tend to be irregular in shape as well as with irregular edges maximizing edge habitat relative to interior habitat. The northern portion of the park contains a

high percentage of interior habitats. Area-sensitive species are expected to utilize the interior habitat in the northern portion of the park, but are not as likely to be present in the portions of the park dominated by edge habitat. Thus, much of the wildlife habitat value of Seward Park lies in the preservation of the forested interior habitat—a rarity in an urban landscape, and its potential to support wildlife.

4.7.3 Wildlife Corridors and Stepping Stones

In fragmented landscapes, 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).

Seward Park at the south end 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. Wildlife can not only move between those diverse forest patches but to and from the large forest area to the north.

4.7.4 Eagle Use

Washington Department of Fish and Wildlife has identified three Bald Eagle nest sites, as shown on the Forest Zone Map (Addendum M). A bald eagle management plan is not required for routine park maintenance activities, including hazard tree removals as these activities are not construction or timber harvest related. In daily practice Parks will work to preserve perch and nesting trees, will strive to protect and preserve all conifers, and if removal is necessary will do all possible to create habitat or snag trees. These basic tenants follow the intentions of the Washington Department of Fish and Wildlife's Bald Eagle Protection Rules (WAC 232-12-292) and are incorporated in Parks tree maintenance activities.

4.8 Human Impacts

Human impacts are evident throughout the park. Direct impacts to vegetation are caused primarily by social trails weaving throughout the park. To a lesser degree there is a history of occasional encampments, both from transients and from scouting or wilderness hobbyists. Illegal garbage dumping, vegetation removal for hobby or fuel use are practically non existent.

Forest access on established trails is generally results in low or no impact on vegetation. Tree root compaction, crushing of low plants and tracking in of non-native vegetation seeds is not an apparent problem. These trails are will established, trees were removed at construction to provide access and the trail surfaces tend to be gravel or heavily compacted.

Access on "free lance "trails is another matter. Tree roots can be compacted or wounded, however there was no evidence of significant amounts of either. Lower layer plants are easily crushed, and there is some evidence of this noted during the walk through. Transport of noxious weed seeds could occur and germination in the softer soils of informal trails could occur.

4.9 Assessing the Potential for Certain Trees to Create Hazardous Situations

Seward Park is unique in Seattle in that it contains a substantial population of old trees. Unfortunately, some of these trees are in a state of decline. Such trees provide high habitat value and play an integral role in forest dynamics. However in some cases trees pose a risk t6 structures or humans. In areas where human **occupancy** rates and frequencies are expected to be low **as** within the interior native forest - trees will be left to fulfill their lifecycles. A problematic tree would also need to have a high probability of falling on an obvious target, such as a high traffic area, playground, parking lot, picnic area or building. In areas where human occupancy is common and frequent, such as play areas, picnic shelters, parking lots and cement roads or pathways, Parks will frequently monitor for trees which may pose a hazard. In all cases, due consideration will taken regarding the preservation of each tree. Hazard trees will be addressed through the Parks Urban Forestry Tree Crews.

In 2004 a tree health and risk assessment was conducted by park staff. In all, 85 trees were identified for monitoring, light pruning or further assessment. A hazard ranking was assigned to all trees meeting the established hazard ranking criteria. This included a high probability of failure, identifiable by poor health, significant die-back, and problematic tree structure, root damage, visible cankers, and rot, disease or pest infestations and a high probability of striking a target (human or structure). The initial review of the data did not take in consideration the low level of occupancy of the interior trails. As occupancy is considerably lower along the interior trails than on the perimeter trail and the developed areas of the Park, trees along the interior trails were evaluated at a much reduced target rating. The results of this assessment were transferred to an ESRI shape file format and a hazard tree map was created in July, 2004. *See Addenda A.*

Of the 85 trees identified, 24 were found along trails in the interior forest of the Park, these trees will not be addressed by the hazard tree program. A complete hazard tree summary is located in Addendum D along with associated charts and tables. The trees are indicated on the forest zone map, Addendum M as well as separately in the maps accompanying the report in Addendum D[1].

4.10 Outstanding Trees

Thirty four trees have been found in the Park that merit designation as Outstanding, either by virtue of size, location or species rarity. These were examined and so designated by noted tree author, Arthur Lee Jacobsen. Seven of those trees are considered significant by Seattle and/or the State of Washington. Included in the listing is the States tallest Pacific Madrone. A complete listing is included in Addendum E and the trees are indicated on the forest zone map in Addendum M[1].

4.11 Poison Oak Inventory

The presence of Poison Oak in the park is significant. The toxic effects of human contact with this native plant vary from person to person, but generally it causes skin poisoning or dermatitis in 75 to 80% of the population (DeTomaso). The plant may have been more prevalent in the Seattle area prior to settlement but has been eradicated in most areas of human use. Seward Park is exceptional, in that vegetation management has not included eradication attempts but rather, control by mechanical methods.

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[1] *It should be noted that the approximate locations of outstanding trees and hazard trees on the maps will not match up. This is a result of how the data in the two surveys was collected. Individuals on the outstanding tree list were located using a Global Position Survey unit (Trimble TDC2), while positions for the trees on the hazard list were estimated based on approximate location.*

In August of 2004 a survey of poison oak locations in the Park was conducted by Al Smith a volunteer at the Park. That data is included in the addenda and is used to develop the following location map. The SUNP plots were inspected for the presence of poison oak also. The Smith data overlaps the SUNP data. Poison oak is found on about 7 acres or 3-percent of the park area. The map in Addendum M depicts the summary survey information.

4.12 Ivy Inventory

English Ivy is found in virtually every vegetation zone in the park except mowed lawn and landscaped areas. In October 2003, Earth Corps personnel initiated an inventory of ivy presence in the park. Transects were installed at 50-foot intervals with the intent of traversing the entire park. The inventory was not completed, however the data gathered is useful to identify ivy presence. The data is interpolated to create an ivy presence layer as shown on the following map. Vegetation zones outside the transect area are included based on the presence of ivy on the SUNP plots and visual presence of ivy, as determined from brief site inspections. Ivy is estimated on 62 acres or about 30-percent of the park area.

4.13 Invasive Cover Summary

Invasive plant cover, park-wide is significant. Based on plot data and inspection the overall invasive cover is summarized as:

The non-native invasive shrub species, Himalayan blackberry, *Rubus discolor,* is the most abundant on native shrub species at 12% cover. Blackberry appeared on 63-percent of the plots. The non native invasive species English ivy is presently the second most abundant non-native species in terms of cover at 8% according to the plot data however the ivy survey indicates the presence of ivy on 30-percent of the area. Ivy appeared on just over half of the plots, suggesting that the survey may be slightly conservative in its representation. English Holly is found on 2% of the area by cover but appeared on 37-percent of the plots.

Figure 6
Invasive Cover Summary

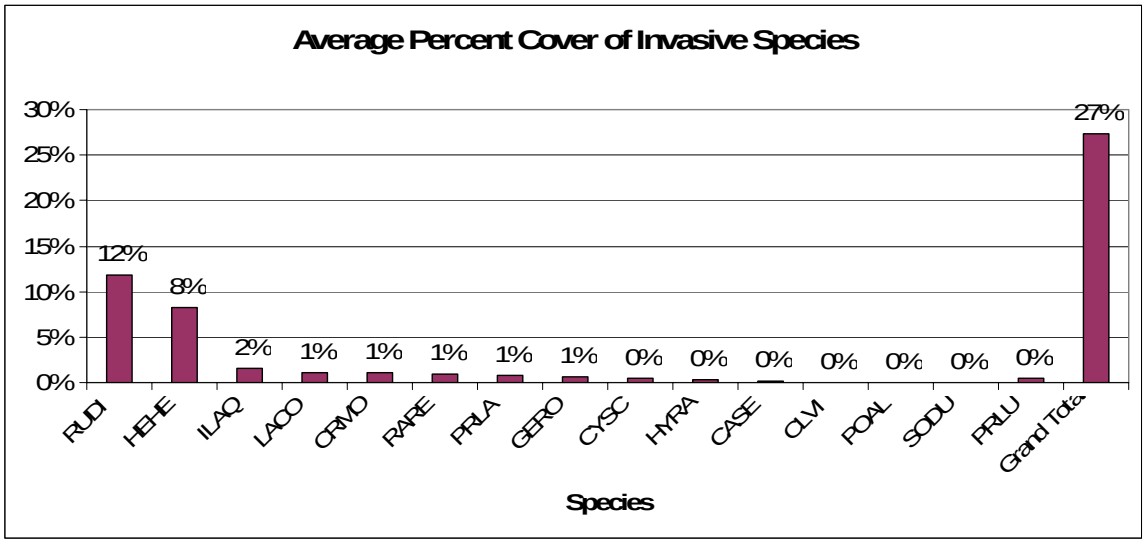
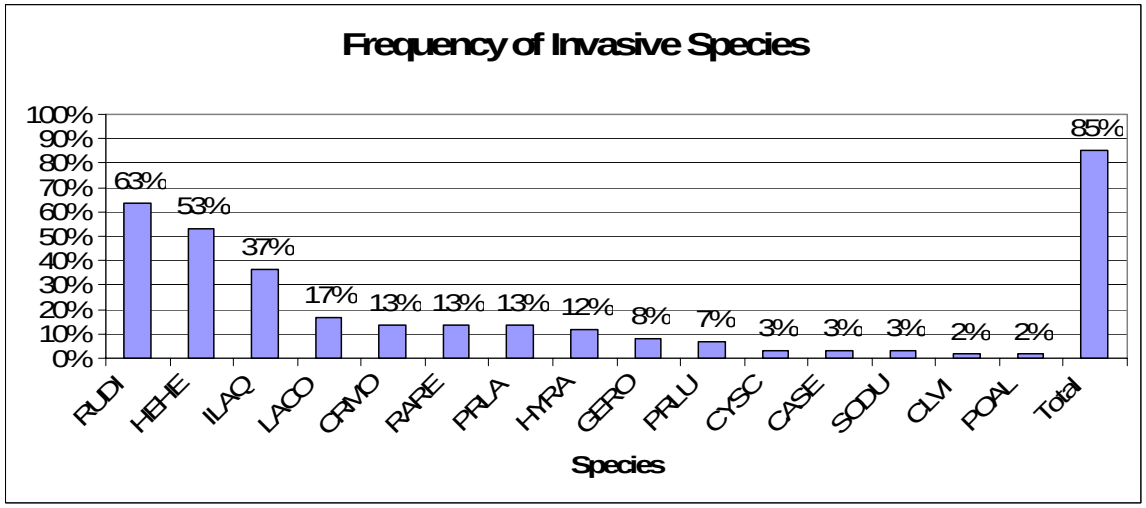


Figure 7
Invasive Species
Frequency



The table following summarizes the estimated acres affected by non-native species. Vegetation management would consider the acres determined by frequency as the most reliable indicator of the extent of target vegetation, however in the case of ivy, the specific survey data is considered most reliable.

Table 6
Summary of Most Abundant Invasive Species

Non-Native Species	% cover	Acres, cover	frequency	Acres frequency
Ivy	30%	62 ac	53%	112 ac
Blackberry	12%	25 ac	63%	134 ac
Holly	2%	4 ac	37%	78 ac
Other	5%	11	8%	17 ac

CHAPTER 5: ISSUES AND CONCERNS

Chapter 4 describes Seward Park quantitatively and qualitatively. Individual zones are defined by vegetative cover and use. Chapter 5 summarizes the issues and concerns found in the data and discusses the implications of those findings within the context of forest health and human use as they relate to Park-wide goals.

MANAGEMENT GOALS (from page 12):

1. Preserve and enhance forest health
2. Enhance vegetation to better provide habitat for native wildlife and endangered species
3. Foster environmental education through stewardship
4. Manage vegetation consistent with habitat, park landscape heritage or established uses

Issues and concerns are summarized on a Park-wide basis. Based on the data, findings are listed along with implications of proactive management as it relates to vegetative health, public safety and other factors. In Chapter 6 we will provide management recommendations for those issues.

A list of issues and concerns is developed based on the Management Goals and Objectives for Seward Park, stated in Chapter 2. The data in chapter 4 is considered in light of those concerns and findings and implications of vegetation management are summarized following. The primary issues and concerns are:

MANAGEMENT ISSUES:	***RELATED GOALS:***
5.1 Forest Health	(*Goal One*)
5.2 Wildlife Habitat	(*Goal Two*)
5.3 Environmental Education	(*Goal Three*)
5.4 Retention of Park Character	(*Goal Four*)
5.5 Vegetation Monitoring	(*Goals One, Two, & Four*)
5.6 Preservation of Rare, Sensitive Plant Communities and Significant Trees	(*Goal One, Two, Three, & Four*)
5.7 Shoreline Vegetation Restoration	(*Goal Two, Three, & Four*)
5.8 Un-managed grassy areas	(*Goals One, Two, Three, & Four*)
5.9 Poison Oak	(*Goal 4*)

5.1 Forest Health

The forest at Seward Park is neither isolated nor untouched by "unnatural" influences. History suggests that regenerative vegetation; primarily woody plants were removed prior to the 1940's decade. This has led to a variable stocking of successional regeneration. Further, the composition of understory vegetation is diluted with invasive, non native species that inhibit natural regeneration.

- Without proactive management of the forest areas the current forest condition may deteriorate.

5.1.1 Invasive Plants

Invasive plants are found throughout the park in all vegetative cover types. The presence of non-native species inhibits regeneration needed for natural forest succession. As well, non-natives can inhibit established tree growth.

English Holly, Himalayan black berry and ivy invasion are wide-spread across the park. Site inspection and separate qualitative studies of ivy invasion confirm and expand the SUNP plot data.

The primary nonnative species based on plot appearance frequency and cover percentage are:

Table 7
Invasive Plant Appearance

	Frequency	Cover %
Himalayan Blackberry	63%	12%
English Ivy	53%	8%
English Holly	37%	2%
Other	8%	1%

Overall, although invasive density is not great, the frequency of appearance is of concern. There is no data from earlier surveys to draw from therefore the progression of these plants is uncertain. Clearly, non native plant invasion is of utmost importance to forest health and regeneration.

- Lack of non-native control will reduce and perhaps prevent natural forest succession.
- Preferred wildlife species may not inhabit non-native vegetative layers.
- Non-native presence on trees may slow growth or cause tree/limb failure.
- Multiple species eradication efforts may require specialized training of workers.
- Single species eradication efforts, such as for holly may provide the greatest return in terms of habitat restoration area.

5.1.2 Native Regeneration

The average tree stem count across the forest areas varies from 10 to 740 stems per acre, averaging 180 per acre. The frequency of big leaf maple probably accounts for a lower than expected tree count (220 per acre) due to large crown sizes in some areas.

The data found average regeneration of native trees to vary from nearly none to over 540 stems per acre, averaging just fewer than 90 per acre. It appears there is adequate regeneration to support a park wide continuation of the natural/native forest successional process. However, regeneration at specific locations throughout the park will improve overall forest health.

- Natural forest succession may fail in some areas without intervention of invasive removal and planting.

- Areas requiring artificial regeneration need to be identified with more intensive survey methodology.
- Follow-up maintenance procedures must be developed, funded and implemented to assure plant establishment.

5.2.3 Bare Soil

About 15 -percent of the ground surface in zones 7 and 9 are bare ground. (About 4 acres or about 17% of the area) This is significantly greater than the park-wide average of 5-percent of the total area. The disturbance is due in part by mountain beaver activity and informal trail use.

- Bare ground invites non-native plant invasion.
- Popular informal trails may need to be closed to allow for forest regeneration.
- Mountain beaver control methods may be unpopular and expensive, with little positive result.

5.2.4 Zone 12 Rehabilitation

This 0.4 acre site is fully occupied in the mid layer with Himalayan Blackberry. The value as open space or forest to human occupation is nil because the area is impenetrable. Casual inspection reveals the presence of wetland indicators under the blackberry.

- On a unit basis, eradication of black berry will be expensive and require multiple entries.
- Blackberry eradication may destroy habitat for certain wildlife.
- Exposure of the soils may reveal wetland characteristics, leading to wetland restoration rather than forest regeneration.

5.2 Wildlife Habitat

5.2.1 Forest Edge

The park contains 40,000 feet of forest edge, particularly useful for wildlife habitat and protection.

- Edge management is likely to require relatively intensive effort because of non native and native grass and undesirable shrub invasion.
- Poison Oak habitat could be encountered in these areas, inhibiting restoration efforts.

5.2.2 Eagle Nests

There are three identified Bald Eagle Nests within the Park. The management of the Seward Park Forest will integrate existing procedures and protocols that protect Eagle nesting sites from disturbance.

5.3 Environmental Education

Environmental education has become an essential component of Seward Park's use. Parks has entered into a cooperative venture with the National Audubon to develop

a naturalist program in the park. This program is in development at the time of printing. Contact the Park Naturalist for further information. This plan has integrated information and input received from the naturalist staff into the applicable areas of the Plan. Naturalist staff will be integrating applicable portions of the Plan into ongoing programs in the Park as well as directly practicing restoration work through workshops and training.

5.4 Retention of Park Character

5.4.1 Overall Appearance and Current Use

Much of the edge of the park facing and surrounding the front entry is composed of pure non-native and native forests. There may be a conflict between restoration of native forest processes and maintenance of the current landscape. The diversity of planted garden and native areas supports a broad range of reactions from visitors. Public input expressed no support for changing the appearance of the Park, to include the landscaped south entry area.

5.4.2 Soil Compaction

Soil compaction on unauthorized trails was found throughout the forest areas and near picnic areas.

- Soil aeration, protection and restoration may require temporary closures of picnic areas and permanent closures of popular trails, limiting recreation use.

5.5 Vegetation Monitoring

5.5.1 Sample Plot re-establishment

There is concern based on public input, that past management practices have not been monitored for long term effects. The SUNP plots were installed so that they can be replicated.

- Plot re-measurement and data base upkeep will require substantial expertise and persistence.
- The current plot distribution may need expansion, requiring additional expense.
- Lack of data base updates will frustrate Park vegetation rehabilitation efforts.

5.5.2 Invasive Plant encroachment (Hatchery)

The Ivy inventory plots found a higher than average in-growth of ivy near the Hatchery site than in other areas in the park.

- Hatchery restoration efforts may not be compatible with the overall goals of the Seward VMP.
- A separate VMP or VMP enhancement for the hatchery site is needed.

5.6 Preservation of Rare or Sensitive Plant Communities and Significant Trees

5.7.1 Garry Oak/Madrona Stands

The mixed Garry Oak/Madrona stand at Seward Park is visible and unique. Understory vegetation has been altered by human use, including regular mowing.

- Sustainability of this site may require closure of the area to establish new plantings and to protect the trees.

5.7.2 Outstanding Trees

Thirty four trees have been identified with characteristics that merit their designation as outstanding. Many of these unique trees are non native.

- Loss of these trees would impact Seattle's tree legacy.
- These trees contribute significantly to Park heritage and interest, particularly to those with a greater than layman interest in vegetation, however the general public may not be affected by the presence of these trees.
- Retention of one of these trees is in conflict with goal one, "Preserve and enhance forest health" since the species is non-native, is known to easily regenerate in native forest and is located in the hatchery area of the park in close proximity to the remnant forest.

5.7 Shoreline Vegetation Management

The shoreline has been surveyed for vegetation quality and quantity. There is in effect, a shoreline restoration plan, focused primarily on Salmon Habitat Restoration.

- The shoreline plan was created for the specific purpose of salmon habitat restoration along the shoreline. A separate VMP should be prepared that considers park-wide management goals and objectives.
- The current shore line survey (2004) was based on the amount of over-hanging vegetation present in each canopy layer and whether that vegetation was native or non-native. Priorities were generated based on a goal of increasing overall canopy cover along the shoreline. The survey did not take into account current uses or management. Management regime was noted in many cases where brush is actively mowed.
- Management of shoreline vegetation for habitat and forest health qualities based on the current shoreline vegetation survey (2004) could be in conflict with public uses and viewpoints.

5.8 Un-managed Grassy Areas

The park contains 9 acres of grass area that are regularly mowed and 4.8 acres of grass areas that are mowed only occasionally. These areas lack structural complexity due to mowing or grass competition.

- Established uses and the visual openness and attractiveness of the park could conflict with the desire to expand native vegetation.

- In unmowed areas, non native plants and invasives could thrive, spreading to the adjacent forest and landscaped areas.

- Lack of structural complexity may lead to lack of wildlife use.

- Reclamation activities could improve forest connectivity.

- Reclamation of un-mowed grass areas could reduce food source for native predatory birds.

5.9 Poison Oak Control

Poison Oak is found around much of the perimeter of the park and to a greater extent near the south picnic and rest areas.

Implication:

- Park use is affected by the presence of poison oak due to potential allergic reactions. Some areas may not be safely accessible.

- Poison oak management will continue to be a maintenance concern for park managers.

CHAPTER 6: MANAGEMENT ACTIONS

Chapter 5 summarizes the issues and concerns in the context of forest health and human use in regards to park goals. In Chapter 6 we provide a summary of current and desired conditions across the park and identify processes required to achieve these desired conditions. Priority implementation directives provide guidance and a means of meeting the objectives identified. General practices are described in detail in the Appendix. Prioritizing the work, especially for a park as large as Seward, presents a major challenge. Consistent application of VMP recommendations over time, according to suggested sequencing, will most efficiently yield the desired effects.

This chapter provides guidance on:

- Overall management priorities for Seward Park
- Priority rankings by task for all management areas
- Top implementation priorities
- Implementation strategies and resources
- Who should do which types of work
- Estimated cost by unit, project and full VMP

Although primarily focusing on forest restoration, VMP implementation also requires tree work, routine maintenance, periodic monitoring, additional planning and design. VMP recommendations should be executed on many fronts, via reforestation projects, cultivation of financial and volunteer resources, ongoing care, and proactive decision-making concerning related Park resources outside the scope of this plan. Over time, recommendations and techniques may be modified based on measured results.

6.1 Vegetation Management Objectives

Vegetation management objectives span all vegetative zones in Seward Park. The following chart of vegetation management objectives presents proposed 20-year targets for vegetation management within the Park. Actions performed to meet these objectives should reduce or improve management issues/ areas to the desired size or coverage.

Vegetation Management in large part is a park-wide concern, particularly with respect to forest health and removal of invasive plants. Other concerns are isolated and confined to discrete locations in the park. Appendix M depicts Vegetation Management Areas, based closely on existing Vegetation Zones delineated in Chapter 4. For each issue discussed below, a location reference is included that corresponds with this map. Other appended maps are referenced as they pertain to individual sections following.

Figure 8
20-year Vegetation Management Objectives

Issue		Current Condition	Target Objective	Desired Condition
1. FOREST HEALTH				
1.1	**Invasive Plants**			Regular, periodic monitoring ensures non-native invasive plants do not get a toe-hold in the native forest. All existing populations are contained and eventually removed
	Ivy	62 acres	<20 acres	< 5% cover at any given spot in forest, no ivy on trees
	Holly	78 acres	< 20 acres	< 5% cover in park
	Himalayan Blackberry	134 acres	< 20 acres	< 5% cover in park
	Other Invasive	17 acres	< 5 acres	< 5% cover in park
	Native Regeneration	90 acres	<10 acres	
	Bare Soil			Within the native forest, bare soil will be confined to designated trails only
	Zone 12 Rehabilitation	0.4 acres	0	Fully restored to native plant community
2. WILDLIFE HABITAT				
	Forest Edge	40,000 linear feet	40,000 linear feet	Grass margins converted to forest where appropriate
	Eagle Nesting Areas	3 (count)	3 (count)	Viable and actively used yearly
3. ENVIRONMENTAL EDUCATION				
	Forest Stewardship	Developing	Increased	Expand community stewardship
4. RETENTION OF PARK CHARACTER				
	Overall appearance and use			
	West Boundary Woodland	Invasives	Decrease	Partnership with neighbors to maintain character of area consistent with goals for park.
	Soil Compaction	Increasing	Decrease	Reduce to designated trail system
	Social Trails	Increasing	Decrease	Evaluate trail system and maintain or close trails as appropriate
5. VEGETATION MONITORING				
	Sample Plot Re-establishment			
	Invasive Plant Encroachment (hatchery)	Detected	Control	Use native plant palettes in hatchery re-build
6. PRESERVATION OF RARE, SENSITIVE PLANT COMMUNITIES AND OUTSTANDING TREES				
	Garry Oak	Altered Understory	Rehabilitate to Native	Oak stands maintained in a native or near-native condition as appropriate
	Outstanding Trees	34 Identified	Protect	Evaluate non-native tree species ability to regenerate in park and manage as appropriate
7. SHORELINE VEGETATION MANAGEMENT				
	Shoreline Vegetation	Restoration	Restore with	Increase upper canopy shading along outer

Issue		Current Condition	Target Objective	Desired Condition
	Management	underway	Modification	edge of perimeter road. Replace invasive populations with natives
8. GRASSLANDS AND LAWNS				
8.1	**Non-native grasses**	Approx. 10 acres	Approx 10 acres	Managed to reduce encroachment into native forest
8.2	**Unmowed Grassland Management**	4.8 acres	2.5 acres	Evaluated and converted to forest, where appropriate
9. POISON OAK CONTROL				
	Poison Oak Control	7 acres	7 acres (Stabilize)	Manage for public safety where appropriate

6.2 Vegetation Management Priorities

Primary management priorities for Seward Park consist of conserving high quality forest composition, and expanding the forest utilizing community volunteer resources when appropriate. Among the vegetation management recommendations outlined in Chapter 6, the most important measures are those that address user safety and critical habitat conservation needs. Overall, management actions are ranked based on the following criteria:

Table 8

VEGETATION MANAGEMENT PRIORITY CHART

Activity by Management Area

Management Activity	Eliminate Tree Ivy	Eradicate Ground Ivy	Eradicate Blackberry	Eradicate Holly	Eradicate Other Invasives	Control Poison Oak	Control Non-native Grasses	Reduce Soil Compaction	Enhance Forest Edge	Fill Regeneration Gaps	Restore Garry Oak Grove	Regenerate Madronas	Manage Significant Trees
Management Area													
North Native Forest	1	2	3	2	3	4	4	4	3	3		3	1
Remnant Native Forest	1	2	3	2	3	4	2	4	3	3	1	1	1
Deciduous Native Forest	1	2	3	2	3	4		4	3	3			
Native / Non-native Forest	1	2	3	2	3	3	3	4	2	3	1	4	
Greensward					3							4	1
Landscape/Ornamental		2		2	3	1			2				1
Grasses					3		1		2		1		
Shoreline	1	2	3	2	3	1	3	4		1			1
Playground						1							

6.3 Forest Health

Maintaining and improving forest health is the primary objective of vegetation management at Seward Park. Four (4) major issues have been identified as major concerns. These are: 1) Invasive Plants, 2) Native Regeneration, 3) Bare Soil, and 4) Zone 12 Rehabilitation.

6.3.1 Invasive Plants

` Invasive plants are prevalent in Seward Park's forest overlap and are difficult to map fully without intensive transect samples; however Maps found in Appendix M suggest areas of greatest frequency. While invasive removal from forest edge and within reclamation projects will provide visibility, the key intent is to sustain and improve the health of the entire North Forest Zone.

Main Objectives:

1. Remove Ivy from trees
2. Reduce Holly density
3. Remove Ivy mats
4. Remove Blackberry patches
5. Increase conifer density
6. Increase native shrub cover

Priority actions:

1. Remove Ivy from trees and create 10-foot "survival ring" free from ivy
2. Remove holly thickets before the plants are too large to easily pull
3. Remove Ivy mats throughout the forest.
4. Eradicate blackberry thickets, especially in forest reclamation areas
5. Replant with site specific shrubs and trees as needed
6. Plan regeneration to achieve multiple vegetative layers
7. Protect plantings from animals (mountain beaver) and human trampling
8. Maintain plantings to establishment (3 years minimum)
    - Mulch
    - Provide water to plantings
    - Monitor and provide weed removal

Priority Areas:

1. Area A The North Native Forest
2. Area B The Remnant Native forest
3. Area C The Deciduous Native Forest
4. Area D The mixed native / non native Forest

Currently, the major management focus has been on controlling English ivy. Several areas of the park are currently in restoration based on the work of IvyO.U.T., a collaborative effort of the Washington Native Plant Society, Friends of Seward Park and Parks. There has also been numerous hours donated by local community volunteers, school groups and other environmental organizations.

Ivy off Trees

This "search and destroy" mission will continue and complete work already underway with the Ivy OUT program. The ivy map included at the end of this VMP shows where ivy is concentrated in the park, and indicates where tree ivy infestations are most apt to be found. The sequence of areas listed in Figure 10 is based on this map, and Earth Corps' ivy inventory map (also appended). Before attacking this work at large scale, individuals organizing efforts should do

advance reconnaissance of all four areas, to locate and mark the most valuable trees or groves (flag and/or map). Projects should be organized accordingly. If available labor is limited, strategic removal from best-quality trees provides more benefit than wholesale sweeps of an area. With large groups, all infested trees can be addressed at once.

Cutting ivy off trees (not pulling) and clearing "survival rings" will be done primarily by supervised volunteers. Individuals and groups of any size are suited to this activity, with minimal training and tools. Work can be accomplished incrementally as volunteer and leadership resources allow. If undertaken as a series of intensive, funded projects, this initiative could be completed quickly. Because ivy poses a great threat to Seward Park's valuable trees, speed is of the essence. While desirable, ground ivy removal other than that immediately around trees is secondary.

Holly Eradication

English holly is dispersed through much of Seward Park, in both intact forest and disturbed areas. Holly was encountered frequently in the baseline vegetation inventory, mostly in small sizes. Timely removal will prevent a future population explosion that would occur if numerous plants were allowed to mature and bear seed. This is a low cost/very high benefit action. Work will be accomplished most efficiently by systematic sweeps through the forest to find plants, starting near vegetation plots where holly was found. Periodic re-sweeping will be needed to deal with resprouts, new or missed plants, annually for 3 years, and at reduced frequency thereafter.

Hand pulling and grubbing readily eliminates young plants, and can be done by volunteers mature and strong enough to handle the needed tools. Caution is advised in using weed wrenches, which can cause injury if improperly used. Ivy too large to pull can be cut or felled, by volunteers (stems up to 4"), SPR staff (to 6") or tree crew (6"+) depending on size. Herbicide application to cuts can reduce or eliminate resprouts, done or directly supervised only by state-certified pesticide applicators employed by or under contract with SPR. Removed plants make excellent wildlife brush piles and barriers to trampling.

Himalayan Blackberry

There are a few dense patches of blackberry scattered around and within the interior of native forests. Additionally, there are several other areas where blackberry is dispersed in low concentrations among other vegetation. Currently many of the populations existing along the forest perimeter are managed on a district level through summer mowing. Populations occurring within the forest should be dealt with as soon as possible. Focus areas include: Area 05A - at the north end of the park, Area 9 and Area 12 (covered under its own directive).

6.3.2 Native Regeneration

Except where forest understory has been reduced by herbivory or trampling or has been replaced by invasive species, Seward Park will require few actions focused at forest regeneration. With robust native vegetation intact, the forest is largely self-regenerating. Areas requiring some assistance include the forest margin along the perimeter/path and grass peninsulas created under tree cover.

Main Objectives:

1. Where feasible, restore multi-story native plant cover if lacking.
2. Reclaim areas covered by non-native invasive plants
3. Where appropriate, extend forest edge to perimeter path

Priority Actions:

1. Identify and map areas with less than 70% native species cover park-wide.
2. Remove invasive plants in areas with low native plant cover
3. Remove grasses and invasive plants from perimeter path forest edge
4. Replant sites with appropriate species, maintaining path drainage swale function.
5. Plan regeneration plantings to achieve multiple vegetative layers
6. Protect plantings
7. Maintain plantings to establishment (3 years)
    - Mulch
    - Provide water appropriate to plantings
    - Provide weed monitoring and removal

Priority Areas:

Zones 25, 29,36,45,46
Zone 03, Trail Edge

6.3.3 Bare Soil

Regeneration work needs to start with bare ground protection, to reduce compaction and potential erosion. Implementation utilizing the standards and protocols outlined in addenda N will greatly enhance all projects and speed restoration of the forest. Brush piles using native branches and/or decaying invasives should be placed strategically to discourage entry from trails, in combination with downed woody debris and logs. Where bare ground remains, a thick blanket of wood chips should be added if feasible. Mulch and woody debris protecting bare ground will need replenishing from time to time, as part of ongoing volunteer stewardship. On the whole, Seward Park's north forest will regenerate unassisted if invasive plants are controlled. Zone 9 requires special attention due to off-trail trampling by people and dogs.

Where trees are planted, understory plants should be added if no natural regeneration occurs within a season or two. Again, volunteers are well-suited for planting and long-term stewardship (monitoring survival, weeding, replanting).

6.3.4 Zone 12 Rehabilitation

Zone 12 is 0.4 acre site that is fully covered with Himalayan Blackberry. Informal inspection reveals the presence of wetland indicator plants beneath the blackberry and where recently removed, regeneration.

Main Objectives:

1. Eradicate blackberry to prevent encroachment to other zones
2. Restore Zone 12 to native forest

Priority Actions:

1. Remove blackberry and other invasives
2. Assess soil type
3. Plant site-appropriate native species, emphasizing vegetative layers
4. Apply biodegradable weed prevention at base of new plantings
5. Maintain until establishment (5 years)
    - Mulch
    - Provide sufficient water to plantings
    - Provide weed monitoring and removal

- Provide mountain beaver monitoring and exclusion if needed

Priority Area:
Zone 12

6.4 Wildlife Habitat

A detailed wildlife survey for Seward Park was not completed as part of this plan; however, much is known of the park's importance as habitat for native fauna, especially bird life, endangered eagles and salmon species. Management will accommodate and support diverse wildlife throughout the park, particularly eagles and deep forest bird species that are very rare in Seattle.

Main Objectives:
1. Protect Eagle nests
2. Protect mature conifer forest
3. Enhance forest edge vegetation
4. Enhance native shoreline habitat
5. Increase habitat for mountain beaver predators

Priority Actions:
1. Monitor eagle nest use and new nest creation
2. Maintain practices which insure activities do not constitute nest disturbance, as per Department of Fish and Wildlife recommendations.
3. Maintain areas of seasonally-unmowed grasses for eagle rodent source.
4. Enhance north conifer forest through related vegetation management actions (invasive control, regeneration).
5. Build horned owl nest boxes in north forest (see Section 6.6)
6. Encourage forest edge irregularities by removing and replacing any hazard trees with multi-layer, native shrubs and forbs.
7. Remove and replace invasive edge plants with wildlife-supporting native species
8. Enhance quality of native vegetation along lake shore in appropriate locations.

Priority Areas:
Zones 5 and 34
Perimeter Path

6.4.1 Eagle Nesting Areas

The following management objectives have been summarized from the Seattle Department of Planning and Development's (DPD) recent draft best available science review for environmental critical areas. DPD's draft document represents an inclusive review of existing literature regarding all GMA recognized environmental critical areas including bald eagle nesting sites. Recommended management actions identified include:

Main Objectives:
1. Maintenance of high tree density and moderate cover – to visually buffer nests from human activities,

2. Complete vegetative screening around nests – to reduce time and frequency of disturbance (eagles nesting at heights greater than 150 ft. were noticeably less prone to disturbance related to human traffic on trails located near the base of the tree),
3. Protection of nests and nest trees year round – since eagles typically use and maintain the same nests year after year, 4) protection of abandoned or un-used nests – since these nest may be used periodically
4. Establishment of a two tiered buffer – the first – protected zone – extending from the base of the nest tree out radially to 400 feet. This zone protects and screens the nest from human activities. The second – conditioned zone – extends from the outer boundary of the protected zone radially to 330-800 feet. Alternate nest locations, perch trees and feeding sites should be included in the conditioned zone. Short term, unobtrusive activities, or those shown not to disturb nesting eagles, such as the use of existing roads, trails, and buildings, can occur year-round in the conditioned zone.

Priority Actions:
1. Screen loop road adjacent to management zones 35, 36 and 44 with woody vegetation of moderate height.
2. Evaluate human activities in zones 35,36, and 44 regarding their probability of disturbing the adjacent eagle nest
3. Conduct survey of potential nesting and roosting trees in park and include candidates on significant tree list
4. Maintain adequate vegetation within 400 feet of all nesting trees.

Priority Area:
Zone 9

6.5 Retention of Park Character

6.5.1 Overall Appearance and Use

Parks current planning process encourages public input on projects that change the appearance of a Park. Current plans to revamp the entry to the Park are under discussion at this time with Parks staff and the public. Native plants will be favored in the palate of the landscape beds. There are no specifics available of these plans at the time of printing. Recommendations based upon this Plan have been made to District Maintenance Staff and the designing Parks Landscape Architect.

West Boundary Forest

The primary management actions in park boundary areas are remediation of hazard trees, removal and control of invasives, and rehabilitation of understory vegetation. Controlling invasives along the park 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 for its highly-visible face to the community and immediate-neighbors. Establishment of resilient native plant communities that can withstand threats from invasive species and intrusions from people will require education and outreach to neighborhood.

Main Objectives:
1. Reduce invasive cover
2. Establish dense native plant communities (particularly shrubs)
3. Encourage stewardship by adjacent neighbors
4. Replace tree losses with appropriate disease-resistant species

Priority Actions:

1. Replant areas of tree loss with species resistant to phytophthora root rot, preferably evergreen natives.
2. Encourage neighbors to help eliminate invasive plants and respect park boundaries.
3. Remove invasive plants, particularly blackberry
4. Plant site-appropriate native species, emphasizing vegetative layers
5. Apply biodegradable weed prevention at base of new plantings
6. Maintain until establishment
   - Mulch
   - Provide adequate water to plantings
   - Provide weed monitoring and removal

Priority Areas

Zone 15, 16

6.5.2 Soil Compaction

Soils compaction is limited to informal trail areas in the forested zones, around picnic, play and parking areas in the grass and greensward areas, and along the perimeter path. Because Seward Park receives concentrated use in certain areas, not all soil compaction, denuding and related erosion can be eliminated. Management should focus on reducing compaction where gains are feasible and vegetation quality can be enhanced.

Main Objectives:

1. Prevent and eliminate trail-related erosion
2. Increase planting sites for native vegetation
3. Provide suitable root zone soil density for existing trees

Priority Actions:

1. Aerate compacted soils around picnic areas and other heavily-used sites
2. Create and maintain mulch rings around trees subject to heavy foot traffic
3. Define perimeter path limit outside pavement edge and replant densely beyond.
4. Identify and correct erosion coming from official trails
5. Identify and close off trails that do not conform with overall park access plan
6. Obliterate junctions of unwanted and official trails with large woody debris and brush
7. Mulch and plant abandoned trails with tough, fast-growing natives
8. Maintain plantings until establishment (3 years)
   - Mulch
   - Fence to protect if necessary
   - Provide adequate water to plantings
   - Provide weed monitoring and removal

Priority Areas

Zone 5 trails, Area G

6.5.2 Social Trails

Social trails fragment the forest, disturb wildlife and introduce invasive seeds and pathogens that can threaten native vegetation. Completely eliminating social trails is impossible. The SPR UF Trail Restoration program currently is mapping and planning an updated trail system for Seward Park.

During this process, existing social trails will be evaluated for abandonment or development into official trails. This VMP implementation initiative seeks to block those that are most destructive to forest integrity. Implementation will require collaborative trail and forest restoration work. Key players are these two UF restoration programs with volunteers, and incidental tree crew involvement.

Once trails to be blocked are identified, volunteers can transport available woody debris, brush and logs to obscure entry points. If salvage plants and woodchips are available, these should be added in the bare trail areas beyond, for a distance of 10-20 feet. Tree work can generate useful brush, chips, small logs and root wads. Invasive shrub removal is another source of material, especially berry-free holly. Planting to further obliterate social trails will primarily be a reforestation volunteer activity. If establishment care can be provided, new plants chosen for their toughness and barrier qualities can supplement salvaged vegetation. Oregon grape, native rose, Devil's club, and tall shrubs like hazel, Indian plum and ocean spray all are suitable selections, depending on light and moisture environment.

A final, important element in eliminating park social trails is public education. Permanent signage at forest trailheads and kiosks is a longer-term objective. Temporary signs posted at restoration sites can raise awareness and discourage off-trail trampling by both human and canine visitors. Bright construction fencing combined with signs may bring further attention to the message, although intruding visually short-term. These measures are inexpensive and easy to implement using a volunteer work force.

6.6 Vegetation Monitoring

6.6.1 Sample Plot Re-establishment

Re sampling of plots will be essential to measuring the success of the restoration project and to monitor for further changes in forest health. Protocols for resampling are include in the Appendix as part of the Best Management Practices for each Zones and for the Park.

6.6.2 Invasive Plant Encroachment (hatchery)

Survey data indicate heavy ivy encroachment from the hatchery site into the surrounding forest. Concern about additional non- native plant encroachment indicates the need to control invasives within the hatchery grounds as part of overall forest restoration. The hatchery site rehabilitation currently underway does not include a vegetation management plan. A plan that is compatible with this overall park VMP needs to be developed.

Main Objectives:

1. Increase integration of hatchery site with native forest
2. Eliminate invasive plant encroachment into park forest
3. Manage and alter hatchery landscape to support overall forest health.

Priority Actions:

1. Create a separate VMP section for the hatchery site
2. Develop any additional plans for site improvements consistent with VMP goals
3. Contain or eliminate all invasive plants on site.

Priority Area:

Zone 6

Once part of the native conifer forest that surrounds it, the Hatchery property is currently a substantially-altered landscape in transition. In addition to natives, the property has significant non-native specimen trees and historic landscape features. This acreage was omitted from this VMP because management objectives and intended vegetation locations and character are not well-defined at this time. The Hatchery's new use as an environmental learning center is just emerging.

The intent of this initiative is to add a Hatchery/Environmental Center section to the overall Seward Park VMP. Objectives reflecting this site's unique landscape character and intended functions must be defined, consistent with and wherever possible furthering park-wide VMP goals. If future landscape changes are undetermined and no VMP is developed near-term, criteria for plant selection should be established before further development, at minimum. In the past, non-native Hatchery vegetation (notably ivy) has infested the surrounding forest. Hydro-seeding with non-native grasses has continued this trend in the recent past, potentially displacing native grasses and forbs from both woods and shore.

Leadership and funding for VMP development lies in the hands of SPR's Environmental Learning Centers manager. The VMP document itself can be completed by Parks UF staff or a qualified consultant. It is of great importance that invasive plants within the Hatchery be controlled as restoration of surrounding high-value forest proceeds. An excellent opportunity exists to link restoration with environmental learning experiences, directly engaging participants in positive ecosystem change.

6.7 Preservation of Rare, Sensitive Plant Communities and Outstanding Trees

6.7.1 Garry Oak Preservation

Seward Park's 0.2 acre Garry Oak grove is almost unique in Seattle. The site has withstood regular mowing of the understory and competition from native Douglas-fir and madrona as well as planted Sycamore trees. The site is worthy of protection not only from the standpoint of silvical uniqueness but aesthetics also.

Main Goals:

1. Protect and sustain the oak grove
2. Provide education about the grove's unique character

Priority Actions:

1. Protect trees from root impacts by trampling and close mowing
2. Assess and address competition from planted Sycamore
3. Study plant associations at Garry Oak groves nearby (may need to go out of City)
4. Assess potential for oak regeneration and understory rehabilitation
5. Provide educational signage
6. Eliminate turf and invasives (may retain poison oak)
7. Underplant with site-specific native vegetation

- Mulch
- Provide water appropriate to plantings
- Provide weed monitoring and removal

Priority Area:

Zone 39

This rare Garry Oak / Madrona stand can be reclaimed to more natural condition gradually or as a single, funded project. The first task is to fence the understory of existing oak trees temporarily to protect their roots and restoration plantings that follow. This site could be enlarged to incorporate and convert small areas of existing lawn and ornamental trees. SPR's landscape architect, district staff and urban forester together should define an appropriate perimeter.

A second step is to gather acorns from the mature Garry oaks and begin propagating seedling trees in containers. Volunteers can take on this task, with Parks horticulture staff providing advice and support as needed. Using native soil containing mycorrhizae (beneficial soil fungi) may improve plant survival. Madronas can be expected to reseed themselves. The next step is to eliminate non-native grasses on the site by sheet mulching or herbicide application, then placing wood chip mulch 3-4" thick overall. The site can be left at this point for a season or longer, if monitored and any grass regrowth controlled by pulling or spot herbicide treatment.

The final task is to replant the site with seedling oaks and associated understory species, including those natives now growing in close proximity to the grove. Appropriate species, based on Garry oak habitat elsewhere include – but are not limited to – the following:

- Common snowberry *Symphorocarpos alba*
- Western serviceberry *Amelanchier alnifolia*
- Hairy honeysuckle *Lonicera ciliosa*
- Western hazel *Corylus cornuta californica*
- Kinnikinnick *Arctostaphyllos uva-ursi*
- Long-stolon sedge *Carex inops*
- Camas (quamash) *Camassia*

Garry oaks are best planted in light gaps or at perimeter locations. Sequenced tree plantings over several years would enhance stand age diversity (5-10 year intervals). Other tree species that commonly grow with Garry oak include Douglas fir, Cascara and Madrona, which is already present. Garry oak canopy is the primary restoration objective. Volunteers can contribute to all planting-related activities: determining plant palette, installing plants, mulching and establishment monitoring and care, Volunteers and Park naturalists together also should develop interpretive signage – an important aspect of this project.

6.7.2 Outstanding Trees

Seward Park is home to a population of native and nonnative trees unique by virtue of their size or rarity. These trees deserve special attention and protection. In the VMP appendix, trees identified as significant (in July 2004) are shown on the Management Areas map, and inventory data included with numbers to match. Trees were GPS-located for the VMP's ArcView-generated map; where possible, trees also need field tagging to help visitors and Parks staff identify them. Seward Park's significant trees are not a static group, but one that will evolve over time to reflect losses and additions. At least every decade, Seward Park should be re-evaluated for outstanding trees, particularly for size as champions succumb. Professionals or knowledgeable volunteers can complete this periodic inventory.

Main Objectives:

1. Sustain health, safety and longevity of identified significant trees
2. Identify additional / replacement trees of significance over time

Priority Actions

1. Evaluate and address each tree's maintenance and tree work needs annually.
2. Establish and maintain a database documenting all maintenance, tree work, monitoring, inspection, removals and additions
3. Identify potential notable trees to supplement current list and replace losses.
4. Where lacking, restore appropriate understory vegetation for native trees
5. Assess invasiveness of notable nonnative trees and eliminate species from park
6. Develop public education materials and tours of significant park trees.

Priority Area:

Park-wide

Because of their value, these significant trees merit individual attention on a regular basis, including monitoring, upkeep and status tracking. The most important first step is for UF staff to set up a database linking inventory data to individual tree management records, to track periodic monitoring, pruning, mulching/weed control, inspection, and loss or removal. To put this management tool into action, UF staff will also need to create paper or electronic forms (for hand-held computers) to record activities as they occur: tree work orders, annual monitoring results, maintenance actions, etc. UF staff can then document work they accomplish or lead as it is done.

District staff, naturalists and volunteer leaders also may record data. To do so, non-UF staff will need to be provided specific direction and suitable tools. These could range from mail-in paper forms, to direct data entry using handheld computers. The bottom line for significant tree management is to monitor annually, to provide routine care (by resource staff and/or volunteers), to mitigate hazard conditions or other problems encountered, and to note trees that are added or removed over time. The key implementation priority is to put a management system into place to protect these trees.

Cultivating visitor awareness of Seward Park's outstanding trees, while not essential, is another aspect of their management. It is best accomplished through guided or self-guided tours. In this regard, skilled volunteers can contribute on a one-time basis translating VMP map and data into interpretive materials, or an ongoing basis leading park tours or "adopting" trees to mulch, weed and monitor. This hands-on care will help insure that special trees receive the extra attention they deserve.

6.8 Shoreline Vegetation Management

Seward Park contains one of the longest undeveloped stretches of freshwater shoreline in the city. It has value for salmon and amphibious habitat, as well as view and recreational value for humans. Perimeter vegetation was evaluated reach-by-reach from a habitat standpoint, and recommendations generated on that basis for restoration priorities and plant palettes. This 2004 inventory and analysis are included as an appendix to this VMP. Shoreline vegetation must balance multiple objectives not yet clearly articulated or spatially defined. Broad management direction needs to be set before additional shoreline vegetation changes are made.

Main Objectives:

1. Establish comprehensive plan for shoreline use and vegetative character.
2. Restore natural shoreline integrity where appropriate
3. Maintain vistas consistent with historic park character

4. Define and control user access along lakeshore.
5. Maximize wildlife habitat consistent with shore's multiple functions.

Priority Actions:

1. Develop plan to delineate appropriate shoreline functions.
2. Refine 2004 shoreline vegetative assessment recommendations based on this plan.
3. Adjust recent restoration plantings if necessary based on this plan.
4. Control invasive plants where existing or potential habitat quality is highest.
5. Plant native trees for salmon habitat enhancement wherever appropriate sites are ready.
6. Fell trees into water and anchor near shore to enrich habitat wherever appropriate.

Priority Area:

Zone 2

Both citizens and SPR staff have expressed a strong desire for practical guidance on management of Seward Park's extensive shoreline. Without fully clarifying objectives and uses for which the park shoreline should be managed, it is impossible to develop location-specific vegetation management recommendations. This initiative involves making such determinations, by examining the multiple roles Seward Park's shoreline plays and spatially delineating these, reach by reach. It is not within the scope of this (or any) VMP to weigh the relative importance of functions a landscape serves, nor to dictate land allocations among them.

This initiative will require project-level funding from City and/or outside sources. A primary objective will be to provide direction for vegetation management, although other issues can be resolved at the same time. The scope should be narrow enough to allow for quick completion: the intent is not to create a full master plan. All legitimate shoreline uses should be adequately represented, and key players consulted: Corps of Engineers, Friends of Seward Park, Friends of Seattle's Olmsted Parks, Audubon, Dept of Wildlife, recreation-oriented organizations, Park landscape architect, urban forester, resource and interpretive staff, Seattle Public Utilities, etc. Besides stakeholders, public involvement opportunities need to be included and well-publicized.

Conflicts among habitat plantings, views, and user access from land and water can be resolved through thoughtful vegetation management for multiple objectives, or may require physical separation. Since baseline resource evaluation already has been done for purposes of salmon habitat enhancement and in greater detail for this VMP (see Appendix), drafting vegetation management recommendations responsive to specific parameters will require limited additional work. Without defined objectives, shoreline vegetation management remains in limbo, subject to variable and conflicting priorities.

6.9 Grassland and Lawns

Grasslands and lawns in developed areas of Seward Park establish its landscape character and support recreation, large-scale gatherings, on-leash pet exercise, and rodent sources for predatory birds. Turf should be maintained in areas where it satisfies these functions. Of primary management interest are the ways that grass directly affects native forest habitat. Exotic grasses dominate park lawns and meadows, reducing Seward Park's native species richness. Intensive sampling and mapping of grasslands were beyond the scope of this VMP. Visual inspection reveals that (1) lawn encroaches directly on forest vegetation, and (2) is itself subject to encroachment by invasive shrubs, along forest edges bordering the perimeter path and south of the loop drive.

Mowed (lawns) and unmowed grass (grasslands) gradually should be eliminated where extent and quality of native vegetation is unnecessarily compromised. In the long run native, non-grass vegetation will require minimal maintenance compared with equal areas of grass. From the standpoint of flora and fauna enhancement, it is desirable to replace lawn with native meadow. From a management standpoint, the difficulty and expense of creating and maintaining native meadow makes conversion impractical on any significant scale. Forest regeneration is a realistic and permanent solution where consistent with established landscape character and use.

Main Objectives:

1. Maintain mowed areas for passive recreation, large events and viewscape
2. Reverse expansion of non-native grasses into park forest
3. Create maintainable forest-turf boundary
4. Extend forest to replace grass along roadways and park perimeter trail
5. Expand and enrich native edge habitat
6. Create trial native meadow to replace small area of existing lawn.
7. Maintain limited non-native meadow for rodent habitat.

Priority Actions:

1. Maintain current lawn areas and selectively reduce over time.
2. Adjust seasonal mowing cycle for unmowed lawn to interrupt seed production, reduce fire danger and provide nesting-season habitat for birds (consult with Audubon).
3. Study feasibility of converting unmowed lawn to native meadow
4. Define lawn perimeters and remove invasive shrubs and grasses beyond
5. Replant grass edges with habitat-enhancing native shrubs and trees
6. Convert narrow peninsulas of mowed and unmowed grass to native vegetation.
7. Prepare planting areas by killing grass and mulching deeply
8. Plan regeneration plantings to achieve multiple vegetative layers
9. Protect plantings from trampling
10. Maintain until establishment (3-5 years)
    - Mulch
    - Provide adequate water to plantings
    - Provide monitoring and grass/weed removal throughout growing season

Priority Areas:

Area G
Zones 25, 29, 36a, 45 and 46

6.9.1 Un-mowed Grass Management

Meadow Conversion

Converting lawn to native meadow is an expensive, multi-stage process; the resulting meadow will require a high level of ongoing care. Complete success is unlikely, because non-native seed source is immediately and abundantly available (unless all of Seward Park is either kept clipped or converted simultaneously – an unlikely prospect). Because community interest is high in creating tall grass habitat near the Environmental Learning Center, one area has been identified as a priority implementation site. It lies down slope from Shelter 3 and the comfort station, extending almost to the top of the south bluff.

Meadow restoration should be done only under professional direction by a landscape contractor. Details concerning materials, methods and sequencing are included in Chapter 7. This implementation initiative will require grant or capital funding, with provision for both establishment care and regular maintenance. Meadow that is created by allowing non-native lawn grasses to grow tall exacerbates the spread of invasive exotic species. It is not a legitimate approach to meadow conversion and is best curtailed in the park as much as possible.

Reclamation of areas currently in mowed and unmowed grasses to native forest will improve habitat continuity throughout Seward Park. It also will reduce invasive plant spread to existing, adjacent forest areas by exotic grasses, shrubs and vines. Conversion will require sustained effort over many years, best undertaken in segments that volunteers and resource staff can handle.

Main Goals:
1. Increase native forest area.
2. Reduce invasive plant encroachment
3. Establish dense multi-layer plant communities

Priority Actions:
1. Remove invasives, particularly non native grasses
2. Plant site-appropriate native species, emphasizing multiple vegetative layers
3. Apply biodegradable weed prevention at base of new plantings
4. Maintain until establishment (5 years)

a. Mulch
b. Provide water to plantings
c. Monitor and provide weed removal

Priority Areas:
Zone 25, 29,36,45,46

6.10 Poison Oak

Seward Park contains one of the highest populations of poison oak in our region, a plant not widely recognized due to its local rarity. This native plant is said to have confounded development of the peninsula before the park was created, and still threatens user safety in high use areas unless actively managed. Although poison oak acts as a severe irritant to most people, its role as a natural fence and ecosystem component are also important management considerations.

Poison oak needs to be controlled where it endangers park users and elsewhere left alone. The poison oak map included in this document (Appendix M) gives a general indication of its current extent in the park. Although very sparse in the interior, this plant can be encountered throughout the peninsula, and its range may shift over time. **Individuals engaged in forest restoration or park maintenance activities should be alert for poison oak wherever they work, and protect themselves accordingly.**

Main Objectives:
1. Reduce risk of poison oak contact in highest-use areas.

2. Maintain poison oak as part of Seward Park's natural plant community.
3. Avoid spreading poison oak in park via maintenance practices.
4. Inform visitors about poison oak's dangers as well as its native ecosystem role.

Priority Actions:

1. Aggressively contain or remove poison oak at south end of the park near heaviest-use areas, especially playground and picnic shelters.
2. Permit poison oak to grow in park areas where risk of unintentional contact is lower.
3. Increase cautionary and informative signage, especially at prominent park entry location.
4. Monitor high use areas at least annually for poison oak advance and control needs.
5. Eliminate mechanical cutting of poison oak, to reduce plant & toxin spread.

Priority Areas:

1. Zone 100
2. Area C
3. Area D
4. Zone 3
5. Protect top-quality habitat
6. Stabilize existing conditions
7. Restore outstanding native vegetation
8. Improve Life (Human) Safety
9. Arrest escalating resource damage
10. Positive Cost/Benefit ratio
11. Ease of implementation
12. Visibility of results

6.11 Implementation Strategies

Implementation is driven by the amount of resources generated and by a strategy which will direct those resources. Currently Parks does not have funding beyond 2005 for restoration activities specifically at Seward Park. The rate of implementation will depended on several factors – community stewardship, available funding and the interest of the larger community of volunteers and donors in the city. The majority of work identified in this VMP can be accomplished by dedicated volunteers and community environmental groups. While prioritized projects are important for vegetative health the methods, or strategy, which is applied will play an important part in the overall success of the Plan.

The following figure summarizes the ten top-priority actions and suggests timeframes for completion within an optimal window of five years. Depending on available funding and volunteers, this period may need to be extended. Certain initiatives may attract strong interest that pushes their implementation forward. Unless a necessary precursor step is skipped in doing so (such as removing invasives before replanting), priorities have some flexibility. For priority initiatives, preliminary budget magnitudes are indicated. These are intended to help staff and volunteers develop projects and identify funding needs.

Figure 9

Prioritized Implementation and Budget

Management Objective	Action	Location	Cost Estimate	Timeframe
FOREST HEALTH				
Invasive Plants	Control and containment	Parkwide		on-going
	Ivy Off Trees	North point	$28,000	2005-2006
	Ivy Off Trees	South portion, North Forest	$40,000	2006
	Ivy Off Trees	South of Loop Drive	$25,000	2006-2007
	Holly Eradication	North Forest	$50,000	2006-2008
	Holly Eradication	South of Loop Drive	$ 6,500	2007-2009
	Himalayan Blackberry	Parkwide		On-going
	Other Invasive			
Native Regeneration		Parkwide		
Bare Soil		Site Specific within Natural Areas		
Zone 12 Rehabilitation	Restore Zone 12 to native forest glade/ forest	Zone 12	$200,000	2006-2007
WILDLIFE HABITAT				
Forest Edge	Evaluate potential to convert grass areas along forest to forest edge	North of loop road	-	2005

Eagle Nesting Areas	Evaluate vegetation within protection zone in terms of blocking human activity	Eastside of lower loop drive	-	2005
ENVIRONMENTAL EDUCATION				
RETENTION OF PARK CHARACTER				
Overall Appearance and use				
	West Boundary Woodland			
	Remove European Mountain Ash from Hatchery (listed on Significant list)	Hatchery		2005
Soil Compaction				
	Block Social trails	North Forest	$10,000	2005-2006
VEGETATION MONITORING				
Sample Plot Re-establishment				
Invasive Plant Encroachment	Reduce invasive spread to hatchery boundary	Hatchery	$25,000	2005
	Use only native plants in hatchery landscape improvements	Hatchery	-	On-going
PRESERVATION OF RARE, SENSITIVE PLANT COMMUNITIES AND OUTSTANDING TREES				
Garry Oak	Garry Oak/Madrona Regeneration and Protection	Zone 39	$15,000	2007-2009
Outstanding Trees	Manage Outstanding Trees	Park-wide	$10,000	2005 ongoing
	Remove Significant tree #14 – refer to Retention of Park Character	Hatchery	-	2005
SHORELINE VEGETATION MANAGEMENT				
Shoreline Vegetation Management				
	Develop Shoreline VMP	Shoreline	$25,000	2005-2006
GRASSLANDS AND LAWNS				
Non-native Grasses	Meadow Conversion	South of Loop Drive	$60,000	2009 begin
Unmowed Grassland Management				

POISON OAK CONTROL				
Poison Oak Control	Maintain current maintenance regime	Parkwide	-	On-going
Total	Total		$555,000	

6.12 Implementation Resources

Locally active community groups currently donating time to restoration in Seward include the following:

- Friends of Seward Park (or similar park stewardship group)
- Earth Corps and IvyOUT volunteers.
- Washington Native Plant Society
- Seattle & National Audubon Society
- SPR's youth TREC program.
- Students (environmental education & service learning programs)
- Local church and synagogue members
- Green Seattle Partnership (which may provide significant volunteers as it develops).

Southeast District is currently not in a position to take on a significant portion of proposed work beyond routine maintenance and supervision. Park naturalist staff, in conjunction with Audubon and visiting school groups, may be able to recruit and manage increasing levels of program-related stewardship.

While contractors may be needed for some hazard tree removal and remediation, DPR tree crews will handle most of this work through normal work orders, with no direct cost. Local certified arborists may also donate professional services, ranging from tree monitoring and evaluation to planting and pruning. Urban Forestry staff will be available for intermittent help on multiple aspects of VMP implementation, as needs arise.

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 are being noticed. 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, youth and religious groups to adopt portions of the forest.

- Establish community relationships through Earth Corps Leadership Grant activities.

- Involve local university students who need practicum/projects for ecological restoration courses (University of Washington Restoration Ecology Network, UW Center for Urban Horticulture Sustainable Community Landscapes Courses).

- "Re-animate" a "Friends of Seward Park" or promote a focus group like "Friends of Seward Park Forest"

- Inform and enlist adjacent property owners and neighborhood residents as volunteers...

- Cultivate interest group partnerships like Audubon and Washington Native Plant Society.

A final important strategy is to tap a broad variety of available funding sources. Because of Seward Park's location, resource stature, heritage and size, VMP implementation should readily attract public agency and private foundation grants. Private donation potential is significant as well, both within and well-beyond the immediate Seward Park neighborhood. Seattle Parks Foundation can provide a convenient vehicle for private donations. Projects sponsored by other City departments and public agencies may occur at Seward Park, particularly related to habitat improvements. Both outside and DPR-sponsored capital projects should be tapped for synergies (and reviewed for conflicts) relating to VMP implementation.

6.13 Budget Estimate

VMP implementation costs depend on how and by whom tasks are accomplished. Based on the data provided and analyzed, and the cost assumptions herein, the 20 year VMP implementation, in 2005 dollars is estimated at $1,543,000. Budget estimates are based on the methods, labor sources and associated rates identified below. Actual costs will vary depending on combination of sources and methods used.

Table 9
Task Accomplishment

Task	Method	Source
Arresting tree ivy /survival rings	Hand Labor	Volunteer
Removing ground ivy	Hand Labor	Volunteer
Removing holly	Hand Labor	Volunteer
Reducing holly regrowth	Chemical Hand Application	City Staff/Contractor
Removing blackberry	Hand Labor/Mechanical Flail	Volunteer/Contractor
Reducing blackberry regrowth	Chemical Hand Application	City Staff/Contractor
Removing other invasive shrubs	Hand Labor	Volunteer
Reducing invasive shrub regrowth	Chemical Hand Application	Contractor
Removing invasive grasses	Hand Labor-Mulch/Mowing	Volunteer/Staff
Reducing invasive. grass regrowth	Chemical (target application)	City Staff/Contractor
Reducing soil compaction	Hand Labor Mulch/ Machine	Volunteer/Contractor
Preparing sites for planting	Hand Labor	Volunteer
Planting native shrubs	Hand Labor	Volunteer
Planting native trees	Hand Labor	Volunteer
Maintaining plantings	Hand Labor	Volunteer/Contractor
Replanting	Hand Labor	Volunteer

For estimating purposes, Volunteer labor is valued at $15 per hour based on Federal and County Grant values. Parks staff labor is valued at $35 per hour and Contractor rates at $65 per hour, including labor, machinery, chemical, etc. The VMP assumes primary labor will be volunteers, with Parks Staff Supervision at 10-percent of cost. Mechanical and Chemical applications are based on Contractor rates.

Table 10
Volunteer Labor Production Estimate

Action	Production	@ $15/hour
Ivy Removal-Trees	1 hour/tree	$15/tree
Ivy Removal heavy	100sq. ft/hour	$.150/sq ft
Ivy Removal Light	330 sq. ft/hour	$045/sq ft
Holly Removal	1000 sq. ft/hour	$.150 sq ft
Blackberry Removal	100 sq ft/hour	$1.50/sq ft
Planting	700 sq ft/hour	$21/sq ft
Maintenance	3 x planting cost for 3 year period	

Park Staff Assumptions

Park staff rates are estimated at $35 per hour. However, tree removal and maintenance crews are estimated at $65 per hour, including equipment. Tree work is estimated at 2 hours per tree whether removal or takedown.

Contract Assumptions

Contractor participation is generally limited to herbicide applications, hazard tree removals and mechanical site preparation. Chemical application is assumed at 0.25 acre per hour (hand or back pack application). Mechanical site preparation (rototilling, brush-cutting) is assumed at 0.10 acre per hour.

Horticultural Assumptions

Costs estimated in Table 13 below are assumed to include plants and delivery to site.

Table 11
Restoration Unit Costs

Plant	Size	Cost		Density	Cost/sq foot
Trees	5 gal	$15	Underplant	1/400 sq ft	$.04
	5 gal	$15	Reforest	1/100 sq ft	$.15
Shrubs	1 gal	$5	Underplant	1/10 sq ft	$.50
	1 gal	$5	Rehabilitate	1 / 4 sq ft	$1.25
Mulch		$20/yd		36 sq ft	$0.55
Materials		$1/ tree			

Cost estimates are based on initial actions only. Costs for follow-up actions are provided in Appendix H.

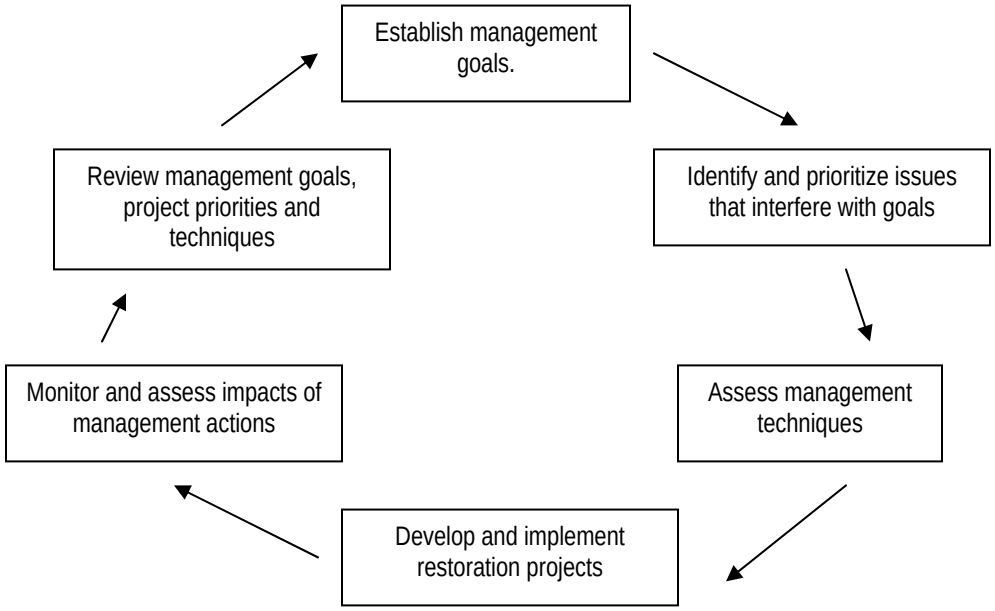
CHAPTER 7: MONITORING

7.1 Monitoring and Adaptive Management

Adapted in part from Golden Gardens VMP

Monitoring allows evaluation of whether or not long-term VMP goals and specific project goals are being met. Monitoring also insures that a project or task, once undertaken, receives appropriate follow-up care. In a variety of ways, monitoring contributes to implementation success.

Monitoring is a critical component to implementation of adaptive management, a cornerstone of this VMP. Until now, techniques for planting or invasive plant control have been tried in various areas of the park with various results. However, there is no systematic way of tracking and evaluating these results to learn from them. A system of *adaptive management* will allow Parks staff to evaluate results of management strategies and create new strategies for future projects.



Adaptive Management Flowchart (adapted from Schwartz and Randall (1995) in Luken and Thieret (1997)).

As illustrated in the chart above, the cycle begins with establishing management goals, which is done in Chapter 2 of this VMP. The assessment in Chapters 3 and 4, and the analysis in Chapter 5 identify primary issues that interfere with the goals. Chapters 6 and 7 present the management techniques we believe are needed to achieve the VMP goals. Implementation begins with a written project plan that clearly communicates objectives, like those found in Priority Initiatives section of Chapter 8. After a project is executed, the success of recommended techniques will be tracked by monitoring, as described in this chapter. The project plan and monitoring reports can then be compared to evaluate the results of the project.

Modifications in objectives or techniques may result from this evaluation and should be published as an addendum to the original plan. After 20 years, approximately four generations of projects should have been completed and evaluated. At that time, it will be useful to update the plan with the information generated by this process.

7.2 What to Monitor

Several types of monitoring are recommended (and referenced) in this plan. These include:

- Forest condition monitoring (comparing baseline condition to change through time)
- Invasive and noxious weed monitoring (to identify and eliminate as soon as possible)
- Project monitoring (part of Establishment Care)
- Significant tree monitoring (as part of an enhanced care program)
- Poison oak monitoring (for encroachment on highest-use areas)

7.3 Monitoring Plans

To succeed, monitoring must produce relevant and usable data; success depends on advance planning and periodic re-evaluation. Appropriate parameters to track must be defined in advance, measured, and documented in a format that is simple and understandable. Specific goals, "yardstick" characteristics, field methodology, records maintenance & analysis and follow-up procedures need to be defined for each type of monitoring. Sample forms are included in the Appendix as a starting point; these should be customized or modified as needed.

7.4 Project Monitoring

For specific implementation projects, baseline monitoring should be done before a project is initiated, then at 1 year, 3 year, and 5 year post-implementation intervals. Parameters to measure should fit the objectives and actions specific to the project. Monitoring is best done by a person who is qualified to perform the monitoring and is uninvolved with project management at the site. This provides valuable peer evaluation for the project manager and Parks staff. Open discussion of results should be used to refine management techniques. Monitoring can be done by paid consultants, trained volunteers, or SPR staff not otherwise connected with a particular project or site. Possibilities include Urban Forestry staff, Gardeners or Naturalists working elsewhere in the park system.

7.5 Forest Condition Monitoring

The key parameters to measure at Seward Park relate to 20 year targets established for each of the Management Areas. These objectives are laid out at the beginning of Chapter 6 in Figure 8 and repeated below for easy reference. At Seward Park, a framework for monitoring long-term landscape change has been established, using the sixty survey plots installed by Seattle Urban Nature Project in June 2004 using GPS location methods. Extensive baseline vegetation data are linked to these individual transect-plots.

Individual transect plots should be re-surveyed periodically to generate updated data by which to gauge overall vegetation management results. An interval of every five years is suggested, ten years at most. This report suggests installation of additional randomly-placed plots in areas south of the loop road that were previously minimally-characterized, at a rate of 1 per 3 acres. This highly-modified part of the park will be particularly subject to change as a result of VMP implementation.

Figure 10
20-year Vegetation Management Objectives *(from page 56)*

Issue		Current Condition	Target Objective	Desired Condition
1. FOREST HEALTH				
1.1	**Invasive Plants**			Regular, periodic monitoring ensures non-native invasive plants do not get a toe-hold in the native forest. All existing populations are contained and eventually removed
	Ivy	62 acres	<20 acres	< 5% cover at any given spot in forest, no ivy on trees
	Holly	78 acres	< 20 acres	< 5% cover in park
	Himalayan Blackberry	134 acres	< 20 acres	< 5% cover in park
	Other Invasive	17 acres	< 5 acres	< 5% cover in park
1.2	**Native Regeneration**	90 acres	<10 acres	
1.3	**Bare Soil**			Within the native forest, bare soil will be confined to designated trails only
1.4	**Zone 12 Rehabilitation**	0.4 acres	0	Fully restored to native plant community
2. WILDLIFE HABITAT				
4.1	**Forest Edge**	40,000 feet	40,000 feet	Grass margins converted to forest where appropriate
4.2	**Eagle Nesting Areas**	3	3	Viable and actively used yearly
3. ENVIRONMENTAL EDUCATION				
	Forest Reclamation	Stable	Increase	Expand community stewardship
4. RETENTION OF PARK CHARACTER				
4.1	**Overall appearance and use**			
4.1.2	*West Boundary Woodland*	Invasives	Decrease	Partnership with neighbors to maintain character of area consistent with goals for park.
4.2	**Soil Compaction**	Increasing	Decrease	Evaluate trail system and maintain or close trails as appropriate
5. VEGETATION MONITORING				
5.1	**Sample Plot Re-establishment**			

Issue		Current Condition	Target Objective	Desired Condition
5.2	**Invasive Plant Encroachment (hatchery)**	Detected	Control	Use native plant palettes in hatchery re-build
6. PRESERVATION OF RARE, SENSITIVE PLANT COMMUNITIES AND OUTSTANDING TREES				
6.1	**Garry Oak**	Altered Understory	Rehabilitate to Native	Oak stands maintained in a native or near-native condition as appropriate
6.2	**Outstanding Trees**	34 Identified	Protect	Evaluate non-native tree species ability to regenerate in park and manage as appropriate
7. SHORELINE VEGETATION MANAGEMENT				
	Shoreline Vegetation Management	Restoration underway	Restore with Modification	Increase upper canopy shading along outer edge of perimeter road. Replace invasive populations with natives
8. GRASSLANDS AND LAWNS				
8.1	**Non-native grasses**	Approx. 10 acres	Approx 10 acres	Managed to reduce encroachment into native forest
8.2	**Unmowed Grassland Management**	4.8 acres	2.5 acres	Evaluated and converted to forest, where appropriate
9. POISON OAK CONTROL				
	Poison Oak Control	7 acres	7 acres	Manage for public safety where appropriate

7.6 Special Purpose Monitoring

Other recommended monitoring is essential to effective, ongoing management of particular types of vegetation: poison oak, invasive and noxious weeds, significant trees, and potentially-hazardous trees. Specialized monitoring is to be done by responsible professional staff, or under their direct supervision. For the most part, suitable data-collection forms and field maps already exist. District staff should monitor poison oak encroachment in high-use areas annually or more often if needed, for purposes of selective control. Likewise, they should continue monitoring and working to eradicate noxious weeds in conjunction with King County Noxious Weed Board staff. Tree-related monitoring will be handled primarily through Parks Urban Forestry staff using standard professional protocols. Non-UF staff and citizens are encouraged to supplement this periodic monitoring by sharing observations about specific trees with hazard and/or heritage potential.

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