PORTLAND PARKS & RECREATION

Healthy Parks, Healthy Portland

Forest Park

Desired Future Condition

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Introduction & History

Forest Park is an unparalleled natural resource; an oasis for plants, wildlife, and the urban explorer. Unique in the nation, Forest Park is the largest natural area within a city and provides a place for quiet reflection, passive recreation, environmental research, and educational discovery. With over 5,000 acres of undeveloped natural area, Forest Park is home to over 100 species of native birds and more than 50 mammals. The park includes Special Status Habitats, such as Interior Forest and Oak Woodlands (designated in the City of Portland Terrestrial Ecology Enhancement Strategy), and has documented flora and fauna that are unique within an urban setting.

Forest Park is an integral part of the wildlife corridor that connects the Portland Metropolitan area to the Coast Range through a series of undeveloped rural properties that are currently in a mix of private and public ownership. This corridor is believed to play a critical role in species dispersal throughout the region, providing an opportunity for recruitment of flora and fauna outside of the urban area (Houle, 1982).

The management of the park is provided by Portland Parks & Recreation (PP&R) and is guided by the *Forest Park Natural Resource Management Plan* (NRMP), adopted by City Council in 1995. The plan details specific actions for ecological restoration, recreation use, and operations and maintenance of the natural area. The Desired Future Condition (DFC) projects the plant community structure for the next 25 years. Both the plan and DFC provide guidance to staff for setting work priorities, making land management decisions, and informing the public about park management plans. The DFC is the means for setting goals for restoration activities. The term acknowledges that natural landscapes change over time and that humans play a key role in determining the degree and direction of that change. For an overview of how the DFC fits into PP&R's ecosystem management, refer to Appendix I.

The Desired Future Condition statement is designed to be complementary to the Forest Park NRMP; the two should be utilized as tools for comprehensive park management.

History

LAND USE AND DISTURBANCE

Plant communities in Forest Park have developed in response to past land use practices and natural disturbance. The following major events and activities shaped the current vegetation communities:

Disturbance Corridors

Eight public utility corridors exist in Forest Park. Each corridor has a 100-year easement which allows for vegetation management to maintain

line function and hazard reduction. Depending upon specific power corridor management, mature trees may be left when they do not interfere with utility transmission.

Fire

There have been three stand replacing fires over the past 120 years. These fires resulted in over 1,400 acres within the park being impacted by fire.

- 1889 fire burned approximately 400 park acres
- 1940 "Bonney Slope" fire burned 170 park acres
- 1951 fire burned over 900 park acres

Infrastructure

Roads, water storage structures, fire hydrants, and culverts are located throughout the park. Many are obsolete and non-functional.

Invasive Species

Due to the park's location in an urban environment, the control of invasive species is likely to be an ongoing management challenge. While English ivy is the species most often associated as a problem in Forest Park, other invasive plants pose a threat to ecosystem health (See Appendix II).

Logging

Extensive logging, which included removal of dead trees and large downed wood, occurred throughout the park in the 19th and 20th centuries. Controlled fires were utilized to reduce slash and other materials deemed as hazardous. Additionally, the City of Portland utilized Forest Park as a wood cutting camp twice in the early 1900s to provide fuel and income to needy families.

Recreation

Recreation use and type has evolved over time. From youth camps of the 1950s to demands for increased cycling opportunities today, recreation impacts the park's natural resources (See Appendix III).

Reforestation

Following the 1951 fire, Forest Park managers planted thousands of trees in the 1950s throughout the central management unit near Saltzman Road. These areas are now evidenced by high densities of even-aged trees that are competing for space and light. Due to limited plant availability, these species included some not typically found in our region, such as Port Orford cedar *(Chamaecyparis lawsoniana)* and Eastern Ponderosa pine *(Pinus ponderosa)*.

Research

The proximity of Forest Park to Portland results in the convenient use of the natural area as a site for scientific inquiry. From environmental education field trips to long-term university research projects, the park serves to provide the community with valuable educational opportunities. Currently, permits are issued for all research activities to balance the value contributed against the impacts that result from this work in the park.

PLANNING

Forest Park Natural Resources Management Plan 1995

The Forest Park Natural Resources Management Plan (NRMP) adopted in 1995 provides the framework for managing the park. The NRMP details forest management actions that favor an old-

growth conifer forest. The plan divides Forest Park into management units. These management units were created to provide a framework for resource protection standards and appropriate levels of recreation use. The management units are defined as follows:

- North Management Unit: Germantown Road to Newberry Road (1,558 acres)
- Central Management Unit: Firelane 1 to Germantown Road (2,247 acres)
- South Management Unit: Burnside to Firelane 1 (1,236 acres)

Portland Wildfire Fuel Reduction Project 2006-2010

In 2006 three City of Portland agencies (Portland Parks & Recreation, Environmental Services, and Fire & Rescue) received a grant from the Oregon Emergency Management (OEM) and the Federal Emergency Management Administration (FEMA) to create long and short term plans and projects to reduce the risk of wildfire in and around Forest Park (http://www.portlandonline.com/parks/index.cfm?c=43178). For Forest Park, the planning effort identified four main ecosystem types:

1. Grass and shrub communities along utility corridors
2. Oak woodlands along the east edge of the park, near Highway 30
3. Interior conifer and mixed conifer-deciduous forest
4. Edge area deciduous and mixed forest

With the greater recognition of the risk of wildfire in natural areas adjacent to homes, the report encourages a deciduous forest of bigleaf maples *(Acer macrophyllum)* and red alders *(Alnus rubra)* that are less likely to ignite and burn adjacent to structures. The deciduous forest retains vast amounts of moisture and lacks the volatile resins found in firs, hemlocks, and cedars. They can actually act as fire breaks if placed strategically in areas where fires are likely to start or spread.

The FEMA report evaluates Forest Park through the lens of wildfire risk reduction. This is an important component of managing a large urban forest, but is only one of the objectives used in developing the Desired Future Condition for Forest Park. **Ecosystem management, which is the foundation for how Portland Parks & Recreation manages its natural areas, involves developing strategies for conservation, restoration, and enhancement that promote wildlife habitat, biodiversity, and water quality**. Each of these elements was evaluated in crafting the Desired Future Condition.

Willamette Subwatershed Improvement Strategies

The City of Portland Bureau of Environmental Services (BES) is developing the Willamette Subwatershed Improvement Strategies (http://www.portlandonline.com/bes/index.cfm?c=31819). These strategies provide actions to improve watershed health. Seven of the subwatersheds are found within Forest Park. Balch and Miller subwatersheds are viewed as urban reference sites (City of Portland, BES, 2010a) because they are in relatively good condition. PP&R and BES will work together to identify and develop priority projects for the subwatersheds of Forest Park.

Forest Park

Natural Resource Inventory

GEOLOGY

Columbia River Basalt comprises the majority of the Tualatin Mountains and the bulk of Forest Park, measuring roughly 700 feet in depth below the West Hills. Remnant cinder cones from volcanic activity between two million until a few hundred thousand years ago, found near Skyline Boulevard, produced formations known as Boring lava that can be identified by a more gray appearance than Columbia River Basalt. In more recent geologic history, wind-deposited loess known as Portland Hills silt accumulated along the ridges of the West Hills in some areas up to depths of 55 feet at the crest of Forest Park.

Portland Hills silt, or loess, is strong when dry, but when wet or saturated it loses its strength and can result in instability especially on steep slopes (Burns, 1998). A study conducted for Metro Regional Government inventorying the number of landslides that occurred from February 1996 to May 1998 documented 73 landslides within the boundaries of Forest Park, ranging from 100-1000 cubic yards in volume. The largest of these was 8,875 cubic yards and occurred along Leif Erikson Drive.

SOILS

The dominant soil types found throughout Forest Park are classified by the USDA Natural Resources Conservation Service (formerly USDA Soil Conservation Service) as Goble Silt Loam, Cascade Silt Loam, and Wauld Very Gravelly Loam (Table 1). Cascade and Goble loams are often collectively referred to as Portland Hills silt.

Table 1: Dominant Soils in Forest Park

Soil Type	Location	Permeability	Erosion Hazard	Vegetation
Goble Silt Loam	Steep hillsides and ridges	Slow; rapid runoff	High	Douglas fir, bigleaf maple
Cascade Silt Loam	Ridgetops	Slow; poorly drained	High	Douglas fir, bigleaf maple
Wauld Very Gravelly Loam	Steep creeks and tributaries	Moderate; runoff is slow to medium	Slight to high	Douglas fir, bigleaf maple

TOPOGRAPHY

Elevations along the floodplain of the Willamette River range from 30 to 40 feet mean sea level (msl). As the land rises up to the Tualatin Mountain range elevations reach 900 to 1,180 feet msl (City of Portland, 1992) in the park. It has been estimated that 90 to 95 percent of the upland slopes in Forest Park exceed 30 percent (City of Portland, 1992) and therefore have severe landslide potential.

AQUATIC RESOURCES

Forest Park is located on the west side of the Willamette Watershed. Due to the steep slopes that are characteristic of the Tualatin Mountains, development occurred more slowly here than in other parts of the watershed (City of Portland, BES, 2004). As a result, the eastern face of the Tualatin Mountain range is unique in the Willamette Watershed due to the presence of open creeks and streams that flow northeast to the Willamette River.

Historically, the creeks and streams of the Tualatin Mountain Range flowed freely into an ecologically-rich mosaic of wetlands that were found along the historic floodplain of the Willamette River. Today the majority of creeks flow freely until they reach Highway 30 and St Helens Road, where they are piped through culverts until they meet the confluence with the Willamette River. While most of the creeks within Forest Park do not have the capacity to provide habitat to fish due to significant fish passage barriers between Forest Park and the Willamette River, these streams play a critical role in providing cold, clean water to the Willamette River.

Seven Willamette River subwatersheds are found within Forest Park. These subwatersheds are considered to be some of the most intact subwatersheds within the City of Portland (City of Portland, BES, 2010a). Within the boundary of Forest Park, streams are flowing through land with a relatively stable land use pattern and thus creeks such as Balch and Miller are viewed as urban reference sites (City of Portland, BES, 2010a). The general stream characteristics for each of these subwatersheds are listed in Table 2.

A recent declining water quality trend in Balch Creek has been identified through a synthesis of six years of water quality data (City of Portland, BES, 2010a). From this analysis, elevated ammonia levels were identified which were likely attributed to failing septic systems in the area. In addition, regression models suggest that total suspended solids in Balch Creek are increasing at a rate of 25% a year, while other westside streams are showing a slight decrease in this metric.

Table 2: Forest Park Subwatershed Characteristics

Subwatershed	Acreage	Percentage within Park	Mainstem Flow	Stream Type within Park	Fish- bearing
Johnson-Nicolai	1,200	3%	intermittent	open channel (headwaters only)	no
Balch	2,236	25%	perennial	open channel	resident cutthroat
Kittridge	1,221	50%	intermittent	open channel	no
Saltzman	1,079	58%	intermittent	open channel	no
Doane	1,302	66%	intermittent	open channel	no
Linnton	2,403	73%	intermittent	open channel	no
Miller	916	60%	perennial	open channel	cutthroat trout, Coho salmon, short-head cottid

Additional information about each of these subwatersheds can be found in the City of Portland, Bureau of Environmental Services Willamette Subwatersheds Characterization Report.

CURRENT VEGETATION COMPOSITION

Forest Park is located along the eastern edge of the Western Hemlock Vegetation Zone which is the most extensive vegetation zone in Western Oregon and Washington (Franklin and Dryness, 1973). While western hemlock *(Tsuga heterophylla)* is considered the climax species for this vegetation type, it is well documented that Douglas fir *(Pseudotsuga menziesii)*, a sub-climax species, dominates the landscape in this zone throughout the Pacific Northwest, even in old-growth stands. Forest Park is no exception to this pattern; multiple "stand replacing fires," and a history of extensive logging and disturbance have led to a forest composition that is typical to that found in a second-growth Douglas fir forest. As a result of this long history of disturbance, much of the forest is composed of relatively young trees that range in age from 50-100 years (Trout Mountain Forestry 2008). Aerial analysis shows that 99% of the park is forested, with a quarter of the park composed of conifer-dominated forest and three-quarters composed of mixed conifer-deciduous forest, which is largely comprised of bigleaf maple and red alder with a conifer component.

Due to Forest Park's location along the edge of the Western Hemlock Vegetation Zone, it is also influenced by the Willamette Valley Vegetation Zone. Dominant tree species include Douglas fir, grand fir *(Abies grandis)*, Oregon white oak *(Quercus garryana)*, Pacific madrone *(Arbutus menziesii)*, and bigleaf maple. All of these species can be found within Forest Park although Oregon white oak and Pacific madrone are restricted to the distinct portions of eastern slopes of Forest Park. A more complete understanding of the diverse composition of flora in Forest Park is achieved when viewed through the lens of influence of both the Western Hemlock and Willamette Valley Vegetation Zones.

SUCCESSIONAL STAGES IN THE PARK

Due to the complex history of past disturbance throughout Forest Park, a variety of vegetation types associated with successional stages is present throughout the park. An extensive classification of the park identified six distinct successional stages that are relevant for how the park is viewed today (Table 3).

Table 3: Successional Stages found throughout Forest Park (Houle, M. 1982)

Vegetation Type	Age Range Associated with Stand	Percent of Total Acres	Associated Alliance(s)
Grass-Forb	2-5	0.7%	Disturbance Corridor
Shrub	3-10 or 3-30 w/ no conifer regeneration	2.2%	Disturbance Corridor
Hardwood Young Conifer	10-35	19.0%	Bigleaf Maple Forest Bigleaf Maple Seasonally Flooded Forest
Hardwood Topped by Conifer	30-80	41.7%	Douglas Fir Bigleaf Maple Forest
Mid-Aged Conifer	80-250	24.6%	Douglas Fir-Western Hemlock Forest Douglas Fir Oregon White Oak Woodland
Mature Hardwood	30-100	11.3%	Bigleaf Maple Forest Bigleaf Maple Seasonally Flooded Forest
Old Growth	>250 years	0.5%	Douglas Fir Giant Forest

Forest Park

Desired Future Condition

Methodology

The Desired Future Condition (DFC) is defined by the vegetative community composition of the natural area. The natural area is subdivided into ecological units defined by plant alliances. An alliance is a vegetation category used by the National Vegetation Classification System (NVCS) that identifies a plant community type based on the presence of dominant and/or diagnostic species in the predominant or uppermost stratum. Typically, the alliance is named after the tree species that dominate the canopy. For example, the Douglas Fir-Western Hemlock Forest alliance (DF-WHF) has an upper tree canopy that consists mainly of Douglas fir and western hemlock. Physical characteristics such as hydroperiod are also used to name some alliances, e.g., Oregon Ash Seasonally Flooded Forest alliance (OASFF).

Occasionally, the NVCS does not include definitions that capture the dynamics of urban ecological management. Areas of permanent disturbance or portions of the landscape that have been modified to accommodate infrastructure will not achieve a typically defined vegetative community. In Forest Park, utility corridors are an area that experience disturbance through the removal of vegetation that may interfere with utility conveyance. In addition, managed buffers to address interface issues with private property, such as fire suppression, may be included to achieve management goals. In these instances, an appropriate vegetation alliance is assigned and defined by Portland Parks & Recreation staff.

While many portions of the landscape are managed for a late seral or climax successional stage, there may be times where the greatest ecological benefit is achieved through actively managing a landscape for an earlier successional stage. For example, oak woodlands were historically maintained through the repeated disturbance of fire; with the advent of fire suppression these rich and diverse habitats are developing into conifer dominated forests. Active management would be required to reset the conditions and structural complexity that constitutes oak woodland.

In a disturbed environment the benchmarks for achieving a later seral stage of succession may be so distant that they exceed planning parameters. The DFC is designed to be a planning document that forecasts conditions for 25 years. Long-term ecological objectives for the site may exceed this planning interval and will be utilized as a target for which to set interim benchmarks. The trajectory of management may be directed toward a later successional stage that resembles historic conditions, but intermediate goals may be defined based on the dynamic ecological conditions in the urban Portland environment. The DFC planning period was determined to provide an opportunity for review,

a realistic timeframe for management activities, and the occasion to incorporate new science and enhanced understanding of ecological conditions into the planning process.

Desired Future Condition for Forest Park

The DFC for Forest Park is:

- a mosaic of evergreen-dominated and mixed deciduous forest
- oak woodlands along portions of the park's eastern edge
- a diversity of native shrubs and open meadows within the disturbance corridors

Structurally, the Desired Future Condition closely mirrors the current condition. It combines the recommendations from the NRMP and FEMA Wildfire Study to set a vegetation trajectory that includes moving towards old-growth forest and reducing fire risk at key interfaces. The alliances associated with the DFC are described with its corresponding successional stage. Alliances are sourced from Natureserve 2009 unless noted otherwise. Page 17 depicts a map of the geographic distribution of the DFC alliances. The methodology utilized to develop this distribution is discussed in Appendix IV.

Ecological Goals

Ecological goals are the foundation of ecosystem management. These goals are accomplished through management strategies achieved through project actions. Associated with each alliance is a management strategy identified to be critical to achieving the Desired Future Condition. These strategies will be accomplished through projects which have been identified in Appendix V. The ecological goals for Forest Park are as follows:

1. Protected Air and Water Quality
2. A Forest with Structural Complexity: Vertically (canopy, midstory and understory, snags and downed wood) and Landscape-Scale (mosaic of habitat types, natural gaps)
3. Floristic Native Biodiversity with Increased Habitat Opportunities for Target Wildlife Species and Avian, Terrestrial, and Aquatic Native Wildlife Corridors (within and surrounding Forest Park)
4. Intact Native Plant and Animal Communities with Minimal Disturbance from Non-native Species and Invasive Species Populations Controlled Through Management
5. Reduction of Catastrophic Fire Risk

Diversity of Shrubs and Open Meadows

SHRUBLAND/GRASSLAND ALLIANCE

This alliance (not an NVCS) is associated with the permanent disturbance corridors that provide access for public utility transmission. Characteristic species include vine maple *(Acer circinatum)*, western hazelnut *(Corylus cornuta)*, cascara *(Rhamnus purshiana)*, and serviceberry *(Amelanchier alnifolia)* along corridor margins or in areas with fewer height constraints. Mock orange *(Philadelphus lewisii)*, snowberry *(Symphoricarpus albus)*, red-flowering currant *(Ribes sanguineum)*, thimbleberry *(Rubus parviflorus)*, red elderberry *(Sambucus racemosa)*, blue elderberry *(Sambucus cerulea)*, and oceanspray *(Holodiscus discolor)* are all appropriate selections to create a shrub-dominated system on an exposed site.

Managing power corridors as shrublands enhances wildlife habitat diversity while reducing wildfire risk and allowing for infrastructure maintenance.

In addition to the disturbance corridors found throughout the park, there are several open meadows and roadsides that fit into this alliance. These are areas of historic disturbance from homesteads, grazing, mowing, and general park maintenance. These grassland edges are primarily composed of non-native grasses, but in areas where disturbance has been reduced, herbaceous native plants are beginning to colonize the edges. Changes in current management and the restoration of these areas with native forbs and grasses have the potential to provide significant pollinator habitat and biodiversity near disturbed edges of the park.

Funding provided through the FEMA Wildfire Risk Reduction Grant resulted in the treatment of invasive species within over 150 acres of power corridors throughout Forest Park. In 2009/10, following removal of invasives, over 20,000 native shrubs were planted to revegetate the treatment areas. These enhanced power corridors will require maintenance to ensure the survival and success of the plantings and could be utilized as a demonstration site for alternatives for utility corridor management.

While the FEMA funding provided an unprecedented opportunity to address wildfire risk reduction while improving habitat quality, there is additional work to be done. An additional 150 acres were identified for fuel load reduction by the Forest Park Wildfire Risk Assessment. Ongoing maintenance of the initially treated power corridors will be required to insure the original investment of time and resources in this area is supported. The level of maintenance necessary for these areas will require a funding source above and beyond Portland Parks & Recreation's Operating Budget.

Management Strategy

- Expand cover and diversity of native vegetation, manage for wildlife and address wildfire risk.

Mosaic of Evergreen-dominated and Mixed Deciduous Uplands

BIGLEAF MAPLE FOREST ALLIANCE

(Acer macrophyllum Forest Alliance)

Bigleaf maple is the dominant tree species with Douglas fir present in the 10-25% cover class range. Red alder and Pacific dogwood *(Cornus nuttallii)* are often found in association with this alliance. Red alder typically is not found in stands older than 60-70 years although individual plants occasionally persist for up to 100 years (City of Portland, 1995). Vine maple is a characteristic sapling found in association with this alliance. Additional shrub species include red elderberry, salmonberry *(Rubus spectabilis)*, thimbleberry, salal *(Gaultheria shallon)*, and dull Oregon grape *(Mahonia nervosa)*. Ferns dominate the herbaceous layer and include sword fern *(Polystichum munitum)*, lady fern *(Athyrium filix-femina)*, and brackenfern *(Pteridium aquilinum)*.

This alliance typically represents an earlier seral stage of succession and is usually found in the Western Hemlock Zone in areas that have been disturbed through fire, logging or landslides. The alliance may persist on wet sites. In some areas, individual bigleaf maple may reach ages that exceed 200 years (City of Portland, 1995).

The Forest Park NRMP recommends the thinning and/or removal of mature maples to release conifer seedlings or provide opportunities for conifer planting in the understory. The Wildfire Risk Reduction Assessment recommends maintaining a wildfire resistant forest by maintaining large areas of maple or a maple-fir mix. These two recommendations present divergent methods for managing this alliance type.

While this alliance has been evaluated to determine the function it provides to wildfire reduction, it has not been evaluated to determine its wildlife function in Forest Park. Bigleaf maple provide food for a

variety of birds and small mammals which include squirrels, chipmunks, finches, and grosbeaks (Uchytil, 1989). This alliance will be monitored to evaluate the utilization of this vegetation alliance by wildlife, survey for any unique plant associations, and evaluate natural regeneration. Following this assessment, a portion of these acres may be underplanted with conifer species to facilitate the development of greater structural complexity.

Management Strategy

- Assess site to determine wildlife utilization, unique plant associations and natural regeneration. Utilize data to inform management needs to create greater structural complexity.

DOUGLAS FIR–BIGLEAF MAPLE FOREST ALLIANCE

(Pseudotsuga menziesii–Acer macrophyllum Forest Alliance)

This alliance is characterized by a diffuse canopy of deciduous and coniferous trees from 35-50 m high with over 60% cover. It is typical to have a two-tiered canopy with Douglas firs emerging through bigleaf maple. Shade-tolerant conifers, such as western hemlock, western red cedar, and grand fir may also be part of the stand composition depending upon the location, land-use history, and age of the forest stand. The shrub layer ranges in cover from 20-60%, is well-developed, and is comprised of a diversity of species. Shrub species commonly associated with this alliance include salmonberry, red elderberry, western hazelnut, vine maple, snowberry, and red huckleberry *(Vaccinium parvifolium)*. The herbaceous layer includes redwood sorrel *(Oxalis oregana)*, sword fern, western trillium *(Trillium ovatum)*, Pacific waterleaf *(Hydrophyllum tenuipes)*, and wild ginger *(Asarum caudatum)*.

This alliance is typically found in areas of disturbance that have been impacted by logging or historic wildfires. Over time these second-growth forests shift canopy dominance toward Douglas fir. In the wettest sites, bigleaf maple may continue to retain dominant canopy status.

Regionally, much of the land that this alliance comprises is composed of Douglas fir plantations and natural regeneration that followed logging operations. In Forest Park, plantations can be found that are comprised of even-aged trees that make up structurally simplistic stands. Competition for light and space in second growth stands will result in some trees dying to make space for the establishment of younger shade tolerant trees. Structural diversity of second-growth, heavily stocked Douglas fir stands may be managed through careful thinning which can accelerate the development of late-successional forest conditions and increase understory complexity (USGS, 2003). Any exploration of stand management must first evaluate the habitat criteria for specific wildlife species as research indicates that an increase or decrease in population due to thinning treatments is species specific.

The 2008 Forest Park Wildfire Fuel Reduction Project identified the areas of greatest risk within the park; they include the interface between private and public property particularly along the western edge of the park where housing density and dry season winds are the highest. Active management of this area is critical to reduce wildfire risk. Recommendations for this buffer area include maintaining a Douglas fir overstory of widely spaced firs interspersed with bigleaf maple. In stands with conifer dominance, fuel reduction work was recommended which could include pruning and the removal of ladder fuels contributed from invasive species.

Management Strategy

- Address wildfire risk. Evaluate habitat criteria for target wildlife to inform need to create greater structural complexity.

DOUGLAS FIR–WESTERN HEMLOCK FOREST ALLIANCE
(Pseudotsuga menziesii–Tsuga heterophylla Forest Alliance)

This alliance type is characterized by a mixed canopy of Douglas fir and western hemlock. Western red cedar is present in this alliance and may co-dominate on valley bottom sites with poorly drained soils. In the presence of disturbance, western red cedar and western hemlock may be missing from the canopy stratum. Grand fir is sometimes found in association with this alliance and a subcanopy of bigleaf maple is typical. Shrubs commonly associated with this alliance include vine maple, dull Oregon grape, salal, red huckleberry, western hazelnut, and baldhip rose *(Rosa gymnocarpa)*. In the presence of disturbance, such as logging or landslides, red alder may regenerate abundantly when mineral soil is exposed. The herbaceous layer is comprised of shade tolerant ferns and forbs such as brackenfern, swordfern, redwood sorrel, vanilla leaf *(Achlys triphylla)*, western starflower *(Trientalis borealis ssp. latifolia)*, inside-out flower *(Vancouveria hexandra)*, and western trillium.

Following disturbance, replacement of Douglas fir by western hemlock is variable dependant upon the moisture regime of the site. On very dry sites, western hemlock can be completely absent from the forest composition while on wet to very wet sites western red cedar will be present. Western red cedar is typically successionally intermediate between Douglas fir, an early successional species, and western hemlock, the climax species. Depending upon disturbance intensity and available seed sources, hemlocks may not make an appearance in a stand until the second century following disturbance (Van Pelt, 2007). In a Douglas fir forest, the presence of hemlocks of different sizes, including canopy trees, can be an excellent indicator of an old-growth conditions.

Management Strategy

- Foster succession to old growth.

DOUGLAS FIR GIANT FOREST ALLIANCE
(Pseudotsuga menziesii Giant Forest Alliance)

This community type has a multi-tiered canopy of Douglas fir, which often is 50 m or more in height. Other coniferous trees such as western hemlock and western red cedar may be present in the upper tree layer, depending upon location and stand history. Broad-leaved deciduous trees such as bigleaf maple and Oregon white oak are common associates. Western yew *(Taxus brevifolia)* may also be part of the subcanopy, particularly in moist ravines. The forest understory is usually species-rich and well-developed, and may be dominated by either shrubs or a mixture of ferns and forbs. Common shrub species include salal, oceanspray, dull Oregon grape, vine maple, snowberry, and western hazelnut. The herbaceous layer is usually dominated by shade-tolerant forbs and ferns, including vanilla leaf, starflower *(Trientalis borealis)*, wild ginger, western trillium, redwood sorrel, sword fern, and maidenhair fern *(Adiantum pedatum)*. Mosses and lichens may be abundant, covering trees, logs or the forest floor.

A small number of acres exhibiting these forest characteristics are found within the areas of Forest Park that were least impacted by fire and logging. In the absence of disturbance, this acreage will grow over the next centuries as second-growth Douglas fir stands mature and take on old-growth characteristics, eventually reaching a concentration and composition that achieves the criteria of a functional old-growth stand.

Management Strategy

- Monitor and maintain for health.

BIGLEAF MAPLE SEASONALLY FLOODED FOREST ALLIANCE
(Acer macrophyllum Seasonally Flood Forest Alliance)

This alliance is associated with riparian forests along streams, rivers, and creeks. Bigleaf maple is the dominant tree in the canopy, but red alder and black cottonwood *(Populus trichocarpa)* are also present to a lesser degree. A dense shrub community includes western hazelnut, salmonberry, thimbleberry, snowberry, and occasionally devil's club *(Oplopanax horridus)*. The herbaceous layer is comprised of ferns, redwood sorrel, western trillium, vanilla leaf, and fringe-cup *(Tellima grandiflora)*. The diverse shrub layer that is associated with this alliance contributes to bird species diversity (Houle, 1982).

Disturbance is often associated with this alliance type; presence of this alliance often indicates a history of selective logging of associated conifer species. Additionally, regular disturbance such as periodic flooding may result in the persistence of this alliance. In the absence of this disturbance, succession will result in the development of a conifer component.

Management Strategy

- Assess site to determine wildlife utilization, unique plant associations, and natural regeneration. Utilize data to inform management needs to create greater structural complexity.

Oak Woodlands

OREGON WHITE OAK WOODLAND ALLIANCE
(Quercus garryana Woodland Alliance)

This alliance is characterized by an open canopy of Oregon white oak found at lower elevations of the treeline where they transition upslope into forests dominated by Douglas fir. Historically, fire maintained this habitat type. Fire suppression near urban areas has resulted in the encroachment of Douglas fir into oak woodlands. This habitat type is now found only in small, isolated pockets throughout the valley (ODFW, 2006). The majority of remnant oak populations are found primarily at or below 300 feet throughout the city, likely reflecting a transition zone between the wetlands and riparian areas that lined the Willamette River and the conifer forests that dominated the higher slopes and crests of the Tualatin Mountain Range. In Forest Park, the remaining oak woodlands are found along the eastern boundary of the park's edge.

Shrubs associated with this alliance include poison oak *(Toxicodendron diversilobum)*, oceanspray, snowberry, serviceberry, vine maple, cascara, and western hazelnut. Sword fern, bracken fern, and a variety of native grasses are often associated with the relatively open cover of this alliance. In Forest Park, species that are not common throughout the Portland Metro area such as western black haw *(Viburnum ellipticum)*, western alum root *(Heuchera micrantha)*, and low snowberry *(Symphoricarpos mollis)* are found associated with oak woodlands.

Oak woodlands have been identified as an important habitat type by regional and state planning efforts (City of Portland, BES, 2010b and ODFW, 2006). The Oregon Conservation Strategy has identified this habitat type as a Strategy Habitat for the Willamette Valley. Oaks provide important structural habitat for wildlife. The acorns that are produced are important for winter survival and are utilized by a variety of species including California quail, varied thrush, acorn woodpeckers, Douglas tree squirrel, black-tailed deer, and mice (ODFW, 2006). Additionally, researchers in the Willamette Valley found a greater abundance of breeding neotropical migrants in Oregon Oak Woodlands than in coniferous forests (Gucker, 2007). In the absence of fire, selective removal of Douglas fir can help maintain this unique and biologically important habitat composition. While the current composition of the eastern edge of Forest Park is dominated by a Douglas fir-bigleaf maple alliance, pockets of remnant oak

woodlands remain both within the park's boundary and on adjacent private property. These remnant oak woodlands must be assessed and prioritized for conifer removal to improve and maintain their habitat quality and composition.

Management Strategy

- Maintain and expand existing acreage through enhancement and/or acquisition.

Riparian Corridors and Aquatic Habitat

Forest Park plays a regional role in delivering clean, cold water to the Willamette River. Creeks and streams flow through each alliance type within Forest Park. While no one subwatershed is completely located within the boundary of Forest Park, management within the park can contribute to improved water quality conditions. Functioning riparian corridors with native vegetation, intact streambanks protected from erosion, and infrastructure that does not contribute to increased sediment load are all critical components of maintaining a healthy functioning system. Aquatic habitats that provide structure for fish, amphibians, and macroinvertebrates are critical for maintaining and improving populations of aquatic wildlife.

Management Strategy

- Enhance riparian buffer vegetation.
- Maintain or improve water quality to meet Federal standards.
- Increase channel complexity and fish habitat.
- Reduce adverse impacts to sediment load from failing infrastructure.

Wildlife Habitat

The diversity of wildlife species using Forest Park has been documented and to date includes more than 50 different mammals and greater than 100 bird species. Additionally, Forest Park is home to a variety of reptiles and amphibians including garter snakes, Pacific giant salamanders, rough-skinned newts, and red-legged and Pacific tree frogs, to name a few. The two perennial streams that flow through the park, Balch and Miller Creeks, have populations of cutthroat trout and Coho salmon; short-head cottids have been observed in Miller Creek. On occasion large mammals such as bear and elk have been documented in the park. The species diversity in Forest Park is largely due to its size and connection to the Oregon Coast Range through a wildlife corridor that functionally links the park to the rural Coast Range. This connection is critical to allow for seasonal and long-term dispersal of individuals which helps maintain genetic and biological diversity. The wildlife corridor is currently unprotected and in the ownership of a mix of private and public properties that span the jurisdiction of Multnomah, Columbia, and Clatsop counties. The preservation and management of the interior lands of Forest Park alone will not protect the species diversity found within the park's boundaries.

The City of Portland's Terrestrial Ecology Enhancement Strategy (TEES) was developed to identify habitat priorities for conservation and restoration. Forest Park has been identified by TEES as an anchor habitat for wildlife both on a local and regional scale. Through TEES, six unique habitat types have been identified as having special status due to their importance for wildlife habitat diversity throughout the state and within the Portland Metro area. Five of the habitat types are found in Forest Park:

- Herbaceous wetlands: Present to a small degree throughout the park.
- Oak woodlands: Patchy distribution along the eastern edge of the park. The most intact example of this habitat type is located near Harborton Road.

- Interior forests: Over 3,000 acres of interior forest are found in Forest Park, the largest acreage of this habitat type within the City of Portland.
- Late successional conifer forests: Total acreage is relatively small, but old growth individuals are found in both the north and south management units of the park.
- Bottomland hardwood forests and riparian habitats: Throughout the park along creeks.

In addition to identifying unique habitats, TEES has identified Special Status Wildlife Species. The TEES Special Status Wildlife Species List was developed to identify species of concern because they are rare, declining or of special interest. Appendices VI and VII list those Special Status Wildlife Species and identifies their known presence in Forest Park and their association with particular habitat types. These lists focus on Special Status Wildlife Species and are not comprehensive lists of all wildlife utilizing the park.

Management Strategy

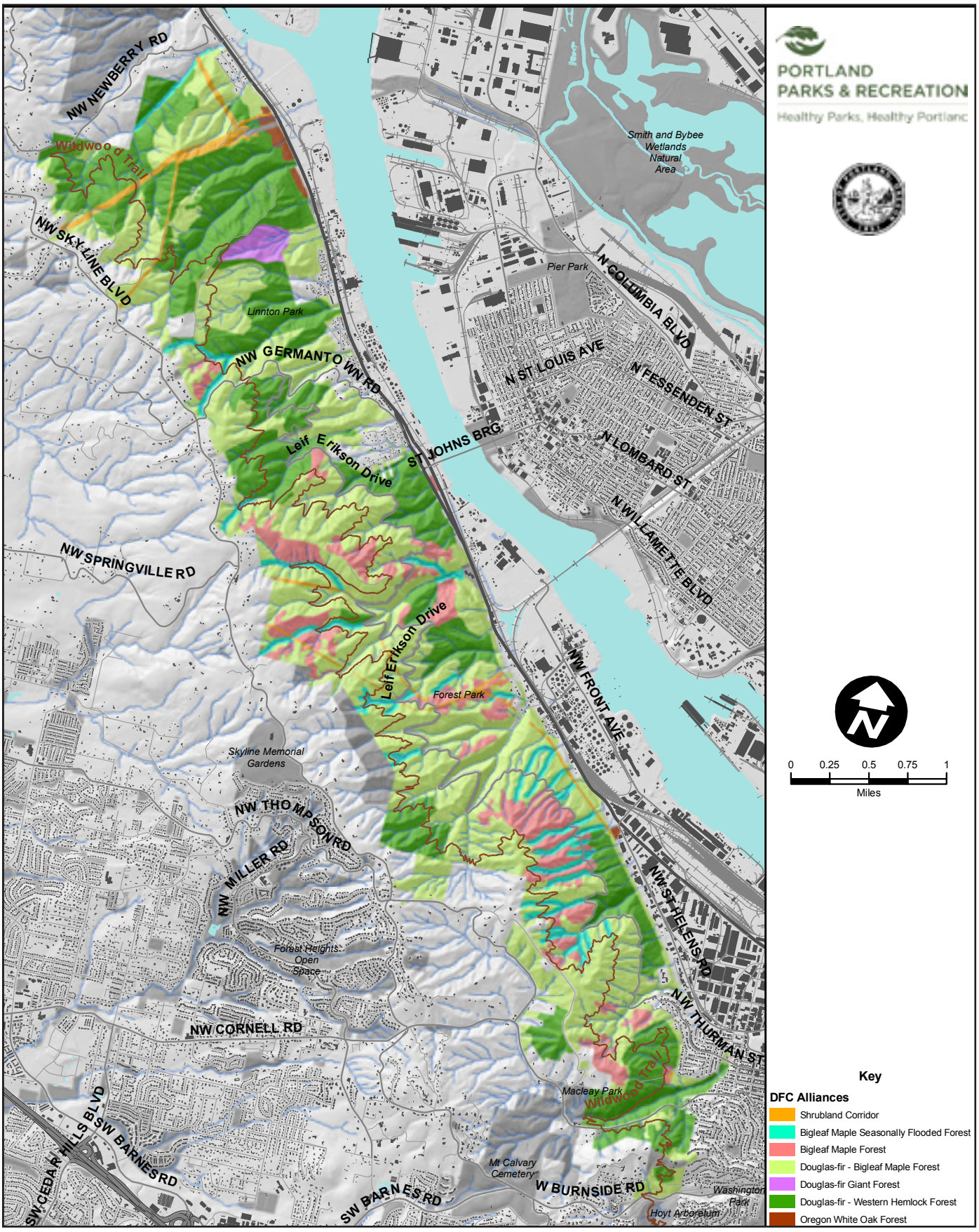
- Reduce existing invasive plant distribution and cover. Monitor and respond to new invasive plant and animal populations.
- Protect, enhance, and expand wildlife habitat features (natural and urban).
- Improve the understanding of wildlife utilization throughout the park and utilize this information to inform management decisions.

Conclusion

Forest Park represents an incredible regional resource for plant and animal biodiversity. Large tracts of interior forest and unique habitat types support a diversity of wildlife not typically found in an urban natural area. The implementation of the DFC will be to maintain, improve, and in some cases, expand the present habitat types. The continued health of Forest Park is dependent upon protection and management of the lands that buffer and influence the interior composition. Long-term management of the park must include:

1. Outreach to private property owners to address invasive species management and wildfire fuel reduction on their lands.
2. Cooperation with partners to protect aquatic resources that exist within and surrounding the park.
3. The establishment of a protected wildlife corridor that extends to the Coast Range.

These actions are critical for the continued health of the flora and fauna that depend upon the habitats and natural resources found in the park. Portland Parks & Recreation has the responsibility of managing Forest Park, but it is critical to engage partners to address these larger regional issues that extend beyond the boundaries of Portland Parks & Recreation management. The preservation of this great place is dependent upon strong partnerships that evaluate how the decisions that are made today influence the ecosystem health and integrity of the park tomorrow.


PORTLAND
PARKS & RECREATION
Healthy Parks, Healthy Portland
NW NEWBERRY RD
Wildwood Trail
NW SKYLINE BLVD
Linnton Park
NW GERMANTOWN RD
Leif Erikson Drive
ST JOHNS BRG
Smith and Bybee Wetlands Natural Area
Pier Park
N COLUMBIA BLVD
N ST LOUIS AVE
N FESSENDEN ST
N LOMBARD ST
N WILLAMETTE BLVD
NW SPRINGVILLE RD
Leif Erikson Drive
Forest Park
NW FRONT AVE
Skyline Memorial Gardens
NW THOMPSON RD
NW MILLER RD
NW ST HELENS RD
Forest Heights Open Space
NW THURMAN ST
NW CORNELL RD
Macleay Park
Wildwood Trail
SW CEDAR HILLS BLVD
SW BARNES RD
Mt Calvary Cemetery
W BURNSIDE RD
SW BARNES RD
Washington Park
Hoyt Arboretum
0 0.25 0.5 0.75 1
Miles
Key
DFC Alliances
Shrubland Corridor
Bigleaf Maple Seasonally Flooded Forest
Bigleaf Maple Forest
Douglas-fir - Bigleaf Maple Forest
Douglas-fir Giant Forest
Douglas-fir - Western Hemlock Forest
Oregon White Oak Forest

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Appendices

APPENDIX I

Ecosystem Management Program

Portland Parks and Recreation's City Nature Group, utilizes an Ecosystem Management Program (The Program) to manage Natural Area properties. The Program utilizes a science-based approach to ecological management and includes six interrelated steps. Applied over time, the sequence of steps informs management and provides the feedback required to modify practices for the best intended outcome. This system is referred to as adaptive management.

The six steps of the Ecosystem Management Program are:

1. ***Inventory:*** An assessment of existing conditions.
2. ***Desired Future Condition:*** A planning goal that describes conditions land managers are attempting to achieve over a specified period of time in a defined area.
3. ***Assessment:*** A gap analysis that identifies the stressors contributing to the difference between the outcomes articulated in the Desired Future Condition and the existing conditions (Inventory).
4. ***Prescription:*** The development of project plans which include a project description, measure of success, budget and timelines for specific interventions to address stressors and achieve the Desired Future Condition.
5. ***Intervention:*** Implementation of the prescription.
6. ***Monitoring:*** Systematic observation and data collection utilizing established protocols to determine the efficacy of the intervention and inform the need to modify the prescription.

APPENDIX II

Invasive Species in Forest Park

One of the more identifiable disturbances in Forest Park is that of invasive species. English ivy *(Hedera helix)*, was introduced to the area at the end of 19th century as a horticultural plant and is identified as an escapee as early as 1929 (Christy, et al. 2009). As time has progressed, so has the distribution of this invasive species. In Forest Park, English ivy is dominant throughout the disturbed edges and entrances of the park. The South Management Unit of the park has the largest acreage with the highest percent cover of English ivy.

In 1994, in an effort to provide meaningful employment for local youth while raising the profile of English ivy as an invasive species, the No Ivy League was born with help various community partners. As a result of this group's dynamic leadership in invasive species removal and tireless efforts to educate and inform the public, many Portland residents often associate English ivy with Forest Park.

In 2004, the City of Portland conducted a vegetation inventory of the entire park; this survey revealed that over 2,300 acres or 49% of the park had no presence of English ivy (Table 1). Of the total acreage, approximately 1, 112 acres or 23% of the park included trace amounts of English ivy which is defined as less than 1 percent of a given area. From this analysis the conclusion can be drawn that over 70% of the park is not significantly impacted by English ivy. Table 1 displays the distribution (as measured by the cover class) of English ivy and its relative presence throughout the park. Cover class is defined as the percent of ground area covered by a vertical projection of the canopy of a species for the entire vegetation unit, an absolute value not relative to the other species present (City of Portland, 2004). Table 1 illustrates the distribution of ivy throughout Forest Park. The map on page 22 provides a visual representation of this distribution.

English ivy is a management concern in the most disturbed edges and entrances of the park. It is critical that its distribution be controlled to insure that the larger percentage of the park continues to remain free of ivy.

Table 1: Distribution of English ivy throughout Forest Park (PP&R Vegetation Survey 2004)

Cover Class	Relative Presence throughout park	
	Acreage	**Percent of Park Surveyed**
Not Found	2,383	49%
Trace (<1%)	1,112	23%
1% to 10%	770	16%
10% to 20%	271	6%
20% to 50%	260	5%
50% to 75%	58	1%
Over 75%	8	<1% (0.18)
Total	4,862	100%

While English ivy might be the most publicly recognizable invasive species in Forest Park, other species pose a threat to ecosystem health. In addition to English ivy and clematis *(Clematis vitalba)*, invasive tree species such as English holly *(Ilex aquifolium)*, non-native laurel *(Prunus lusitanica* and *P. laurocerasus)*, non-native cherry *(Prunus avium)*, English hawthorn *(Cratageus monogyna)*, horse chestnut *(Aesculus hippocastanum)*, and Norway maple *(Acer platanoides)* are found distributed throughout the park. Of

particular concern is English holly as it is present in greater numbers than other invasive trees and was found to be the most widely distributed invasive species in Forest Park (City of Portland, 2004).

For the past three years, PP&R's Protect the Best crew has worked to remove invasive species from the most pristine areas in Forest Park. This program was designed to provide protection of the most ecologically intact natural areas within the PP&R Natural Area Portfolio from the threat of habitat degradation by invasive species. In Forest Park, the crew has worked predominately in the North Management Unit and along the west side of the park above Leif Erickson Drive. Due to the overall health of Forest Park, this crew has spent up to 75% of their working hours dedicated to removing invasive species in Forest Park. As a result, they have provided initial treatment to over 1,800 acres within the park and retreated over 800 of those originally treated acres as of the end of March 2010 (City of Portland, 2010). This body of work has resulted in over 2,400 English holly trees alone being removed from Forest Park.

Invasive species that have a smaller distribution but the potential for significant impact to the ecosystem of Forest Park are being identified and addressed as part of a citywide program of Early Detection Rapid Response. A coordinated campaign to address garlic mustard *(Alliaria petiolata)* throughout the Portland Metro area and in Forest Park has been ongoing for the past two years. In Forest Park, garlic mustard is found along roadsides and trails; it has been inadvertently distributed by park users and domesticated and wild animals. This particular species is of significant concern because of its documented ability to disturb woodland ecosystems. Garlic mustard exudes chemicals from its roots that may prevent other plants from thriving. As a result, it has the capacity to significantly alter the native woodland herbaceous plant community – reducing plant diversity, destroying palatable forage for wildlife, and reducing opportunities for pollinators.

The potential for the introduction of new invasive species to Forest Park due to the disturbed edge that exists along the park boundary and the proximity to residential properties is high. This requires constant vigilance and a quick response to new invasive plants as they appear. Portland Parks & Recreation is currently addressing several invasive species that have newly arrived to the park's perimeter, primarily through the illegal dumping of yard debris. These species include lesser celandine *(Ranunculus ficaria)*, yellow archangel *(Lamiastrum galeobdolon)*, butterbur *(Petasites japonica)*, and spurge laurel *(Daphne laureola)*. Long-term protection of the park from invasive species will require a significant outreach program to private property landowners to address invasive species control at the interface between public and private property.

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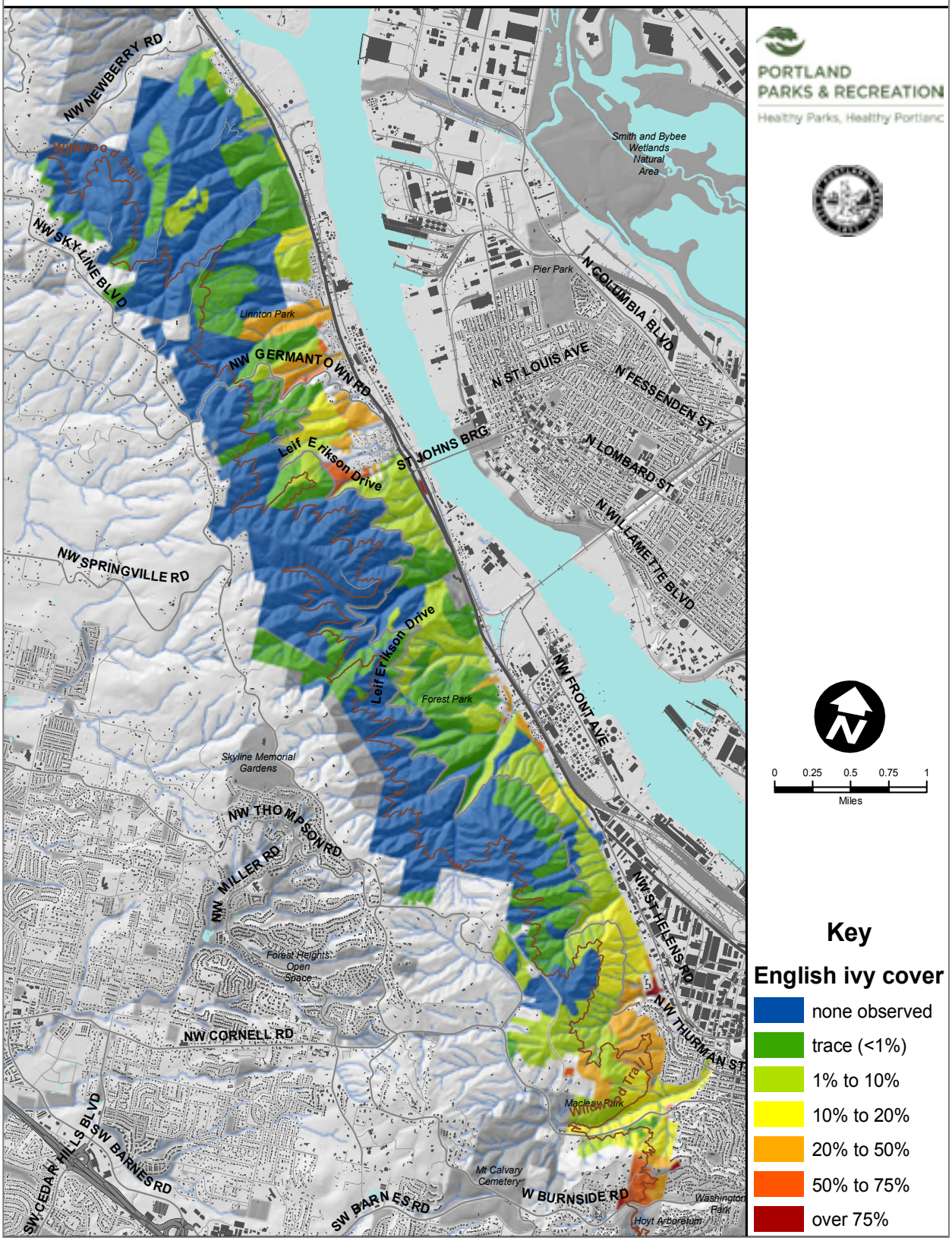
Forest Park English Ivy Distribution (surveyed 2004)



APPENDIX III

Recreation in Forest Park

Forest Park has experienced a marked increase in recreational use and transformation of recreational types since its inception. Prior to the declaration of the area as a park, recreation included walking, nature study, and picnicking (Munger, 1960).

Following the dedication of the area as Forest Park, the City of Portland allowed overnight camping for local youth during the summer months, developed bridle paths for horseback riding, and opened Leif Erikson and Saltzman Roads to one-way scenic drives. A lack of facilities to support these recreation activities, impacts to the park's natural resources, and an increase in use resulted in a modification of recreation over time. Horseback riding is permitted within the park on specifically designated trails only. Forest Park is now closed to overnight camping and vehicle access is restricted to park maintenance and emergency access vehicles.

Current recreation includes hiking, biking, running, dogwalking, and horseback riding. As in the past, park managers have to evaluate the impacts from recreation on the natural resource. Recreation demands can have significant adverse impacts to the natural resources of Forest Park. It is not uncommon to see park users walking with their dogs off leash in Forest Park, although City Code requires dogs be on leash at all times within the park. The 1995 Forest Park Natural Resources Management Plan identified the adverse impacts from dogs off leash to flora, fauna, and water quality. Increased erosion, trampled vegetation, reduced water quality, and disturbed wildlife are all evidenced impacts from dogs off leash. Beginning in 2006, the City of Portland began the Dogs for the Environment program which provided outreach to park users about following PP&R rules regarding having your dog on a leash at all times on park property unless the dog is in one of the City's 32 off-leash areas. This program has also provided education about the impacts from off-leash dogs and their unattended waste to wildlife, water quality, and other park users' experience and safety. Through this program an expanded ranger program has been funded in collaboration with the Bureau of Environmental Services to enforce leash and scoop laws.

Over time, recreation pressures change. Currently, in the City of Portland, a portion of community members expressed a desire to expand off-road cycling opportunities, specifically to provide additional single track cycling experiences. Single track cycling is defined as a trail with a minimum width of 18 inches and a maximum width of four feet (City of Portland, 2009). A group of stakeholders have convened to form a Forest Park Single Track Advisory Committee which is evaluating the potential for creating additional opportunities for this recreational desire. The recommendations that arise from this committee must improve both the cycling experience and the ecological health of Forest Park and will be evaluated by Portland Parks & Recreation.

The history of recreation in Forest Park illustrates that recreational demands will evolve over time as the popularity of particular leisure activities waxes and wanes. The ecological integrity of Forest Park must always be assessed and considered first when evaluating the accommodation of expanded recreation. Forest Park is a finite natural resource, managed as a natural area, and recreational demands and their impacts are potentially infinite. The 1995 Forest Park Natural Resource Management Plan, identifies broad recreational types for each of the three management units. To inform future park management the development of recreation guidelines and thresholds for each management unit is essential. For example, as the North Management Unit has been identified as having the highest resource qualities

and lowest levels of use (City of Portland, 1995) a recommended guideline would be that future trail development be limited to regional trail expansion for pedestrian use only.

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APPENDIX IV

GIS Methodology for DFC

GIS analysis was utilized to determine the geographic distribution of the desired future conditions for Forest Park. Areas of the Park were categorized into one of 7 types:

1. Douglas-fir-Bigleaf Maple Forest (PSME-ACMA)
2. Douglas-fir-Western Hemlock Forest (PSME-TSHE)
3. Bigleaf Maple Forest (ACMA)
4. Bigleaf Maple Seasonally Flooded Forest (ACMA SFF)
5. Shrubland Corridor (SC)
6. Douglas-fir-Giant Forest (PSME GF)
7. Oregon White Oak Forest (QUGA)

Data regarding identified fire safety concerns from the Wildfire Risk Reduction Final Report (Trout Mountain Forestry 2008) was utilized to develop buffers of mixed forest composed of Douglas fir interspersed with bigleaf maple along the eastern and western edges of the park. Those buffers were defined as follows:

- Proximity to Skyline Road <500 ft, then DFC = PSME-ACMA
- Proximity to Thompson Road <500 ft, then DFC = PSME-ACMA
- Urban-interface, east boundary (Trout Mountain Forestry 2008), then DFC = PSME-ACMA*

** Existing vegetation inventories (City of Portland, 2004) and aerial analysis were utilized to identify significant areas of Oregon White Oak Forest (QUGA) within the urban-interface boundary. In areas of overlap, Oregon White Oak Forest (QUGA) is the desired future condition.*

LIDAR data was utilized to determine the percent conifer distribution and tree height classification throughout the park boundary. LIDAR data was collected in 2004 during leaf-off conditions utilizing a 1-meter footprint. The resulting first return data points represent conifer height very well, but effectively ignore deciduous structure, which enabled an estimation of overall conifer coverage and the identification of locations of coniferous structure that met specific height parameters.

Vegetation inventories (City of Portland, 2004) were utilized to confirm alliance types. The following rules were applied based upon species structural composition:

- If <25% conifer cover (LIDAR) and, bigleaf maple >25% with conifer presence>25% (Inventory), or If <25% conifer cover (LIDAR) and bigleaf maple 20-50%, and Douglas fir 10-20% (Inventory), then DFC = PSME-ACMA
- If >25% conifer cover, trees >200ft tall (LIDAR), and >60% cover conifer composition (Douglas fir >20%, western hemlock 1-10%, and western red cedar and/or grand fir 1-10%), dbh >30" present and Douglas-fir-Western Hemlock (Inventory), then DFC = PSME-TSHE
- If <25% conifer cover (LIDAR) and bigleaf maple >50% and < 25% conifer cover (Inventory), then DFC = ACMA
- If <25% conifer cover (LIDAR) and bigleaf maple >50% and located within 100 foot stream buffer, then DFC = ACMA SFF
- If >trace Oregon white oak present (Inventory) or trace located adjacent to vegetation unit >trace, then DFC = QUGA

All powerline corridors were designated as Shrubland Corridor Alliance which includes a desired future condition of a mosaic of shrubs, open meadows, and the retention of trees where they do not interfere with line transmission.

Douglas-fir Giant Forest area was designated based knowledge of site conditions, topographical analysis, and field data collected during mapping of old growth trees within Forest Park.

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APPENDIX V

DFC Projects

The following projects have been identified as important to meeting the Desired Future Condition for Forest Park. Each of these projects includes a target year for completion. It should be noted that many projects are ongoing or require maintenance which will precede or exceed the date of completion listed below. Ongoing projects or programs have been denoted.

SHRUBLAND/GRASSLAND ALLIANCE	
Project Description	**Target Year for Completion**
Establish management/maintenance plans with utility companies.	2015
Work closely with utility companies to retain trees throughout corridors. When removal is required, identify opportunities for snag preservation and creation. Provide snag and downed wood creation guidelines.	2015
Develop roadside mowing program that reduces frequency and informs timing of roadside mowing to encourage native species colonization and reduce the spread of invasives.	2015
Identify target wildlife species for management.	2015
Survey and map unique plants.	2015
Secure funding for long-term corridor management.	2020
Develop revegetation plans for utility corridors to provide shrub, forb, and grass diversity.	2020
Engage in active management of all Wildfire Fuel Reduction priority projects to reduce fuel load and invasive species along utility corridors.	2020
Develop revegetation plans for open meadows and roadsides to provide shrub, forb, and grass diversity.	2025
BIGLEAF MAPLE FOREST ALLIANCE	
Project Description	**Target Year for Completion**
Monitor alliance to determine wildlife utilization.	2015
Survey and map unique plants.	2015
Evaluate natural regeneration.	2015
Develop stand management plan.	2020
DOUGLAS FIR-BIGLEAF MAPLE FOREST ALLIANCE	
Project Description	**Target Year for Completion**
Identify target wildlife species for management.	2015
Evaluate natural regeneration.	2015
Survey and map unique plants.	2015
Minimize wildfire risk through the removal of flammable weeds and ladder fuels.	2020
Maintain a buffer of mixed conifer-deciduous forest composed of Douglas fir interspersed with bigleaf maple along the eastern and western edges of the park.	2020
Develop stand management plan.	2020

DOUGLAS FIR-WESTERN HEMLOCK ALLIANCE	
Project Description	**Target Year for Completion**
Identify target wildlife species for management.	2015
Evaluate natural regeneration.	2015
Survey and map unique plants.	2015
Develop stand management plan.	2020
DOUGLAS FIR GIANT FOREST ALLIANCE	
Project Description	**Target Year for Completion**
Identify target wildlife species for management.	2015
Survey and map unique plants.	2015
Map all old growth trees within this alliance.	2015
Core a sample of old growth trees to determine stand age.	2015
BIGLEAF MAPLE SEASONALLY FLOODED FOREST ALLIANCE	
Project Description	**Target Year for Completion**
Identify target wildlife species for management.	2015
Evaluate natural regeneration.	2015
Survey and map unique plants.	2015
OAK WOODLANDS ALLIANCE	
Project Description	**Target Year for Completion**
Identify target wildlife species for management.	2015
Survey and map unique plants.	2015
Assess all Oregon oak populations along eastern Park boundary. Identify stem density, conifer encroachment and understory associations. Utilize this data to determine priority oak management areas.	2015
Implement selective removal of encroaching conifers in identified priority areas.	2020
Identify opportunities for the restoration of this habitat type in the presence of natural disturbance such as climate change, disease, landslide or fire.	ongoing
Pursue acquisition of properties that contain significant remnant oak populations or provide a restoration opportunity of this alliance along the eastern boundary of Forest Park.	ongoing
RIPARIAN CORRIDORS AND AQUATIC HABITAT	
Project Description	**Target Year for Completion**
Inventory infrastructure such as roads, trails, culverts, bridges and water storage structures to establish priorities for improvement, replacement or removal.	2015 (Leif Erikson) 2020 (all other access roads) 2020 (fish bearing streams) 2035 (all other)
Work with the Bureau of Environmental Services to establish project priorities for subwatershed planning.	2015
Assess PP&R stream surveys of Balch and Miller Creek to inform priority areas for stream enhancement.	2015
Maintain and improve water quality to meet or exceed the Department of Environmental Quality's standards for tributaries to the Willamette River.	ongoing
Improve channel complexity and fish habitat in Balch and Miller Creeks.	2035

WILDLIFE HABITAT	
Project Description	**Target Year for Completion**
Removal of tree ivy which threatens the integrity of the forest canopy. Long-term maintenance and identified funding sources to maintain this work on a cycle of 5 years following initial treatment.	2015
Control invasive plant species listed on the City of Portland's Early Detection Rapid Response (EDRR) List.	ongoing
Complete initial treatment of invasive species in the most ecologically healthy units of the Park through the Protect the Best program.	2015
A long-term plan to reduce invasive species cover in less ecologically healthy areas which includes addressing funding required for long-term maintenance and restoration, measures of success and a monitoring strategy.	2015
Conduct wildlife studies to determine presence/absence, distribution and population of target species.	2015
Assessment of wildlife habitat features such as snags and large downed wood throughout alliances. Recommendations for creation/protection of these features.	2015
Identification of opportunities for urban habitat features such as but not limited to bird and bat boxes.	2015
Map existing wetlands throughout Park and develop protection/ enhancement strategies for these sites.	2015
Engage in regional planning efforts to protect wildlife corridor connection to the Coast Range.	2020
Implement protection/enhancement strategies for wetlands.	2020
Create a list of EDRR animal species for Forest Park and develop management response to detection.	2020
Work in partnership with outside agencies to monitor and control introduced insect pests.	ongoing
During the upgrade of buildings or installation of new structures include avian friendly designs and evaluate opportunities for urban habitat such as ecoroofs.	ongoing
Minimize impacts to wildlife from land management actions by utilizing the Migratory Bird Treaty Act TEES Guidelines.	ongoing

APPENDIX VI

Special Status Bird Species Association with NVCS Alliance

All Data resourced from Houle, 1982 unless noted otherwise: a) Johnson and O'Neil, 2001; b) Kotliar, 2007; c) Purple Martin Conservation Association, 2010; d) Broshot, 2010.

Bird Name	Observed in Forest Park	Home Range	Associated Alliances		
			Douglas Fir Giant Forest	Mixed Conifer Forest (includes all other forest types listed in DFC)	Disturbance corridor shrublands
American kestrel	Yes	270 acres	Breeding[1] Feeding[1]		Feeding[2]
Bald eagle	Yes	4 mile radius	Breeding[1] Feeding[2]		Feeding[2]
Band-tailed pigeon	Yes	0.1-0.5 mile radius	Feeding[2]	Breeding[1] Feeding[2]	Feeding[2]
Black Throated Gray Warbler	Yes	Unknown	Breeding[2] Feeding[1]	Breeding[2] Feeding[1]	Breeding[2] Feeding[2]
Brown creeper	Yes	Unknown	Breeding[1] Feeding[1]	Breeding[2] Feeding[2]	
Bullock's oriole	No	Unknown		Close Association	
Bushtit	Yes	Unknown	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]	Breeding[1] Feeding[1]
Chipping sparrow	No	0.5-1.5 acres	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]	Breeding[1] Feeding[1]
Common nighthawk	No	0.5 mile diameter	Breeding[2]	Breeding[2]	Breeding[2]
Downy woodpecker	Yes	5-8 acres		Breeding[2] Feeding[2]	
Great blue heron	Yes	10 mile radius	Breeding[2]	Breeding[1]	
Hermit warbler	No	Unknown	Breeding[1] Feeding[1]		
House wren	Yes	1.1-4.4 acres			Feeding[1]
Hutton's vireo	Yes	Unknown		Breeding[2] Feeding[2]	Breeding[2] Feeding[2]
Merlin	No	Unknown	Breeding[2] Feeding[2]		Feeding[2]
Nashville warbler	No	Unknown	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]	Breeding[1] Feeding[1]
Olive-sided flycatcher	Yes	24-64 acres	Breeding[1] Feeding[1]	Feeding[2]	Feeding[1]
Orange-crowned warbler	Yes	5 acres		Breeding[2] Feeding[2]	Breeding[1] Feeding[1]

Pacific slope flycatcher	Yes	Unknown	Close Association	General Association	
Peregrine falcon	No	6.5 to 15.5 square miles	General association	General association	Feeding[1]
Pileated woodpecker	Yes	320-600 acres	Breeding[1] Feeding[1]	Feeding[2]	
Purple finch	Yes	Unknown	Breeding[1] Feeding[1]	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]
Purple martin	No	5-10 square miles	Breeding[2]		Breeding[2] Feeding[2]
Red crossbill	Yes	Unknown	Breeding[1] Feeding[1]	Feeding[2]	
Red-eyed Vireo	Yes	Unknown			Breeding[2] Feeding[1]
Rufous hummingbird	Yes	Unknown	Breeding[2] Feeding[1]	Breeding[1]	Breeding[1] Feeding[1]
Swainson's thrush	Yes	Unknown	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]
Varied thrush	Yes	Unknown	Breeding[1] Feeding[1]	Breeding[2] Feeding[2]	Feeding[2]
Vaux's swift	Yes	Unknown	Feeding[1] Feeding[2]		Feeding[1]
Western wood-pewee	Yes	3-4 acres	Breeding[1] Feeding[1]	Breeding[2] Feeding[2]	Feeding[1]
White-breasted nuthatch	Yes	37 acres per pair	Breeding[2] Feeding[2]		
Willow flycatcher	Yes	0.8-2.9 acres			Breeding[1] Feeding[1]
Wilson's warbler	Yes	0.5-3.2 acres	Breeding[2] Feeding[2]	Breeding[1] Feeding[2]	Breeding[2] Feeding[2]
Winter wren	Yes	0.1-1.3 acres	Breeding[1] Feeding[1]	Breeding[2] Feeding[2]	
Yellow breasted chat	No	0.15-0.75 acres			Breeding[2] Feeding[2]
Yellow warbler	Yes	0.2-0.9 acres	Feeding[2]	Breeding[2] Feeding[2]	Breeding[1] Feeding[1]

[1] Preferred Habitat thought to support a higher population

[2] Habitat used by a species but thought to support a lower population

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APPENDIX VII

Special Status Amphibian/Mammal Species Association with NVCS Alliance

All Data resourced from Houle, 1982 unless noted otherwise referenced: a) City of Portland, 1995; b) Johnson and O'Neil 2001.

Species name	Observed in Forest Park	Alliance Associations		
		Douglas Fir Giant Forest	Mixed Conifer Forest (Includes all other forest types listed in DFC)	Disturbance corridor shrublands
American beaver	Yes		Breeding[2] Feeding[2]	Breeding[1] Feeding[1]
California myotis	No data			Breeding[1] Feeding[1]
Hoary bat	No data	Breeding[2]		
Long-legged myotis	No data	Breeding[2] Feeding[2]	Breeding[2] Feeding[2]	Feeding[2]
Northern red-legged frog	Yes	Close Association	General Association	
Red tree vole	No data	Breeding[2] Feeding[2]		
Silver-haired bat	No data	Breeding[2]	Feeding[2]	Feeding[1]
Western gray squirrel	No data	Breeding[2] Feeding[2]	Breeding[1] Feeding[1]	Feeding[2]
White-footed vole	No data	Breeding[1] Feeding[1]	Breeding[1] Feeding[1]	Breeding[2] Feeding[2]
Yuma myotis	No data	Breeding[1]	Breeding[2]	Breeding[2] Feeding[2]

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REFERENCES

Houle, Marcy. One City's Wilderness: Its Wildlife and Habitat Interrelationships. 1982. Special Report for The Oregon Parks Foundation.

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