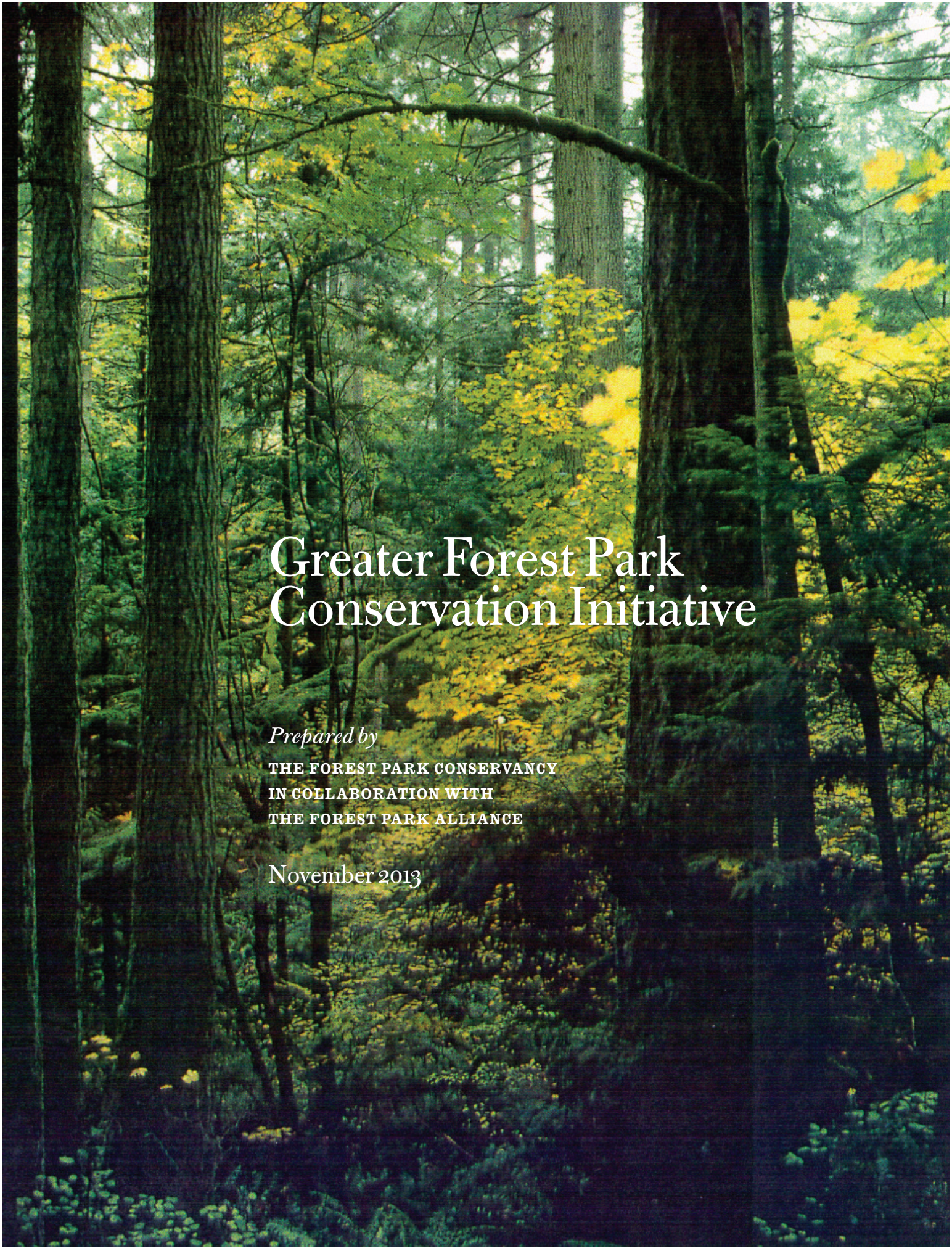
# Greater Forest Park Conservation Initiative

## Mapping the trail to a healthy and sustainable Forest Park.

*Prepared by:*

**THE FOREST PARK CONSERVANCY IN COLLABORATION WITH THE FOREST PARK ALLIANCE.**

The Forest Park Conservancy



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**THE FOREST PARK CONSERVANCY**
**IN COLLABORATION WITH**
**THE FOREST PARK ALLIANCE**

November 2013

**SUGGESTED CITATION**

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**FOREST PARK ALLIANCE MEMBERS**

Audubon Society of Portland

City of Portland Bureau of Environmental Services

Columbia Land Trust

Forest Park Conservancy

Forest Park Neighborhood Association

Friends of Trees

Linnton Neighborhood Association

Metro Regional Government

Portland Parks & Recreation

The Intertwine Alliance

West Multnomah Soil & Water Conservation District

# Preface

In 2008 the Friends of Forest Park became the Forest Park Conservancy. This transition was more than just a change of name. It indicated a maturing of the organization and an intention to be a stronger and more capable partner to the park's owner and operator, Portland Parks & Recreation. It signaled a readiness for greater conservation leadership.

The new identity brought with it new questions. Where do we stand in our efforts to restore and protect Forest Park? What is our ultimate vision for the park's ecological health? Are we on course to achieve that vision and if not, how should we respond? How do we best engage residents of the Portland region with the park's future? What is our responsibility not just to the park but to the greater landscape with which the park is so deeply intertwined? If the Forest Park Conservancy was to live up to its new name, it needed to find its footing among these fundamental questions.

The Conservancy responded by launching the Greater Forest Park Conservation Initiative in 2010. The initiative does much more than just guide the Conservancy's work in helping to restore and protect Forest Park. It is a visionary effort to look not just within but also beyond the boundaries of the park, to consider how Forest Park benefits from and contributes to the ecological health of our region, and to marshal the forces necessary to work at that scale.

While Portland Parks & Recreation has comprehensive and longstanding management plans that are being implemented with both competence and commitment, it became clear early in the life of the Conservation Initiative that no single organization, no matter how competent and committed, could possibly address the full range of issues and opportunities facing the park and the greater regional landscape of which it is a part. Fortunately, it proved relatively easy to find strong and willing partners to come in service to Portland's most iconic and beloved natural space. Altogether, the conservancy brought together ten nonprofit and government agencies with a stake in Forest Park and surrounding lands. The Forest Park Alliance was born.

As demonstrated by the remarkable quality of this document, but even more so by the significant on-the-ground conservation work that is already underway, the Greater Forest Park Conservation Initiative has already shown itself to be a tremendous force for Forest Park's ecological future. With the continued leadership of the Forest Park Alliance, it should remain so for many years.

**MIKE WETTER**

*Executive Director, Intertwine Alliance*

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# Executive Summary

**Forest Park is a beloved gem within the City of Portland's parks system that for decades has been the focus of civic, conservation, and recreational planning and management efforts.**

This document—the *Greater Forest Park Conservation Initiative*—takes a larger view, addressing not just Forest Park but also the natural areas around it. Together, these lands form a unique and vibrant natural ecosystem just minutes from the center of a major urban area. This ecosystem not only serves the greater Portland-Vancouver region but is a national tourist attraction.

No city in the contiguous United States can boast a comparable natural and recreational resource on its doorstep—a resource that still supports most of the native plants and animals that were here during the Lewis and Clark expedition, that facilitates migration of wildlife between the Oregon Coast and the Cascade Range, that purifies our air and sequesters significant amounts of carbon, that is subject to the demands of competing human uses and the growing ecological pressures associated with urban areas. These pressures can only be expected to increase with the influx of new residents to the region during the coming years.

The Forest Park Alliance—a coalition of local organizations dedicated to conserving important regional habitats—developed this document to serve as a roadmap for the long-term protection and restoration of the Greater Forest Park ecosystem, through collaborative action.

## Current Conditions

The availability of information on current conditions in the Greater Forest Park ecosystem varies depending on ownership, with more information available about areas owned by public agencies and nonprofit organizations than about tracts owned by private parties. In general, plant diversity in the Greater Forest Park ecosystem is fairly high, in part because of the ecosystem's location near the dividing line between the western hemlock (*Tsuga heterophylla*) and Willamette valley vegetation zones. Forest Park's 5,200 acres are almost completely forested, mostly (three-quarters) with mixed conifer-deciduous forest. The rest is dominated by relatively uniform conifer forest. Logging and other human disturbances have led to a forest composition that is typical of a second-growth Douglas-fir (*Pseudotsuga menziesii*) forest, with many areas consisting mostly of young trees (i.e., 50 to 100 years old); the reason for the preponderance of young trees is not completely understood. The park includes several special-status habitats such as interior forest and oak woodlands. Native vegetation in Forest Park is still mostly healthy but is threatened by invasive plant species.

*The following adjacent properties are managed for conservation:*

- → **A 38-acre remnant old-growth parcel owned by the Forest Park Conservancy**
- → **64 acres of forested wildlife sanctuary owned and managed by the Audubon Society of Portland**
- → **86 acres owned by Metro but managed by Audubon**
- → **The Ennis Creek, Burlington Creek, and McCarthy Creek properties, which are owned by Metro and total approximately 1,000 acres**

Surrounding these lands are 8,690 acres of private property (i.e., residences, private woodlands, small farms, utility corridors, and industrial sites) that falls within the Greater Forest Park ecosystem and retains various levels of ecological value.

The Greater Forest Park ecosystem has ten creeks that total more than 30 stream miles. The middle and upper reaches of most of these waterways are in good condition, with heavy canopy cover and largely intact riparian corridors. However, the lower reaches (i.e., from Highway 30 to the Willamette River) tend to be channelized, flow through a pipe, or be affected by toxins as a result of industrial activities. Development in some of the upper watersheds has reduced canopy cover and increased sediment inputs to streams. The Balch Creek watershed, for example, is notable for its downward-trending water quality (because of sediment), and in McCarthy Creek water temperature is a concern. The Oregon Department of Environmental Quality lists Saltzman, Miller, and McCarthy creeks as migration, spawning, or rearing habitat for salmon or trout species, some of which are federally listed as threatened. In addition, Balch Creek has a small population of cutthroat trout. Fish diversity and density in the ecosystem are low, primarily because of passage barriers (i.e., culverts) in the lower reaches.

Avian species in Forest Park number 104, a full one-third of which are listed as special-status species. Thus, the proportion of special-status species is relatively high.[1] The park is an important conservation area for amphibians, because of its relatively large expanse of intact habitat. The area is used by at least seven native amphibian species, including the northern red-legged frog (a federal species of concern), which ventures outside the park to forage and breed. With a dispersal distance of up to 2 miles, the red-legged frog—like many amphibians—is affected by migration barriers and habitat fragmentation within the Greater Forest Park ecosystem.

Additional studies are needed to understand the abundance and distribution of reptiles and invertebrates in the Greater Forest Park ecosystem. Although invertebrates themselves are small, their ecological influence is huge because of their sheer numbers and mass. They play a critical role in the food chain and are important pollinators. For these reasons, invertebrates are one focus of the *Greater Forest Park Conservation Initiative.*

Mammal species in Forest Park number more than 50 and include bats (which represent one-quarter of the park's mammal species), rodents, rabbits, insectivores, moles, carnivores, and deer and elk. Relatively common are black-tailed deer, coyote, striped skunks, and long- and short-tailed weasels. Little is known about the abundance and distribution of elk, mountain beaver, brush rabbit, and bobcat, all of which have been observed in the Greater Forest Park ecosystem. Additional studies are needed to fill information gaps about the ecosystem's mammals, how they respond to human disturbance, and how disturbances affect their breeding and migration.

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1 For the purposes of this document, special-status species are those that are officially listed or identified as a species of concern (e.g., a sensitive, focal, or "watch list" species, or a candidate for listing) by the U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Oregon Biodiversity Information Center (formerly the Oregon Natural Heritage Information Center), Oregon Watershed Enhancement Board, Partners In Flight, Northwest Power and Conservation Council (i.e., *Willamette Basin Subbasin Plan*), National Audubon Society, or American Bird Conservancy.

## Threats

This document is, in part, a response to the main threats facing the Greater Forest Park ecosystem's native plants and animals: invasive species, climate change, and habitat loss, degradation, and fragmentation:

- **Invasive species.** Infestations of invasive species are significant in some areas of the Greater Forest Park ecosystem. Invasive animal species—including invertebrates—are problematic because they have the potential to disrupt the ecosystem. In addition, non-native plants such as English and Irish ivy (*Hedera helix* and *Hedera hibernica*, respectively), Clematis *vitalba* (i.e., old man's beard), and garlic mustard (*Alliaria petiolata*) are damaging native trees, disrupting establishment of native understory plants, and altering habitat. The result can be seen today in some areas of the ecosystem: a mixed forest of maturing and threatened trees with limited numbers of new conifer seedlings. As the mature trees begin to die off, the forest may lack a viable next generation to take their place and could eventually become an "ivy desert," devoid of native trees, with only trace numbers of native shrubs. This type of forest would lack biodiversity and be unable to provide habitat for many native wildlife species.
- **Climate change.** Over the last century, the Pacific Northwest has seen a 1.5-degree Fahrenheit increase in average temperature, the loss of snowpack in the Cascades, and shifts in the timing and flow of streams. Documented shifts in habitat, the extent and timing of migrations, and the geographic range of many insects, birds, trees, and flowering plants strongly suggest that climate change already is affecting our natural systems. During the coming years, additional impacts are expected to the region's birds, terrestrial wildlife, plants, aquatic species, and river flow.
- **Habitat loss, degradation, and fragmentation.** Streams in the Greater Forest Park ecosystem have been piped or channelized, while wetlands, meadows, and forests have been converted to agriculture, roadways, urban and suburban development, and utility corridors. The process of habitat conversion continues in some parts of the Greater Forest Park ecosystem. In addition to outright habitat loss, conversion degrades remaining habitat through such factors as increased inputs of sediment and toxic contaminants to streams; changes in hydrology and thus habitat-forming processes; light and noise pollution; and introduction of invasive species. Improper use and siting of trails (i.e., in riparian areas) also can degrade habitat. In addition, when substantial amounts of native habitat already have been lost, habitat fragmentation becomes an issue. Portland Parks & Recreation considers the loss of foraging and migration habitat and the potential isolation of wildlife populations to be current threats in the Greater Forest Park ecosystem.

Considering the highly altered state of the Greater Forest Park ecosystem's natural systems and the ongoing threats it faces, it is our responsibility to actively manage the ecosystem for long-term biodiversity and ecosystem health. Otherwise the ecosystem will continue to degrade and become less resilient to the influence of its largely urban surroundings.

## Conservation Goals, Objectives, and Activities

Our best efforts as a society and, more locally, as a community, need to be focused on securing funds to protect and restore the Greater Forest Park ecosystem through habitat restoration, acquisition of ecologically valuable property, conservation easements, and preventive care and maintenance. Educating private landowners on invasive species removal, sustainable management on working lands, and the importance of enhancing native wildlife habitat and protecting stream health on their properties can go a long way in preventing further degradation and fragmentation of habitat, as can agreement on best management practices for development and careful planning regarding recreational infrastructure such as trails. In some cases, policies may need to be modified to accommodate conservation goals. Additional data may need to be collected to inform detailed work plans for on-the-ground actions.

*The following themes reappear throughout the conservation objectives and activities that the Forest Park Alliance has developed for this Greater Forest Park Conservation Initiative:*

- → **Information gathering**
- → **Acquisition or protection of key habitats**
- → **Control of invasive species**
- → **Community outreach and education**
- → **Best management practices**
- → **Adaptive policy and planning that maintain the ecosystem's health and biodiversity**

The Alliance has grouped objectives and activities into four main goal areas: streams, connectivity, forests, and wildlife. Table ES-1 presents the Forest Park Alliance's overarching goals and a sampling of the associated types of conservation activities the Alliance is calling for. (For full lists of the exact conservation objectives and activities, see Tables 5, 6, 7, and 8 in the text.)

An important fifth goal is to attract financial resources to implement the conservation activities identified in the *Greater Forest Park Conservation Initiative*. Under current financial scenarios, it is unlikely that the budgets of partner organizations of the Forest Park Alliance will be able to fund the conservation activities described in this document, or that a single funding source will become available that can address the identified needs. Thus, a collaborative public/private/nonprofit approach is needed. Resources could come through a combination of traditional conservation funding mechanisms, such as bond measures, system development charges, agency grants, and private contributions. Or they might emerge from more novel methods, such as green infrastructure, market-based funding, or as-yet unidentified approaches. Either way, it is important to act now to develop stable, long-term sources of funding so that we can address immediate and long-term conservation needs and plan future expenditures for the most opportune time, both financially and ecologically.

**TABLE ES-1**

*Goals and Sample Types of Conservation Activities*

**GOAL 1: STREAMS: Protect and improve hydrologic processes and water quality in area streams, to safeguard watershed functions and human health.**

*Types of Conservation Activities:*

→ Assess/map habitat conditions, invasive plants, road and trail density, and restoration needs and priorities.

→ Reestablish ecological processes that increase channel complexity in streams.

→ Restore riparian habitat; ensure adequate riparian buffers to reduce sediment inputs, provide fish habitat, and maintain or lower stream temperatures.

→ Remove invasive plants.

→ Identify sources of pollutants and develop a strategy for addressing them.

→ Address waste issues caused by dogs and degraded septic systems.

→ Minimize impacts of development on streams.

→ Conduct outreach to landowners regarding healthy riparian management practices.

**GOAL 2: CONNECTIVITY: Protect and improve connectivity between Forest Park, the Tualatin Mountains, the Coast Range, and the Willamette River.**

*Types of Conservation Activities:*

→ Develop and test a connectivity model and connectivity-related mapping and database tools.

→ Identify target species, biodiversity corridors, and buffer areas.

→ Assess roads, trails, and best management practices for their impact on connectivity.

→ Protect high-priority biodiversity corridors via acquisition and conservation easements.

→ Enhance habitat (including along power line corridors) and key habitat features.

→ Plan/manage infrastructure to protect connectivity.

→ Conduct outreach to landowners regarding control of invasive species and prevention of infestations.

**GOAL 3: FORESTS: Maintain and improve forests to support diversity, structural integrity, connectivity, and complexity.**

*Types of Conservation Activities:*

→ Assess/map stand trajectory, diseased areas, native flora, rare species, special habitats (e.g., oak woodlands, old-growth), special habitat features (snags, etc.), and infestations of invasive plants and animals.

→ Develop an oak habitat restoration and management plan.

→ Identify desired future conditions on private lands.

→ Manage forests for old-growth characteristics, open spaces, downed wood, off-channel aquatic habitat, and inputs of large wood to streams.

- → Restore habitat and connectivity, especially high-quality habitat and habitat used by rare species.
- → Revegetate with native species.
- → Manage diseased sites and invasive plants; track activities.
- → Train land managers to identify rare plants.
- → Prevent new infestations of invasive species through best management practices, the Early Detection Rapid Response program, the Perimeter Program, and outreach to landowners.

**GOAL 4: WILDLIFE: Maintain and protect native wildlife diversity.**

*Types of Conservation Activities:*

- → Assess/inventory habitat conditions, migration barriers, and high-quality habitat.
- → Monitor species' presence/absence and identify causes of decline.
- → Study wildlife use of corridors to other ecosystems.
- → Maintain/protect critical habitat and migration corridors by using conservation easements, working with transportation planning departments, etc.
- → Conserve special habitat features and habitats.
- → Restore key habitats for priority species; enhance habitat and connectivity.
- → Control invasive species.
- → Minimize disturbances during key life stages (nesting) and in key areas (i.e., edge habitats).
- → Conduct outreach to private landowners regarding best practices in managing land for conservation (e.g., reducing pesticide use).

## Collaboration as an Underlying Value

Large-scale restoration efforts cannot succeed when undertaken by one organization alone. Instead, it takes the work of many passionate, committed partners who can broaden engagement and cooperation while making efficient use of funding and human resources. This has been the approach of the Forest Park Alliance, whose members value cooperative effort. Alliance partners currently are collaborating in restoring and maintaining the Greater Forest Park ecosystem, and they expect to continue to work together to raise funds to implement the conservation activities identified in this document. Toward that end, this *Greater Forest Park Conservation Initiative* is expected to serve as a tool for coordinating activities (so as to achieve a whole greater than the sum of its parts) and for telling a larger, more comprehensive story of the ecological significance of the Greater Forest Park ecosystem and local efforts to protect it.

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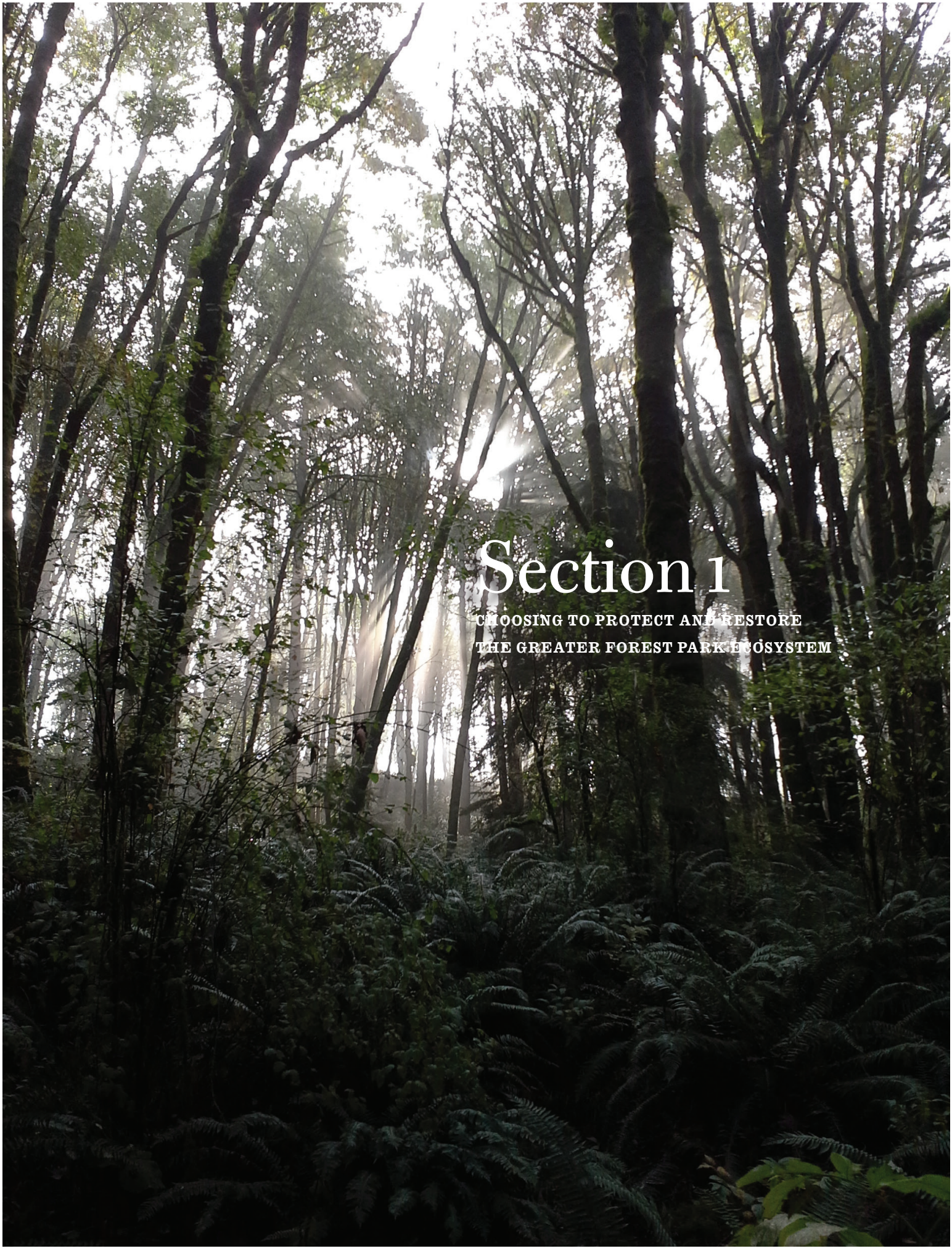

# Section 1

## CHOOSING TO PROTECT AND RESTORE THE GREATER FOREST PARK ECOSYSTEM

**SECTION 1**

# Choosing to Protect and Restore the Greater Forest Park Ecosystem

Nested near the heart of the greater Portland-Vancouver region lies a regional ecological treasure — the Greater Forest Park ecosystem, consisting of 5,200-acre Forest Park, more than 1,100 acres of surrounding natural areas owned by Metro, the Audubon Society of Portland, the Forest Park Conservancy, and over 8,600 acres of private land. Together, these lands provide an expanse of relatively unfragmented habitat that supports an impressive diversity of native plants and animal species, many of them rarely seen near an urban area. The Greater Forest Park ecosystem includes special-status habitats such as oak woodlands and interior forest, all of the plants characteristic of a western hemlock forest, at least 100 native bird species, and 50 species of native mammals. In fact, the vast majority of the species spotted in the area when Captain William Clark ventured up the Willamette River in 1806 are still found in the ecosystem today. Each year, thousands of nature lovers and recreational users are drawn to Forest Park's 79 miles of trails to experience this diversity.

In addition to its recreational opportunities, the Greater Forest Park ecosystem helps to provide the Portland region with a wide array of ecological services, including clean air and water, stormwater control, flood abatement, and wildlife habitat. The ecosystem's forest plays an important role in helping the region adapt to climate change because its trees sequester significant amounts of carbon dioxide and contribute to air quality. Additionally, the ecosystem is an integral part of the wildlife corridor that connects the Portland area to the Coast Range, through a series of undeveloped rural properties that currently are in a mix of private and public ownership. This corridor is believed to play a critical role in species dispersal throughout Northwest Oregon, providing an opportunity for recruitment of flora and fauna from outside the urban area.[2] (See Figures 1 and 2. Figure 2 shows in blue how the Coast Range Volcanics ecoregion extends to Portland via Forest Park. Ecoregions are based on geology, physiography, vegetation, climate, soils, land use, wildlife distributions, and hydrology.) Given the Greater Forest Park ecosystem's size, location, and species assemblages, its conservation is critical to maintaining biological diversity, ecological integrity, and ecosystem services in the region and beyond.

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2 *Forest Park: One City's Wilderness. Its Wildlife and Habitat Interrelationships* (M.C. Houle, 1982. Oregon Parks Foundation, Portland, Oregon).

# Purpose and Goals of the Greater Forest Park Conservation Initiative

This *Greater Forest Park Conservation Initiative* (GFPCI) brings pertinent information from several existing documents into one place, to create a document that focuses on the Greater Forest Park ecosystem and can be used by Forest Park Alliance members (see page 2) as a road map to protect and restore this regional ecological treasure. The GFPCI is intended to be implemented via partner collaboration, cooperation, coordination, and fundraising and is part of a strategic, long-term effort and commitment—a collaborative undertaking by a number of local organizations who are dedicated to conserving important regional habitats in partnership with the community of the greater Portland-Vancouver region and beyond. Through the GFPCI, the partners in the Forest Park Alliance seek to add value to the public's investment by ensuring that Forest Park's natural resources and surrounding connected habitats are protected and preserved for generations to come. To accomplish this, it is critical to move forward together now, focusing on long-term goals and objectives that ultimately will lead to comprehensive, large-scale restoration.

This document presents five overarching goals and associated conservation objectives and activities that the Forest Park Alliance has identified for the Greater Forest Park ecosystem.

**THE OBJECTIVES AND ACTIVITIES ARE PRESENTED IN SECTION 4.**

*The overarching goals are as follows:*

1 **STREAMS: Protect and improve hydrologic processes and water quality in area streams, to safeguard watershed functions and human health.**

*Rationale:* Healthy rivers and streams provide habitat for a wide diversity of tree, plant, and wildlife species, support some of the highest levels of biodiversity, and serve as important avenues for wildlife movement. Healthy rivers and streams also provide services to the human population by attenuating and reducing stormwater and flood flows, recharging groundwater, storing sediment, offering recreational opportunities, and delivering cool, clean water.

2 **CONNECTIVITY: Protect and improve connectivity between Forest Park, the Tualatin Mountains, the Coast Range, and the Willamette River.**

*Rationale:* Plants and animals need connectivity within and between landscapes so that they can cross less suitable habitats to carry out essential life functions, such as dispersing, finding a mate, or overwintering. The physical movement and genetic mixing that connectivity allow are crucial in preventing extirpations of native species. As the human population and the effects of climate change increase, biodiversity corridors need to be deliberately planned if we are to maintain connectivity for a range of native plant and animal species.[3]

3 **FORESTS: Maintain and improve forests to support diversity, structural integrity, connectivity, and complexity.**

*Rationale:* Forests filter the air we breathe, sequester significant amounts of carbon, and play a role in maintaining hydrologic processes that support healthy rivers, streams, and fish populations. In addition, forests with a diversity of native trees and structural complexity provide habitat for native plants and wildlife.

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3 Adapted from *Regional Conservation Strategy for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

**FIGURE 1: Connection to Oregon Coast Range**


**FIGURE 2: Ecoregions of Northwest Oregon**

Source: Ecoregions of Oregon (U.S. Environmental Protection Agency. Available at http://www.epa.gov/wed/pages/ecoregions/or_eco.htm.)

**FOREST PARK**

4 **WILDLIFE: Maintain and protect native wildlife diversity.**

*Rationale:* A diversity of native wildlife is necessary to maintain a healthy ecosystem. Biologically diverse ecosystems help regulate atmospheric chemistry and the chemical composition of our water supplies, are critical to nutrient cycling and soil fertility, and address many basic human needs by providing clean air and water and sustaining productive agriculture. Healthy, biologically diverse ecosystems support a variety of species that pollinate flowers and crops, clean up waste, and help put food on the table. Diverse natural systems exhibit greater stability and ability to recover from disturbances (including climate change and other human-caused disturbances) than do simplified systems.

5 **FUNDING: Attract financial resources to help achieve these goals.**

*Rationale:* Under current financial scenarios, it is unlikely that the budgets of partner organizations of the Forest Park Alliance will be able to fund the activities identified in this document, or that a single funding source will become available that can address these conservation needs. Thus, new financial resources will be needed.

The GFPCI is not a comprehensive or regulatory document. Instead, it is intended to be used by partners as they formulate detailed organization- and site- specific conservation plans.

## Geographic Boundary and Land Uses

For the purposes of this document, the Greater Forest Park ecosystem is defined geographically as the area bounded by NW Logie Trail Road to the north, NW Skyline Boulevard to the west, Highway 26 to the south, and the Willamette River to the east (see Figure 3). Land within the ecosystem falls into three general categories, based on ownership and management focus:

→ **FOREST PARK**. The 5,200 acres that constitute Forest Park proper are owned primarily by the City of Portland and managed by the Bureau of Parks & Recreation (i.e., Portland Parks & Recreation, or PP&R), which manages the park for conservation and recreational uses. PP&R manages Metro-owned properties in Forest Park through an intergovernmental agreement.

→ **LANDS MANAGED FOR CONSERVATION**. Totaling approximately 1,185 acres, lands in this category are contiguous with but outside of Forest Park, are owned by public or nonprofit entities (i.e., Metro, the Audubon Society of Portland, and the Forest Park Conservancy), and are managed for conservation. (See Figure 4.)

→ **PRIVATE LANDS**. This category consists of privately owned property that includes residences, private woodlands, small farms, utility corridors, and industrial sites. Of the 8,690 acres within the Greater Forest Park ecosystem that are privately owned, 851 acres are in parcels that are contiguous with Forest Park and 7,839 acres are separated from the park by other privately or publicly owned land.

**FIGURE 3: Project Area**

## The Forest Park Alliance

Large-scale restoration efforts cannot succeed when undertaken by one organization alone. Instead, it takes the collaboration of many passionate, committed partners who can broaden engagement and cooperation while making efficient use of funding and human resources. The GFPCI began with the recognition that protecting and restoring the Greater Forest Park ecosystem will require more resources than any single organization or agency can provide; a collaborative public/private/nonprofit approach is needed. Thus, in 2012 several organizations who are committed to the long-term viability and sustainability of the Greater Forest Park ecosystem established the Forest Park Alliance.

*The following organizations (in alphabetical order) played a leading role in development of the Alliance:*

- **AUDUBON SOCIETY OF PORTLAND.** This private nonprofit organization manages its own 150-acre wildlife sanctuary for conservation and to control invasive species. Additionally, working in partnership with Metro, Audubon manages the 86-acre Collins Sanctuary. Audubon also co-manages the Backyard Habitat Certification Program, which assists individual landowners in Portland with invasives removal, native plant establishment, wildlife enhancements, and stormwater management.
- **CITY OF PORTLAND BUREAU OF ENVIRONMENTAL SERVICES (BES).** BES provides Portland residents with clean river programs, including programs for water quality protection, watershed planning, wastewater collection and treatment, sewer installation, and stormwater management. BES forms partnerships with public and private landowners to restore degraded streambanks, wetlands, and upland areas. This restoration work improves water quality by controlling erosion, reducing stormwater pollution, aiding in long-term salmon recovery, and enhancing wildlife habitat.
- **COLUMBIA LAND TRUST.** The Columbia Land Trust works to conserve, restore, and manage signature landscapes, vital habitats, and working farms and forests in the Columbia region, including the Greater Forest Park ecosystem. Columbia Land Trust co-manages the Backyard Habitat Certification Program, which assists individual landowners in Portland with removal of invasive species, native plant establishment, wildlife enhancements, and stormwater management.
- **FOREST PARK CONSERVANCY (FPC).** The mission of this 501(c) 3 nonprofit is to work in partnership with Portland Parks & Recreation to protect and restore Forest Park as an irreplaceable natural resource. FPC does invasive species control work and stewards a number of ongoing habitat restoration projects within Forest Park. In 2011 the organization began assisting private landowners with habitat restoration projects on properties adjacent to Forest Park. FPC has partnered with West Multnomah Soil & Water Conservation District to work with private landowners within the geographic boundaries outlined in this document. FPC also manages the 38-acre Ancient Forest Preserve north of Forest Park. FPC led the development and publication of this document and is serving as the primary champion for its implementation.
- **FOREST PARK NEIGHBORHOOD ASSOCIATION.** Forest Park Neighborhood Association is a 501(c)3 nonprofit that represents residents and landowners in both the City of Portland and Multnomah County. The neighborhood, which includes Forest Park, stretches from West Burnside Street to NW Cornelius Pass Road and to the Washington County line to the west. Situated in the hills, forests, and ravines of the Tualatin Mountains, this land retains a significant amount of functioning native habitat, with important

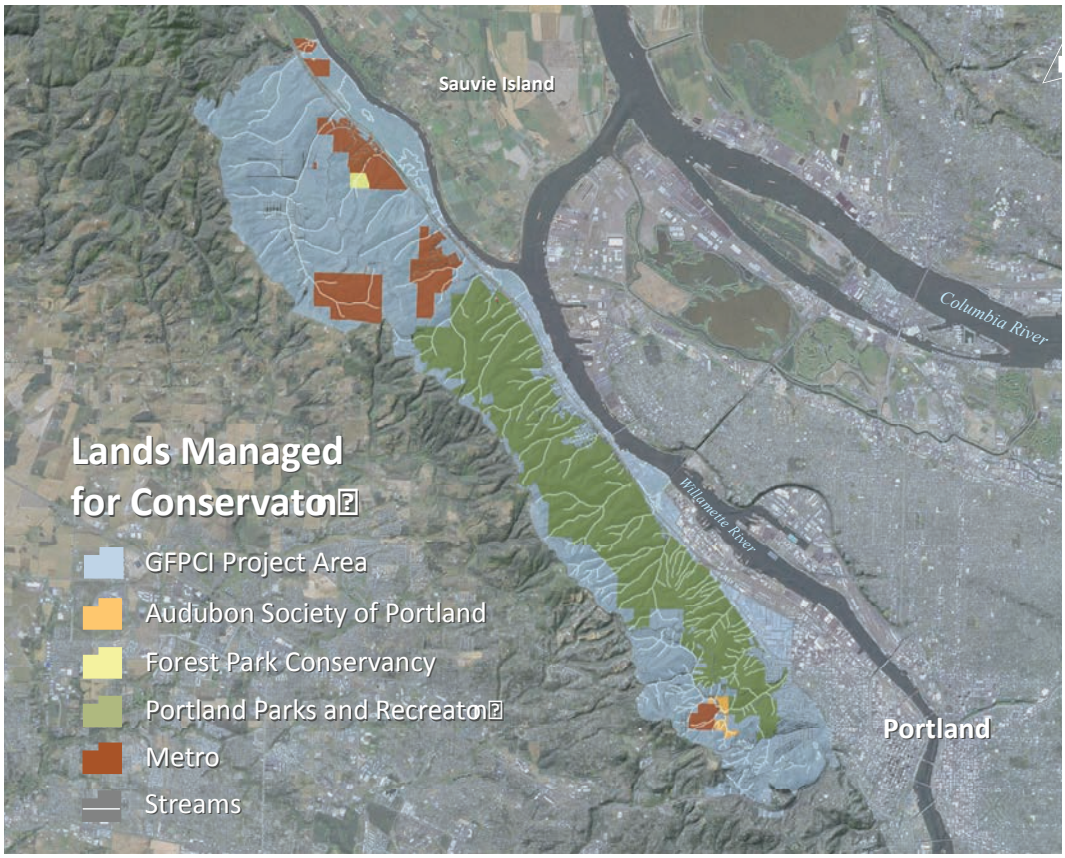



**FIGURE 4: Lands Managed for Conservation**

biodiversity corridors connecting Forest Park to the larger ecosystem. The Forest Park Neighborhood Association has long recognized the importance of these lands to the health of Forest Park and fully supports efforts to preserve and enhance wildlife habitat in and around the park.

→ **FRIENDS OF TREES.** This 501(c) 3 nonprofit organization brings people together in Northwest urban areas to plant and care for city trees and greenspaces. Since 1989, thousands of Friends of Trees volunteers have planted and cared for half a million trees and native plants. In recent years the organization has expanded dramatically, establishing offices in Vancouver, Washington, and Eugene, Oregon, to organize community plantings in neighborhoods and greenspaces in these areas. During the 2012-13 planting season, volunteers gave 38,000 hours of their time to planting and restoration work at 100 events in two states, nine counties, and 20 cities. Friends of Trees intends to increase its planting and restoration work in the Portland-Vancouver and Eugene-Springfield areas and organize community plantings in Salem and at the Sandy River Delta. Friends of Trees has been leading tree planting events in Forest Park for more than 15 years.

→ **METRO REGIONAL GOVERNMENT.** Metro owns and manages the Ennis Creek, Burlington Creek (formerly known as Agency Creek), and McCarthy Creek properties north of Forest Park; together, these properties total more than 1,000 acres. Metro staff provide technical expertise for conservation planning, along with mapping resources. In addition, Metro owns many smaller parcels, totaling more than 200 acres, within Forest Park proper; these lands are managed by the City of Portland under an intergovernmental agreement.

- → **LINNTON NEIGHBORHOOD ASSOCIATION**. Linnton, founded in 1843, remains bound to its origins as a live/work community. The neighborhood endeavors to balance its high expectations for livability and proper stewardship of the land with its continuing integration with, and support of, industry. As Portland's gateway to our coast and to our neighbors across the oceans, Linnton's vision is to reawaken, enhance, and protect our wonderful natural environment; and to expand on Portland's expertise of the built environment in order to express the larger community's commitment to a viable future.
- → **PORTLAND PARKS & RECREATION (PP&R)**. As the manager of Forest Park, PP&R is responsible for all natural resource planning and management activities within the park. PP&R runs the Protect the Best Program (a restoration crew working to maintain the highest quality acreage in Forest Park) and works with contractors and partner groups, including the Forest Park Conservancy, to complete restoration work throughout the park. PP&R manages a number of Metro-owned properties within the park as part of an intergovernmental agreement. PP&R sets goals and objectives for restoration activities and provides technical expertise in restoration planning and project implementation. The 1995 *Forest Park Natural Resource Management Plan* guides PP&R's management of the park.[4]
- → **THE INTERTWINE ALLIANCE**. The Intertwine Alliance is a Portland-Vancouver regional coalition of more than 100 nonprofit organizations, public agencies, and private firms working together to attract new sources of funding, better leverage existing investments, and more fully engage residents to connect with and steward the region's natural assets. The Intertwine Alliance accomplishes this work by acting as a convener and facilitator, building collaboration by connecting the wide range of voices and efforts of regional partners, finding new monies to support capacity, leveraging the assets of partners and others, and finding creative ways to engage all members of the community. Built on regional efforts dating back to 1988, The Intertwine Alliance was formed in 2008 and launched as an independent nonprofit organization in July 2011.
- → **WEST MULTNOMAH SOIL & WATER CONSERVATION DISTRICT (WMSWCD)**. WMSWCD works with private landowners in western Multnomah County to help them conserve and protect their natural resources, including water quality and biodiversity. WMSWCD has partnered with FPC to work with private landowners within the geographic boundaries outlined in this document and has financially supported FPC Day of Stewardship events and FPC work on priority private landowner parcels. WMSWCD staff provide technical expertise for conservation planning, mapping resources, and financial assistance to landowners for conservation plan implementation.

## Organization of This Document

The rest of this document explains common threats to ecosystem health, summarizes current conditions in the Greater Forest Park ecosystem, and presents conservation objectives and activities for achieving the overarching goals identified in this document.

4 Portland Parks & Recreation, Bureau of Planning, City of Portland, February 1995.

**Ivy flowers**

**Wave tree**

**TABLE 1**

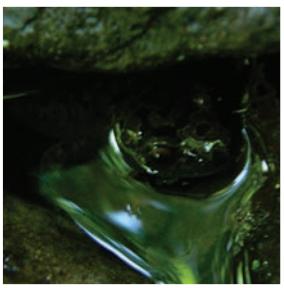
## About Forest Park

| | |
|---|---|
| **LOCATION** | Just west of downtown Portland, Oregon; located entirely within city limits |
| **OWNERSHIP** | The City of Portland is the largest single landowner of Forest Park, which is managed by PP&R's City Nature Division. Much of the work of assessing, planning, and managing the park's resources is the responsibility of PP&R. In addition, Metro, Audubon, and the Forest Park Conservancy own and manage large tracts of land within the Greater Forest Park ecosystem that provide critical wildlife habitat and biodiversity for the Portland area. [AS1] |
| **SIZE** | 5,200 acres |
| **HUMAN USES** | Hiking, walking, running, bird watching, enjoying nature, horseback riding, mountain biking |
| **COMMON SPECIES*** | *Mammals:* Northern flying squirrel, Townsend's chipmunk, blacktail deer, mountain beaver, bobcat, coyote, long-tailed weasel |
| | *Resident birds:* Pacific wren, dark-eyed junco, spotted towhee, black-capped chickadee, chestnut-backed chickadee, golden-crowned kinglet, pileated woodpecker, Steller's jay, Anna's hummingbird, pygmy owl |
| | *Migratory birds:* Rufous hummingbird, olive-sided flycatcher, Pacific-slope flycatcher, Swainson's thrush, western tanager |
| | *Amphibians:* Northern red-legged frogs, Pacific giant salamander, Dunn's salamander, Pacific tree frogs |
| | *Shrubs:* Sword fern (Polystichum munitum), salal (Gaultheria shallon), Oregon-grape (Mahonia nervosa and Mahonia aquifolium), lady fern (Athyrium filix-femina), red huckleberry (Vaccinium parvifolium), vine maple (Acer circinatum), western hazel (Corylus cornuta) |
| | *Flowers:* Wild ginger (Asarum caudatum), inside-out flower (Vancouveria hexandra), Hooker's fairy bells (Disporum hookeri), vanilla leaf (Achlys triphylla), trillium (Trillium ovatum) |
| | *Trees:* Red alder (Alnus rubra), bigleaf maple (Acer macrophyllum), Douglas-fir (Pseudotsuga menziesii), western hemlock (Tsuga heterophylla), western red cedar (Thuja plicata) |

Fish species are present in Forest Park but are not included in this list because of their limited distribution.

# Section 2

## THREATS TO ECOSYSTEM HEALTH



SECTION 2

# Threats to Ecosystem Health

For decades it was commonly assumed that natural areas would take care of themselves, the notion being that ecosystems were self-regulating and would sustain themselves over time. As settlers arrived in the Willamette Valley and Portland's population expanded, our forbearers changed the natural landscape in numerous ways: by logging portions of the native forest, disrupting natural cycles (including fire cycles), and introducing non-native plants and animals. This history, combined with more recent and even ongoing activities, has left the Greater Forest Park ecosystem vulnerable to a number of threats to its long-term health. Primary among them are habitat loss, degradation, and fragmentation; climate change; and invasive species.

## Habitat Loss, Degradation, and Fragmentation

**About This Threat.** One of the greatest threats to biodiversity and ecological processes is the destruction, degradation, and fragmentation of habitat. This is the result of several factors, a major one being the direct conversion of wetlands, prairies, and forests to other uses, including agriculture, roadways, utility corridors, and urban and suburban development.

Habitat loss and degradation also can result from timber harvest, wildlife (including historical wildfire) the effects of invasive species (especially plants), improper recreational uses, and various other human activities. Invasive plants play a role in the loss and degradation of native habitat because, when they move into an area, they often out-compete native species for nutrients and/or habitat; this results in the decline or extirpation of natives. Habitat alteration within utility corridors can cause extensive damage to native vegetation and soils, and regular utility corridor maintenance can remove large numbers of trees and shrubs and compact the soil. In these cases, the loss of shrub habitat is of concern because shrubs provide breeding habitat for sparrows, thrushes, and warblers, and flowering plants are used by pollinators such as hummingbirds, moths, and bees. Recreational activities—especially off-trail movements—can destroy habitat and displace wildlife. Trails themselves fragment existing natural areas and thus can affect wildlife that is sensitive to human influence. Timber harvest, fire, and woodcutting all reduce the number of large, old trees in a forest; this disrupts the long-term recruitment of coarse woody debris (i.e., fallen trees and branches) to streams and to the forest floor, where normally it would structure habitat, cycle nutrients, and provide food for a range of native species. Even in protected areas such as Forest Park, natural disturbances and current and past human activities can have the effect of degrading habitat, by reducing the diversity and health of vegetative communities and altering essential ecological processes. The resulting habitat is not necessarily the best habitat for native species, or not the specific habitat to which native species have adapted over time.

One effect of habitat loss and degradation is fragmentation of the remaining habitat. When fragmentation occurs, habitat patches become smaller and sometimes isolated, often resulting in a change of flora and fauna within that patch. Additional habitat degradation occurs when structures such as roads, culverts, and fences create barriers to traditional migration routes; in waterways, areas of warm water also can act as thermal barriers. The general scientific consensus is that connections between habitat fragments are crucial to the persistence of many species and populations, and that well-designed biodiversity corridors can help maintain biological diversity and ecosystem functions. Corridors provide the opportunity for many species to traverse habitat that is not suitable for permanent residency to locate

better habitat, find a mate, disperse from natural areas, escape predation or other dangers, and access habitats needed seasonally or at different life history stages. In isolated habitat patches, species become locally extinct over time; corridors allow for reintroduction of these species and facilitate genetic diversity. The longer a habitat patch is isolated, the fewer wildlife species it holds.

**Local Impact.** Forest Park has a history of extensive logging, multiple stand-replacing fires, and heavy recreational use.[5] This history of human and natural disturbance contributes to the preponderance of deciduous trees in the park and the high number of relatively young trees (between 50 and 100 years old). Currently there are eight public utility corridors in Forest Park, along with numerous roads, water storage structures, fire hydrants, and culverts, many of which are obsolete and non-functional. Surrounding lands within the Greater Forest Park ecosystem consist of lands managed for conservation and privately owned property that includes residences, private woodlands, small farms, utility corridors, and industrial sites.

Steps have been taken to protect the natural landscape of the Greater Forest Park ecosystem, through management by Portland Parks & Recreation and acquisition and conservation easement efforts by Metro, the Forest Park Conservancy, and the Columbia Land Trust. However, the *Forest Park Wildlife Report* identifies "the loss of habitat for foraging and immigration and the potential isolation of terrestrial wildlife populations" as an ongoing threat to the populations' persistence in Forest Park and surrounding ecosystem.[6] Many of the lands within the ecosystem remain privately held, and some of these are at risk of development or conversion. (In contrast, some lands are owned by private parties who are working with the Forest Park Alliance partners to improve native habitat and protect existing biodiversity corridors; these conservation efforts advance the goals of the Forest Park Alliance.)

Protecting forested habitat north of Forest Park is important because it maintains the connection between Forest Park and the Coast Range. In addition, conserving other habitats such as pastures, streams, ponds, and agricultural lands to the northwest and southwest (i.e., Rock and Abbey creeks and the Tualatin Hills) is critical to protecting species that rely on the Greater Forest Park ecosystem. Protecting habitat west of Skyline Boulevard is key to maintaining species such as northern red-legged frogs, deer, elk, and several species of birds.

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**GENERAL APPROACHES TO ADDRESS THIS THREAT:**

- → Secure funding to protect and restore vulnerable habitats through restoration, easements, acquisition, and preventive care.
- → Educate private landowners on invasive species removal, preservation and enhancement of native flora, the importance of habitat for wildlife, streamside management, and the effects of toxic contaminants on the ecosystem.
- → Implement mitigation and management to minimize impacts to native shrub habitat in utility corridors. Develop long-term strategies and plans between managers and utility companies to identify native plant species that can enhance wildlife habitat and allow for safe utility conveyance.
- → Effectively regulate and enforce trail use to combat habitat degradation and wildlife

5 *Forest Park Desired Future Condition* (Portland Parks & Recreation, January 2011. www.portlandoregon.gov/parks/article/335638.).

6 *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

displacement caused by recreational activities, especially off-trail movements and nighttime use of trails. For example, consider trail closures and relocation where there is consistent erosion or trail failures (i.e., Lower Macleay), study the potential impacts of proposed new trails on both wildlife and habitat, and follow best management practices for trail construction and maintenance to minimize impacts on the ecosystem.

## Climate Change

**About this Threat.** Environmental, economic, and social health depend on the ability of natural systems to provide ecosystem services such as clean air and water, forest productivity, habitat for pollinators, stormwater control, and flood abatement. The occurrence of climate change has been well documented. Over the last century, the Pacific Northwest has seen an increase in average temperature (by 1.5 degrees Fahrenheit), the loss of snowpack in the Cascades, and shifts in the timing and flow of streams.[7] Documented shifts in habitat, the extent and timing of migrations, and the geographic range of many insects, birds, trees, and flowering plants strongly suggest that climate change already is affecting our natural systems.[8] During the coming years, additional impacts are expected on birds, terrestrial wildlife, plants, aquatic species, and river flow, including flow in the Willamette and Columbia rivers.

Regionally, scientists recently published the *Oregon Climate Change Adaptation Framework* and *Washington Climate Change Impacts Statement.* These documents outline the potential effects of climate change in Oregon and Washington over the next 40 to 50 years. In Oregon, the following effects have been deemed very likely, likely, or more than likely to occur:

- → Increase in average annual temperatures and the likelihood of extreme heat events
- → Changes in the timing and quality of available water (i.e., more winter rain and drier summers)
- → Increase in wildfire frequency, intensity, and extent
- → Increased incidence of drought
- → Loss of wetlands
- → Increased frequency of extreme precipitation events and flood magnitude
- → Increased landslides

**Impact in Oregon.** According to the 2012 *Forest Park Wildlife Report,*[9] the *Oregon Climate Change Adaptation Framework* predicts the following for plant and wildlife species:

- → Wildlife and plant species will undergo both latitudinal and elevational shifts in geographic distribution.
- → Some species will decline in abundance or become locally extinct.
- → Species strongly associated with aquatic, wetland, and riparian habitats will suffer detrimental impacts as a result of reduced stream flows and increased drought; fish and amphibians will be the most vulnerable.

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7 *Oregon Climate Change Assessment Report* (Oregon Climate Change Research Institute, 2010).

8 Ibid, plus "Climate Change Impacts on Streamflow Extremes and Summertime Stream Temperatures and their Possible Consequences for Freshwater Salmon Habitat in Washington State" (Mantua et al. 2010 In *Climate Change), The Washington Climate Change Impacts Assessment (*Climate Impacts Group, 2009), and *Climate Change Impacts on Columbia River Basin Fish and Wildlife (*Independent Scientific Advisory Board, 2007).

9 *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

- → The life cycles of plants and animals (such as pollinators) will be out of sync.
- → Non-native pests will most likely become more abundant as temperatures increase, directly affecting the food web.

**GENERAL APPROACHES TO ADDRESS THIS THREAT:**

- → Prepare for changes that already are occurring or are generally known to occur. This is critical because the exact future effects of climate change are unknown.
- → Be flexible and adaptable in managing natural resources, while maintaining and restoring the resilience of our natural systems.
- → Maintain adequately connected habitat in good ecological condition.
- → Restore riparian and upland areas and increase the quality of habitat for fish and other aquatic species.
- → Identify Forest Park and its surrounding ecosystem as providing carbon sequestration and develop management objectives that incorporate carbon sequestration strategies across the landscape. (Urban forested habitats, such as those within the Greater Forest Park ecosystem, have been shown to provide significant urban sequestration of carbon.)
- → Conduct studies to determine how much carbon the Greater Forest Park ecosystem can sequester and dovetail sequestration efforts with ongoing management. Such studies will help determine important decisions for land use planning, land acquisition, restoration priorities, and management of natural areas.

## Invasive Plant and Animal Species

**About This Threat.** There are many definitions of invasive species. A robust and concise definition used in the *Regional Conservation Strategy* is a species that is "non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health."[10]

Invasive species have detrimental impacts on both habitat and the viability of native species. When invasive plants and animals become dominant, they often out-compete native species for food or habitat or disrupt the food web, causing a decline in native species. In some cases, loss of one native species leads to the loss of another that relies on it for essential resources. For example, the Fender's blue butterfly relies on the Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) for larval food, so a loss of Kincaid's lupine can lead to a decline in the Fender's blue butterfly population. In addition, non-native wildlife can carry diseases to which native species have no resistance and humans may be susceptible. West Nile virus is one example.

The presence of non-native invasive plants and animals is a primary threat to forest health and biodiversity, especially in urbanized areas, where habitat already is fragmented and in many cases degraded. In fact, the percentage of non-native species tends to be greater near urban areas than in more isolated locations. Shade-tolerant weeds such as English and Irish ivy can eliminate large trees and other native plants.

10 *Regional Conservation Strategy for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

English and Irish ivy and many other ornamental plants from other parts of the world were brought to the United States and have spread widely. In their native range these plants are held in check by other plants that co-evolved with them, pests, predators, and the weather regime. When introduced into U.S. forests, some of these plants have been able to out-compete native plants; over time they are capable of undermining the ecological health of native ecosystems.

**Local Impact.** Invasive species infestations are high in some areas of the ecosystem. Increasingly, the Greater Forest Park ecosystem is threatened by a variety of non-native invasive plants, including English and Irish ivy, English holly (*Ilex aquifolium*), Armenian blackberry (*Rubus bifrons* syns. *Rubus armeniacus, Rubus discolor*), Clematis, and garlic mustard. Of these, English and Irish ivy, Clematis, and garlic mustard likely pose the greatest threat to the long-term health of the ecosystem. Advanced ivy encroachment up into the trees weakens them, rendering them top heavy and more susceptible to windfall (via the sail effect) or snow-loading events. Ground ivy prevents establishment of native plants and can out-compete conifer seedlings in the forest understory. Thick Clematis canopies can block light and break native trees, allowing encroachment of additional invasive species. Garlic mustard alters soil chemistry, making it less suitable for native species.

The end result, which can be seen today in some areas of the Greater Forest Park ecosystem, is a mixed forest of maturing and threatened trees with limited numbers of conifer seedlings being established at the ground level. As the mature trees begin to die off, the forest may lack a viable next generation to take their place. In the absence of intervention, the worst-case scenario in these areas would be an eventual "ivy desert": a forest devoid of native trees, with trace numbers of native shrubs. This type of forest would lack biodiversity and be unable to provide habitat for native wildlife.

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**GENERAL APPROACHES TO ADDRESS THIS THREAT:**

→ Facilitate cooperative efforts by landowners and managers to remove invasive species and restore native habitat, because invasive species readily cross ownership boundaries.

→ Protect and increase habitat connectivity between natural areas, especially near urban areas where habitat is limited and can become isolated.

→ Increase preventive measures, such as signage and boot brushes at trailheads, to reduce trails as invasive species vectors.

**TABLE 2**

## Connections between Objectives and Threats

| | | | INVASIVE SPECIES | CLIMATE–BIOLOGICAL COMMUNITY | CLIMATE–PHYSICAL PROCESSES | HABITAT–FRAGMENTATION | HABITAT–CONVERSION | HABITAT–DEGRADATION | HABITAT–LOSS |
|---|---|---|---|---|---|---|---|---|---|
| **GOAL AREA** | 1. | Streams: Protect and improve hydrologic processes and water quality in area streams, to safeguard watershed functions and human health. | | | | | | | |
| | 2. | Connectivity: Protect and improve connectivity between Forest Park, the Tualatin Mountains, the Coast Range, and the Willamette River. | | | | | | | |
| | 3. | Forests: Maintain and improve forests to support diversity, structural integrity, connectivity, and complexity. | | | | | | | |
| | 4. | Wildlife: Maintain and protect native wildlife diversity. | | | | | | | |
| | 5. | Funding: Attract financial resources to help achieve these goals. | | | | | | | |
| **OBJECTIVES** | | | | | | | | | |
| **STREAMS** | S1: | Improve water quality on all tributaries within the Greater Forest Park ecosystem. | ● | | | ● | | ● | ● |
| | S2: | Conserve and improve riparian habitat on all subwatersheds within the Greater Forest Park ecosystem. | ● | ● | ● | ● | | ● | ● |
| | S3: | Improve upland habitat conditions in each tributary. | ● | ● | ● | ● | | ● | |
| | S4: | Reduce the negative impacts of invasive plants on overall watershed health (e.g., increased sediment and stream temperatures and reduced canopy cover). | ● | ● | ● | ● | ● | ● | ● |
| **CONNECTIVITY** | C1: | Refine regional connectivity information. | | | | ● | ● | ● | ● |
| | C2: | Protect and enhance connectivity through acquisitions, easements, and voluntary management agreements. | | | | ● | ● | ● | ● |
| | C3: | Protect and enhance connectivity through habitat enhancements. | | | | | | ● | ● |
| | C4: | Use up-to-date tools for responding to EDRR species that could take advantage of enhanced connectivity. | ● | | | | | ● | |
| | C5: | Plan and manage infrastructure to protect connectivity. | | | | ● | | | |
| **FORESTS** | F1: | Finish assessments of forest conditions. | | ● | | | | ● | |
| | F2: | Actively manage land to create the key structural and compositional components of old-growth forest ecosystems where opportunities exist. | | ● | | | | | ● |
| | F3: | Protect native flora within the Greater Forest Park ecosystem. | | | | | | ● | ● |
| | F4: | Protect and preserve special habitat features (e.g., snags, downed wood, forest openings, rock habitats, springs and seeps, vernal pools, fens, and off-channel habitats). | | | | ● | ● | ● | ● |
| | F5: | Remove and control invasive plant species, to reduce the decline of native species populations. | ● | | | | | ● | |

**TABLE 2 (CONTINUED)**

## Connections between Objectives and Threats

| | | | INVASIVE SPECIES | CLIMATE–BIOLOGICAL COMMUNITY | CLIMATE–PHYSICAL PROCESSES | HABITAT–FRAGMENTATION | HABITAT–CONVERSION | HABITAT–DEGRADATION | HABIITAT–LOSS |
|---|---|---|---|---|---|---|---|---|---|
| **GOAL AREA** | 1. | Streams: Protect and improve hydrologic processes and water quality in area streams, to safeguard watershed functions and human health. | | | | | | | |
| | 2. | Connectivity: Protect and improve connectivity between Forest Park, the Tualatin Mountains, the Coast Range, and the Willamette River. | | | | | | | |
| | 3. | Forests: Maintain and improve forests to support diversity, structural integrity, connectivity, and complexity. | | | | | | | |
| | 4. | Wildlife: Maintain and protect native wildlife diversity. | | | | | | | |
| | 5. | Funding: Attract financial resources to help achieve these goals. | | | | | | | |
| **OBJECTIVES** | | | | | | | | | |
| **WILDLIFE** | W1: | Maintain or increase the diversity of invertebrates in terrestrial and aquatic environments. | | ● | | | | ● | |
| | W2: | Improve understanding of the presence/absence of fish species and the potential for native fish species within each tributary. | ● | ● | | ● | | ● | ● |
| | W3: | Develop "desired future conditions" for native fish populations. | ● | ● | | ● | | ● | ● |
| | W4: | Improve fish passage and critical habitat connections for aquatic organisms. | | | | ● | | | ● |
| | W5: | Implement projects that improve overall conditions for fish. | | | | ● | | ● | |
| | W6: | Fill data gaps regarding the life history, habitat needs, and status and trends of amphibian and reptile species. | ● | ● | | ● | | ● | ● |
| | W7: | Maintain and protect habitat and associated corridors that amphibians and reptiles need to complete all of their life stages. | | ● | | ● | ● | ● | ● |
| | W8: | Implement conservation strategies that restore key habitat features in aquatic and upland habitats. | | ● | | ● | ● | ● | ● |
| | W9: | Support existing efforts and conduct studies that monitor bird populations where decline has been documented or is suspected. | ● | ● | | ● | | ● | ● |
| | W10: | Minimize the degradation, loss, and fragmentation of bird habitat. | | | | ● | ● | ● | ● |
| | W11: | Minimize disturbance during important times in the avian life cycle, such as breeding and nesting. | | | | | | ● | |
| | W12: | Conduct further research to determine presence/absence, abundance, distribution, and connectivity needs of mammalian species on lands managed for conservation. | | | | ● | ● | ● | ● |
| | W13: | Improve habitat connectivity for mammals. | | | | ● | ● | ● | ● |

# Section 3

## CURRENT CONDITIONS

SECTION 3

# Current Conditions

In establishing long-term objectives and developing specific, on-the-ground conservation plans, it is essential to consider the current condition of the forests, streams, and fish and wildlife in the focal area. This section summarizes current conditions in and around the Greater Forest Park ecosystem. Additional information is available from the Forest Park Alliance's partner organizations, the references cited here, the Intertwine Alliance's *Regional Conservation Strategy for the Greater Portland-Vancouver Region* and *Biodiversity Guide for the Greater Portland-Vancouver Region*,[11] and the City of Portland's *Terrestrial Ecology and Enhancement Strategy*.[12]

The condition of natural resources in the Greater Forest Park ecosystem varies throughout the ecosystem, as does the amount of baseline data on the different components of the ecosystem. In general, more information is available on natural resource conditions in areas managed by public agencies or nonprofit organizations than on lands held in private ownership or for industry use. Looking ahead to how the information in this section will be used, it will be important to work with land managers to fill any pertinent data gaps, so that more complete, accurate, and effective conservation plans can be developed.

## Forest Health

Old-growth forest occupies only a tiny fraction of the greater Portland-Vancouver region. A majority of the upland forests in the region have been harvested multiple times or have recently occupied areas of former prairie or oak habitat. Many forests in the region are less than 60 years old and historically were managed for timber production; this is true of much of the foothills of the Coast Range and Cascades. Forests in these areas tend to be densely planted with Douglas-fir and generally lack a significant shrub and tree layer beneath the canopy.

Although clear-cut harvest creates open conditions favorable for many species, it typically does not leave important biological elements from the previous stand. For example, in most commercial timber stands, large dead wood is limited. As a consequence of this lack of biological legacy, forests that have developed following harvest and subsequent abandonment vary greatly in species composition, depending on harvest method, fire intensity, conditions immediately after harvest, and the amount of time since harvest.

The diversity of native flora is an indicator of whether a system is healthy and biodiversity is being maintained. When habitat is destroyed or the life cycle of flora is interrupted, native species can decline and in some cases become extirpated. According to the *Biodiversity Guide for the Greater Portland- Vancouver Region*, known native plant species in the region number roughly 650, approximately 250 of which either have been extirpated or have not been detected in 20 years. The biggest threats to native flora in the region are non-native plant and animal species, introduced pests and pathogens, continued habitat loss, and lack of knowledge.[13]

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11 *Regional Conservation Strategy for the Greater Portland-Vancouver Region* and *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

12 *Terrestrial Ecology and Enhancement Strategy* (City of Portland, 2011, www.portlandoregon.gov/bes/51052).

13 "Flora of the Region," in the Biodiversity Guide for the Greater Portland-Vancouver Region (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

Pollinators such as butterflies, native bees, and other insects depend on flowering plants for habitat. Plant diversity and insect diversity are directly correlated, such that the loss of one can mean the loss of another. Loss of habitat usually is linked to population reductions, which lead to reduced genetic diversity of a species. When this happens, species lose their ability to adapt to different environmental conditions and cross-breeding between native and non-native species can occur. Hybridization threatens species viability, and eventually natives can be reduced or replaced by hybrids. Thus, it is critical to maintain and conserve large areas of habitat to prevent additional habitat loss and fragmentation.

## Forest Conditions in Forest Park

Blanketing a steep slope rising northwest of downtown Portland, Forest Park has more than 5,200 acres of native forest that includes special-status habitats such as interior forest and oak woodlands. Aerial analysis shows that 99 percent of Forest Park is forested. Stands range from almost pure conifer to mixed conifer/broadleaf to almost pure deciduous; the latter is dominated by bigleaf maple, alder, and various shrubs. Stands located on lands owned by Metro and private parties have a strong component of alder, maple (*Acer* spp.), bitter cherry (*Prunus emarginata*), and other shrubs. One-quarter of Forest Park is conifer-dominated forest, and three-quarters consists of mixed conifer-deciduous forest—largely bigleaf maple and red alder with a conifer component. Because of the lack of forest openings, native shrub habitat is fairly uncommon in and around Forest Park and is found most often as a component to forest understory. Power line corridors within the park are a combination of shrub and open grassland habitat that, with restoration, could provide enhanced opportunities for pollinator habitat.

The diversity of flora in Forest Park is attributable in part to the fact that the park is located along the eastern edge of the western hemlock vegetation zone but also is influenced by the Willamette Valley vegetation zone.[14] The western hemlock vegetation zone is the most extensive vegetation zone in western Oregon and Washington.[15] Although western hemlock (*Tsuga heterophylla*) is considered the climax species for this vegetation type, Douglas-fir, 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 (at least three in recent history) and a history of extensive logging and other human disturbances have significantly altered the natural progression of forest succession, leading to a forest composition that is typical of a second-growth Douglas-fir forest. Much of the forest in Forest Park is composed of relatively young trees, between 50 and 100 years old.[16] In the Willamette Valley vegetation zone, the dominant tree species are Douglas-fir, grand fir (*Abies grandis*), Oregon white oak (*Quercus garryana*), Pacific madrone (*Arbutus menziesii*), and bigleaf maple. All of these species are found within Forest Park, although Oregon white oak and Pacific madrone are primarily restricted to distinct portions of eastern slopes in the park.

With its complex history of past disturbance, Forest Park has a variety of vegetation types associated with different successional stages. An extensive classification of the park identified six distinct successional stages (see Table 3).

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14 *Forest Park Desired Future Condition* (Portland Parks & Recreation, January 2011 www.portlandoregon.gov/parks/article/335638).

15 *Natural Vegetation of Oregon and Washington* (J.F. Franklin and C.T. Dyrness, 1973, Gen.Tech.Rep. PNW-GTR-008. Portland. OR: U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station).

16 *Forest Stand Management Recommendations: Metro's Agency and Ennis Creek Tracts* (Trout Mountain Forestry, 2012).

**TABLE 3**

## Successional Stages Found throughout Forest Park[17]

| VEGETATION TYPE | AGE RANGE ASSOCIATED WITH STAND | PERCENT OF TOTAL ACRES | ASSOCIATED ALLIANCES |
|---|---|---|---|
| Grass-forb | 2-5 | 0.7% | Disturbance corridor |
| Shrub | 3-10 or 3-20 with no conifer regeneration | 2.2% | Disturbance corridor<br>Bigleaf maple forest<br>Bigleaf maple seasonally flooded forest |
| Hardwood young conifer | 10-35 | 19.0% | Douglas-fir bigleaf maple forest |
| Harwood topped by conifer | 30-80 | 41.7% | Douglas-fir western hemlock forest<br>Douglas-fir Oregon white oak woodland |
| Mid-aged conifer | 80-250 | 24.6% | Bigleaf maple forest<br>Bigleaf maple seasonally flooded forest |
| Mature hardwood | 30-100 | 11.3% | Douglas-fir giant forest |
| Old growth | >250 years | 0.5% | |

17 Forest Park: One City's Wilderness. Its Wildlife and Habitat Interrelationships (M.C. Houle, 1982. Oregon Parks Foundation, Portland, Oregon).

Although still mostly healthy, the native vegetation in Forest Park is threatened. Approximately 30 percent of the park[18] is under threat by non-native invasive weeds such as English and Irish ivy, garlic mustard, Clematis, Armenian blackberry, and English holly, which are able to out-compete native flora, thus effectively reducing habitat for native wildlife. Left unchecked, these invasive plants will fundamentally and dramatically change the character of Forest Park. Furthermore, habitat fragmentation continues to threaten Forest Park's vital link with the broader ecosystem and the crucial biodiversity corridors that extend between the park and the Oregon Coast Range.

## Forest Conditions on Metro-owned Properties

Metro owns several natural areas within the Greater Forest Park ecosystem (see Figure 4) and is in the process of writing site-specific conservation plans for all of its properties within the ecosystem. Two Metro-owned tracts within the boundary of the Greater Forest Park ecosystem that already have management plans in place are Ennis Creek and Burlington Creek (formerly known as Agency Creek). These properties, which occupy approximately 670 acres north of Forest Park, historically were managed for timber harvest, before being acquired by Metro to protect water quality, wildlife habitat, and access to nature for the region's residents. In 2012 Trout Mountain Forestry completed a forest inventory and management recommendations for the Ennis and Burlington Creek tracts. The goal of this report was to describe existing conditions and make recommendations for managing these properties to achieve Metro's desired future condition of "a mosaic of healthy and diverse forests that are resistant to disease and fire and provide a variety of habitats and habitat connectivity for wildlife."[19] The descriptions below are summarized from the 2012 Trout Mountain Forestry report.

18 Forest Park Desired Future Condition (Portland Parks & Recreation, January 2011. www.portlandoregon.gov/parks/article/335638.).

19 Forest Stand Management Recommendations: Metro's Agency and Ennis Creek Tracts (Trout Mountain Forestry, 2012).

### BURLINGTON CREEK (FORMERLY AGENCY CREEK)

Forest vegetation on the Burlington Creek tract falls into three general types—hardwood, Douglas-fir plantation, and mature conifer/hardwood—each of which has its own history of management. There are also some scattered Oregon white oak trees along the eastern portion of the property, mainly along the railroad right-of-way and the interface with private properties. Oregon white oaks occupy only a very small portion of the property.

The Douglas-fir plantation type is the dominant type on the Burlington Creek property, covering approximately half the total acreage, with an overall density estimated at 622 trees (> 3 inches diameter) per acre. The hardwood type occupies a large swath of the Burlington Creek property. Areas dominated by hardwood forest vegetation have been largely unmanaged since they were last harvested and vary in tree density and composition from acre to acre. Overall density is high, at an estimated 623 trees (> 3 inches diameter) per acre.

Mature conifer/hardwood forest vegetation, which is dispersed on several areas of the property, is characterized by mature second-growth conifer and hardwood forest, with a scattering of remnant old-growth Douglas-fir and young, shade-tolerant conifers in the understory. The overall tree density is very high, estimated at 443 trees (> 3 inches diameter) per acre.

### ENNIS CREEK

Forest vegetation on the Ennis Creek tract was divided into five general types: hardwood, Douglas-fir plantation, mature conifer/hardwood, young conifer/hardwood, and mature hardwood.

Mixed conifer/hardwood is the dominant forest vegetation type on the Ennis Creek property and is characterized by moderate survival of planted Douglas-fir mixed with maple, alder, and cherry (*Prunus* spp.). The surviving planted trees have a clumped or aggregated arrangement throughout the stand. This arrangement mimics naturally regenerated stands and will help prevent the spread of root diseases, such as laminated root rot (*Phellinus weirii*).

The younger hardwood type at Ennis Creek is the second most common forest vegetation type, covering several large swaths across the central and northern thirds of the property. Stocking is extremely high, at almost 1,500 trees per acre. The dominant trees are maple stump sprouts, naturally regenerated bitter cherry and red alder, and planted Douglas-fir. A small amount of cedar and grand fir also are present. After the most recent logging of the site, it was replanted with Douglas-fir; however, because of a lack of follow-up treatments to kill the competing hardwoods, less than 50 percent of the planted fir survived.

The Douglas-fir plantation type is characterized by a well-stocked plantation of Douglas-fir, accompanied by grand fir, alder, and bigleaf maple stump sprouts. On both the Ennis Creek and Burlington Creek properties, the diversity of understory shrubs in the Douglas-fir plantation type is the lowest of all the forest vegetation types, with only four species recorded. Armenian blackberry is the most abundant, with 7 percent cover.

The mature conifer/hardwood type covers a block in the northeast portion of the property, as well as a few small parcels northeast of the power line right-of-way. It is a second-growth conifer and hardwood forest with a canopy dominated by large Douglas-fir, hemlock, cedar, alder, and maple. Younger cedar and hemlock growing in the understory and mid-story eventually will create an uneven-aged structure. English and Irish ivy are the most prevalent understory species and apparently have spread up from the power line right-of-way. Other major species include vine maple, oceanspray (*Holodiscus discolor*), hazel (*Corylus cornuta*), cascara (*Rhamnus purshiana*), Oregon-grape, and elderberry (*Sambucus racemosa* and *Sambucus caerulea)*.

The mature hardwood forest type covers the majority of the southern portion of the Ennis Creek property and is dominated by alder and maple, with scattered cedar and Douglas-fir. Many of the maple and fir trees are rather large and have the potential to provide excellent wildlife habitat. This forest vegetation type has lower understory shrub diversity than some of the younger types because of the dense shade cast by much of the older forest, as well as the intense competition from established patches of vine maple and salmonberry (*Rubus spectabilis*) in canopy gaps.

#### MCCARTHY CREEK

In 2011, Metro acquired 388 acres in the McCarthy Creek watershed with the goal of protecting habitat adjacent to key Rock Creek tributaries and associated wetlands. The acquisition protects a habitat corridor around Abbey Creek that links the Rock Creek watershed with Forest Park. Together with160 acres of land purchased just across Northwest Skyline Road, the McCarthy Creek acquisition expands an anchor site to a total of more than 540 acres. With the recent expansion of the urban growth boundary nearby, Metro considers it critically important to keep the forest intact along this corridor.[20]

The 388 acres are a combination of two acquisition parcels that historically have been managed as commercial forestland. These core acres of upland habitat consist of steep hillsides covered with dense, young Douglas-fir and bigleaf maple trees, as well as western red cedar, western hemlock, alder, and cottonwood. The larger trees and snags are concentrated around the riparian areas; however, there is a smaller 47-acre parcel of older, larger trees.

McCarthy Creek is a fish-bearing stream that supports coho, spring and fall Chinook, and winter steelhead in its lower reaches. This acquisition secured 2.5 miles of the McCarthy Creek, its tributaries, and associated riparian habitat. This area also contains early seral shrub habitat, which provides habitat for neotropical migrants such as the olive-sided flycatcher.

Metro's goal for this property is to transition it from a commercial timber harvest operation to a more diverse, mature forest through by controlling invasive species and implementing other best management practices, such as conducting deferred maintenance on a system of legacy logging roads, some of which may be decommissioned. These measures are expected to increase the diversity of wildlife habitat and improve water quality.

## Forest Park Conservancy: Ancient Forest Preserve

In 1990, the Friends of Forest Park (now the Forest Park Conservancy) completed the purchase of a 38-acre remnant old-growth parcel just 11 miles outside of Portland, on the eastern slope of the Tualatin Mountain Range (see Figure 4). With more than 90 percent of the Pacific Northwest's original old-growth forest gone, what is now the Forest Park Conservancy's Ancient Forest Preserve gives Portland-area residents a chance to experience an old-growth forest close to home. The preserve is an important link between several regionally significant natural areas and serves as part of a larger biodiversity corridor that connects Forest Park (just 2.5 miles from the preserve's southern boundary), Oregon's Coast Range, and Burlington Bottoms wetlands (located at the base of the Ancient Forest Preserve's watershed).

The 38-acre preserve includes 29 acres of old-growth forest conditions and 9 acres of early successional forest. There are conservation easements over approximately 370 acres of adjacent land just south and east of the preserve boundary. These easements were acquired from the Agency Creek Management Company and Linnton Rock Corporation and have specific management restrictions for timber harvest and development, to protect critical biodiversity corridors between Forest Park and the Coast Range.

20 Natural Areas Program Land Acquisition (Metro. December 21, 2011, memo).

There are four distinct vegetation communities in the Ancient Forest Preserve: upland scrub-shrub, immature riparian forest, mature and old-growth forest, and mature riparian forest. In a 1996 Metro study, both clear-cut and forested areas of the watershed offered significant plant species diversity and abundance.[21] The interior of the forest contains greater abundance and diversity of forest species than the edge habitat adjacent to it. The early successional forest has lower species diversity and abundance, and the presence of non-native species will slow the rate of succession over time.

Portions of the Ancient Forest Preserve and surrounding easement lands have been affected by harvesting, fires, and mining, which have partially isolated preserve land from the Coast Range and Forest Park. In addition, Highway 30 acts as a barrier between the upper and lower portions of the watershed. As a result of these disturbances, the interior 29 acres of intact old growth now functions as edge habitat.[22] As forest succession moves forward and the forest matures, the effects of this edge habitat will be reduced. Studies have shown that to adequately maintain interior habitat for old-growth plant and animal species, a core of old-growth forest must be maintained at least 200 feet from the edge of a different forest structural stage or age.[23] The Forest Park Conservancy will manage the Ancient Forest Preserve for old-growth habitat conditions.

## Forest Conditions on Audubon-owned Properties

The Audubon Society of Portland manages 150 acres of forested wildlife sanctuary adjacent to the southwest corner of Forest Park near Upper Macleay Park. These 150 acres are managed as three parcels: the 30-acre Pittock Sanctuary (acquired in 1930), the 34-acre Uhtoff Sanctuary (acquired in several purchase beginning in 1981), and the 86-acre Collins Sanctuary (acquired by Metro from the Oregon Parks Foundation in 2008). Audubon manages all three parcels for wildlife habitat and passive recreation. A total of 4 miles of trails wind through the three parcels, which are bisected by Cornell Road. Bicycles, horses, and dogs are prohibited on Audubon's trails (with the exception of service animals) because they disrupt avian habitat—particularly during nesting season—and increase erosion, user conflicts, and safety issues on trails. A series of interpretive signs at the visitor center and on the trails introduce visitors to the communities of flora and fauna that can be found in the Greater Forest Park ecosystem. The visitor center, located on Cornell Road, includes office space, a wildlife hospital, and an onsite caretaker's residence. Total developed area is less than 1 acre.

### PITTOCK SANCTUARY

Audubon purchased 12 acres of this parcel in early 1930, with the remaining 18 acres donated by the Pittock estate later that year. Photographs of the property from the early 1930s show stands of conifers of mixed age on the northern half of the property and grass and shrub habitat on the southern half. Balch Creek flows through these open meadows, and there is little streamside habitat. Anecdotal evidence, supported by what is seen in the photographs, indicates that the property once housed a small family dairy.

Audubon volunteers put considerable effort into the property in the 1930s and 1940s. An area just north of Balch Creek, which was severely degraded as a result of seasonal flows from a small creek and cattle grazing in the area, was excavated to create a pond, with an earthen dam separating the pond from Balch Creek. Although Audubon still holds a historical water right to withdraw water from Balch Creek to keep the pond full when seasonal flows are inadequate to maintain water levels, it has not exercised this water right for at least 40 years.

21 *Ancient Forest Preserve: Draft Master Plan* (Metro, 1996).

22 *Ancient Forest Preserve: Draft Master Plan* (Metro, 1996).

23 *Ancient Forest Preserve: Draft Master Plan* (Metro, 1996).

Trails were built and many trees were planted. Not all of these trees were native species; a California laurel (*Umbellularia californica*), a redwood (*Sequoia sempervirens*), a few giant Sequoia (*Sequoiadendron giganteum*), and some cherry and plum (*Prunus* spp.) species are still present.

The Pittock Sanctuary forest is predominantly mixed-aged conifer and hardwood topped by conifer. Small areas around the pond are still dominated by hardwood, but some remnant old-growth Douglas-fir trees can be found in the northern portion of the parcel. These trees are approximately 250 to 300 years old, with the two tallest trees measuring approximately 255 feet. There is a healthy understory of red cedar, hemlock, and grand fir but a notable lack of coarse woody debris on the ground for an area with such old trees. This is in part because most of the downed wood resulting from the extensive windfall from the 1962 Columbus Day storm was removed.

Roughly 95 percent of the Pittock Sanctuary is free of invasive plant species. A significant restoration effort took place from 2007 to 2010, with funding for AmeriCorps field teams and large volunteer work parties coming from Metro's Nature in Neighborhoods program, Portland's Bureau of Environmental Services' Watershed Investment Fund, and Toyota and National Audubon's Together Green Volunteer Initiative. Several acres of English and Irish ivy were cleared manually, English holly up to 2 inches in diameter was pulled with weed wrenches, scattered patches of Vinca (*Vinca* spp.) were removed manually, and blackberry was removed in several small patches. A second restoration effort took place from 2011 to 2013 with additional funds from Metro's Nature in Neighborhoods program. Contract crews treated ivy and Clematis on the steep slopes between Cornell Road and Balch Creek, roadside populations of Vinca were eradicated, blackberries were cut and treated, and English holly and hawthorn (*Crataegus* spp.) were cut and stump treated. The only remaining significant invasive plant communities are the roadside garlic mustard, which despite constant vigilance has spread in small patches into the forest, and a ¼-acre area of reed canary grass (*Phalarus arundinacea*) that has taken over an area formerly dominated by ivy and blackberry.

### UHTOFF SANCTUARY

The Uhtoff Sanctuary first came into existence in 1981 when Audubon purchased 21 acres on the south side of Cornell Road. Funds for this acquisition were raised by Audubon members. Over the years additional contiguous parcels have been added, the most recent a 2007 purchase of 5 acres that connect to Hilltop Drive near Barnes Road. There are no trails or access to these recent acquisitions. A 1920s- or 1930s-era house that sits on the 21-acre parcel now serves as the caretaker's residence for Audubon.

The forest of the Uhtoff Sanctuary is predominantly mixed-age conifer. There are several notable hemlocks of great age, all of which appear to be nearing the end of their lifespan, as well as a few very old Douglas-firs and bigleaf maples. The trailed section of the Uhtoff Sanctuary has a healthy understory of red cedar and hemlock. The upper reaches of the property, which are the more recently acquired parcels, have a stronger hardwood component.

When Audubon's restoration efforts began in earnest in 2007 the Uhtoff Sanctuary had the lowest percentage of invasive plant cover of the three parcels. There was a 2-acre patch of English and Irish ivy on the western boundary of the property (bordering the Collins Sanctuary), a few small patches of ivy throughout, and some scattered English holly. Given the relatively good condition of the forest overall, this parcel has been the lowest priority for restoration. Volunteer restoration work by the Boy Scouts and others has made a significant dent in the ivy populations. For 2013-2014 Audubon plans a one-time treatment of the property by contractors, to deal with the remaining ivy and holly.

### COLLINS SANCTUARY

In 2007 the Collins Sanctuary was in the worst condition of all of the parcels managed by Audubon. The property had been logged twice—once in the 1800s and again in the mid 1950s. Ivy, Clematis, holly, and hawthorn were abundant. Despite a reasonably well-established mixed canopy, the understory layer was severely lacking, and invasives dominated the shrub and ground cover layer, leaving this parcel severely degraded. Audubon decided to focus its initial efforts on the Pittock Sanctuary in order to protect the resources associated with Balch Creek and the remnant old growth on that parcel.

Following acquisition of the Collins Sanctuary by Metro in 2008, an intensive 2-year restoration effort began as part of the stabilization process that Metro performs on its new acquisitions. Contract crews treated the property several times, almost entirely eliminating the invasive plant communities.

Since stabilization Audubon has taken on the role of onsite steward of the Collins Sanctuary. The primary concern regarding invasive plants has been the battle against garlic mustard on the roadside corridors of both Cornell Road and Skyline Drive. To date Audubon has been successful in keeping garlic mustard from reaching the interior of the property.

Audubon and Metro have partnered with Friends of Trees to work on reestablishing a healthy understory layer. Since 2010 two plantings a year have taken place at the Collins Sanctuary. The plantings have been coordinated by Friends of Trees, with Audubon, Metro, and Friends of Trees jointly determining the species to be planted. This partnership is based on 10 years of planting experience, with the goal of introducing 10,000 native trees and shrubs in the Collins Sanctuary.

## Wildfire: Role and Risk

Natural and anthropogenic wildfire is a habitat-forming process that for centuries shaped the landscapes of western Oregon, influencing which flora and fauna were present—and in what combinations—in prairies, savannas, woodlands, and forests. Until 1850, wildfire played a significant role in shaping conifer-dominated forests in the Coast Range and its foothills, including what is now the Greater Forest Park ecosystem. These lower intensity fires burned erratically, leaving areas of large living trees, damaged and dead trees, and large fallen trees in irregular patches across the landscape. Historically this mosaic of fire effects provided a variety of habitat structures for many species, from bacteria to woodpeckers. However, since 1850, widespread anthropogenic fire has ended, natural wildfire has been suppressed, and timber harvest has replaced wildfire as the primary means of forest regeneration. According to the *Biodiversity Guide for the Greater Portland-Vancouver Region*, this loss of a natural habitat-forming process threatens the region's biodiversity.[24]

There are obvious challenges in restoring wildfire to the ecosystem because fire can threaten homes and businesses, not to mention human life. Ironically, in many areas the loss of natural wildfire has led to a buildup of forest fuel loads that increases the risk of high-intensity, so-called catastrophic wildfire, such as a sustained crown fire, that could threaten structures on neighboring property.

With the construction of hundreds of new homes near Forest Park during the last two decades, there may be greater potential for loss from wildfire than there was previously.[25]

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24 *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

25 *Portland Wildfire Readiness Assessment: Gap Analysis Report* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009).

However, the current predominance of mixed conifer-deciduous forest in the park, rather than more fire-prone conifer-dominated forest, may reduce risk from wildfire. (Deciduous forests retain high amounts of moisture and lack the readily flammable resins found in conifers.[26]) The 2009 *Portland Wildfire Readiness Assessment: Gap Analysis Report* describes Forest Park's vegetation as "mostly in a fire-resistant state due to the native species mix and relatively low fuel build-up."[27] This assessment represents current conditions only. The report notes that in certain areas, high-risk fuels such as Clematis and blackberry have the potential to build up over time and that "during a severe drought, park vegetation that is not normally flammable could dry out enough to carry a fire into the forest canopy where it would be very difficult to bring under control."[28] Climate change could increase the vegetation's susceptibility to catastrophic wildfire by extending the dry season.[29] Additionally, fire risk in Forest Park would be expected to rise if, over the long term, the park were to become dominated by conifers, such as in old-growth forest conditions with heavy ground fuels.

Clearly, balance needs to be struck between protecting and restoring ecologically functional vegetation in the Greater Forest Park ecosystem and maintaining safety for surrounding landowners and their property. In 2011 Portland Parks & Recreation identified reducing the risk of catastrophic fire as one of its goals for Forest Park and has outlined projects to map vulnerable areas, inventory and monitor fuel loading, and reduce risks (see *Forest Park Ecological Prescriptions*, Portland Parks & Recreation, August 2011). The 2009 *Portland Wildfire Readiness Assessment: Gap Analysis Report* also presents recommendations for reducing risk from wildfire,[30] and the *Biodiversity Guide for the Greater Portland-Vancouver Region* includes general strategies for addressing the need for fire in the landscape without losing large amounts of mature forest to catastrophic fire or putting valuable property or human life at risk.[31]

In conjunction with the *Portland Wildfire Readiness Assessment: Gap Analysis Report*, the City of Portland received a grant through the Federal Emergency Management Agency (FEMA) to address the areas at highest risk of wildfire (i.e., Willamette Bluffs, Powell Butte, and 165 acres of power line corridor within Forest Park). Within Forest Park, these funds allowed for the removal of flammable weeds such as blackberry and Scotch broom and the elimination of ladder fuels, like Clematis, that could carry a ground fire into the surrounding tree canopy. Additional priority projects exist, have been identified through the Gap Analysis, and are reiterated in the *Forest Park Ecological Prescriptions*.[32]

Although the *Greater Forest Park Conservation Initiative* does not include an objective specifically for management of wildfire risk, it does point readers to associated Forest Park ecological prescriptions (see text following Table 7). The Forest Park Alliance expects to work cooperatively with PP&R to achieve the objectives in Table 7 without increasing the risk of catastrophic fire.

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26 *Forest Park Desired Future Condition* (Portland Parks & Recreation, January 2011).

27 *Portland Wildfire Readiness Assessment: Gap Analysis Report* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009).

28 *Portland Wildfire Readiness Assessment: Gap Analysis Report* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009).

29 *Portland Wildfire Readiness Assessment: Gap Analysis Report* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009).

30 *Portland Wildfire Readiness Assessment: Gap Analysis Report* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009).

31 *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

32 *Forest Park Ecological Prescriptions*, Portland Parks & Recreation, August 2011.

## Watershed Health

Watershed health is a critical component of the overall vitality of the Greater Forest Park ecosystem. Healthy rivers and streams provide habitat for a wide diversity of tree and plant species. In the Pacific Northwest, open-water riparian areas support some of the highest levels of biodiversity and serve as important avenues for wildlife movement. In addition, healthy rivers and streams provide services to the human population by attenuating and reducing stormwater and flood flows, recharging groundwater, storing sediment, providing recreational opportunities, and delivering cool, clean water. In urban areas, many streams can no longer provide these services because they have been put into underground pipes. Watershed health also is reduced by roads and trails that crisscross drainage networks, creating culvert barriers to fish and wildlife movement and disrupting the delivery of large wood and sediment to receiving waters downstream.

According to the *2005 Portland Watershed Management Plan*, a number of conditions limit the healthy function of tributaries and subwatersheds in the Willamette watershed:[33]

- → Degraded or lost instream and riparian habitat, including a lack of large wood and channel complexity
- → Water quality limitations such as high temperature, erosion, and toxic pollutants
- → lashy hydrology (i.e., dramatically fluctuating stream levels) as a result of local soils, geological conditions, and extensive amounts of impervious surfaces (related to development)
- → Degradation or loss of upland resources, especially as a result of residential development and invasive species

In the Greater Forest Park ecosystem there are eleven tributaries: eight in Forest Park and three north of the park that flow through properties owned by Metro, the Forest Park Conservancy, and private parties. Together, these waterways total approximately 40 stream miles within the park itself. All of the tributaries within Forest Park flow into the Willamette River, while tributaries north of Forest Park, (including Miller Creek) flow into the Multnomah Channel. Figure 5 shows subwatersheds within the Greater Forest Park ecosystem.

Stream conditions vary by reach. Conditions in the middle to upper reaches of tributaries range from fair to excellent. Most of the waterways within Forest Park itself are in good condition, with mostly intact riparian corridors and a heavy canopy cover. Exceptions to the general condition exist in areas where failing culverts and low quantities of instream wood

33 *2005 Portland Watershed Management Plan* (City of Portland Bureau of Environmental Services, 2005, www.portlandoregon.gov/bes/article/107808).

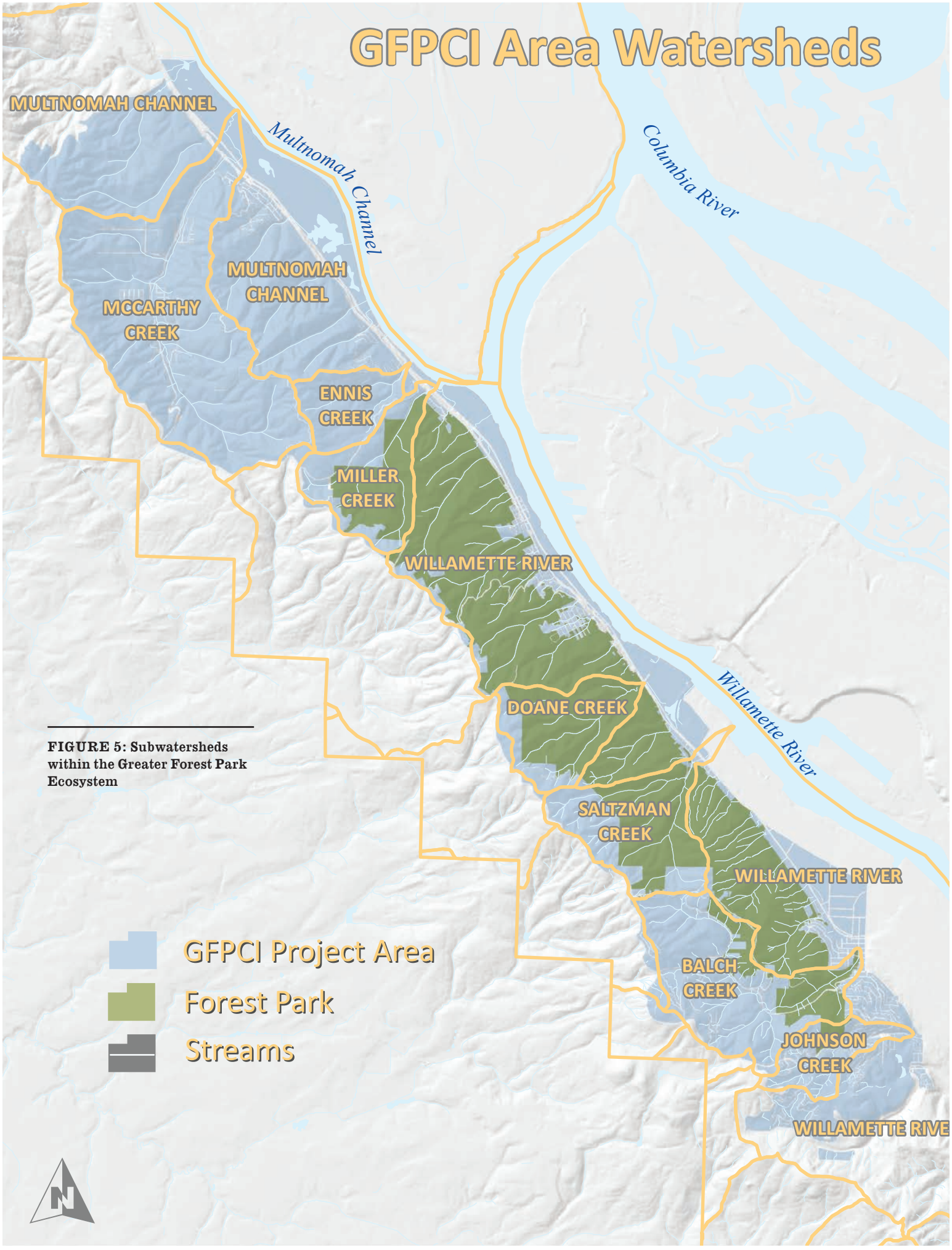


**FIGURE 5:** Subwatersheds within the Greater Forest Park Ecosystem

have been identified.[34] Development in some of the upper watersheds has created areas with reduced canopy cover and increased sediment. Southerly Balch Creek, for example, has one of the most highly developed headwaters within the Greater Forest Park ecosystem, in part because of its location near Portland's urban center. Previous development has put habitat in the upper Balch Creek watershed at high risk of degradation.

Most of the streams exiting Forest Park flow under Highway 30 through an industrial area that is part of the Portland Harbor Superfund Site. From Highway 30 to the Willamette River, most of these tributaries either are channelized, flow through a pipe, or are affected by toxins as a result of industrial activities. The exception is Miller Creek. Flowing from Forest Park to the Multnomah Channel south of the Sauvie Island bridge, Miller Creek consists almost completely of open channel. Although work has been done to reduce fish passage barriers between Miller Creek and the Willamette River, the area still presents obstructions during all but high flow; these obstructions affect fish seeking refugia in the lower reaches of Miller Creek within Forest Park. Nine-mile-long Saltzman Creek also is largely open channel, before entering a culvert under Highway 30. In both watersheds the dominant land use is open space, with only 6 percent of each watershed consisting of impervious area.[35]

## Floodplain Conditions

Many of the tributaries that run through Forest Park and into the Willamette River either flow into a pipe or are disconnected from their floodplain. A floodplain corridor should function as an integral part of the stream ecosystem. Floodplains perform important natural functions, including temporarily storing floodwaters, moderating peak flows, maintaining water quality, recharging groundwater, and preventing erosion. Floodplains also provide wildlife habitat, recreational opportunities, and aesthetic benefits.36 In the Greater Forest Park ecosystem, many floodplain functions have been lost to urban development.

Floodplain restoration is the process of fully or partially restoring a stream's access to its floodplain so as to return those valuable floodplain functions. There are several types of floodplain restoration:

**Hydrologic restoration**—reconnecting the stream to the floodplain and restoring the stream's natural hydrology

**Vegetative restoration**—removing invasive species and replanting native plant communities appropriate to the site and conditions

**Habitat restoration**—installing structures to improve wildlife habitat, or replanting native plant communities to gain habitat

The lower sections of many of the westside streams that flow through the industrial area east of Highway 30 are in great need of one or more of these types of restoration. Addressing restoration opportunities here would ultimately provide economic, ecological, and sociological benefits to Portland-area residents.

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34 *2013 Report on the Health of Portland Watersheds* (City of Portland Bureau of Environmental Services, 2013, draft document), *Forest Park Stream Assessments for Saltzman, Doane, and Linnton Creeks, 2013* (City of Portland Bureau of Environmental Services, 2013), and *Aquatic Inventory Project Physical Habitat Surveys* (Oregon Department of Fish and Wildlife, 2000; applies to Miller, Saltzman and Balch creeks).

35 *Westside Streams Water Quality and Trend Analyses Status Report* (City of Portland Bureau of Environmental Services, 2010, technical memorandum).

36 *Floodplain Restoration and Stormwater Management: Guidance and Case Study* (Chagrin River Partnerships, Inc., and Biohabitats).

## Water Quality

In 2006, the Oregon Department of Environmental Quality (DEQ) established total maximum daily loads (TMDLs) for the lower Willamette River and its tributaries. The lower Willamette was listed for stream temperature, bacteria, and mercury. Because the TMDL applies to the entire watershed and not just the river, several of the westside streams, including Balch, Miller, and Saltzman creeks, were tested for both bacteria and temperature. Most of these streams provide critical cool, clean water to the Willamette River, so it is important that they be monitored for trends in temperature and bacteria and that associated issues are addressed.

Key water quality information on westside streams is summarized below.

*Detailed additional information is available from the City of Portland at:*

→ **https://www.portlandoregon.gov/bes/watershedapp/index.cfm?action=DisplayContent&-SubWaterShedID=3**

→ **http://www.portlandoregon.gov/bes/article/292285**

### MILLER AND SALTZMAN CREEKS

Miller and Saltzman creeks are by no means pristine, but DEQ's trend monitoring showed that they can be characterized as minimally impacted watersheds within an urban area. City of Portland monitoring showed similar results: Of four westside streams monitored between 2002 and 2008, Miller and Saltzman creeks had the best water quality and did not display any significant trends in water quality. Water temperature appears to be declining in both streams, which met the 18°C temperature standard for salmon and trout rearing and migration during the 2002 to 2008 monitoring period.37 Miller Creek did not exceed the 18°C criterion in 2011 or 2012, and sediment has not been identified as a limiting factor in the creek.

### BALCH CREEK

Balch Creek was the only stream that showed a downward trend in water quality. It had an increase in total suspended solids (TSS) of 25 percent per year, which is most likely attributable to development in the headwaters and malfunction of sanitary wastewater removal systems.38 (Many residents in the Balch Creek watershed use onsite sanitary wastewater disposal systems because they are unable to connect to the city sewer system.) Ongoing stormwater runoff issues (e.g., NW Cornell Road) and land clearing, specifically, may also be contributing to the increases in TSS.39 Integrating the TSS results with the results of monitoring of physical habitat, hydrology, and biological communities would give a fuller picture of the significance of the TSS trend in the Balch Creek watershed.

### MCCARTHY CREEK

McCarthy Creek is one of the largest watersheds within the Greater Forest Park ecosystem. Ownership in this watershed is a mixture of public and private and includes some state ownership. Metro owns a large section of McCarthy Creek's headwaters. Studies conducted by the West Multnomah Soil & Water Conservation District found elevated levels of both

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37 *Westside Streams Water Quality and Trend Analyses Status Report* (City of Portland Bureau of Environmental Services, 2010, technical memorandum).

38 *Portland Watershed Management Plan Report. 2010-2012 (PAWMAP)* (City of Portland Bureau of Environmental Services, 2012).

39 *Westside Streams Water Quality and Trend Analyses Status Report* (City of Portland Bureau of Environmental Services, 2010, technical memorandum).

sediment and temperature in McCarthy Creek.[40] DEQ lists both Miller and McCarthy creeks as salmon and trout rearing and migration habitat; DEQ also lists McCarthy Creek as spawning habitat for salmon and steelhead.[41] Thus, McCarthy and Miller creeks are subject to a water quality standard: the seven-day average daily maximum (7dAM) should not exceed 18°C (64.4° F).

McCarthy Creek exceeded this standard on 45 days in 2009, 52 days in 2011, and 57 days in 2012.[42] The lower section of the stream has consistently higher temperatures than the middle and upper portions. These high water temperatures may be attributable in part to the relative lack of native riparian vegetation in the stream's middle reach. Land along this section of McCarthy Creek was cleared historically, leaving it devoid of vegetation in many areas. More recently, beavers, invasive species (primarily reed canary grass and Japanese knotweed [Polygonum cuspidatum]), and grazing have made it difficult for native vegetation to become re-established. Future studies should focus on the middle reach of McCarthy Creek to determine whether it is the source of increases in water temperature in the stream.

Sediment is also significantly higher in McCarthy Creek than in surrounding streams of similar size and habitat features. The main road in the McCarthy Creek watershed runs directly adjacent to the creek and in some areas has caused significant erosion problems. Anecdotal evidence suggests that a historical clay mill in the area may also be contributing to the sediment loading. Future studies should focus on determining the impacts of sediment in McCarthy Creek and identifying alternatives to mitigate them.

## Portland Harbor Site

In 2000, Portland Harbor—on the Willamette River from its confluence with the Columbia Slough to the Broadway Bridge—was added to the U.S. Environmental Protection Agency's (EPA) National Priority List, making it a Superfund site subject to long-term cleanup of contaminated media, such as sediment.

Designation of Portland Harbor as a Superfund Site is the result of more than a century of industrial use along the Willamette River. Today, water and sediments along the harbor are contaminated with many hazardous substances, including heavy metals, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), dioxin, and pesticides. These compounds have been found to be harmful to human health and the environment. Because of the contamination, some types of fish found in Portland Harbor, such as bass, carp, and catfish, currently pose a health risk to those who eat them.

EPA and DEQ currently are working with potentially responsible parties to clean up contaminated sediment in Portland Harbor and control sources of additional contamination.[43] In March 2012, EPA received a draft feasibility study from the Lower Willamette Group that describes various options for cleaning up Portland Harbor. Public information sessions were held on the draft feasibility study in April and May 2012. EPA recently conducted technical review of the feasibility study and submitted comments to the Lower Willamette Group. After revisions have been completed, EPA will write a proposed plan that summarizes cleanup alternatives and proposes a preferred plan for cleaning up contaminated sediment in Portland Harbor. The proposed plan is anticipated to be available in late 2014.

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40 *Water Quality Monitoring Report* (West Multnomah Soil and Water Conservation District, 2011-2012).

41 Water Quality Program Rules—Division 041: Water Quality Standards (Oregon Department of Environmental Quality, December 2003, fish use designation tables and figures, Salem, OR).

42 *Water Quality Monitoring Report* (West Multnomah Soil and Water Conservation District, 2011-2012).

43 http://www.fws.gov/oregonfwo/Contaminants/PortlandHarbor/

This GFPCI does not include goals or objectives for Portland Harbor. Once the proposed plan and clean-up alternatives have been completed, the Forest Park Alliance will work with EPA and stakeholders to implement projects recommended in that plan.

## Wildlife

The Greater Forest Park ecosystem includes a combination of urban, rural, and industrial development, is somewhat fragmented by roads and power line corridors, and forms a narrow extension of the Oregon Coast Range. Wildlife found within the ecosystem are a combination of species associated with human disturbance and species that are native to the Oregon Coast ecosystem. Many species in the ecosystem also are found regionally, within the greater Portland-Vancouver area.

Wildlife habitat in the Greater Forest Park ecosystem has been influenced historically by logging and fires and, more recently, by climate change and invasive plant and animal species. These types of habitat alterations impair terrestrial mammals' ability to disperse and migrate and also can reduce forage habitat.[44] As a result, many species are not found in their historical habitats.

The current status of wildlife in the Greater Forest Park ecosystem is discussed below, by group. Additional information is available in the Intertwine Alliance's *Regional Conservation Strategy for the Greater Portland-Vancouver Region*[45] (RCS) and Portland Parks and Recreation's *Forest Park Wildlife Report*.[46] The RCS contains in-depth information about fish and wildlife species in the region and discusses issues and threats for each species on a larger, broader scale. The *Forest Park Wildlife Report* provides an inventory of species that use park habitats through the compilation of historical and resent research-based information. Lists of species of interest in Forest Park are provided in Appendix A.

### Invertebrates

Invertebrates are an important part of a functioning ecosystem and account for approximately 97 percent of all animal species worldwide. They can be divided into two groups, terrestrial and aquatic. Invertebrates can be found in every habitat type, from the forest floor to the tops of trees and in every body of water. Their ecological influence is huge, because of their sheer numbers and mass.[47] Invertebrates serve as food for other animals and/or are instrumental in the recycling of nutrients in the soil, thus playing a critical role in the food chain. When it comes to research and conservation efforts, invertebrates seem to be underrepresented.

Because of a lack of research and studies, the total number of invertebrate species in the Greater Forest Park ecosystem is unknown. However, the *Regional Conservation Strategy* indicates that Oregon has an estimated 1,000 exotic invertebrate species, with a majority of them in the greater Portland-Vancouver area. (This is because the Port of Portland facilities are the main entry for exotic terrestrial invertebrates.)

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44 *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

45 *Regional Conservation Strategy for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

46 *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

47 "Fish and Wildlife of the Region: Invertebrates" in *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

Although we do not have specific species information for the entire Greater Forest Park ecosystem, we do have information specific to Forest Park. According to information compiled by John Deshler in the *Forest Park Wildlife Report*:

> Great strides were made in 2012 to document the diversity of arthropods in Forest Park. More than 400 species of insects are currently known to occur. Beetles and moths contribute at least 340 species and dominate insect diversity, as they do worldwide. Within Balch Creek, diversity of invertebrates is relatively evenly split between the families of stoneflies, caddisflies, mayflies, and true flies, but mayflies are especially abundant there. Despite a substantial recent increase in our knowledge of Forest Park arthropod diversity, much remains to be known, and the diversity of these animals is likely to greatly exceed current figures. The diversity found during the years of data collected by Oregon Department of Agriculture and U.S. Department of Agriculture surveys suggests that additional surveys would substantially broaden our knowledge of arthropod diversity. In contrast to vertebrate wildlife groups, many arthropod species in the park are non-native. The number and impact of nonnative species is poorly understood. About 10 percent of the insects and arachnids in the park have their origins in Europe and Asia.[48]

As with other organisms, the leading causes of decline for invertebrates are loss of habitat, invasive plant and animal species, chemical pollution, climate change, and hybridization with other species.

## Fish

Many fish species spend their entire lives within a specific home range, which can vary in size from several feet to several miles, depending on species. At least 72 fish species spend all or some of their life cycle within the greater Portland-Vancouver region. Twenty-four of these are non-native, and 47 are native. Habitat and water quality are critical to native species at all stages of their life cycle. Sufficient habitat and clean water are needed to maintain viable populations and prevent species decline. Development, road crossings, and stream barriers create challenges for native species, both within the region and within the Greater Forest Park ecosystem.

The Greater Forest Park ecosystem currently hosts several species of native fish, both resident and migratory (i.e., anadromous). McCarthy Creek, Miller Creek, Balch Creek, and two unnamed streams between McCarthy Creek and Logie Trail support fish now, and several other streams are known to have had fish historically. DEQ lists both McCarthy and Miller creeks as "salmon and trout rearing and migration habitat" and lists McCarthy additionally for spawning habitat for salmon and steelhead.[49] Habitat conditions in both watersheds range from poor to good. The lower third of the McCarthy watershed has several fish passage barriers that are most likely migration barriers during certain times of the year. The middle third of the McCarthy watershed has been affected by development and is lacking adequate riparian vegetation and fish habitat because of homes and lawns along the streambanks. Temperature is also a limiting factor for fish in the lower sections of the watershed. (See "Watershed Health," above, for temperature findings).

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48 *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

49 Fish use designation tables and figures in *Water Quality Program Rules—Division 041: Water Quality Standards* (Oregon Department of Environmental Quality, December 2003, Salem, OR).

Fish diversity in most of the streams within the Greater Forest Park ecosystem is low. The primary cause of low fish diversity and densities is passage barriers in the lower reaches. Miller and McCarthy creeks are the only streams that currently enable fish passage. Balch Creek has a small viable population of native cutthroat trout, but this is considered to be an isolated resident population. A few juvenile cutthroat trout, coho salmon, and steelhead have been found in the lower reaches of Miller Creek, which is accessible in all but the lowest flows. In 2012, an adult cutthroat trout was collected. It is presumed that there are three species that breed in Miller Creek. Both coastal cutthroat and steelhead are federally listed species. McCarthy Creek has a population of resident cutthroat trout, and juvenile Chinook salmon have been found during surveys in the lower reach of the watershed.

## Amphibians

Amphibians are unique, and many play an important role in energy and nutrient cycling. Most amphibians are tied to aquatic and terrestrial habitats, because they spend part of their life cycle in both habitats. As a result of their life history and the sensitivity of their skin to toxins, amphibians have the potential to be key indicators of environmental health. According to the *Oregon Conservation Strategy*, "a recent study (2005) synthesized data from around the world and concluded that many amphibian populations are indeed declining in significant numbers: globally, 32 percent of amphibian species are threatened, compared to about 12 percent of bird species and 23 percent of mammal species. Of particular concern are declines noted in areas with no detectable changes in habitats."[50]

The decline in amphibian populations is attributable to many factors, including habitat loss and destruction, climate change, pesticides, other pollutants, disease, and non-native species. The most significant of these at the local level are habitat loss and degradation, which vary within the Greater Forest Park ecosystem. The level of amphibian populations is believed to vary based on habitat conditions and historical management activities, with the greatest impacts likely being from the filling and draining of wetlands (for industrial development) and past management activities. Limited mobility and migration barriers are also limiting factors. Roads and undersized culverts can act as barriers to the migration of breeding populations of amphibians and limit access to different habits during their life history.

Research has shown that 18 native amphibian species and one non-native live in the greater Portland-Vancouver region. Twelve of these species are considered species of concern and/or are state listed as sensitive species in Oregon or Washington.[51] Forest Park itself is an important conservation area for amphibians because of its relatively large expanse of intact habitat.

Surveys conducted by regional amphibian experts and PP&R staff indicate that at least seven native amphibian species inhabit Forest Park. One of these—the northern red-legged frog—is identified as a special-status species in the *Terrestrial Ecology Enhancement Strategy*.[52]

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50 *The Oregon Conservation Strategy* (Oregon Department of Fish and Wildlife, 2006).

51 "Amphibians" in the *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

52 *Terrestrial Ecology and Enhancement Strategy* (City of Portland, 2011, www.portlandoregon.gov/bes/51052). The *Terrestrial Ecology and Enhancement Strategy* considers special-status species to be those that are officially listed or identified as a species of concern (e.g., a sensitive, focal, or "watch list" species, or a candidate for listing) by the U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Oregon Biodiversity Information Center (formerly the Oregon Natural Heritage Information Center), Oregon Watershed Enhancement Board, Partners In Flight, Northwest Power and Conservation Council (i.e., *Willamette Basin Subbasin Plan*), National Audubon Society, or American Bird Conservancy.

Terrestrial amphibian species, which lay their eggs underground or in rotting logs, are more common in Forest Park than aquatic amphibians are because of a lack of standing water. Although Forest Park has cool, clear, fast-running streams, species that lay their eggs in water are less common because the number of ponds is limited. One stream-breeding salamander, the coastal giant salamander, is abundant in the lower reaches of many streams in the park. Two resident frog species—the northern red-legged frog and the Pacific tree frog—are widely distributed through the park.[53] The northern red-legged frog is a federal species of concern and is considered by the state of Oregon to be a vulnerable species. This species is common in Forest Park and uses habitat both inside and outside the park. Because the northern red-legged frog has a dispersal distance of up to 2 miles and migrates beyond the park boundary, it is critical to remove migration barriers and maintain and protect habitat connections. Impacts from road mortality have been noted for this species during spring migrations.

## Reptiles

On a global scale, the status of the vast majority of reptile species is unknown. The primary threats to reptiles are habitat loss and fragmentation, collection for food and pet trades, non-native species, predators, vehicles/roads, climate change, pollution, disease, and mining.[54] Locally and regionally, loss of wetland and pond habitat is the most significant threat, with road mortality, predation by non-native species, and human-caused disturbance to basking and nesting activities acting as additional stressors. For some of the more reclusive reptiles, the factors that limit populations are still unknown and will require additional studies.

In the greater Portland-Vancouver region there are a total of 16 reptile species: two native and two non-native turtles, four lizards, and eight snakes. Because the Greater Forest Park ecosystem is dominated by upland conifer forests, the potential for reptile species, which prefer open, sunny conditions, is limited. The western pond turtle and the western painted turtle are considered sensitive-critical by the state of Oregon. It is unknown whether these sensitive species occur within the Greater Forest Park ecosystem, but they may be present in areas where there is open water. The common garter snake and the northwest garter snake occur and breed in the park. The rubber boa has not been reported in Forest Park but may be present, as the park has many habitats similar to those that the rubber boa inhabits. Only one lizard—the northern alligator lizard—has been sighted in the park, in the 1990s.[55] Reptile studies within Forest Park and the surrounding ecosystem have been insufficient to accurately determine the presence/absence and abundance of these species, so additional studies are recommended.

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53 "Amphibians" in *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

54 "Reptiles" in the *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

55 "Reptiles" in *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

## Birds

Birds make up a majority of the vertebrate species that use the habitat within the Portland-Vancouver region, with at least 219 known native species and eight non-native species. Birds can be reliable indicators of a healthy ecosystem. Researchers have made the correlation that when native bird species decline, the health of the ecosystem is also declining.[56] With the diversity of bird species in the region so high and each species being tied to a particular habitat, management can be difficult and complex, especially when managing for multiple species within a single geographic area.

Birds are highly mobile and can use different habitats for feeding, nesting, protection, roosting, and resting. Some species require highly specialized habitat, while others do not. Coniferous forests support some of the highest densities of breeding land birds. Specialized habitat features, such as snags, and small patches of specialized habitat, such as oak, are important in supporting bird species. Primary cavity users (i.e., those who create the cavities) and secondary cavity users (those who use an existing cavity) depend on the retention of dead and dying wood to maintain their populations.

Forested habitat within urban areas can provide critical migration habitat that birds use for stopovers. Because of its location along the Pacific Flyway, the Portland-Vancouver area is especially significant. In 2001, a presidential executive order mandated that federal agencies protect migratory birds, with an emphasis on species of concern that have been identified under the Endangered Species Act. In 2011, the City of Portland renewed its commitment to the protection and conservation of migratory birds and the contribution that urban areas can make toward bird conservation. (The City of Portland originally made this commitment in 2003 by signing the Urban Conservation Treaty for Migratory Birds with the U.S. Fish and Wildlife Service.)[57]

Only one bird species within the Portland-Vancouver area is listed as threatened: the northern spotted owl. This species is not known to occur within the Greater Forest Park ecosystem, but it may occur. Twenty-nine bird species that are listed as sensitive or priority species of concern in Oregon and Washington are found within the greater Portland-Vancouver area. Within the Greater Forest Park ecosystem there are 104 known bird species, about a dozen of which are rare. Given the relative homogeneity of habitat in Forest Park, the park has relatively low overall avian diversity but a high diversity of species identified as special-status species in the City of Portland's *Terrestrial Ecology Enhancement Strategy*.[58] The *TEES* lists a full one-third of the park's birds as special-status species (see Appendix A).[59] Although several of these species are abundant in the park, in recent years the populations of some of them have declined. Statewide, at least 17 of the species found in Forest Park are showing evidence of decline on a larger scale.

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56 *Regional Conservation Strategy for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

57 "Fish and Wildlife of the Region: Birds" in the *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

58 *Terrestrial Ecology and Enhancement Strategy* (City of Portland, 2011, www.portlandoregon.gov/bes/51052).

59 "Birds" in *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

With their high mobility and complex life histories, bird species face a variety of threats. In the greater Portland-Vancouver region the primary threats to birds are as follows:[60]

- → Degradation, loss, and fragmentation of habitat, including oak habitat and riparian forest
- → Disturbances such as roads, noise, and artificial lights
- → Building strikes (particularly during migration)
- → Invasive species (both flora and fauna)
- → Urbanization
- → Predation by domestic cats and disturbance and predation by domestic dogs
- → Land management and restoration practices that conflict with nest success
- → Reduction in insect populations, which are important food resources

## Mammals

Mammals are present at every level of the food chain and are typically divided into seven subgroups:

- → Rodents
- → Rabbits, hares, and pikas (i.e., lagomorphs)
- → Bats
- → Shrews and moles
- → Ungulates
- → Omnivores
- → Carnivores

Not including marine mammals, Oregon has at least 122 mammal species and Washington has 111. Within the greater Portland-Vancouver area there are at least 76 mammal species, including eight non-natives. Sixteen of the 68 native species are considered a sensitive species or have a more critical designation by Oregon or Washington. Twenty-one are identified as a state strategy species in one or both state conservation strategies.

Mammals play a variety of roles in our ecosystem and provide stability to entire food webs and life cycles.[61] These life cycle functions are many times disrupted by human actions and have ripple effects on both wildlife and the habitat they depend on. Mammal species in urban and suburban areas are mostly habitat generalists, such as raccoons, coyotes, skunks, and eastern fox squirrels. This contrasts with habitat specialists, which are less tolerant of urbanization and require specific habitat types or larger, more intact habitats. Examples of habitat specialists include the gray fox, western gray squirrel, and Douglas squirrel.

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60 *Regional Conservation Strategy for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

61 "Mammals" in the *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

The most significant threats to mammal diversity and population viability are habitat fragmentation and loss. The introduction of invasive plant and animal species and the loss of specialized habitat features in localized areas have caused a decline in the species associated with those habitats. Other impacts, especially in urban and suburban areas, are barriers from roads and culverts that pose a threat to daily, seasonal, and dispersal movement patterns. Many mammal species are difficult to track and study because they are small, live underground, or have low population numbers. Many state and federal agencies focus management efforts on fish and game species, resulting in limited funding and resources to study and manage small, lesser known mammals. How a species interacts with human disturbance is important because this can dictate how the species is managed. Because the Greater Forest Park ecosystem is close to an urban environment, it is important to better understand how mammals respond to human disturbance and how disturbances affect breeding and migration patterns.

The most detailed information we have about mammals within the Greater Forest Park ecosystem is for Forest Park itself, from a variety of studies and professional sources. The diversity of mammal species in the park is considered healthy, with 56 mammal species having been recorded there. Of those, six are non-native and thirteen are identified as a special-status species in the *Terrestrial Ecology Enhancement Strategy*.[62]

Bats make up about one-quarter of the park's mammal species. Of the 10 bat species in the park, eight are special-status species.[63] Most of the data collected on large game or carnivores are from anecdotal accounts by users or adjacent property owners. Some of the information is contradictory, and accurate accounts of all species that reside in or use the park are unknown.

Mammals found within Forest Park include bats, rodents, rabbits, insectivores, moles, carnivores, and ungulates (see Appendix A). Several species, such as black-tailed deer, coyote, deer mice, striped skunks, and long- and short-tailed weasels, are relatively common and well distributed in the park. Others, such as elk, mountain beaver, brush rabbit, and bobcat, are known to occur in the park, but their distribution and abundance are poorly understood. Additional detailed studies would help fill these gaps, and targeted surveys would determine the presence or absence of mammals that are assumed to occur in the park because of the presence of certain habitat features.

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62 *Terrestrial Ecology and Enhancement Strategy* (City of Portland, 2011, www.portlandoregon.gov/bes/51052).

63 "Mammals" in *Forest Park Wildlife Report* (Portland Parks & Recreation, December 2012. J. Deshler, author. www.portlandoregon.gov/parks/article/427357).

# Section 4

## CONSERVATION OBJECTIVES AND ACTIVITIES

**SECTION 4**

# Conservation Objectives and Activities

This section presents the Forest Park Alliance's objectives for conservation activities in the Greater Forest Park ecosystem. The objectives and activities are designed to achieve the Alliance's goals related to streams, connectivity, forests, and wildlife (see Section 1) and contribute to a healthy ecosystem in Forest Park, the Greater Forest Park ecosystem, and the region.

In developing its conservation objectives and activities, the Forest Park Alliance drew on earlier planning efforts and documents, particularly Portland Parks and Recreation's *Forest Park Ecological Prescriptions*,[64] the City of Portland's *2005 Portland Watershed Management Plan*,[65] and the Intertwine Alliance's *Regional Conservation Strategy for the Greater Portland-Vancouver Region* and its companion document, the *Biodiversity Guide*.[66] Conservation objectives and activities also were informed by the professional judgment of Forest Park Alliance partners. Finalizing the conservation objectives and activities was a collaborative process among the partners and involved many of the same entities who participated in development of the *Forest Park Ecological Prescriptions* (see below).

Of the final objectives and activities, those that are specific to Forest Park were influenced most by the *Forest Park Ecological Prescriptions*, while those relating to private lands or lands managed for conservation were based more on other sources.

Because the Greater Forest Park ecosystem is a regional resource, Forest Park Alliance partners will need to work together if the goals and objectives in the *Greater Forest Park Conservation Initiative* are to be achieved. Accordingly, all partners in the Forest Park Alliance have committed to cooperating to implement the activities presented in this section.

## Forest Park Ecological Prescriptions Process

From 1995 to 2011, management of Forest Park was guided by two planning documents that, together, were intended to be tools for comprehensive management of the park:

- → **Forest Park Natural Resources Management Plan** (**NRMP**).[67] The NRMP provided guidance for the management of Forest Park. The plan was adopted through City Council in 1995, and a vegetation and ecological conditions inventory was completed in 2004.
- → **Forest Park Desired Future Condition.**[68] The Desired Future Conditions report was completed in January 2011 and had an exclusively ecological focus. The report was designed to complement the Forest Park NRMP and provide Portland Parks & Recreation the means to set and prioritize goals for restoration activities.

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64 *Forest Park Ecological Prescriptions*, Portland Parks & Recreation, August 2011.

65 *2005 Portland Watershed Management Plan* (City of Portland Bureau of Environmental Services, 2005, www.portlandoregon.gov/bes/article/107808).

66 *Regional Conservation Strategy for the Greater Portland-Vancouver Region* and *Biodiversity Guide for the Greater Portland-Vancouver Region* (The Intertwine Alliance, 2012. A. Sihler, editor. The Intertwine Alliance, Portland, OR. www. theintertwine.org).

67 Portland Parks & Recreation, Bureau of Planning, City of Portland, February 1995.

68 Portland Parks & Recreation, January 2011, www.portlandoregon.gov/parks/article/335638.

In 2011, Portland Parks & Recreation initiated a multi-agency planning process to develop a 10-year "prescription" plan that would outline the projects needed to achieve PP&R's desired future conditions for Forest Park. The process, which was completed in August 2011, produced a final report that describes 36 projects. Titled *Forest Park Ecological Prescriptions*, the report specifies activities, timelines, measures of success, partner commitments, and project costs for each of the ecological prescriptions. From this larger set of 36 projects, the report highlights a subset of projects as being the highest priority for meeting the ecological goal with which they are associated. Some of the ecological prescriptions involve activities exclusively within Forest Park (removing invasive vines, for example), while others focus largely on issues and areas outside of the park (e.g., identifying priority biodiversity corridor connections and mapping wildland/urban interface areas in the vicinity of the park).

## Implementing Conservation Activities in and outside of Forest Park

Implementation of any conservation activities within Forest Park boundaries requires the permission of Portland Parks & Recreation. For the conservation activities presented in this document, PP&R is the lead on projects that are conducted within the park, in partnership with citizen groups, staff from other City of Portland bureaus, and local, state, and federal agencies. However, the conservation objectives presented in this *Greater Forest Park Conservation Initiative* require long-term commitments, in terms of both staffing and financial resources. Given the staffing and financial constraints at PP&R, the Forest Park Alliance recommends that PP&R allow other partner organizations and agencies to take the lead on specific projects inside Forest Park, with formal oversight by PP&R.

In addition to projects within Forest Park, both this document and the *Forest Park Ecological Prescriptions* describe conservation activities that are critical to protecting and enhancing the ecological health of Forest Park but that are not necessarily appropriate for PP&R to play a lead role on because the activities involve issues or areas outside of the park. For example, this document and the *Forest Park Ecological Prescriptions* both emphasize the importance of understanding and managing the ecological connections between Forest Park and other lands, such as by conserving and enhancing biodiversity corridors while minimizing the spread of invasive species into Forest Park and the Greater Forest Park ecosystem. Regional partners, including private landowners, will need to play a major role in conserving and enhancing connectivity. As for controlling invasive species, the Forest Park Conservancy and West Multnomah Soil & Water Conservation District already have established the Perimeter Program, which is a 2-year-old collaborative effort to identify and restore priority areas in lands directly adjacent to Forest Park. The fact that some conservation issues extend beyond the geographical boundaries of Forest Park is one reason that the Forest Park Alliance launched the *Greater Forest Park Conservation Initiative*—to address these needs external to the park, and to identify partners who can take a lead role when other organizations are constrained from doing so.

## Existing Efforts within Forest Park

Currently, conservation activities within Forest Park are led by Portland Parks & Recreation and the Forest Park Conservancy, with the aid of Portland's Bureau of Environmental Services and other partner groups. Through efforts such as PP&R's Protect the Best Program, the vast majority of Forest Park's acreage has received initial treatment for tree ivy and other canopy weeds during the past 3 years. Table 4 summarizes existing conservation activities within Forest Park.

A long-term source of funding must be secured for the programs in Table 4 if this conservation work is to continue inside Forest Park's boundaries

**TABLE 4**

## Current Conservation Activities within Forest Park

| PROGRAM | LEAD | GOAL | NOTES |
|---|---|---|---|
| **Protect the Best** | PP&R | Preserve the highest quality acreage in Forest Park | Initial treatment on 1,607 acres and follow-up work on 1,581 acres during the last 3 years |
| **No Ivy League** | PP&R | Remove English and Irish ivy and other invasive weeds | Relies on volunteers, who have removed English and Irish ivy from more than 260 acres1 |
| **Early Detection, Rapid Response (EDRR)** | PP&R | Treat fast-moving invasive species s such as garlic mustard | Involves a set of protocols |
| **Habitat Restoration** | PP&R | Restore areas of the park not addressed through Protect the Best | Coordinates with BES crews<br>Initial treatment on 3,236 acres during the last 3 years |
| **Habitat Restoration** | Forest Park Conservancy | Non-native species removal and revegetation at six sites in Forest | Park Seasonal field crew of four, with an average of 1,500 volunteers per year |

## Existing Efforts outside Forest Park

A variety of conservation efforts (including the Perimeter Program described above) are under way in areas that are outside Forest Park but within the Greater Forest Park ecosystem. Funding is needed for these conservation activities. Some of the conservation efforts outside the park relate to the Forest Park Alliance's objectives and activities, which are presented in Tables 5 through 8.

## Objectives, by Goal Area

Tables 5 through 8 present the Forest Park Alliance's conservation objectives and activities, grouped by goal area (i.e., streams, connectivity, forests, and wildlife). Given the interrelated character of natural systems, there is a certain amount of overlap among the conservation activities for different goals. This is to some degree intentional, so that each table can stand alone in representing the activities needed to achieve a particular goal.

The conservation objectives and activities are organized by logical sequence, rather than priority. Unlike the *Forest Park Ecological Prescriptions*, the Forest Park Alliance did not identify high-priority objectives. Instead, the Alliance considers all of the objectives important to achieve.

Checkmarks in the tables indicate the type of land where the activity is to be conducted—i.e., Forest Park (FP), lands managed for conservation (LMC), and private lands (Priv). In some cases, activities will need to be customized for different land use types so as to derive the greatest ecological benefit within the appropriate societal and economic context.

## Goal Area: Streams

Objectives and activities related to streams are intended to protect and improve hydrologic processes and water quality in area streams, to safeguard watershed functions and human health.

**TABLE 5**

### Objectives and Activities for Goal 1: Streams

| OBJECTIVES<br>STREAMS | | ACTIVITIES<br>STREAMS | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| **OBJECTIVE: S1**<br>Improve water quality on all tributaries within the Greater Forest Park ecosystem.<br>*(Addresses Forest Park Ecological Prescriptions 1A, 1B, and 1D.)* | 1. | Develop a comprehensive database of water quality parameters to ensure that water quality standards are being met and that TMDLs within the Willamette River tributaries continue to be implemented. | ● | ● | ● |
| | 2. | Based on the water quality data collected, work with land managers to identify sources of pollutants and develop a strategy for addressing them on a project-by-project basis. Focus on fish-bearing streams, such as Balch, McCarthy, and Miller creeks, and Burlington Creek, which supplies cool, clean water to the Burlington Bottoms Wetland, where native turtle restoration is under way. | ● | ● | ● |
| | 3. | Secure funds to replace high-priority culverts that are impeding fish passage and/or are directly delivering sediment to streams (e.g., because they are undersized or were not properly installed); implement culvert replacements. | ● | ● | |
| | 4. | Conduct road inventories on high-priority watersheds to better understand sediment and pollutant sources from roads, trails, and key sites where road/trail maintenance, relocation, or removal could occur. Give highest priority to McCarthy, Miller, Balch and Burlington creeks and all Metro-owned properties. | ● | ● | ● |
| | 5. | Reduce water quality impacts to Balch Creek resulting from habitat impairments and erosion. | ● | ● | ● |
| | 6. | Assess road and trail density. Set capacity guidelines to protect water quality. | ● | ● | ● |
| | 7. | Address waste management issues created by dog waste and degraded septic systems. | ● | ● | ● |

**TABLE 5 (CONTINUED)**

## Objectives and Activities for Goal 1: Streams

| OBJECTIVES<br>STREAMS | | ACTIVITIES<br>STREAMS | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| **OBJECTIVE: S2**<br>Conserve and improve riparian habitat on all subwatersheds within the Greater Forest Park ecosystem.<br>*(Addresses Prescriptions 3I, 3J, 3O, 1E, and 1G.)* | 1. | Work with BES to complete its westside streams subwatershed analysis; prioritize restoration based on level of impairment and feasibility of restoration. | ● | | ● |
| | 2. | Conduct a comprehensive watershed assessment on Balch, McCarthy, Miller, and Burlington creeks to better understand riparian habitat conditions and restoration needs and priorities. | ● | ● | ● |
| | 3. | Restore riparian habitat where necessary. | ● | | ● |
| | 4. | Reestablish ecological processes that increase channel complexity and the ongoing recruitment of large woody debris to streams, particularly fish-bearing or potentially fish-bearing streams. | ● | ● | ● |
| | 5. | Ensure adequate riparian buffers to reduce sediment, provide fish habitat, and lower (or maintain) stream temperatures. | ● | ● | ● |
| | 6. | Intensify efforts to remove invasive species and replace with native vegetation to improve bank stability, reduce sediment, and lower stream temperatures. See Objective S4, below. | ● | ● | ● |
| | 7. | Encourage the Oregon Department of Transportation (ODOT) to establish a riparian crossing under Highway 30 linking the north end of the Greater Forest Park ecosystem with the Burlington Bottoms Wetlands. | | ● | |
| | 8. | Educate private landowners adjacent to Forest Park and other lands managed for conservation about the importance of healthy riparian management practices in residential areas. | ● | ● | |

**Indian Plum**

**Conducting Watershed Assessments in Forest Park**

**TABLE 5 (CONTINUED)**

## Objectives and Activities for Goal 1: Streams

| OBJECTIVES<br>STREAMS | | ACTIVITIES<br>STREAMS | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| **OBJECTIVE: S3**<br>Improve upland habitat conditions in each tributary.<br>*(Addresses Prescriptions 1C and 1G.)* | 1. | Identify degraded areas of upland habitat and the extent of impacts. | ● | ● | ● |
| | 2. | Identify priorities for restoring and enhancing upland habitat form and function in priority | ● | ● | ● |
| | 3. | Work with the City of Portland, developers, and private landowners to minimize the amount of development within headwater areas to reduce stormwater impacts and sediment and pollutant inputs to streams. | ● | ● | |
| | 4. | Update and implement best management practices for development and zoning to protect native fish habitat and human health and ensure that water quality and soil productivity are maintained. | ● | ● | |
| **OBJECTIVE: S4**<br>Reduce the negative impacts of invasive plants on overall watershed health (e.g., increased sediment and stream temperatures and reduced canopy cover).<br>*(Addresses Prescription 1E.)* | 1. | Assess invasive plants, especially with regard to increased erosion in riparian areas. | ● | ● | ● |
| | 2. | Use priorities and treatment methodologies already developed by the Cooperative Weed Management Area (CWMA) partners (i.e., the City of Portland and West Multnomah Soil & Water Conservation District). | ● | ● | ● |
| | 3. | Treat high-priority areas and monitor results. | ● | ● | ● |

**STREAM-RELATED FOREST PARK PRESCRIPTIONS:**

- → *Project 1A:* Reduce water quality impacts from infrastructure.
- → *Project 1B:* Address turbidity inputs to Balch Creek watershed.
- → *Project 1C:* Best management practices (BMPs) for instream maintenance work.
- → *Project 1D:* Pet waste management.
- → *Project 1F:* Septic system education and outreach program.
- → *Project 1G:* Headwater land protection program.
- → *Project 3I:* Balch Creek enhancement.
- → *Project 3J:* Miller Creek enhancement.
- → *Project 3O:* Stream enhancement.

*For detailed information on these projects, see Appendix B.*

## Goal Area: Connectivity

Objectives and activities related to connectivity are intended to protect and improve connectivity between Forest Park, the Tualatin Mountains, the Coast Range, and the Willamette River.

**TABLE 6**

### Objectives and Activities for Goal2: Connectivity

| OBJECTIVES<br>CONNECTIVITY | | ACTIVITIES<br>CONNECTIVITY | MGMT AREA<br>PRIV | <br>LMC | <br>FP |
|---|---|---|---|---|---|
| **OBJECTIVE: C1**<br>Refine regional connectivity information.<br>*(Addresses Prescriptions 3B and 3G.)* | 1. | Develop and test a data-based model of connectivity. | ● | ● | ● |
| | 2. | Develop mapping and database tools. | ● | ● | ● |
| | 3. | Assess special-status habitats (riparian, oak, wetlands, interior forest, ponds) and develop conservation goals for connectivity. | ● | ● | ● |
| | 4. | Develop a list of target wildlife species and guilds in conjunction with the City of Portland's Terrestrial Ecology and Enhancement Strategy (TEES), with habitat and connectivity needs fully defined. | ● | ● | ● |
| | 5. | Identify and map key corridor connections. | ● | ● | ● |
| | 6. | Identify buffer areas and key priority areas. | ● | ● | ● |
| **OBJECTIVE: C2**<br>Protect and enhance connectivity through acquisitions, easements, and voluntary management agreements.<br>*(Addresses Prescriptions 3G, 3M. and 4C.)* | 1. | Develop a multi-county partnership to pursue easements and acquisitions. | ● | ● | |
| | 2. | Protect additional lands along the north end of Forest Park, including a buffer for the ancient forest. | ● | | |
| | 3. | Acquire or protect key properties linking Forest Park and the Rock Creek drainage, to maintain important biodiversity corridors between the park and Washington County. | ● | | |
| | 4. | Protect additional lands between Forest Park and the Tualatin Mountains, to increase connectivity of natural areas. | ● | | |

**TABLE 6 (CONTINUED)**

## Objectives and Activities for Goal2: Connectivity

| OBJECTIVES<br>CONNECTIVITY | | ACTIVITIES<br>CONNECTIVITY | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| **OBJECTIVE: C3**<br>Protect and enhance connectivity through habitat enhancements.<br>*(Addresses Prescriptions 3C and 4C.)* | 1. | Continue implementation of the West Multnomah Soil & Water Conservation District's Canopy Weed Removal program. (The program provides free technical assistance and invasive removal crews to landowners in targeted areas surrounding Forest Park.) | ● | | |
| | 2. | Implement vegetation treatment to restore habitat along power line corridors. | ● | ● | ● |
| | 3. | Develop an outreach program and materials to communicate to adjacent landowners the importance of habitat enhancement in corridor areas. Highlight existing programs that can help landowners enhance habitat (i.e. Backyard Habitat Certification Program and WMSWCD. | ● | | |
| | 4. | Write management recommendations that include creation and/or expansion of key habitat features (e.g., snags, downed wood, brush piles, and rock piles) as well as suggestions for changes in use, infrastructure, and park amenities that will protect or improve connectivity. | ● | ● | ● |
| | 5. | Continue to develop projects for improving wildlife habitat structures and evaluate wildlife use. Implement most effective project types. | ● | ● | ● |
| | 6. | Complete wildlife habitat structure guidelines (as needed) and incorporate them into utility MOUs. | ● | | ● |
| | 7. | Minimize fencing that restricts wildlife movement on private property. | ● | | |
| **OBJECTIVE: C4**<br>Use up-to-date tools for responding to EDRR species that could take advantage of enhanced connectivity.<br>*(Addresses Prescription 4B.)* | 1. | Use the Cooperative Weed Management Area (CWMA )partners' Multnomah County target species lists and Early Detection Rapid Response (EDRR) protocols. | ● | ● | ● |
| | 2. | Use iMap Invasives mapping and monitoring protocol for EDRR species, to include annual reporting by Forest Park Alliance partners. | ● | ● | ● |
| | 3. | Implement annual treatments on EDRR species. | ● | ● | ● |
| | 4. | Make information about invasives available to property owners to encourage reporting and removal. | ● | | |
| **OBJECTIVE: C5**<br>Objective C5: Plan and manage infrastructure to protect connectivity.<br>*(Addresses Prescription 3E.)* | 1. | Work to minimize wildlife movement barriers created by roads, trails, and development. | ● | ● | ● |
| | 2. | Assess road and trail density. Set capacity guidelines to protect connectivity for focal species, once they have been identified. | ● | ● | ● |
| | 3. | Establish best management practices for trail construction and maintenance to protect connectivity. | ● | ● | ● |

**CONNECTIVITY-RELATED FOREST PARK PRESCRIPTIONS:**

→ *Project 3B:* Wildlife use characterization.

→ *Project 3C:* Improve wildlife habitat structures throughout Forest Park.

→ *Project 3E:* Habitat fragmentation response.

→ *Project 3G:* Wildlife corridor connections.

## Goal Area: Forests

Objectives and activities related to forests are intended to maintain and improve forests to support diversity, structural integrity, connectivity, and complexity.

Unlike Portland Parks & Recreation's *Forest Park Ecological Prescriptions*, the *Greater Forest Park Conservation Initiative* does not include an objective specifically for management of wildfire risk. However, it does point readers to associated Forest Park ecological prescriptions (see text below Table 7).[69] The Forest Park Alliance expects to work cooperatively with PP&R to achieve the objectives in this section without increasing the risk of catastrophic fire.

69 See also the 2009 *Portland Wildfire Readiness Assessment: Gap Analysis Report* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009) and *Biodiversity Guide for the Greater Portland-Vancouver Region* (Trout Mountain Forestry and Moore Iacofano Goltsman, Inc., July 2009) for additional recommendations regarding management to reduce the risk of catastrophic fire.

**TABLE 7**

### Objectives and Activities for Goal3: Forests

| OBJECTIVES<br>FORESTS | | ACTIVITIES<br>FORESTS | MGMT AREA<br>PRIV | <br>LMC | <br>FP |
|---|---|---|---|---|---|
| **OBJECTIVE: F1**<br>Finish assessments of forest conditions.<br>*(Addresses Prescriptions 2A, 2D, and 3F.)* | 1. | Complete a stand trajectory assessment on all lands currently managed for conservation and large areas of private land where access can be secured. | ● | ● | ● |
| | 2. | Survey for disease in areas where surveys have not been completed. | ● | ● | ● |
| | 3. | Use existing maps and data to conduct an inventory of oak woodland habitat; coordinate this work with the Oak Woodlands Working Group, through the Intertwine. | ● | ● | ● |
| | 4. | Reassess public and private forestlands to update existing vegetation inventories. | ● | ● | |
| **OBJECTIVE: F2**<br>Actively manage land to create the key structural and compositional components of old-growth forest ecosystems where opportunities exist.<br>*(Addresses Prescription 2C and 3C.)* | 1. | Identify and document all old-growth patches in the Greater Forest Park ecosystem, taking into consideration age, structural elements, habitat, and associated species. | ● | ● | ● |
| | 2. | Encourage species diversity when planting harvested units or other open areas that will become forest. | ● | ● | |
| | 3. | Maintain or encourage the development of a deep, complex forest canopy, with a diverse understory or canopy gaps. | ● | ● | ● |
| | 4. | Ensure adequate snags for wildlife. | ● | ● | ● |
| | 5. | Develop a forest management plan to achieve desired future conditions (DFCs) on both private and public lands. | ● | ● | ● |

**Jack Anliker stands among a forest threatened by ivy.**

**TABLE 7 (CONTINUED)**

## Objectives and Activities for Goal3: Forests

| OBJECTIVES<br>FORESTS | | ACTIVITIES<br>FORESTS | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| **OBJECTIVE: F3**<br>Protect native flora within the Greater Forest Park ecosystem.<br>*(Addresses Prescriptions 2D, 3D and 3F.)* | 1. | Survey and map all rare plant species2 in Forest Park and develop a database to track locations and distribution. | | | ● |
| | 2. | Train land managers and staff to recognize rare plants on lands within their jurisdiction. | | ● | ● |
| | 3. | Perform rare plant surveys before any site-disturbing activities; share the results with the Oregon Biodiversity Center. | ● | ● | ● |
| | 4. | Maintain and restore high-quality habitat and increase the genetic diversity of rare species, to avoid extirpations. | ● | ● | |
| | 5. | Formulate and implement a plan for managing diseased sites. | ● | ● | |
| | 6. | Develop an oak habitat restoration and management plan with prescriptive activities. | ● | ● | ● |
| | 7. | Educate property owners about the value of trees and native plants (in upland and riparian areas) for property value, erosion and stormwater management, and wildlife. | ● | | |
| **OBJECTIVE: F4**<br>Protect and preserve special habitat features (e.g., snags, downed wood, forest openings, rock habitats, springs and seeps, vernal pools, fens, and off-channel habitats).<br>*(Addresses Prescription 3C.)* | 1. | Map all special habitat features within the Greater Forest Park ecosystem. Develop conservation goals to enhance and protect habitats that support focal wildlife species. | ● | ● | ● |
| | 2. | Apply forest management practices that create and maintain forest openings, while taking into consideration the need to maintain contiguous canopy for wildlife movement. | | ● | |
| | 3. | Retain and manage for future snags and leave downed wood for wildlife. | ● | ● | ● |
| | 4. | Restore natural flow regimes in areas streams and protect off-channel habitat. | ● | ● | |
| | 5. | Provide buffers for springs, seeps, and ponds. | ● | ● | |
| | 6. | In areas where beavers are present, allow beavers to create off-channel habitat, where appropriate. Work with private landowners and the Oregon Department of Fish and Wildlife as needed to identify potential sites. | ● | ● | |
| | 7. | Control invasive plant species. | ● | ● | ● |
| | 8. | Assess road and trail densities. Set capacity guidelines to protect wildlife and special-status habitats. | ● | ● | ● |
| | 9. | Site recreational trails away from special habitat features and enforce seasonal closures to protect wildlife within these sensitive habitats. | ● | ● | ● |
| | 10. | Establish best management practices for trail construction and maintenance to protect wildlife and special-status habitats. | ● | ● | ● |
| | 11. | Review wildfire reduction/safety strategies provided to private property owners to identify potential conflicts with GFPCI goals (snags, downed wood, contiguous canopy, etc.). If there are conflicts, work with appropriate agencies to develop strategies to minimize those conflicts. | ● | | |

**TABLE 7 (CONTINUED)**

## Objectives and Activities for Goal3: Forests

| OBJECTIVES<br>FORESTS | | ACTIVITIES<br>FORESTS | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| **OBJECTIVE: F5**<br>Protect native flora within the Greater Forest Park ecosystem.<br>*(Addresses Prescriptions 2D, 3D and 3F.)* | 1. | Complete inventory to determine the location and level of infestation within the Greater Forest Park ecosystem. | ● | ● | |
| | 2. | Coordinate and collaborate with partners and educational institutions through iMap Invasives where partners may enter the location and type of species found and technique and timing of treatment. | ● | ● | |
| | 3. | Implement best management practices to prevent and control the spread of invasive species before, during, and after implementation of projects that disturb the soil surface or that may have the potential to spread from one site to another. | ● | ● | ● |
| | 4. | Continue to implement the Forest Park Perimeter Program (Forest Park Conservancy in cooperation with WMSWCD) to address invasive species on private land adjacent to Forest Park. | ● | | |
| | 5. | Develop a protocol to address invasive species issues that cross jurisdictional boundaries; create a map that identifies these areas. | ● | ● | ● |
| | 6. | Replant native species where necessary. | ● | ● | ● |
| | 7. | Work on reducing human vectors of invasive species through educational programs (i.e. outreach to hikers/bikers about cleaning before and after leaving trails, trail brushes at trailheads, protocols for parks and invasive control crews, gardeners, firewood etc.) | ● | ● | ● |

**FOREST-RELATED FOREST PARK PRESCRIPTIONS:**

→ *Project 2A:* Stand trajectory assessment.

→ *Project 2B:* Invasive vine monitoring and removal program.

→ *Project 5B:* Wildfire fuels inventory and monitoring.

→ *Project 5C:* Utility corridor wildfire risk reduction.

→ *Project 5D:* Wildfire resistant landscape program.

*For detailed information on these projects, see Appendix B.*

## Goal Area: Wildlife

Objectives and activities related to wildlife are intended to maintain and protect native wildlife diversity.

**TABLE 8**

### Objectives and Activities for Goal4: Wildlife

| OBJECTIVES<br>WILDLIFE | | ACTIVITIES<br>WILDLIFE | MGMT AREA<br>PRIV | <br>LMC | <br>FP |
|---|---|---|---|---|---|
| (Multiple objectives, to benefit multiple plant and animal species) | 1. | Control and remove invasive plant and animal species. | ● | ● | ● |
| | 2. | Conduct a road inventory to determine the density and condition of roads within the Greater Forest Park ecosystem. | ● | ● | ● |
| | 3. | Minimize habitat fragmentation caused by roadways and trails. | ● | ● | |
| | 4. | Use conservation easements and other tools to protect high-value habitat and connection corridors. | ● | | |
| | 5. | Work with landowners to manage private lands for conservation and habitat values for a variety of native species. For example, educate landowners on the importance of the following: | | | |
| | | Minimizing the use of toxic contaminants | | | |
| | | Managing land for dead and dying trees (to help increase viability of primary and secondary cavity-dependent bird species) | ● | | |
| | | Timing landscape work to minimize harm to birds | | | |
| | | Minimizing bird strikes, predation on birds by domestic cats, etc. | | | |
| *Invertebrates*<br>**OBJECTIVE: W1**<br>Maintain or increase the diversity of invertebrates in terrestrial and aquatic environments.<br>*(Addresses Prescriptions 1C, 3N, 4A, 4B.)* | 1. | Implement long-term conservation strategies that minimize impacts to riparian habitat, reduce sediment to streams, and maintain natural hydrologic cycles. | ● | ● | ● |
| | 2. | Implement best management practices and follow standard relocation protocols during aquatic restoration activities. | ● | ● | ● |
| | 3. | Reduce the amount of pesticides and other toxic contaminants entering streams. | ● | ● | |
| | 4. | Encourage the colonization of insects and bees by encouraging the establishment of flowering herbaceous plants. | ● | ● | ● |
| | 5. | Identify gaps in connectivity and work with landowners in key target areas where restoration would provide the most benefit. | ● | ● | |
| *Fish*<br>**OBJECTIVE: W1**<br>Improve understanding of the presence/absence of fish species and the potential for native fish species within each tributary.<br>*(Addresses Prescription 3A.)* | 1. | Work with agency partners to inventory fish species and identify the current presence/absence of natives and non-natives using the agencies' preferred protocols. | ● | ● | ● |
| | 2. | Use existing data and anecdotal information to identify historical presence/absence of native fish species and create a GIS layer that accurately shows these areas. | ● | ● | ● |

**TABLE 8 (CONTINUED)**

## Objectives and Activities for Goal4: Wildlife

| OBJECTIVES<br>WILDLIFE | | ACTIVITIES<br>WILDLIFE | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| *Fish*<br>**OBJECTIVE: W3**<br>Develop "desired future conditions" for native fish populations.<br>*(Addresses Prescription 3B.)* | 3. | Work with the Oregon Department of Fish and Wildlife (ODFW) to assess fish habitat status and conditions by using a standard core set of fish habitat variables and measurement protocols to observe and contrast fish population and habitat status and conditions throughout the Greater Forest Park ecosystem. Use the resulting data to evaluate the conditions, processes, and interactions between human, aquatic, riparian and terrestrial features at a larger landscape level. | ● | ● | ● |
| | 4. | Work with ODFW to develop "desired future conditions" for native fish population status and distribution across each subwatershed. Produce maps that show the logical progression of rebuilding local populations to the desired endpoint at 100 years for full occupation across the estimated historical range of species. | ● | ● | ● |
| *Fish*<br>**OBJECTIVE: W4**<br>Improve fish passage and critical habitat connections for aquatic organisms.<br>*(Addresses Prescription 1A.)* | 1. | Conduct a culvert inventory on all streams within the Greater Forest Park ecosystem and produce a coarse-filter assessment that identifies culverts that could restrict access to suitable upstream habitats (i.e., habitats with sufficient flow and suitable slopes) or that pose a sediment risk. Focus first on streams that (1) provide rearing or spawning habitat for fish on ODFW's Sensitive Species List for fish, (2) historically provided habitat for species on ODFW's Sensitive Species List, (3) contribute cool, clean water to the Willamette River and/or provide spawning habitat, rearing habitat, or refugia for native fish, or (4) have a resident population of native cutthroat trout or coastal cutthroat trout. | ● | ● | ● |
| | 2. | Identify and rate values at risk to determine whether a culvert poses a threat to aquatic organism passage, water quality (i.e., risk of high sediment input resulting from culvert failure), or both. | ● | ● | ● |
| | 3. | Rate and prioritize sections of road that pose a threat to water quality from sediment and/or other pollutants. | ● | ● | ● |
| *Aquatic/riparian species*<br>**OBJECTIVE: W5**<br>Implement projects that improve overall conditions for fish.<br>*(Addresses Prescriptions 3I, 3J, and 3O.)* | 1. | Use data to prioritize and plan restoration projects that directly benefit aquatic and riparian species through riparian habitat connectivity and stream restoration to provide habitat complexity and optimum water quality. | ● | ● | ● |

**TABLE 8 (CONTINUED)**

## Objectives and Activities for Goal4: Wildlife

| OBJECTIVES<br>WILDLIFE | | ACTIVITIES<br>WILDLIFE | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| *Amphibian/reptiles*<br>**OBJECTIVE: W6**<br>Fill data gaps regarding the life history, habitat needs, and status and trends of amphibian and reptile species.<br>*(Addresses Prescriptions 3A and 3B.)* | 1. | Conduct presence/absence and life history studies to better understand the population levels, habitat needs, range extents, dispersal capabilities, and movement dynamics of amphibian and reptile species known to occur in the Greater Forest Park ecosystem. Focus on federal species of concern or species that are state-listed in Oregon (see Appendix A), such as western pond turtle and western painted turtle. Within Forest Park, prioritize research on red-legged frogs (a TEES species) and northwestern salamanders. | ● | ● | ● |
| | 2. | Use citizen science, educational institutions, and other funded projects to monitor red-legged frog populations. | ● | ● | ● |
| | 3. | Identify habitat where priority amphibian and reptile species are likely to occur. | ● | ● | ● |
| | 4. | Identify best management practices to maintain and protect critical habitat and migration corridors for priority amphibian and reptile species (e.g., assess the need for wildlife crossings at roadways). | ● | ● | ● |
| | 5. | Work with existing agency and nonprofit programs to identify and implement protocols for long-term monitoring of the status and trends of priority amphibian and reptile species. | ● | ● | ● |
| *Amphibian/reptiles*<br>**OBJECTIVE: W7**<br>Maintain and protect habitat and associated corridors that amphibians and reptiles need to complete all of their life stages.<br>*(Addresses Prescriptions 3B, 3E, and 3G.)* | 1. | Protect specific areas where critical activities such as feeding, breeding, or migration are known to occur, particularly during spring and early summer. Minimize predators and disturbance. | ● | ● | ● |
| | 2. | Implement best management practices to maintain and protect critical habitat and migration corridors for priority amphibian and reptile species. | ● | ● | ● |
| | 3. | Where critical habitat is located on unprotected private land, provide education and foster partnerships that will lead to long-term habitat protection and viability of the species. | ● | | |
| | 4. | Plan projects to address the presence, habitat, movement, and seasonal activity patterns of amphibians and reptiles on both public and private land. Ensure that education on best management practices and programs is available to private landowners to ensure success. For example, educate private property owners about native frog and turtle use of key habitat features. | ● | ● | ● |
| | 5. | Continue to protect water quality, provide healthy riparian habitat, reduce siltation and pollution, and promote large woody debris recruitment in streams. | ● | ● | ● |
| | 6. | Assess roads, culverts, and trails as barriers or hazards to amphibian or reptile movement; construct wildlife crossing structures to minimize harm. | ● | ● | ● |

**TABLE 8 (CONTINUED)**

## Objectives and Activities for Goal4: Wildlife

| OBJECTIVES<br>WILDLIFE | | ACTIVITIES<br>WILDLIFE | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| *Amphibian/reptiles*<br>**OBJECTIVE: W8**<br>Implement conservation strategies that restore key habitat features in aquatic and upland habitats.<br>*(Addresses Prescription 3C.)* | 1. | Restore key aquatic and upland habitat features that are especially important to native reptiles and amphibians. | ● | ● | ● |
| | 2. | Coordinate with existing programs and partnerships among local, county, and state jurisdictions and nonprofits to support existing recovery efforts, such as those for native turtles. | ● | ● | ● |
| *Birds*<br>**OBJECTIVE: W9**<br>Support existing efforts and conduct studies that monitor bird populations where decline has been documented or is suspected.<br>*(Addresses Prescription 3B.)* | 1. | Work with the City of Portland to implement the Urban Conservation Treaty for Migratory Birds. Categories of action that require further implementation are habitat protection and improvement, hazard reduction, invasive species management, and education and outreach. | ● | ● | ● |
| | 2. | Use citizen science, educational institutions, and other funded projects to monitor species where populations are known to be in decline, with priority given to special-status species within Oregon. Population dynamics studies should prioritize (1) the olive-sided flycatcher, varied thrush, Hutton's vireo, and western wood peewee, which are special-status species, and (2) the band-tailed pigeon, purple finch, pileated woodpecker, brown creeper, black-throated gray warbler, and bushtit, which are species of interest. All of these species are known to occur within the Greater Forest Park ecosystem. | ● | ● | ● |
| | 3. | Conduct studies to identify threats and causes of decline. | ● | ● | ● |
| *Birds*<br>**OBJECTIVE: W10**<br>Minimize the degradation, loss, and fragmentation of bird habitat.<br>*(Addresses Prescriptions 3B and 3C.)* | 1. | Conserve specialized habitat features (such as snags) and small patches of specialized habitat (such as oak habitat). | ● | ● | ● |
| | 2. | Manage for the protection of small and large habitat patches, with the goal of large patches or "anchor habitat" being larger than 25 acres. | ● | ● | |
| | 3. | Identify areas where edge habitat should be limited through restoration activities such as the planting of shrubs and trees. | ● | ● | |
| | 4. | Protect and restore riparian forests for contiguous availability of complex vegetation structure with a variety of native shrubs. | ● | ● | |
| | 5. | Expand existing patches where possible through conservation easements, landowner agreements, or other conservation tools. | ● | ● | |
| | 6. | Reduce the effects of multiple land-use management in coniferous and mixed type forests, which support some of the highest densities of breeding land birds. | ● | ● | |
| *Birds*<br>**OBJECTIVE: W11**<br>Minimize disturbance during important times in the avian life cycle, such as breeding and nesting.<br>*(Addresses Prescriptions 3L and 4E.)* | 1. | Use land management and restoration practices that minimize disturbance during the nesting stage, when a species is most vulnerable to nest failure. | ● | ● | ● |
| | 2. | Minimize impacts (e.g., disturbance, predation by domestic cats and dogs, roads noise, artificial light) along edge habitats. | ● | ● | ● |

**TABLE 8 (CONTINUED)**

## Objectives and Activities for Goal4: Wildlife

| OBJECTIVES<br>WILDLIFE | | ACTIVITIES<br>WILDLIFE | MGMT AREA<br>PRIV | LMC | FP |
|---|---|---|---|---|---|
| *Mammals*<br>**OBJECTIVE: W12**<br>Conduct further research to determine presence/absence, abundance, distribution, and connectivity needs of mammalian species on lands managed for conservation.<br>*(Addresses Prescription 3B.)* | 1. | Collaborate with educational institutions, agencies, other nonprofit organizations, and private landowners to conduct presence/absence surveys on Metro-acquired land, the Forest Park Conservancy's Ancient Forest Preserve, and conservation easements held by the Forest Park Conservancy. | ● | ● | |
| | 2. | Fill data gaps on the abundance and distribution of species, focusing on the highest special-status species first. | ● | ● | |
| | 3. | Use existing data to determine the impacts of recreational use on species sensitive to human presence and urbanization within the Greater Forest Park ecosystem. | | ● | ● |
| *Mammals*<br>**OBJECTIVE: W13**<br>Minimize the degradation, loss, and fragmentation of bird habitat.<br>*(Addresses Prescriptions 3B and 3C.)* | 1. | Identify and map high-quality habitat based on indicators in the Regional Conservation Strategy. | ● | ● | ● |
| | 2. | Partner with the Columbia Land Trust to secure funding for and develop a strategy for identifying and prioritizing high-value lands for protection within the Greater Forest Park ecosystem. | ● | | |
| | 3. | Monitor and enforce existing conservation easements within the Greater Forest Park ecosystem in perpetuity. | ● | ● | |

**WILDLIFE-RELATED FOREST PARK PRESCRIPTIONS:**

- → *Project 1B:* Address turbidity inputs to Balch Creek watershed.
- → *Project 3A:* Wildlife study.
- → *Project 3B:* Wildlife use characterization.
- → *Project 3C:* Improve wildlife habitat structure throughout Forest Park.
- → *Project 3E:* Habitat fragmentation response.
- → *Project 3G:* Wildlife corridor connections.
- → *Project 4A:* Long-term invasive plant management plan.
- → *Project 4B:* EDRR plant control.
- → *Project 4C:* Forest Park buffer program.
- → *Project 4D:* EDRR animal pest control.
- → *Project 4E:* Animal pest management plan.

*For detailed information on these projects, see Appendix B.*

# Section 5

## FUNDING FOR IMPLEMENTATION

**SECTION 5**

# Funding for Implementation

Section 1 lists one overarching goal for the Greater Forest Park ecosystem that has not yet been addressed: attracting financial resources to implement the conservation activities identified in this document and achieve the objectives that Forest Park Alliance partners are aspiring to.

Large-scale restoration efforts cannot succeed when undertaken by one organization alone. Instead, it takes the collaboration of many passionate, committed partners who can broaden engagement and cooperation while making efficient use of funding and human resources. The GFPCI began with the recognition that protecting and restoring the Greater Forest Park ecosystem will require more resources than any single organization or agency can provide; thus, a collaborative public/private/nonprofit approach is needed.

Many organizations already are acting to advance conservation of the Greater Forest Park ecosystem. *Forest Park Ecological Prescriptions*[70] describes commitments that PP&R, Bureau of Environmental Services, West Multnomah Soil & Water Conservation District, Forest Park Conservancy, and others have made to help implement specific prescriptions in and around the park. Forest Park Alliance partners are currently active in restoration and maintenance of the Greater Forest Park ecosystem and expect to work together to raise funds for implementation of the conservation activities identified in this document. Toward that end, this GFPCI document is expected to serve as a tool for coordinating activities (so as to achieve a whole greater than the sum of its parts) and for telling a larger, more comprehensive story of the ecological significance of the Greater Forest Park ecosystem and local efforts to protect it.

Unfortunately, much more funding is needed than is currently available or likely to become available under current financial scenarios. Traditional conservation funding mechanisms such as bond measures, system development charges, agency grants, and private contributions (funneled through land trusts and other nonprofit organizations) may need to be supplemented by more novel methods, such as green infrastructure, market-based funding, or as-yet unidentified approaches. Either way, it is important to act now to develop stable, long-term sources of funding so that we can address immediate conservation needs and plan future expenditures for the most opportune time, both financially and ecologically.

70 *Forest Park Ecological Prescriptions* (Portland Parks & Recreation, August 2011).

# Section 6

COMMUNITY

**SECTION 6**

# Community

Success of a conservation initiative of this scale, within an urban and rural area, will require a concerned and committed community that is aware of the issues and engaged in ways that make a difference. Gaining majority support in a large community—both in terms of volunteer time and financial support—is a major undertaking. However, it is critical that conservation leaders be supported and backed by citizen leaders and the community as a whole.

The first step is to make the public aware of the threats, the problems these threats cause and a solution to the problem. The next step is to make a connection and encourage volunteers, community leaders and funders to be actively involved and invested in the cause. The final step is to gain a long-term commitment and support to provide long-term sustainability for the project.

*There are three main objectives to accomplish community involvement:*

→ **Public Awareness and Education.** Forest Park Conservancy will work with partners to develop a public outreach campaign with appropriate messaging that connects with and inspires community members to understand the issues the Greater Forest Park ecosystem faces. Increasing public interest in the GFPCI will help raise private dollars and hopefully encourage permanent public funding for ongoing restoration and maintenance.

→ **Engaging volunteers and community groups.** This will involve a public campaign to recruit new volunteers and invigorate existing volunteers to become more deeply engaged. Volunteer events will be held more frequently as milestones are achieved. In addition, the Forest Park Conservancy will collaborate with other friends groups and community organizations to plan events together, share volunteers, and rally support for the campaign.

→ **Encourage contributions to the initiative or specific goals.** Contributions from local businesses, foundations, individuals, and partner agencies can come in numerous forms, such as staff time, cash donations, and in-kind materials. Relationships with local businesses, foundations and community organizations will be developed and fostered to build long-term sustainability for the project. Public education and outreach will be key tools used in building these relationships.

**APPENDIX A:**

# Species of Interest

(from Portland Parks & Recreation's 2012 *Forest Park Wildlife Report*)

**TABLE:** *Species either listed, candidate, sensitive, or of concern at the state or federal levels.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | FEDERAL | OREGON | FOREST PARK OCCURANCE | FOREST PARK BREEDING |
|---|---|---|---|---|---|
| GROUP: *Birds* | | | | | |
| Bald eagle | *Haliaeetusleucocephalus* | (delisted) | Threatened | Occurs | Breeds |
| Peregrine falcon | *Falco peregrinus* | (delisted) | Sensitive, Vuln. | Occurs | Breeds |
| Band-tailed pigeon | *Patagioenasfasciata* | of Concern | | Occurs | Breeds |
| Northern spotted owl | *Strixoccidentaliscaurina* | Threatened | | Rare | Non-breeder |
| Common nighthawk | *Chordeiles minor* | | Sensitive, Crit. | Rare | Non-breeder |
| Lewis's woodpecker | *Melanerpeslewis* | of Concern | Sensitive, Crit. | Rare | Non-breeder |
| Pileated woodpecker | *Dryocopuspileatus* | | Sensitive, Vuln. | Occurs | Breeds |
| Olive-sided flycatcher | *Contopuscooperi* | of Concern | Sensitive, Vuln. | Occurs | Breeds |
| GROUP: *Mammals* | | | | | |
| American marten | *Martesamericana* | Candidate | Sensitive, Vuln. | Historical | N/A |
| Red tree vole | *Arborimuslongicaudus* | Candidate | Sensitive, Vuln. | Historical | N/A |
| White-footed vole | *Arborimusalbipes* | of Concern | | Undetermined | Undetermined |
| Camas pocket gopher | *Thomomysbulbivorus* | of Concern | | Undetermined | Undetermined |
| Western gray squirrel | *Sciuris griseus* | | Sensitive, Vuln. | Does not occur | N/A |
| Silver-haired bat | *Lasionycterisnoctivagans* | of Concern | Sensitive, Vuln. | Occurs | Undetermined |
| Fringed myotis | *Myotisthysanodes* | of Concern | Sensitive, Vuln. | Occurs | Undetermined |
| Western big-eared bat | *Corynorhinustownsendii* | of Concern | Sensitive, Crit. | Occurs | Undetermined |
| Long-eared myotis | *Myotis evotis* | of Concern | | Occurs | Undetermined |
| Long-legged myotis | *Myotis volans* | of Concern | Sensitive, Vuln. | Occurs | Undetermined |
| Yuma myotis | *Myotisyumanensis* | of Concern | | Occurs | Undetermined |
| California myotis | | | | | |
| GROUP: *Amphibians* | | | | | |
| Northern red-legged frog | *Rana aurora* | of Concern | Sensitive, Vuln. | Occurs | Breeds |
| Oregon slender salamander | *Batrachosepswrighti* | of Concern | Sensitive, Vuln. | Does not occur | N/A |
| GROUP: *Fish* | | | | | |
| Coastal cutthroat trout | *Oncorhynchusclarkii clarkii* | of Concern | Sensitive, Vuln. | Occurs | Breeds |
| Steelhead | *Oncorhynchusmykiss* | Threatened | Sensitive, Crit. | Occurs | N/A |

**TABLE:** *Birds of interest for Forest Park grouped by occurrence and listed taxonomically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | TAXON | OCCUR. | BREEDING | TEES STATUS | NON-NATIVE | SEASON |
|---|---|---|---|---|---|---|---|
| Mallard | *Anas platyrhynchos* | Waterfowl | Occurs | Unknown | | | A |
| Great blue heron | *Ardea herodias* | Heron | Occurs | Non-breeder | ✖ | | A |
| Turkey vulture | *Cathartes aura* | Raptor | Occurs | Unknown | | | S |
| Osprey | *Pandion haliaetus* | Raptor | Occurs | Non-breeder | | | S |
| Bald eagle | *Haliaeetus leucocephalus* | Raptor | Occurs | Breeds | ✖ | | A |
| Sharp-shinned hawk | *Accipiter striatus* | Raptor | Occurs | Breeds | | | A |
| Cooper's hawk | *Accipiter cooperii* | Raptor | Occurs | Breeds | | | A |
| Red-tailed hawk | *Buteo jamaicensis* | Raptor | Occurs | Breeds | | | A |
| Peregrine falcon | *Falco peregrinus* | Raptor | Occurs | Breeds | ✖ | | A |
| Rock pigeon | *Columba livia* | Dove | Occurs | Undetermined | | ✖ | A |
| Band-tailed pigeon | *Patagioenas fasciata* | Dove | Occurs | Breeds | ✖ | | S |
| Mourning dove | *Zenaidura macroura* | Dove | Occurs | Non-breeder | | | A |
| Western screech-owl | *Megascops kennicottii* | Owl | Occurs | Breeds | | | A |
| Great horned owl | *Bubo virginianus* | Owl | Occurs | Breeds | | | A |
| Northern pygmy-owl | *Glaucidium gnoma* | Owl | Occurs | Breeds | | | A |
| Barred owl | *Strix varia* | Owl | Occurs | Breeds | | ✖ | A |
| Northern saw-whet owl | *Aegolius acadicus* | Owl | Occurs | Breeds | | | A |
| Vaux's swift | *Chaetura vauxi* | Swift | Occurs | Breeds | ✖ | | S |
| Anna's hummingbird | *Calypte anna* | Hummingbird | Occurs | Breeds | | | A |
| Rufous hummingbird | *Selasphorus rufus* | Hummingbird | Occurs | Breeds | ✖ | | S |
| Red-breasted sapsucker | *Sphyrapicus ruber* | Woodpecker | Occurs | Breeds | | | S |
| Downy woodpecker | *Picoides pubescens* | Woodpecker | Occurs | Breeds | ✖ | | A |
| Hairy woodpecker | *Picoides villosus* | Woodpecker | Occurs | Breeds | | | A |
| Northern flicker | *Colaptes auratus* | Woodpecker | Occurs | Breeds | | | A |
| Pileated woodpecker | *Dryocopus pileatus* | Woodpecker | Occurs | Breeds | ✖ | | A |
| Olive-sided flycatcher | *Contopus cooperi* | Flycatcher | Occurs | Breeds | ✖ | | S |
| Western wood-pewee | *Contopus sordidulus* | Flycatcher | Occurs | Breeds | ✖ | | S |
| Willow flycatcher (little) | *Empidonax traillii brewsteri* | Flycatcher | Occurs | Undetermined | ✖ | | S |
| Hammond's flycatcher | *Empidonax hammondii* | Flycatcher | Occurs | Undetermined | | | S |
| Pacific-slope flycatcher | *Empidonax dificilis* | Flycatcher | Occurs | Breeds | ✖ | | S |
| Cassin's vireo | *Vireo cassinii* | Vireo | Occurs | Breeds | | | S |

**TABLE:** *Birds of interest for Forest Park grouped by occurrence and listed taxonomically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | TAXON | OCCUR. | BREEDING | TEES STATUS | NON-NATIVE | SEASON |
|---|---|---|---|---|---|---|---|
| Hutton's vireo | *Vireo huttoni* | Vireo | Occurs | Breeds | ✖ | | S |
| Warbling vireo | *Vireo gilvus* | Vireo | Occurs | Breeds | | | S |
| Gray jay | *Perisoreus canadensis* | Corvid | Occurs | Breeds | | | A |
| Steller's jay | *Cyanocitta stelleri* | Corvid | Occurs | Breeds | | | A |
| Western scrub-jay | *Aphelocoma californica* | Corvid | Occurs | Breeds | | | A |
| American crow | *Corvus brachyrhynchos* | Corvid | Occurs | Breeds | | | A |
| Common raven | *Corvus corax* | Corvid | Occurs | Breeds | | | A |
| Tree swallow | *Tachycineta bicolor* | Swallow | Occurs | Undetermined | | | S |
| Violet-green swallow | *Tachycineta thalassina* | Swallow | Occurs | Undetermined | | | S |
| Barn swallow | *Hirundo rustica* | Swallow | Occurs | Breeds | | | S |
| Black-capped chickadee | *Poecile atricapillus* | Chickadee | Occurs | Breeds | | | A |
| Chestnut-backed chickadee | *Poecile rufescens* | Chickadee | Occurs | Breeds | | | A |
| Bushtit | *Psaltriparus minimus* | Bushtit | Occurs | Breeds | ✖ | | A |
| Red-breasted nuthatch | *Sitta canadensis* | Nuthatch | Occurs | Breeds | | | A |
| White-breasted nuthatch (SB) | *Sitta carolinensis aculeata* | Nuthatch | Occurs | Undetermined | ✖ | | U |
| Brown creeper | *Certhia americana* | Creeper | Occurs | Breeds | ✖ | | A |
| Bewick's wren | *Thryomanes bewickii* | Wren | Occurs | Breeds | | | A |
| House wren | *Troglodytes aedon* | Wren | Occurs | Non-breeder | ✖ | | A |
| Pacific wren | *Troglodytes pacificus* | Wren | Occurs | Breeds | ✖ | | A |
| Golden-crowned kinglet | *Regulus satrapa* | Kinglet | Occurs | Non-breeder | | | W |
| Ruby-crowned kinglet | *Regulus calendula* | Kinglet | Occurs | Non-breeder | | | W |
| Townsend's solitaire | *Myadestes townsendi* | Thrush | Occurs | Non-breeder | | | M |
| Swainson's thrush | *Catharus ustulatus* | Thrush | Occurs | Breeds | ✖ | | S |
| Hermit thrush | *Catharus guttatus* | Thrush | Occurs | Non-breeder | | | W |
| American robin | *Turdus migratorius* | Thrush | Occurs | Breeds | | | A |
| Varied thrush | *Ixoreus naevius* | Thrush | Occurs | Breeds | ✖ | | W |
| European starling | *Sturnus vulgaris* | Starling | Occurs | Non-breeder | | ✖ | A |
| Cedar waxwing | *Bombycilla cedrorum* | Waxwing | Occurs | Undetermined | | | S |
| Orange-crowned warbler | *Oreothlypis celata* | Warbler | Occurs | Breeds | ✖ | | S |
| Nashville warbler | *Oreothlypis ruficapilla* | Warbler | Occurs | Non-breeder | ✖ | | M |
| MacGillivray's warbler | *Geothlypis tolmiei* | Warbler | Occurs | Unknown | | | M |

**TABLE:** *Birds of interest for Forest Park grouped by occurrence and listed taxonomically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | TAXON | OCCUR. | BREEDING | TEES STATUS | NON-NATIVE | SEASON |
|---|---|---|---|---|---|---|---|
| Yellow warbler | *Setophaga petechia* | Warbler | Occurs | Unknown | ✖ | | S |
| Yellow-rumped warbler | *Setophaga coronata* | Warbler | Occurs | Undetermined | | | S |
| Black-throated gray warbler | *Setophaga nigrescens* | Warbler | Occurs | Breeds | ✖ | | S |
| Townsend's warbler | *Setophaga townsendi* | Warbler | Occurs | Breeds | | | S |
| Hermit warbler | *Setophaga occidentalis* | Warbler | Occurs | Undetermined | ✖ | | M |
| Wilson's warbler | *Cardellina pusilla* | Warbler | Occurs | Breeds | ✖ | | S |
| Spotted towhee | *Pipilo maculatus* | Sparrow | Occurs | Breeds | | | A |
| Chipping sparrow | *Spizella passerina* | Sparrow | Occurs | Non-breeder | ✖ | | A |
| Fox sparrow | *Passerella iliaca* | Sparrow | Occurs | Non-breeder | | | M |
| Song sparrow | *Melospiza melodia* | Sparrow | Occurs | Breeds | | | A |
| Lincoln's sparrow | *Melospiza lincolnii* | Sparrow | Occurs | Non-breeder | | | M |
| White-throated sparrow | *Zonotrichia albicollis* | Sparrow | Occurs | Non-breeder | | | W |
| White-crowned sparrow | *Zonotrichia leucophrys* | Sparrow | Occurs | Breeds | | | A |
| Golden-crowned sparrow | *Zonotrichia atricapilla* | Sparrow | Occurs | Non-breeder | | | W |
| Dark-eyed junco | *Junco hyemalis* | Sparrow | Occurs | Breeds | | | A |
| Western tanager | *Piranga ludoviana* | Cardinal | Occurs | Breeds | | | S |
| Black-headed grosbeak | *Pheucticus melanocephalus* | Cardinal | Occurs | Breeds | | | S |
| Brewer's blackbird | *Euphagus cyanocephalus* | Blackbird | Occurs | Undetermined | | | A |
| Brown-headed cowbird | *Molothrus ater Blackbird* | Occurs | Undetermined | | | | S |
| Purple finch | *Carpodacus purpureus* | Finch | Occurs | Breeds | ✖ | | S |
| House finch | *Carpodacus mexicanus* | Finch | Occurs | Breeds | | | M |
| Red crossbill | *Loxia curvirostra* | Finch | Occurs | Non-breeder | ✖ | | A |
| Pine siskin | *Spinus pinus* | Finch | Occurs | Breeds | | | A |
| Lesser goldfinch | *Spinus psaltria* | *Finch* | Occurs | Undetermined | | | M |
| American goldfinch | *Spinus tristis* | Finch | Occurs | Breeds | | | A |
| Evening grosbeak | *Coccothraustes vespertinus* | Finch | Occurs | Non-breeder | | | A |
| House sparrow | *Passer domesticus* | Passerid | Occurs | Breeds | | ✖ | A |
| American kestrel | *Falco sparverius* | Raptor | Rare | Non-breeder | ✖ | | A |
| Merlin | *Falco columbarius* | Raptor | Rare | Non-breeder | ✖ | | W |
| Northern spotted owl | *Strix occidentalis caurina* | Owl | Rare | Non-breeder | * | | U |
| Common nighthhawk | *Chordeiles minor* | Nightjar | Rare | Non-breeder | ✖ | | S |

**TABLE:** *Birds of interest for Forest Park grouped by occurrence and listed taxonomically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | TAXON | OCCUR. | BREEDING | TEES STATUS | NON-NATIVE | SEASON |
|---|---|---|---|---|---|---|---|
| **Lewis's woodpecker** | *Melanerpes lewis* | Woodpecker | Rare | Non-breeder | ✖ | | M |
| **Dusky flycatcher** | *Empidonax oberholseri* | Flycatcher | Rare | Non-breeder | | | M |
| **Ash-throated flycatcher** | *Myiarchus cinerascens* | Flycatcher | Rare | Non-breeder | | | M |
| **Western kingbird** | *Tyrannus verticalis* | Flycatcher | Rare | Non-breeder | | | S |
| **Red-eyed vireo** | *Vireo olivaceus* | Vireo | Rare | Non-breeder | ✖ | | S |
| **American dipper** | *Cinclus mexicanus* | Dipper | Rare | Non-breeder | | | W |
| **Lazuli bunting** | *Passerina amoena* | Cardinal | Rare | Non-breeder | | | S |
| **Pine grosbeak** | *Pinicola enucleator* | Finch | Rare | Non-breeder | | | M |
| **California quail** | *Callipepla californica* | Landfowl | Extirpated | Non-breeder | | | |
| **Mountain quail** | *Oreortyx pictus* | Landfowl | Extirpated | Non-breeder | | | |
| **Ruffed grouse** | *Bonasa umbellus* | Landfowl | Extirpated | Non-breeder | | | |
| **Sooty grouse** | *Dendragapus fuliginosus* | Landfowl | Extirpated | Non-breeder | | | |

**TABLE:** *Mammals of interest for Forest Park listed by occurrence and alphabetically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | ORDER | OCCURRENCE | BREEDING | TEES STATUS | NON-NATIVE |
|---|---|---|---|---|---|---|
| Elk | *Cervus canadensis* | Artiodactyla | Occurs | Non-breeder | | |
| Mule deer | *Odocoileus hemionus* | Artiodactyla | Occurs | Breeds | | |
| Coyote | *Canis latrans* | Carnivora | Occurs | Breeds | | |
| Bobcat | *Lynx rufus* | Carnivora | Occurs | Breeds | | |
| Striped skunk | *Mephitis mephitis* | Carnivora | Occurs | Breeds | | |
| Short-tailed weasel | *Mustela erminea* | Carnivora | Occurs | Breeds | | |
| Long-tailed weasel | *Mustela frenata* | Carnivora | Occurs | Breeds | | |
| Raccoon | *Procyon lotor* | Carnivora | Occurs | Breeds | | |
| Western spotted skunk | *Spilogale putorius* | Carnivora | Occurs | Breeds | | |
| Long-eared myotis | *Myotis evotis* | Chiroptera | Occurs | Undetermined | ✖ | |
| Long-legged myotis | *Myotis volans* | Chiroptera | Occurs | Undetermined | ✖ | |
| Yuma myotis | *Myotis yumanensis* | Chiroptera | Occurs | Undetermined | ✖ | |
| Big brown bat | *Eptesicus fuscus* | Chiroptera | Occurs | Undetermined | | |
| Silver-haired bat | *Lasionycteris noctivagans* | Chiroptera | Occurs | Undetermined | ✖ | |
| Hoary bat | *Lasiurus cinereus* | Chiroptera | Occurs | Undetermined | ✖ | |
| California myotis | *Myotis californicus* | Chiroptera | Occurs | Undetermined | ✖ | |
| Little brown bat | *Myotis lucifugus* | Chiroptera | Occurs | Undetermined | | |
| Fringed myotis | *Myotis thysanodes* | Chiroptera | Occurs | Undetermined | ✖ | |
| Western big-eared bat | *Corynorhinus townsendii* | Chiroptera | Occurs | Undetermined | ✖ | |
| Brush rabbit | *Sylvilagus bachmani* | Lagomorpha | Occurs | Breeds | | |
| Virginia opossum | *Didelphis virginiana* | Marsupial | Occurs | Breeds | | ✖ |
| Mountain beaver | *Aplodontia rufa* | Rodentia | Occurs | Breeds | | |
| Northern flying squirrel | *Glaucomys sabrinus* | Rodentia | Occurs | Breeds | | |
| Creeping vole | *Microtus oregoni* | Rodentia | Occurs | Breeds | | |
| Townsend's vole | *Microtus townsendii* | Rodentia | Occurs | Breeds | | |
| Deer mouse | *Peromyscus maniculatus* | Rodentia | Occurs | Breeds | | |
| Norway rat | *Rattus norvegicus* | Rodentia | Occurs | Breeds | | ✖ |
| Black rat | *Rattus rattus* | Rodentia | Occurs | Breeds | | ✖ |
| Eastern gray squirrel | *Sciurus carolinensis* | Rodentia | Occurs | Breeds | | ✖ |
| Eastern fox squirrel | *Sciurus niger* | Rodentia | Occurs | Breeds | | ✖ |
| Townsend's chipmunk | *Tamias townsendii* | Rodentia | Occurs | Breeds | | |

**TABLE:** *Mammals of interest for Forest Park listed by occurrence and alphabetically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | ORDER | OCCURRENCE | BREEDING | TEES STATUS | NON-NATIVE |
|---|---|---|---|---|---|---|
| Douglas squirrel | *Tamiasciuris douglasii* | Rodentia | Occurs | Breeds | | |
| Shrew mole | *Neurotrichus gibbsii* | Soricomorpha | Occurs | Breeds | | |
| Coast mole | *Scapanus orarius* | Soricomorpha | Occurs | Breeds | | |
| Townsend's mole | *Scapanus townsendii* | Soricomorpha | Occurs | Breeds | | |
| Trowbridges shrew | *Sorex trowbridgii* | Soricomorpha | Occurs | Breeds | | |
| Vagrant shrew | *Sorex vagrans* | Soricomorpha | Occurs | Breeds | | |
| Cougar | *Felis concolor* | Carnivora | Rare | Non-breeder | | |
| Black bear | *Ursus americanus* | Carnivora | Rare | Non-breeder | | |
| Red fox | *Vulpes vulpes* | Carnivora | Rare | Undetermined | | |
| American beaver | *Castor canadensis* | Rodentia | Rare | Non-breeder | ✖ | |
| North american porcupine | *Erethizon dorsatum* | Rodentia | Rare | Undetermined | | |
| Pacific jumping mouse | *Zapus trinotatus* | Rodentia | Rare | Breeds | | |
| Pacific water shrew | *Sorex bendirii* | Soricomorpha | Rare | Breeds | | |
| American marten | *Martes americana* | Carnivora | Historical | Not applicable | ✖ | |
| Gray fox | *Urocyon cinereoargenteus* | Carnivora | Historical | Not applicable | | |
| Red tree vole | *Arborimus longicaudus* | Rodentia | Historical | Not applicable | ✖ | |
| White-footed vole | *Arborimus albipes* | Rodentia | Undetermined | Undetermined | ✖ | |
| Western red-backed vole | *Clethrionomys californicus* | Rodentia | Undetermined | Undetermined | | |
| Gray-tailed vole | *Microtus canicaudus* | Rodentia | Undetermined | Undetermined | | |
| Long-tailed vole | *Microtus longicaudus* | Rodentia | Undetermined | Undetermined | | |
| Bushy-tailed woodrat | *Neotoma cinerea* | Rodentia | Undetermined | Undetermined | | |
| Dusky footed woodrat | *Neotoma fuscipes* | Rodentia | Undetermined | Undetermined | | |
| Camas pocket gopher | *Thomomys bulbivorus* | Rodentia | Undetermined | Undetermined | ✖ | |
| Mazama pocket gopher | *Thomomys mazama* | Rodentia | Undetermined | Undetermined | | |
| Dusky shrew | *Sorex monticolus* | Soricomorpha | Undetermined | Undetermined | | |

**TABLE:** *Mollusks of interest for Forest Park grouped by type and occurrence, and listed alphabetically.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | HABITAT & TYPE | OCCURRENCE | BREEDING |
|---|---|---|---|---|
| Banana slug | *Ariolimax columbianus* | Terrestrial Slug | Occurs | Breeds |
| European red slug | *Arion rufus* | Slug | Occurs | Breeds |
| Reticulate taildropper slug | *Prophysaon andersoni* | Slug | Occurs | Breeds |
| Yellow-bordered taildropper slug | *Prophysaon foliolatum* | Slug | Occurs | Breeds |
| Northwest hesperian | *Vespericola columbiana* | Slug | Occurs | Breeds |
| Cochlicopa lubrica | *Cochlicopa lubrica* | Snail | Occurs | Breeds |
| Pygmy Oregonian | *Crypotomastix germana germana* | Snail | Occurs | Breeds |
| garden snail | *Cryptomphalus aspersus* | Snail | Occurs | Breeds |
| Robust lancetooth | *Haplotrema vancouverense* | Snail | Occurs | Breeds |
| Oregon megomphix | *Megomphix hemphilli* | Snail | Occurs | Breeds |
| Pacific sideband snail | *Monadenia fidelis fidelis* | Snail | Occurs | Breeds |
| Oregon forestsnail | *Allogona townsendiana* | Snail | Does not occur | Not applicable |
| Western thorn | *Carychium occidentale* | Microsnail | Occurs | Breeds |
| Toothless column snail | *Columella edentula* | Microsnail | Occurs | Breeds |
| Paralaoma servilis | *Paralaoma servilis* | Microsnail | Occurs | Breeds |
| Broadwhorl tightcoil | *Pristiloma johnsonii* | Microsnail | Occurs | Breeds |
| Denticulate tightcoil | *Pristiloma langsingi* | Microsnail | Occurs | Breeds |
| Conical spot | *Punctum randolphi* | Microsnail | Occurs | Breeds |
| Pupilla hebes | *Pupilla hebes* | Microsnail | Occurs | Breeds |
| Cross vertigo | *Vertigo modesta* | Microsnail | Occurs | Breeds |
| Zonitoides nutidus | *Zonitoides nitidus* | Microsnail | Occurs | Breeds |
| Ramshorn snail | *Planorbidae* | Aquatic Freshwater snail | Occurs | Breeds |
| Pleurocerid | *Juga sp.* | Freshwater snail | Occurs | Breeds |
| Pea clam | *Pisidiidae* | Bivalve | Occurs | Breeds |
| Floaters | *Anodonta sp.* | Bivalve | Does not occur | Not applicable |
| Western pearlshell | *Margaritifera falcata* | Bivalve | Does not occur | Not applicable |
| Western ridged mussel | *Gonidea angulata* | Bivalve | Does not occur | Not applicable |
| Asian clam | *Corbicula fluminea* | Bivalve | Does not occur | Not applicable |

**TABLE:** *Amphibians, reptiles, and fish of interest for Forest Park.*

## Forest Park Wildlife Inventory

| COMMON NAME | SCIENTIFIC NAME | ORDER | OCCURRENCE | BREEDING | HABITAT ASSOCIATION WITH FP |
|---|---|---|---|---|---|
| CLASS: *Amphibians* | | | | | |
| **Pacific treefrog** | *Pseudacris regilla* | Frog | Occurs | Breeds | Pond breeding |
| **Northern red-legged frog** | *Rana aurora* | Frog | Occurs | Breeds | Pond breeding |
| **Ensatina** | *Ensatina eschscholtzii* | Salamander | Occurs | Breeds | Terr. breeding |
| **Dunn's salamander** | *Plethodon dunni* | Salamander | Occurs | Breeds | Stream breeding |
| **W. red-backed salamander** | *Plethodon vehiculum* | Salamander | Occurs | Breeds | Terr. breeding |
| **Rough-skinned newt** | *Taricha granulosa* | Salamander | Occurs | Breeds | Pong breeding |
| **Coastal giant salamander** | *Dicamptodon tenebrosus* | Salamander | Occurs | Breeds | Stream breeding |
| **Northwestern salamander** | *Ambystoma gracile* | Salamander | Undetermined | Undetermined | Pond breeding |
| **Long-toed salamander** | *Ambystoma macrodactylum* | Salamander | Undetermined | Undetermined | |
| **Clouded salamander** | *Aneides ferreus* | Salamander | Undetermined | Undetermined | |
| **Oregon slender salamander** | *Batrachoseps wrighti* | Salamander | Undetermined | Undetermined | |
| CLASS: *Reptiles* | | | | | |
| **Common garter snake** | *Thamnophis sirtalis* | Snake | Occurs | Breeds | Forest openings |
| **Northwestern garter snake** | *Thamnophis ordinoides* | Snake | Occurs | Breeds | Forest openings |
| **Northern alligator lizard** | *Elgaria coerulea* | Lizard | Rare | Breeds | Rock quarry |
| **Rubber boa** | *Charina bottae* | Snake | Undetermined | Undetermined | Forest |
| **Ring-necked snake** | *Diadophis punctatus* | Snake | Undetermined | Undetermined | |
| **Western skink** | *Plestiodon skiltonianus* | Lizard | Undetermined | Undetermined | |
| **Western fence lizard** | *Sceloporus occidentalis* | Lizard | Undetermined | Undetermined | |
| **Southern alligator lizard** | *Elgaria multicarinata* | Lizard | Undetermined | Undetermined | |
| CLASS: *Fish* | | | | | |
| **Coastal cutthroat trout** | *Oncorhynchus clarkii clarkii* | Salmonid | Occurs | Breeds | Balch, Miller creeks |
| **Coho salmon** | *Oncorhynchus kisutch* | Salmonid | Occurs | Non-breeder | Miller Creek only |
| **Steelhead** | *Oncorhynchus mykiss* | Salmonid | Occurs | Non-breeder | Miller Creek only |
| **Sculpin** | Cottus sp. | Cottid | Occurs | Breeds | some major creeks |

**APPENDIX B:**

# Tables of Forest Park Ecological Prescriptions

(from Portland Parks & Recreation's 2011 *Forest Park Ecological Prescriptions*)

*footnotes:*

1 Forest Park: A Call to Action *(City Club of Portland, 2010. City Club of Portland Bulletin, Vol. 92, No. 48, May 28, 2010. www.pdxcityclub.org).*

2 Refers to threatened and endangered species and species identified as rare in the Portland area in Urbanizing Flora of Portland, Oregon: 1806-2008 (J.A. Christy, A. Kimpo, V. Marttala, P. K. Gaddis, and N. L. Christy, 2009, Occasional Paper *3 of the Native Plant Society of Oregon 2009).*

**TABLE**

## Protected Air and Water Quality

| COMMITTED RESOURCE | PROJECT NUMBER | PROJECT NAME | STRESS / GAP | MEASURE OF SUCCESS | KEY COMPONENTS | TOTAL BUDGET | FUNDS NEEDED |
|---|---|---|---|---|---|---|---|
| | w1A | **Reduce Water Quality Impacts from Infrastructure** | Erosion from infrastructure | Streambank/ streambed stability associated with infrastructure | → Identify trail and roadway impacts to water quality<br>→ Develop priorities for rebuilding, relocating, and/or restructuring<br>→ Implement high priority projects | $50,000<br><br><br>TBD | $50,000<br><br><br>TBD |
| | w1B | **Address Turbidity Inputs to Balch Creek Watershed** | Turbidity | | → Turbidity levels in park streams reduced<br>→ Identify sources within park boundary<br>→ Develop strategy for addressing sources outside of park boundary<br>→ Outreach, monitoring, and priority project implementation | $90,000<br><br><br>$190,000 | $90,000<br><br><br>$190,000 |
| ✖ | 1C | **Best Management Practices (BMPs) for Instream Maintenance Work** | Erosion from maintenance activities | Erosion reduced | → Identification of regular and emergency maintenance sites<br>→ Coordination with Bureau of Environmental Services to develop BMPs for maintenance and erosion control | $25,000 | 0 |
| ✖ | 1D | **Pet Waste Management** | Waste management | Ammonia levels in park streams reduced; Reduction in off-leash dog use; *E. coli* associated with domestic dogs reduced | → Measure and identify ecoli inputs to to Forest Park streams<br>→ Develop outreach and education campaign around results<br>→ Continue to fund educational programs, including Ranger efforts | $40,000 | $5,000 |
| | 1E | **Control Erosion Issues from Invasive Species** | Erosion from invasive species | Reduced distance of riparian corridor dominated by species of concern for erosion | → Develop a list of species of concern for erosion<br>→ Access riparian corridors for these species<br>→ Prioritize areas for treatment and enhancement<br>→ Implement high priority projects | $55,000 | $55,000 |
| | 1F | **Septic System Education and Outreach Program** | Waste management | Ammonia levels in park streams reduced | → Develop target outreach list for Balch Creek watershed<br>→ Create outreach materials and/or outreach/ education program<br>→ Work with BES and BDS to determine potential for incentive program and/or assistance with outreach | $200,000 | $200,000 |
| | 1G | **Headwater Land Protection Program** | Turbidity | Turbidity levels in park streams reduced | → Develop & implement outreach program<br>→ Acquire and maintain easements | $10,000<br>$250,000 | $10,000<br>$250,000 |
| ✖ | 1H | **Air Quality Assessment** | Data gap: air pollutants | Air quality assessment completed; Areas of concern identified and management recommendations established | → Identify areas of air quality concern within and surrounding Forest Park<br>→ Coordinate with ongoing research evaluting bio-indicators (lichen distribution<br>→ Develop response plan for areas of concern (revegetation, education and outreach, and policy change) | $55,000 | 0 |

**w** = *Indicates highest priority prescriptions for meeting the ecological goal*

✖ = *Indicates that PPR staff and/or funds have been committed to implement this project*

**TABLE**

## A Forest with Structural Complexity

| COMMITTED RESOURCE | PROJECT NUMBER | PROJECT NAME | STRESS / GAP | MEASURE OF SUCCESS | KEY COMPONENTS | TOTAL BUDGET | FUNDS NEEDED |
|---|---|---|---|---|---|---|---|
| | **w2A** | **Stand Trajectory Assessment** | Data gap: stand trajectory assessment | Stand management plans for all alliances; Stand management plan that addresses NRMP recommendations for maple thinning and and documents management strategies | → Evaluate representative stands of each alliance type to determine successional trajectory<br>→ Sampling will include geographic distribution throughout alliances and will evaluate such variables as mortality, regeneration, stem density, and the presence of snags and large down wood | $90,000 | $90,000 |
| ✖ | **w2B** | **Invasive Vine Monitoring and Removal Program** | Invasive vines | Invasive vines (ivy/clematis) controlled within park boundary | → Create pre/host monitoring program to evaluate and document change<br>→ Establish cyclical removal program that provides treatment through manual and chemical techniques | $280,000 | $150,000 |
| ✖ | 2C | **Old Growth Survey** | Data gap: old growth status | Old growth patches identified and documented and management strategy developed to protect stands and associated species | → Locate and map old growth habitat<br>→ Collect data on old growth patches throughout park, including age, structural elements, habitat features, rare plants | $10,000 | 0 |
| | 2D | **Forest Disease Assessment** | Data gap: forest disease assessment | Survey complete; Plan developed for managing diseased sites | → Survey for laminated *(Phellinus)* root rot pockets<br>→ Utilize aerial imagery for initial assessment<br>→ Formulate plan for managing diseased sites | $12,000 | $12,000 |

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✖ = *Indicates that PPR staff and/or funds have been committed to implement this project*

**TABLE**

## Floristic Native Biodiversity with Increased Opportunities for Wildlife

| COMMITTED RESOURCE | PROJECT NUMBER | PROJECT NAME | STRESS / GAP | MEASURE OF SUCCESS | KEY COMPONENTS | TOTAL BUDGET | FUNDS NEEDED |
|---|---|---|---|---|---|---|---|
| ✖ | w3A | **Wildlife Study** | Data gap: wildlife use | Multi-season monitor complete and protocol in place to provide subsequent monitoring | → Conduct a wildlife study that determines presence/absence, distribution and population, and patch size of target species<br>→ Monitoring protocol to inform adaptive management<br>→ Integrate opportunities for citizen science | $80,000 | 0 |
| ✖ | w3B | **Wildlife Use Characterization** | Data gap: wildlife needs | Target guild and/or species for specific management practices (including habitat structure recommendations) for each vegetation alliance | → Informed by/dependent upon 3A Wildlife Study<br>→ Development of target species/guilds list<br>→ Create species/guild based management recommendations for each vegetation alliance | $20,000 | 0 |
| | w3C | **Improve Wildlife Habitat Structures throughout Park** | Lack of habitat structure | Snags, down wood, and brush piles created at appropriate densities throughout park | → Develop guidelines for snag, brush pile, and down wood creation/retention<br>→ Incorporate guidelines into MOUs with utility companies<br>→ Implement opportunities for habitat structure creation throughout park | $20,000<br><br>TBD | 0<br><br>TBD |
| ✖ | w3D | **Rare Plant Protection** | Data gap: rare plant distribution | Plant list of plants rare to Forest Park complete; Database developed to track species presence and distribution; Survey and manage protocol implemented | → Create a survey and manage protocol for park<br>→ Database developed o track location and distribution<br>→ Mapping of all species within park | $60,000 | $10,000 |
| ✖ | w3E | **Habitat Fragmentation Response** | Habitat fragmentation | Natural areas protected from additional fragmentation; Priority corridor connections protected | → Assess special status habitats that are increasingly fragmented in park<br>→ Develop plans and prescriptions to minimize further fragmentation and to enhance habitat types and features within patches<br>→ Assess feasibility of reconnecting fragmented habitats<br>→ Design and implement a wildlife area management program that protects priority patches of non-frag habitat | $20,000 | 0 |
| | w3F | **Oak Habitat Conservation, Restoration, and Management Program** | Oak habitat loss | Improved health and protected acreage of oak woodland habitat | → Work with BES TEES to complete City of Portland Oak Habitat Conservation Strategy<br>→ Using available maps and data, conduct inventory of oak habitats Revise/Edit map to illustrate all oak habitat polygons<br>→ Utilize inventory to establish assessment areas<br>→ Utilize assessment tools (landscape and project scale) to determine health function and management needs of inventoried oak habitat patches | $30,000 | $30,000 |

**TABLE (CONTINUED)**

## Floristic Native Biodiversity with Increased Opportunities for Wildlife

| COMMITTED RESOURCE | PROJECT NUMBER | PROJECT NAME | STRESS / GAP | MEASURE OF SUCCESS | KEY COMPONENTS | TOTAL BUDGET | FUNDS NEEDED |
|---|---|---|---|---|---|---|---|
| | w3G | **Wildlife Corridor Connections** | Habitat fragmentation | Natural areas protected from additional fragmentation; Priority corridor connections protected | → Develop Local Pilot project<br>→ Identify all priority corridor connections for Forest Park including Willamette River, Pacific Coast and Tualatin Valley<br>→ Designation of agency/organization to take on project coordination for corridor protection<br>→ Multi-county partnership to pursue easements and acquisition | $200,000<br><br><br><br>TBD | $200,000<br><br><br><br>TBD |
| | 3H | **Wetland Protection and Enhancement** | Data gap: wetland documentation | Wetlands protected and enhanced | → Mapping all existing wetlands<br>→ Development and implementation of protection/enhancement strategies for all wetlands | $10,000 | 0 |
| | 3I | **Balch Creek Enhancement** | Lack of stream complexity | Channel complexity and aquatic habitat improved; Prioritization of instream and streambank issues | → Identification of reaches that lack critical habitat features, passage issues and erosion concerns<br>→ Funding identified to implement priority projects<br>→ Implementation of priority projects | $40,000<br><br>$700,000 | $40,000<br><br>$700,000 |
| | 3J | **Miller Creek Enhancement** | Lack of stream complexity | Channel complexity and aquatic habitat improved | → Identification of reaches that lack critical habitat features, passage issues and erosion concerns<br>→ Prioritization of instream and streambank issues<br>→ Funding identified to implement priority projects | $30,000<br><br><br>TBD | $30,000<br><br><br>TBD |
| ✖ | 3K | **Wildlife Friendly Design Standards** | Impacts to wildlife from park development | Infrastructure that utilizes "wildlife friendly" design | → Building standards for upgrades and new construction<br>→ Integration of these standards into any any development within the park<br>→ Evaluate and minimize impacts to birds and other wildlife during design and construction, and regular maintenance to buildings, structures, or infrastructure | $30,000<br><br><br>TBD | 0<br><br><br>TBD |
| ✖ | 3L | **Roadside Management Program** | Impacts to plant and animal communities from roadside management | Invasive species cover reduced and native species plant cover increased along roadsides and within open meadows | → Maintenance plans that address timing of mowing, brushing, and herbicide application to reduce impacts to wildlife and native plants and invasive species distribution<br>→ Coordinate with staff who implement this work to develop guidelines | $10,000 | $10,000 |

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**TABLE (CONTINUED)**

## Floristic Native Biodiversity with Increased Opportunities for Wildlife

| COMMITTED RESOURCE | PROJECT NUMBER | PROJECT NAME | STRESS / GAP | MEASURE OF SUCCESS | KEY COMPONENTS | TOTAL BUDGET | FUNDS NEEDED |
|---|---|---|---|---|---|---|---|
| ✖ | 3M | **Inholding Acquisition** | Habitat fragmentation | Natural areas protected from additional fragmentation and priority corridor connections protected and expanded | → Prioritization of inholding acquisitions<br>→ Pursue acquisition of priority properties | $1,200,000 | $600,000 |
| ✖ | 3N | **Pollinator Habitat Program** | Lack of habitat pollinations | Increased pollinator habitat in areas throughout the park | → Identify trail entrances, roadsides, meadows and powerline corridors for pollinator habitat creation and enhancement<br>→ Implement pollinator enhancement projects with consultation with Xerces society<br>→ Develop citizen science component to measure and monitor pollinator presence | $15,000 | 0 |
| | 3O | **Stream Enhancement** | Lack of stream complexity | Increased aquatic and riparian habitat quantity/quality | → Conduct stream surveys and riparian assessments<br>→ Prioritize enhancement projects<br>→ Implement and monitor priority projects | $30,000 | $30,000 |

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✖ = *Indicates that PPR staff and/or funds have been committed to implement this project*

**TABLE**

# Reduction of Catastrophic Fire Risk

| COMMITTED RESOURCE | PROJECT NUMBER | PROJECT NAME | STRESS / GAP | MEASURE OF SUCCESS | KEY COMPONENTS | TOTAL BUDGET | FUNDS NEEDED |
|---|---|---|---|---|---|---|---|
| ✖ | w5A | **Defining and Mapping Wildland Urban Interface Areas in the Vicinity of Forest Park** | Wildland Urban Interface (WUI) and utility corridor infrastructure and maintenance | Hazardous wildfire fuels reduced; Invasive species cover reduced and native plant diversity increased; Long-term management/maintenance plans in place; Wildfire resistant landscape at high priority public/private interfaces | → Definition of WUI around Forest Park perimeter<br>→ Develop and assign risk categories to land within WUI<br>→ Accurately map all utility corridors in Forest Park<br>→ Map WUI around Forest Park perimeter | $80,000 | 80,000 |
| ✖ | w5B | **Wildfire Fuels Inventory and Monitoring** | Unknown fire risk and adjacent development | Wildfire resistant landscape at high priority public/private interfaces | → Inventory/characterize wildfire fuels<br>→ Establish vegetative fuel bed plots throughout the park<br>→ Monitor vegetative fuel beds and establish fire information system | $10,000<br><br>$30,000 | $10,000<br><br>$30,000 |
| | 5C | **Utility Corridor Fire Risk Reduction** | Wildland Urban Interface (WUI) and utility corridor infrastructure and maintenance | Hazardous wildfire fuels reduced; Invasive species cover reduced and native plant diversity increased; Long-term management/maintenance plans in place | → Field inventory and survey utility corridors to determine vegetative composition, hazardous wildlife fuels, and suitability for management as emergency access, fire break, and/or habitat enhancement corridors<br>→ Analyze and prioritize inventory data (from above) to determine highest risk areas and long-term utility corridor management needs<br>→ Identify secure source of funding for long-term management<br>→ Coordination with utility companies to adopt fire resistant landscape management and maintenance agreements<br>→ Partner with public/private utility managers to develop demonstration-demonstration-scale hazardous fuel reduction projects | $50,000<br><br>TBD | $50,000<br><br>TBD |
| | 5D | **Wildfire Resistant Landscape Program** | **Unknown fire** risk and adjacent development | **Wildfire resistant** landscape at high priority public/private | → **Using maps from project 5A, conduct field** survey to identify high priority public/private WUI areas for vegetation management and wildfire fuel reduction<br>→ Develop a coordinated wildfire education and outreach plan for City staff, park stewards, and private landowners through programs and partners (FPC,WMSWCD, Backyard Habitat Certification, Multnomah CWPP, etc.)<br>→ Using wildfire retardant plant species, develop designs for wildfire resistant landscape plantings on high priority public/private WUI areas<br>→ Fund and implement demonstration scale fire resistant landscape projects | **$80,000**<br><br>TBD | **$80,000**<br><br>TBD |

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✖ = *Indicates that PPR staff and/or funds have been committed to implement this project*