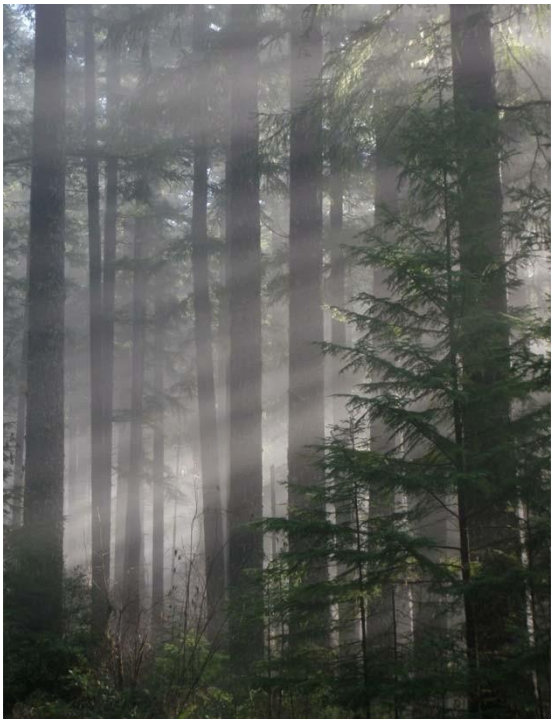
Corvallis Forest Stewardship Plan



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Reviewed & Updated June 3, 2013 by

Corvallis Watershed Management Advisory Commission
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Table of Contents

1. Executive Summary **4**

2. Introduction **6**
Background *6*
Vision Statement for the Corvallis Forest *7*
Purpose of the plan *8*
Implementation and Administration *8*

3. History & Resource Conditions **10**
Historical Background *10*
Physical and Landscape Setting *13*
Natural Resource Conditions *15*
Forest Stands *28*
Social and Economic Context *32*

4. Policies **35**
Vision Statement *35*
Guiding Principles *35*
Desired Future Condition *35*
Resource Policies *36*
Standards & Guidelines *38*

5. Management Opportunities **48**

6. Monitoring **54**

7. Public Involvement **58**

Glossary **60**

References **62**

Figures

Figure 1. Vicinity Map 6
Figure 2. Aerial Image 14
Figure 3. Streams & Fish Map 17
Figure 4. Road System Map 27
Figure 5. Vegetation Cover Types Map 31
Figure 6. Reserve Areas Map 41

Tables

Table 1. Major roads in the Corvallis Forest 26
Table 2. Vegetation cover types... 30
Table 3. Estimated timber volumes by species 30
Table 4. Estimated timber volumes by vegetation type 30

Sidebars

Federal Lands Management 13
Restoration options: Snag Creation 19
Restoration Stories: Oak Savanna 20
Endangered Species: What is the City's obligation? 21
Sensitive Species with Potential to be Present on the Corvallis Forest 22
Restoration options: Peacock Larkspur... 23
FSC Certification 32
Partners... 34

Appendices

Appendix A. Public Participation Legacy
Appendix B. Fish and Aquatic Resources
Appendix C. Wildlife Habitats
- 2009 City of Corvallis Final Report
- 2014 Corvallis Watershed MAMU Report
- USFWS Approved MAMU Plan

Appendix D. Natural Resources Inventory
- Corvallis Forest Natural Resources Inventory Report 2010
- Understory Plan Survey Final Report 2010

Appendix E. Social Impact Analysis
Appendix F. Stream Temperature Monitoring

1. Executive Summary

This is a stewardship plan for the Corvallis Forest, a 2,352-acre City of Corvallis ownership that encompasses the lower elevations of the 10,000-acre Rock Creek Watershed on the northeast flanks of Marys Peak. Rock Creek Watershed is one of the sub-watersheds of Marys River Watershed, which is one of the many large rural watersheds in the Willamette River basin. The primary purpose for City ownership of this land it to supply drinking water to the community. Water that is diverted into City pipes flows primarily from federal forestland located above the intakes managed by the US Forest Service. City infrastructure, which is on the City of Corvallis ownership, includes a 100 million gallon water reservoir, two stream diversion structures and a water treatment facility. This infrastructure provides approximately one out of every three gallons of water consumed by Corvallis Public Works' customers each year.

This plan, adopted by the City Council in 2006 and updated in 2013, represents the first comprehensive, multi-resource plan developed in the history of the City's ownership of Corvallis Forest. Previously, City lands were managed by the US Forest Service under cooperative agreement, with the primary purpose being timber harvest management. Controversy over the harvest impacts on the northern spotted owl and citizen concern over the negative impacts of clearcutting stopped logging in the Corvallis Forest in the late 1980s. Given this difficult environmental and political setting, for almost two decades the City limited its activity to operation of water collection and treatment facilities, thereby avoiding the issue of future management of the Corvallis Forest.

In 2005, the City began a yearlong visioning process with public meetings, sponsored by the Watershed Management Advisory Commission (WMAC), which resulted in a Vision Statement and set of Guiding Principles for stewardship of Corvallis Forest:

> ***The Corvallis Forest within the Rock Creek Watershed is a professionally managed, healthy ecosystem with diverse forest and productive habitat for all species native to the watershed.***

In 2006, the City hired a consultant team led by Trout Mountain Forestry to assess current resource conditions and work with the WMAC, Staff, and citizens to create a stewardship plan. The focus of this effort was to develop a management policy framework that would reflect citizen values and guide future management decisions. Stewardship recommendations focused on a "go slow" risk-averse approach that prioritized maintenance and enhancement of desired conditions of streams, wildlife habitat and native plant communities. Timber harvest was identified as useful in some forest stands to accomplish these purposes.

By 2012 preliminary plan recommendations were accomplished, and the WMAC began a 12-month process of plan review and update. Standards and Guidelines were expanded, and updated resource inventory information and management opportunities included.

Stewardship polices in this plan (Section 4, page 34) cover these topics: forest age and structure; reserves; aquatic habitat; wildlife habitat; water quality; native vegetation and invasive species; roads; forest chemicals; public access; fires; neighbors and planning; monitoring; and public outreach.

Management opportunities are presented for each policy area, including: selective thinning and gap creation in dense homogeneous stands to diversify habitats and forest structure; wildlife habitat enhancements; restoration of uncommon and rare plant habitats; surveys for sensitive species; invasive species monitoring and control; ongoing monitoring of water quality and sensitive resources; consideration of cooperative research opportunities; and expanded outreach to schools, groups, and the general public.

By identifying and addressing current resource needs through careful management activities, this plan can enhance the protection of municipal forest resources and will provide a framework to guide future stewardship projects.

2. Introduction

This chapter describes the vision for the Corvallis Forest, states the purpose of this plan, outlines the planning process, and details plan implementation and administration.

Background

The City of Corvallis owns 2,352 acres of forest located on the lower slopes of Marys Peak in western Benton County, Oregon (Figure 1). The major stream flowing through the City's ownership is Rock Creek. The City acquired the land in the early 1900s to protect the 10,000-acre Rock Creek Watershed, the upper slopes of which are the source for approximately 1 billion gallons of potable water delivered to Corvallis annually. Less than 20 percent of the City's land, around 400 acres, actually lies upstream of the water intake facilities. Although many are accustomed to referring to the City-owned portion of the Rock Creek Watershed as the "Corvallis Watershed," this document will refer to it as the *Corvallis Forest* in recognition of this fact.

The bulk of the Rock Creek Watershed lies in the Siuslaw National Forest, administered by the US Forest Service. The Forest Service has designated more than 99% of its lands within the watershed as reserves to be managed for wildlife habitat for riparian and old-growth related species.

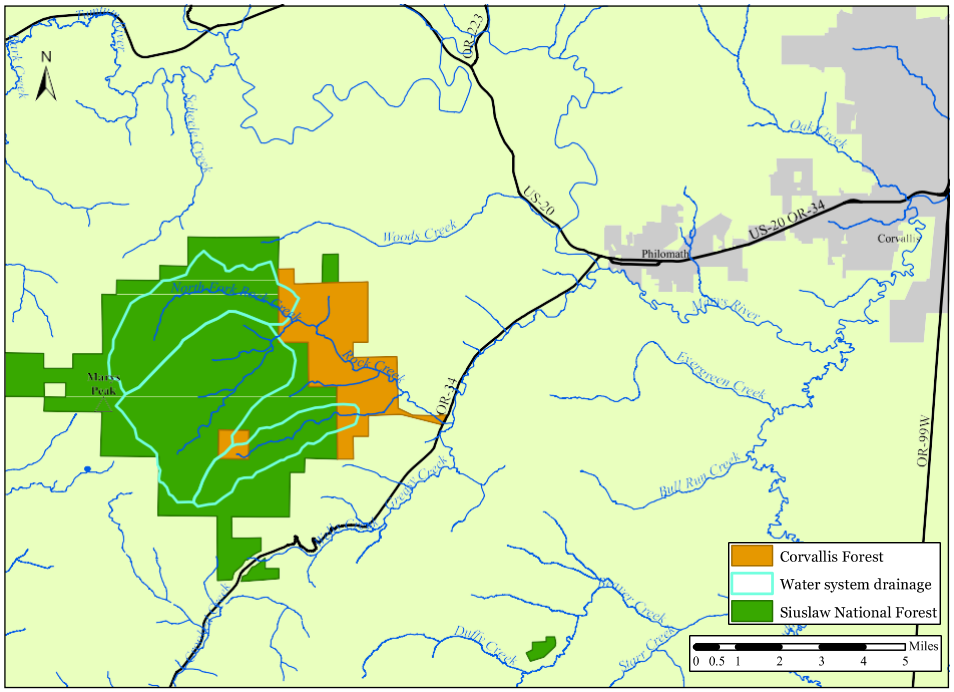


Figure 1. *Vicinity map*

Within the Corvallis Forest, approximately 1,000 acres were harvested during an 80-year period ending in the late 1980s. Then, controversy over the effects of clearcutting and the need to protect older forests for the northern spotted owl and other wildlife species put a stop to the harvesting program, which had been administered by the Forest Service. Several attempts to re-initiate timber management in the subsequent decades failed due to ongoing citizen concern about environmental impacts.

The Corvallis Forest Stewardship Plan (CFSP) was developed over a 2-year period in 2005 and 2006. The first year was highlighted by a series of public workshops hosted by Public Works staff and the Watershed Management Advisory Commission (WMAC), a standing board that advises the City Council on watershed matters. With input from these meetings, the WMAC developed a vision statement and guiding principles for management. For more information on the original planning process see Appendix A, (Public Participation Legacy) at https://apps.corvallisoregon.gov/webdocs/showdoc.aspx?docID=904962

Vision Statement for the Corvallis Forest

Throughout its ownership history the City has considered the Corvallis Forest to be one of the community's most significant ecological, economic and social resources. The CFSP is guided by the following ***Vision***:

> ***The Corvallis Forest within the Rock Creek Watershed is a professionally managed, healthy ecosystem with a diverse forest and productive habitat for all species native to the watershed.***

This Vision is further refined in a set of ***Guiding Principles***:

- Conservation-based management practices demonstrate that water quality, stream health, wildlife habitat enhancement, and tree harvest can go hand in hand;
- Protecting the health and diversity of the forest and its ecosystems are top priorities;
- We are a "good neighbor" and integrated into the larger landscape, recognizing our connections to the greater watershed;
- Corvallis Forest is managed to be comprised of a variety of different ages and types of forest to provide diversity of terrestrial and aquatic habitats;
- Corvallis Forest is resilient to fire, invasive species, insects and disease;
- Access is controlled to minimize risk of fire, water contamination and invasive species introduction;
- Corvallis Forest is available for limited educational, recreational, and research opportunities;

- Corvallis Forest supports high quality water production for the City of Corvallis;
- Corvallis Forest is a generator of revenue that is primarily used to offset the cost of forest management, and secondarily helps fund the City of Corvallis water utility system.

With this vision, the Corvallis Forest provides a model for sustainable resource management that is an inspiration and legacy of stewardship for future citizens. The City's demonstration of stewardship practices strives to encourage others to become better caretakers of our important natural resources. This plan meets Forest Stewardship Council forest certification standards (see sidebar, page 32 for more details).

Purpose of the plan

The purpose of this plan is to provide City officials and staff with guidance for the integrated management of Corvallis Forest resources. This plan establishes a ***framework*** that will guide management of the Corvallis Forest over time. To ensure the responsible and long-term stewardship of this extraordinary City property, the Plan does the following:

- Describes property conditions, and incorporates resource inventories
- Details resource management policies, standards, and guidelines
- Describes future needs, and references monitoring and evaluation information

The plan is not intended to provide an exhaustive inventory of all relevant resources, nor is it intended to provide a highly detailed blueprint for management. Primary supporting materials include appendices and other CFSP related documents. Periodic operating plans will be used to implement the Vision and Guiding Principles, and provide substantial details of proposed activities.

Many forest planning processes result in a range of alternative approaches that can be implemented. These kinds of plans analyze the relative advantages and disadvantages of each alternative. The current planning effort is different – the City and the consulting team made a conscious decision to develop a single, broadly defined pathway that represents an approach to managing the forest that is most likely to receive broad community support and reflects the priorities and adopted vision of the community.

Implementation and Administration

The City of Corvallis Public Works Department is responsible for implementing the adopted plan. City staff is responsible for ongoing monitoring and evaluation. Written operational plans will guide Corvallis Forest activities. The City will engage other

resource professionals as necessary, to supplement their expertise and/or work force. Guidance from or oversight by appropriate resource professionals will be sought for significant resource improvements or modifications.

The Watershed Management Advisory Commission will advise the Public Works Department and City Council concerning matters relating to the management of the Corvallis Forest. The ultimate decision on resource policy and management direction rests with the Corvallis City Council. Any policy changes to the Corvallis Forest Stewardship Plan require the approval of the City Council.

3. History & Resource Conditions

This chapter provides historical background for the Corvallis Forest, summarizes the socio-economic context, and reviews the current resource situation.

Historical Background

Historic Vegetation Patterns

In the early 1800s (pre-European settlement), the landscape surrounding Corvallis was strikingly different than that which is seen today. Conditions mirrored those found throughout the Willamette Valley and western Oregon. At that time, four major vegetation types occurred in the area: prairie, riparian forest and wetlands, open woodland, and upland forest. Open grasslands dominated the vegetation from the floodplain margins to the hillsides of most valleys of the area. Isolated groves of trees were primarily white oak and Douglas-fir. This prairie condition had been intentionally cultivated by the local Calapooya Indians, who routinely burned the valley grasses to maintain important food and fiber "crops," including oak, camas, hazel, and berry plants, to encourage lush grass growth for game, and to create open travel routes. When the first European settlers began arriving in the Willamette Valley in the 1840s, there was little standing in the way of pioneer settlement. Diseases brought into the area by early trappers and explorers had already decimated native Indian populations (reducing their numbers by nearly 75 percent). Vegetation patterns changed quickly as a result of the cessation of native vegetation burning, and the beginning of farming and grazing practices by early settlers.

The Corvallis Forest is located in the transition zone between the valley and upland forest, an area that was affected by the burning practices of native tribes and later agricultural clearing by settlers. The forest shows evidence of long-standing forest cover: some older Douglas-fir remain from stands that originated in the 1600s. They are surviving denizens from an era when these foothills were covered with much more open, multi-aged stands, the result of use of fire by local Indians. Timber harvest began in the Corvallis Forest in the early 20th century to supply local sawmills.

Water Use History

In 1906, the City of Corvallis began developing a water collection and delivery system in the lower reaches of the Rock Creek drainage, which at the time was a nearly undisturbed watershed. At that time, the watershed was mostly private timberland holdings and homestead properties containing no Forest Service land and limited city ownership. Sporadic railroad logging by private companies began as early as 1907 in the Woods Creek area north of the watershed. As logging operations moved up the north slope of Marys Peak in the 1910s and expanded into the watershed, concerned citizens began an effort to establish Rock Creek as a protected municipal watershed.

An Act of Congress in 1920 transferred 1720 acres of revested Oregon and California Railroad lands to the Forest Service specifically for municipal watershed protection, as a core ownership for the Forest Service to expand on. The City of Corvallis had been actively purchasing land in the watershed, mainly in the areas where infrastructure existed. By 1940 major portions of timbered lands within the Rock Creek watershed had been purchased by either the City or the Forest Service, resulting in the current ownership pattern.

An agreement signed by the Secretary of Agriculture and the City of Corvallis on February 7, 1922 limited access within the watershed to protect the water source. Since then, limited access for logging, research, and contract forestry work has been authorized by permit, but protecting water quality for domestic use remains the first priority for all management practices.

The City's water system was modernized in 1956 when the present 4.5 million gallon per day water treatment plant was built. Water is supplied to the plant by stream intakes at diversion structures on the South Fork of Rock Creek, Griffith Creek, and North Fork Rock Creek, and during low-flow by an earthen dam reservoir on the North Fork of Rock Creek. Combined, the intakes provide a supply of about three million gallons per day. The balance of the City's water need is supplied by withdrawal and treatment of Willamette River water.

Timber Harvest History

Some timber harvesting was done prior to City acquisition of the land, covering about 400 acres. During this era, forest practices were unregulated; low value and defective trees were left standing or on the ground, and the forest was left to naturally regenerate. After acquisition, the City attempted to maintain the forest in a more pristine condition. However, a series of natural events that began in late in 1949 changed that management approach.

Two winters of heavy timber windthrow, followed by a dry summer in 1951, provided optimum conditions for a Douglas-fir bark beetle epidemic which left scattered patches of dead trees throughout in the watershed. By the spring of 1952, windfall and bark beetles had killed over 60 million board feet of timber. Fire hazard was increased; access was mostly non-existent, except for one fire control road accessing the lower watershed. Public support was solicited and received for a salvage-logging program to halt the bark beetle epidemic, recover the value of the dead and down timber, reduce fire hazard, and develop a permanent road system for future forest management.

Maintaining water quality was always the first management consideration. All conceivable methods of protecting water quality and soil stability were tried, many of them revolutionary: locating roads as far from stream courses as possible; stabilizing cut and fill slopes with grass seeding and mulch; installing frequent and over-sized ditch-relief culverts; and using perforated pipes to stabilize wet areas. Logging practices were

designed to minimize soil disturbance: up-hill cable logging was preferred; yarding across live streams avoided; tractor logging used as a last resort, restricted to dry conditions and gentle topography; and skid trails were cross-ditched and out-sloped for drainage.

In 1962 another natural disaster—the Columbus Day Storm—blew down over 30 million board feet of timber. In a sense this was a repeat of the 1949 natural disaster, but this time the established road system enabled a prompt management response.

Annual timber sales on the Siuslaw National Forest and the Corvallis Forest continued through the late 1980s, administered by the Forest Service under formal agreements. Over 600 acres in the Corvallis Forest were clearcut in 20-to-60 acre blocks and replanted to Douglas-fir during this period, including some of the earliest reforestation efforts in the region. Implementation of the Northwest Forest Plan in 1994 designated Forest Service lands as Late Successional Reserve, halting harvest of mature timber. From the late 1980s to 2006, there was no commercial timber harvest and very limited other activity with the Corvallis Forest.

Approval of the CFSP in 2006 resulted in increased activity such as thinning, fish and wildlife habitat improvements, invasive weed control, road repair and maintenance, and increased public involvement.

Cultural Resources

While the area within the Corvallis Forest has seen significant human use and settlement for well over 100 years, few historic structures remain.

Early homesteads were located at 3 sites: at Griffith Creek, lower Rock Creek, and along Old Peak Road. The Griffith Creek site is at the plant operator's residence, though no historic structures remain. The Rock Creek site includes the other plant operator's residence, parts of which were built in the early 1900s. At the Old Peak Road site an old cellar hole, remnant fruit trees, stone piles, and wire fence fragments evidence the old homestead site, but no structures are evident on 1948 aerial photos. A fourth homestead site may have been located in the vicinity of lower Stilson Creek, though no historic evidence has been found.

Early water system components can be found in several locations, the most significant being ruins of the original Middle Fork dam, found just east of the Forest Service property boundary. Routing of early waterlines are evident in a few locations, consisting of old pipe sections, supports, access roads, and graded rights-of-way. There are remnants of an abandoned dam and pumping station directly behind the plant operator's residence. Fragments of early #9 phone line wire can be found north of Rock Creek in Sections 13 and 18, presumably used to service the old fire lookout north of the City's ownership on Pioneer Butte.

A file search of records at the State Historic Preservation Office in Salem found low probability of pre-historic archaeological resources in the area. Additional historic resources may be present.

Physical and Landscape Setting

The Corvallis Forest is a 2,352-acre City of Corvallis ownership that encompasses the lower elevations of the 10,000-acre Rock Creek Watershed on the northeast flanks of Marys Peak (Figure 2, page 14). Rock Creek is one of the sub-watersheds of Marys River, which is in turn one of the many large rural watersheds in the Willamette River Basin. Located on the forested mid-to-lower slopes of four thousand foot high Marys Peak (highest point in the Oregon Coast Range), the Corvallis Forest is about 12 miles southwest of Corvallis, Oregon.

The main stem of Rock Creek is a moderate gradient stream in the lower elevations of the watershed (elevation 400 feet). The five principal tributaries of the main stem include the North, Middle and South forks of Rock Creek, as well as Griffith and Stilson Creeks. The upper reaches of these streams become high gradient as the topography changes to steep slopes rising to the watershed ridgetops at elevations of 1,600 to 4,000 feet.

Upslope of the City lands, the Rock Creek Watershed is primarily owned by the United States Forest Service (USFS) as part of the Siuslaw National Forest. There are several small private adjoining ownerships. The City maintains a 100 million gallon water reservoir, stream diversion structures, and a water treatment facility. This system provides Corvallis with approximately one-third of its annual water needs.

Moderate to steep slopes with deeply incised valleys and sharp ridges dominate the topography of the Rock Creek Watershed. The landform is comprised of volcanic and sedimentary rocks formed during the Eocene and Oligocene ages, primarily basalt lava and ash next to Tyee Formation sedimentary sandstone and siltstone.

The maritime climate features an extended winter rainy season with hot, dry summers. Snow can accumulate in the upper watershed during brief, cold storm events, which are often followed by melting warm rains, creating a surge of elevated water levels that drop soon afterward. Average annual precipitation is above 60 inches.

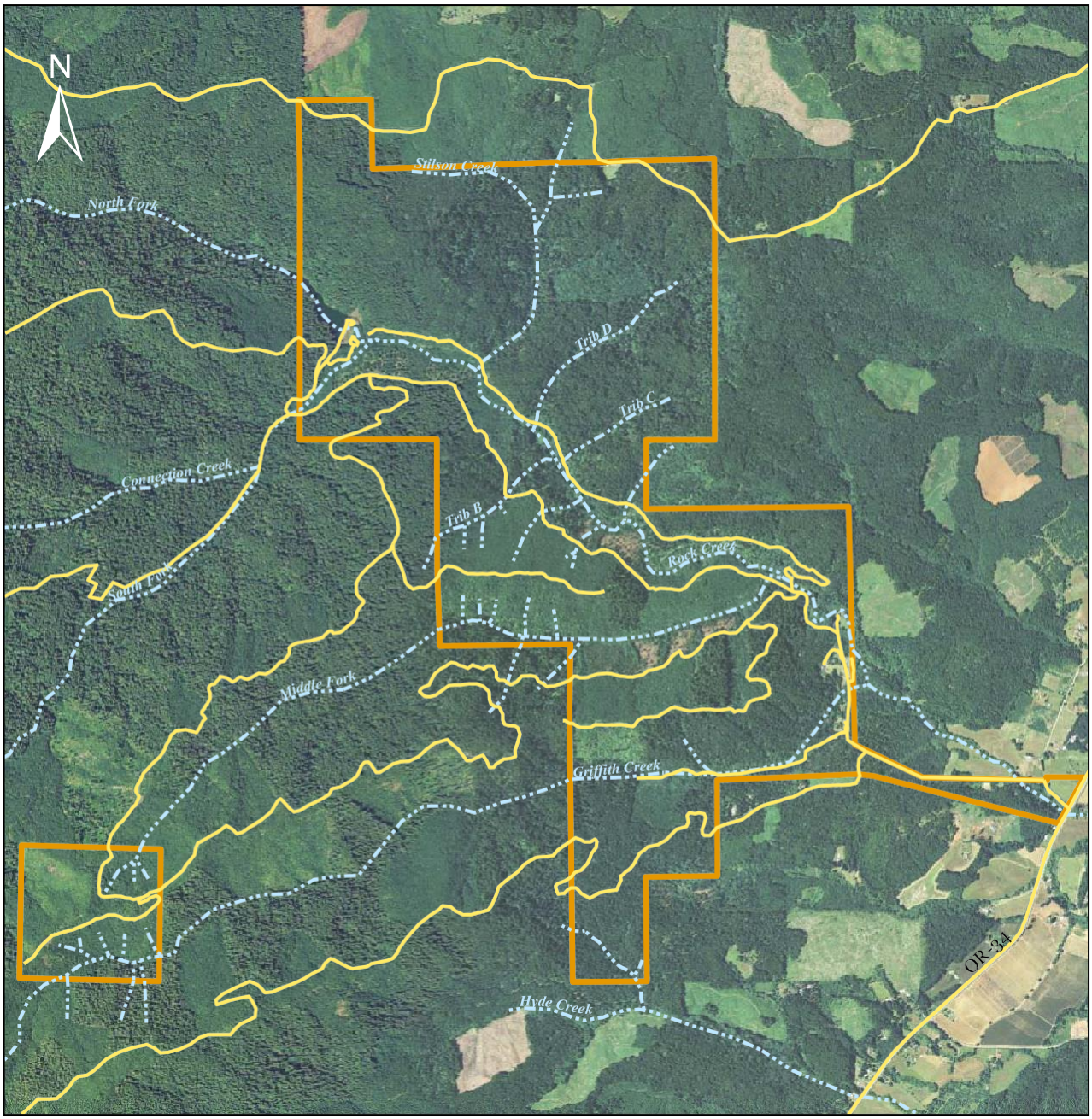
Federal Lands Management

The **Northwest Forest Plan** prescribes the management direction for Forest Service lands adjacent to the Corvallis Forest. Ninety-nine percent of the federal land in the Rock Creek Watershed is allocated to **Late-Successional Reserve (LSR)**, where the objective is to protect and enhance late-successional and old-growth forest, and habitat for related species, including northern spotted owl and marbled murrelet.

About half of Forest Service lands in the watershed are designated **Riparian Reserve**, which overlie all other land allocations, including LSRs. Riparian Reserves include lands directly coupled to streams, rivers, and lakes, where the objective is to protect aquatic resources, benefit riparian-dependent species, and allow dispersal of late-successional forest species throughout the LSR network.

Eighty acres, or one percent, of the federal lands in the watershed have been allocated to **Matrix**, which consists of those lands outside other allocations. Timber harvest and other silvicultural activities are allowed within suitable stands.

Figure 2. Aerial Image



Roads

Streams

Corvallis Forest

Source: 2012 NAIP Digital Imagery

0 0.25 0.5 1 1.5 Miles

Natural Resource Conditions

Water System & Water Quality

The City of Corvallis has legally recorded rights to withdraw water from four streams: the North, South, and Middle Forks of Rock Creek, as well as Griffith Creek. Water production structures located on the property include the North Fork Reservoir, diversion structures on Griffith Creek and the North and South Forks of Rock Creek, and a historic (inactive) diversion on the Middle Fork of Rock Creek. Water is piped from diversions to a treatment plant on the property. Water treatment structures include the water treatment plant, two settling ponds, two backwash lagoons, and a backwash tank. Two year-round residences provide on-site housing for the water treatment plant operators. Other structures include maintenance and utility sheds and a communications tower. Leaving the City property, water enters an interconnected system of eight storage reservoirs and 246 miles of distribution lines located throughout the City of Corvallis.

While the City's ownership has a minor impact on overall water system flows or water quality, it contains most of the water system infrastructure and plays a key role in water system security. The majority of the drinking water source area is on U.S. Forest Service land.

The Rock Creek watershed provides approximately one third of the City of Corvallis' water needs, or just less than one billion gallons per year. The watershed provides a near-steady flow of about three million gallons per day, except during the months of September and October when stream flows are lowest. The Taylor Water Treatment Plant in South Corvallis provides treated Willamette River water for the remainder of the City's needs.

The Rock Creek water system provides water at approximately half the cost of the Taylor Treatment Plant, primarily because water from Rock Creek flows to Corvallis by gravity, greatly reducing pumping costs. It has further advantages as a separate source of supply, and as a closed and secure system.

Water quality at both water treatment plants is sampled regularly for over 100 contaminants. The water produced by each plant is of similar quality, and meets or exceeds all applicable drinking water quality standards.

Aquatic Resources

The main stem of Rock Creek is a low-gradient stream, with floodplains and a channel substrate generally comprised of bedrock and large cobbles. Tributary streams are generally of moderate gradient across City ownership, increasingly steep as they rise to USFS land in the upper watershed (See Figure 3, page 17).

The physical and biotic condition of the Rock Creek aquatic corridor is strongly influenced by historic upslope forest management, as well as municipal infrastructure (roads, dams, trash racks, and water diversions). The following summary is based on stream inventory work conducted for this plan, as well as work conducted in the past for the Forest Service. The methodologies used and further details regarding stream inventory work are included in Appendix B, (Fish and Aquatic Resources) at http://www.corvallisoregon.gov/index.aspx?page=1464.

Fish Habitat

Wood is important in streams because logjams create pools that serve as important fish habitat. Gravel naturally accumulates behind logjams, serving important functions for stream temperature regulation and as a spawning substrate. The historic removal of riparian conifers on the Corvallis Forest reduced natural sources of large wood available for input to the mainstem of Rock Creek. Previously, the sediments and large wood from fallen trees and debris flows collected by intake dams, trash racks and booms were removed from the stream. Logs and sediments that accumulate behind intake dams and trash racks are now removed and deposited downstream of the intakes. Recently, fish ladder and road culvert improvements have improved fish passage to upstream habitats.

Fish Populations

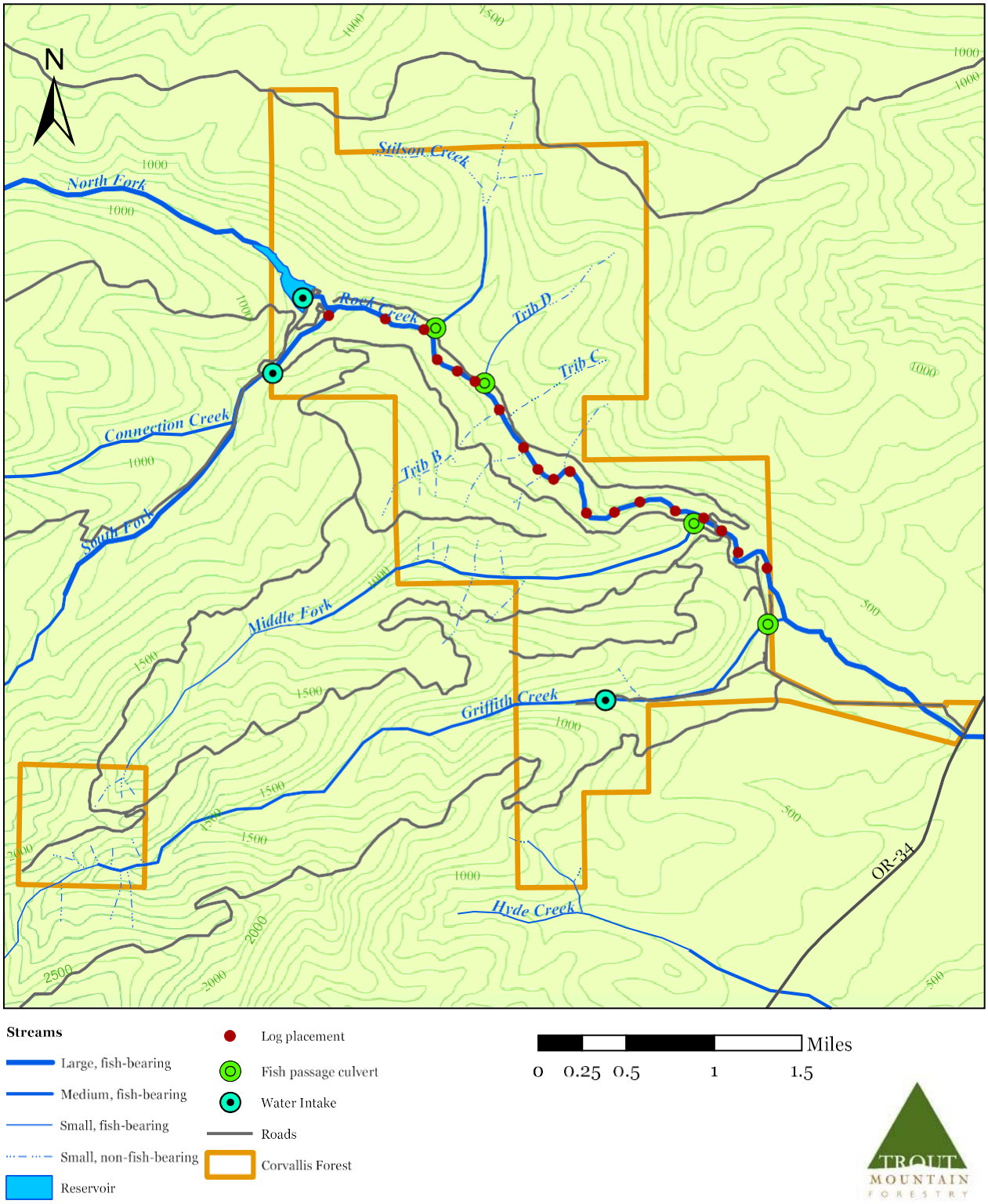
The endemic fish species of greatest concern in the Rock Creek watershed is the coastal cutthroat trout (*Oncorhynchus clarki*). These fish are plentiful, and generally migrate to stream habitats for spawning and incubation. Prior to 2006 there were verified sightings of adult winter steelhead (*Oncorhynchus mykiss*) spawning in the Rock Creek watershed. However, none were observed in snorkel surveys.

Basin Scale Temperature Regimes

Extremely high water quality exists in the headwaters of the Rock Creek Watershed. All headwater streams originate from high coastal elevations and flow through largely intact "Late Successional Reserves" (old-growth forest reserves) on Forest Service land. Canyons are narrow, steep, heavily shaded, and contain high wood densities and associated gravel accumulations. These tributaries eventually transition into wider floodplains and flatter channel gradients onto the City ownership, with increased air and sun exposure, and resulting higher stream temperatures. Exposed bedrock creates a heat sink in midday and a heat source after the sun leaves the stream.

Permitted water withdrawals from diversion structures reduce water delivery to the mainstem of Rock Creek, which when combined with seasonal low flow impacts can result in temperatures that sometimes exceed Department of Environmental Quality (DEQ) thresholds, with the potential for negative impacts on both fish and

Figure 3. Streams and Fish



macroinvertebrate populations. Joint City/USFS monitoring is being conducted to better understand stream temperature dynamics.

Restoration Actions

Several impediments to fish passage identified in 2006 were corrected in 2008. Impassable road culverts on the Middle Fork Rock Creek, Stilson Creek, Tributary D of Rock Creek, and Griffith Creek were replaced with large-diameter fish-passage culverts. Other impediments removed included an abandoned dam and pumping station, an abandoned roadbed, and an old trestle bridge. In addition, fish ladders were added or improved on the Griffith Creek and South Fork diversions. These actions have opened 8.3 miles of prime upstream habitat. Fish population monitoring has shown these actions now effectively allow juvenile fish to pass freely into these habitats.

In-stream large log placement in 2008 created 19 large-log complexes along the Rock Creek main stem. These have begun to accumulate fine wood and stream gravels, and have proven to be largely stable to subsequent high stream-flow weather events. Riparian restoration added conifer plantings on 3,000 feet of the main stem of Rock Creek, which over time will provide additional stream shading and future replacement of large in-stream wood.

Wildlife

The diversity and abundance of wildlife populations is largely determined by the presence, location, distribution and condition of the vegetative habitat. The intent of management is to provide a diversity of high-quality habitats, rather than to manage for a single particular species. This summary describes landscape context, key habitat types, habitat conditions, and associated wildlife of the Corvallis Forest. Species lists and further details are included in Appendix C, (Wildlife Habitats).

Landscape Context

The Corvallis Forest is primarily conifer-dominated, and includes three fairly distinct age classes: young (20-50 years), mid-aged (60-100 years) and mature (110-180+ years). Areas dominated by hardwood trees are present in the southeast portion of the site and along larger streams. A limited number of grass-dominated forest openings are located around the entry/residence/facilities areas, and along Old Peak Road. A reservoir is located along the western boundary.

The property is bordered by Siuslaw National Forest land along the west, which is primarily a mature-conifer forest, managed as a Late Successional Reserve. The objective of this land designation is to protect and enhance conditions of late successional

and old growth forest ecosystems, which serve as habitat for late successional related species. The north, south, and east adjoin younger, privately owned forests and agricultural fields. The 1000+ acres of mature forest habitat on City of Corvallis land and the proximity and connectivity of the Corvallis Forest to the 8,800 acres of Forest Service lands (including 6,200 acres of older forests), create a large block of mature habitat, which include a high number of old-growth trees. This habitat condition is very rare in Northwest Oregon.

Habitat Conditions and Associated Wildlife

The following summarizes the key habitat types found on the Corvallis Forest, its condition, and some of the species associated with these types. (For more stand structure information, see Forest Stands, page 25).

- ***Mature conifer habitat*** *(750 acres, or 32 percent of ownership)*

Mature conifer stands comprise a third of the Corvallis Forest. These previously unlogged areas are most widespread in the northern part of the ownership, but are also found as more isolated fragments elsewhere. Stands are extremely diverse in tree size, age and composition, providing vibrant and healthy forest habitats, including a well-developed native understory, frequent snags, and down rotten logs. This extensive area of mature conifers, and proximity to mature habitat on Forest Service lands allows the site to be utilized by over 100 endemic conifer-associated species. Commonly observed species include Pacific wren, ruby- and golden-crowned kinglets, hermit warbler, varied and hermit thrush, Hutton's and Cassin's vireo, Pacific-slope flycatcher, brown creeper, western tanager, Stellar's jay, Townsend's chipmunk, Douglas and flying squirrel, red-backed and red tree vole. Species requiring large home ranges may also be present, including cougar, black bear, American marten and northern goshawk. The presence of bald eagle, spotted owl, pileated woodpecker, and red tree vole attests to the viability of the older forest habitat conditions present in the Corvallis Forest.

Restoration Stories: Snag Creation

Snags — standing dead trees — are an important habitat component of healthy forests. Young, managed stands often lack snags, especially the larger snags of high value to many wildlife species, including the ESA-listed Northern spotted owl.

Between 2009 and 2011 over 680 snags were created in parts of the Corvallis Forest where natural snags were especially lacking. The project was grant funded by Marys Peak Stewardship Group, and the 2010 Federal Stimulus Program.

Climbers scaled selected trees and cut tops to simulate natural snag creation processes such as wind and weather breakage, or bear damage. Tree tops were left on the forest floor for woody debris habitat. On some trees, climbers bored cavities to speed decay and encourage use by cavity-dependent species like woodpeckers and bats.

- ***Mid-age conifer habitat*** *(660 acres, or 28 percent)*

These previously logged stands of natural origin are located mostly in the southern portions of the property. Some areas originated following agricultural abandonment. Stands vary in density and composition. Shrub and ground cover is varied, smaller snags and down wood are abundant, and some large residual trees are present. As a result, these stands provide quality habitats for a wide variety of species: cavity-nesters (northern flicker, hairy and downy

woodpecker and red-breasted sapsucker); secondary cavity-nesting species (chestnut-backed chickadee, red-breasted nuthatch, Douglas and flying squirrel and Townsend's chipmunk); large residual tree nesting structure (spotted owl, bald eagle); small shrub-dominated, open areas (Wilson's, orange-crowned and MacGillivray's warbler, Bewick's wren and song sparrow; and mature hardwoods (western tanager, band-tailed pigeon, cedar waxwing and evening grosbeak).

- ***Young conifer stands*** *(637 acres, 27 percent)*

These young planted stands are quite monotypic, comprised of dense, small diameter Douglas-fir, completely lacking residual large tree structure. Found throughout, but most common in the center of the property, these areas have very limited wildlife potential due to their simple tree structure, limited plant diversity and lack of cavity or log habitat. Only very common bird species including American robin, dark-eyed junco, hermit warbler, golden-crowned kinglet, Pacific wren, Pacific-slope flycatcher and varied thrush are found. Harvests since 2006 were designed to provide more diverse stand structure and improved habitat values.

- ***Hardwood Habitat*** *(< 1 percent)*

Mature hardwoods represent only a small percentage of overall forest cover, but add greatly to species diversity. Hardwoods are located across the property as scattered individual trees, as dominant trees in old root-rot pockets, and along perennial drainages. Bigleaf maple is most common, but madrone, chinquapin and Pacific dogwood and cascara also are found. Red alder, Oregon ash, black cottonwood, and willow species are all common along streams. Hardwoods offer unique food (mast and lichen), cover, diverse insect fauna, abundant leaf litter, cavity habitat, woody debris, and environmental conditions not found in coniferous trees. Hardwood-associated species include black-headed grosbeak, black-throated gray warbler, warbling vireo, sharp-shinned hawk and ruffed grouse. Oregon white oak, historically more widespread in portions of the Corvallis Forest, is uncommon now, found only in a few locations. Oregon white oak habitat is especially important to wildlife with well over 100 species using oaks for nesting, foraging, hiding and resting.

Restoration Stories: Oak Savanna

Few areas of oak savanna remain on the Corvallis Forest; most disappeared as fast-growing conifers dominated the forest in the early 1900s. Protecting existing oak trees and meadows will preserve these legacies and increase the habitat for oak-dependent species.

In 2010-12 oak and meadow habitat was restored in a 3-acre historic homestead site beside Old Peak Road:

- Meadow expanded by removing encroaching conifers
- Oaks freed from overtopping fir
- Seeded to native grasses
- Weeds controlled by mowing
- Native shrubs planted at meadow margins
- Removed trees placed as woody debris in adjacent stand
- Funding from Marys Peak Stewardship Group

- ***Riparian Habitat*** *(192 acres, 8 percent)*

Riparian habitat is widespread on the ownership, surrounding large and small streams, numerous ephemeral drainages, and the North Fork

Reservoir. In some areas, large conifers and large logs are common, mixed with deciduous tree cover. Past timber harvesting has reduced conifer tree cover in some areas, allowing hardwoods and shrubs to now dominate. The riparian zone represents the interface of the aquatic and upland habitats, providing for both aquatic and terrestrial species including: yellow warbler, willow flycatcher, black-headed grosbeak, beaver, muskrat, raccoon, river otter, several bat species, and a number of amphibians (northwestern, Dunn's and red-backed salamander, rough-skinned newt, and red-legged frog).

- ***Forest openings*** *— meadows, grasslands, and small human-made and naturally occurring in-forest openings (72 acres, 3 percent)*

Open forest habitat is very limited on the Corvallis Forest, primarily in few small meadows along the east end of Rock Creek Road and a small meadow along Old Peak Road. A large open area surrounds the water plant facilities and residences. Non-native grass species provide the overwhelming ground cover, but some native forbs and grasses are also present. The distribution pattern of the existing grassland creates a large amount of edge habitat—the transition from open to shrub or forest that is used by many species. Open habitat is required by a number of wildlife species that are not likely to inhabit dense forested areas including: sparrows (white-crowned, song, fox, golden-crowned and savanna), spotted towhee, orange-crowned warbler, common yellowthroat, Bewick's wren, mourning dove, American goldfinch, California quail and western bluebird. In addition, a number of reptiles (alligator lizards, Western racers and gopher snakes), small mammals (certain shrews and voles), and raptors (American kestrel) may only be encountered in open habitats.

- ***Rocky areas*** *(<1 percent)*

Areas of exposed gravel, rock, and boulders are most common in the shallow soils located north of Rock Creek and old riparian slide areas but also are present throughout the remainder of the ownership. Exposed rocky areas provide unique habitat conditions required by a number of salamander and reptile species and are likely utilized by a number of the associated species including; fence lizard, western skink, Dunn's and red-backed salamander.

Endangered Species: What is the City's obligation?

The US Fish & Wildlife Service (USFWS) is responsible for protecting rare species under the Endangered Species Act (ESA). Under the ESA, the City is prevented from "take" — causing death or harm — to a listed species, or its habitat.

Oregon Department of Forestry (ODF) rules for habitat protection are not as strict as those promulgated by the US Fish & Wildlife Service (USFWS). So which rules does Corvallis have to follow? The Corvallis Forest is not Federal land, yet the USFWS rules are still legally applicable — they supersede state law.

Some landowners have chosen to develop a Habitat Conservation Plan (HCP) to ensure their management approach meets ESA provisions, as Benton County has done in their Prairie Species HCP, to which the City is a signatory. But HCPs can be costly and time-consuming to develop.

Corvallis works closely with the USFWS to ensure management activities provide the required protections for ESA-protected species.

Listed & Sensitive Species

The Endangered Species Act (ESA) provides mandatory protection to federally listed species and their critical habitat. The US Fish and Wildlife Service

(USFWS) maintains listings of ESA-listed species and candidates, and reviews new listings and de-listings. Current species lists and management guidelines are found at the USFWS website at http://www.fws.gov/endangered. Northern spotted owl *(Strix occidentalis caurina)* and marbled murrelet *(Brachyramphus marmoratus)* are the only ESA-listed species thought to be present on the Corvallis Forest.

- ***Northern Spotted Owl*** *(Federal and State-Threatened)*

This bird is associated with mature conifer or mixed forests containing large trees, snags, multi-tree layers and a closed canopy. The US Forest Service conducts yearly surveys that include the Corvallis Forest as part of a long-term spotted owl monitoring study. In the early 1990s there were three owl activity areas on City lands (two pairs and one single) and six owl activity centers located on adjacent Forest Service land. In the 2000s, only one pair remained on the Corvallis Forest near Stilson Creek. By 2012 no nesting pairs remained, with two single owls documented close to the Forest Service boundary near Griffith and Middle Fork Creeks. Since the 1990s, the invasion of barred owls *(Strix varia)* into the Oregon Coast Range has significantly reduced spotted owl populations.

- ***Marbled Murrelet*** *(Federal and State-Threatened)*

This seabird spends most of its time on the ocean, returning inland to mature forest only to nest. Murrelets do not build a nest structure, but use large moss covered lateral limbs, debris accumulations or mistletoe clumps in the upper canopies of large trees as platforms for their single egg. Surveys conducted in early 1990s documented at least five murrelet sites on Forest Service lands and one confirmed site on Corvallis Forest, located in the Stilson Creek area. These "occupancy/presence" surveys made no attempt to locate nests. A nest was subsequently located north of the reservoir. Surveys conducted in portions of the Corvallis Forest in 2007 and 2008 detected no birds.

- ***Bald eagle*** *(de-listed 2007)*

Bald eagles *(Haliaeetus leucocephalus)* nest and roost in mature and old growth conifers near large water bodies. A bald eagle nest site has been intermittently active on Corvallis Forest approximately 1 mile from the reservoir. A second nest tree is located nearby, with the single pair of birds alternating between nest trees. The site has been active at least since 1996, and is monitored annually by volunteers. One young was produced in 2012 and survived to fledging.

Sensitive Species with Potential to be Present on the Corvallis Forest

Mammals
- Fringed myotis
- Silver-haired bat
- Long-legged myotis
- American marten
- Red Tree Vole

Birds
- Purple marten
- Northern Goshawk
- Willow Flycatcher
- Olive-sided Flycatcher
- Western Bluebird

Amphibians
- Clouded Salamander

No survey information exists on other Listed species. The Oregon Department of Fish and Wildlife (ODFW) maintains a list of "Sensitive Species." These are native animals that may become threatened or endangered throughout all or any significant

portion of their range in Oregon. There are no legal management obligations associated with Sensitive Species.

Vegetation and Botanical

Vegetation patterns within the Corvallis Forest are influenced by the rain shadow effect of Marys Peak, and the aboriginal burning practices prior to Euro-American settlement. On dry, south-facing slopes (mainly north of Rock Creek), the dominant vegetation is the Douglas-fir/poisonoak (warm) plant association. Evidence of periodic fire is still evident by the charred trunks of scattered old growth trees. On north facing, moister slopes (primarily south of Rock Creek), the dominant plant association is Western hemlock/Oregon-grape/salal. Past logging or natural disturbances have influenced plant community composition and successional pathways.

Understory Vegetation

A detailed natural resources inventory was conducted in 2010. The survey delineated and mapped plant communities, and inventoried plant species present on the Corvallis Forest, finding 13 tree species, 16 shrub species, and 71 herb species. Of these totals, 12 species were non-native. These data provide a baseline of property botanical conditions, allowing the City to monitor the effects of management actions. For species lists, maps, survey methodologies, and additional details regarding this work see Appendix D, (Natural Resources Inventory) at https://apps.corvallisoregon.gov/webdocs/showdoc.aspx?docID=904960.

Rare Species

A population of peacock larkspur (*Delphinium pavonaceum*) was documented on the property. This species is a federal Species of Concern and is listed as Endangered by the State of Oregon. These occur in three subpopulations on City ownership. The largest subpopulation is located in narrow strips of remnant native prairie on both sides of the lower portion of Rock Creek Road. A second subpopulation is found on a small rocky knoll adjacent to Highway 34, and the smallest is found in the fallow field adjacent to the north side of Henkle Way. The latest monitoring surveys (2012) found a total of 515 individual plants, which is a 9.1 percent increase over baseline numbers.

No other rare plants were documented within the ownership. Open grassland areas contain species not found in other parts of the Corvallis Forest, including both weedy and native species. These are small remnants of larger areas of open prairie and savanna present at the time of Euro-American settlement.

Restoration Stories: Peacock Larkspur

Lower portions of the Corvallis Forest were once native prairie, now a rare ecosystem in the Willamette Valley. A population of one rare prairie plant, Peacock Larkspur, is found at roadsides and in meadows along Rock Creek Road.

Protection measures began in 2006, and a 2010 restoration project is helping to bring back this uncommon beauty:

- Inventory of plant populations
- Delaying roadside and field mowing until after seedset
- Removal of exotic blackberries
- Cooperation with Benton County efforts

Other species of concern that may be present on the Corvallis Forest include:

- Tall bugbane (*Cimicifuga elata*), a state candidate for listing as threatened or endangered. No tall bugbane was found during past surveys, but suitable habitat is present on northerly slopes within the ownership, and there is a good likelihood that tall bugbane is present.
- Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) is located along Henkle Way on private land north of the property. If prairie or savanna habitats are restored on the Corvallis Forest, this population could serve as a seed source.

Uncommon habitats that may include other species of concern include:

- Native prairie species occur in fields along Rock Creek Road and adjacent to Highway 34. These areas are managed to maintain them free of invasive weeds and woody non-prairie vegetation. Some areas are candidates for restoration to native prairie or savanna.
- Oak woodland habitats across the ownership have been restored through removal of overtopping conifers and control of understory invasive weeds.

Invasive species

Invasive species are relatively uncommon in the Corvallis Forest due to low timber harvest levels and soil disturbance during the 1986-2006 period. Roadside weed surveys were conducted in 2006. Weed populations have been largely controlled as a result of property-wide roadside and riparian weed treatments conducted 2009-11. Weed populations are carefully monitored and controlled, with pre-operation weed surveys conducted before all major management actions.

The most significant weed threat in the Corvallis Forest is false brome (*Brachypodium sylvaticum*). It has historically been concentrated along roads and riparian areas, but can move into the forest interior without annual control measures.

Other invasive weed threats include exotic blackberry (*Rubus armeniacus* aka *R. discolor*) and Scotch broom *(Cytisus scoparius)*, mostly limited to disturbed soil areas along pipelines, roadsides, or log landings. Reed canary grass *(Phalaris arundinacea)*, is a heavy, dense grass found along streams and deposits of dredge spoils; it generally does not spread through upland areas. A few ornamental species have escaped and are spreading in understory areas, including English ivy *(Hedera helix)* and English holly *(Ilex aquafolium)*, but these are limited to a few areas low in the watershed. Introduced, perennial grasses and forbs are present in prairie habitats and threaten the peacock larkspur population and other native prairie species.

Soils and Slope Stability

Corvallis Forest contains soils of the Blachly, Honeygrove, Jory, Klickitat, and Ritner series (USDA Web Soil Survey). As in much of the Coast Range, the area has narrow valley bottoms and steep slopes. The soils are typically gravelly clay loams on steep slopes and gravelly clay on lower slope positions. They are deep, well drained and of

volcanic origin. Both earthflows and debris torrents can occur in the upper elevations and steeper portions of the ownership; however, the entire main block of Corvallis Forest is rated low risk for debris torrents (USDA Forest Service, 2005). Slumps and small earthflows are the primary hillslope erosion processes on the property.

Slope stability is an important factor in determining what kinds of forest management activities are possible or desirable. Because many streams in the area are lacking in large woody structures for fish habitat, unstable slopes have the potential to deliver large woody debris to streams, which is necessary for building fish habitat such as deep pools. Such landslides contribute large volumes of sediments, short term negative impacts that are balanced by the long term benefit of stream structure and fresh spawning gravel.

Roads

The road system is owned mostly by the Forest Service, but maintained jointly by the USFS and City of Corvallis (Figure 4, page 27). Early roads were constructed to access the original water system, and to harvest timber. The road system was upgraded and expanded in the 1950s and 1960s as the Forest Service began salvage harvesting in the upper reaches of the watershed following windthrow and subsequent insect outbreak. Roads are generally well constructed and in good condition with relatively low maintenance requirements. There are few mid-slope locations; roads are mainly located on ridgetops, with moderate to low grades. Four culverts that were impediments to fish passage were replaced in 2008.

In 2003, the Siuslaw National Forest conducted a Forest Roads Analysis that included Corvallis Forest; it analyzed the condition of the road network and included a system for prioritizing road maintenance within the larger Marys River Watershed (USDA Forest Service, 2005). The status of roads in the City's ownership is summarized in Table 1, page 26.

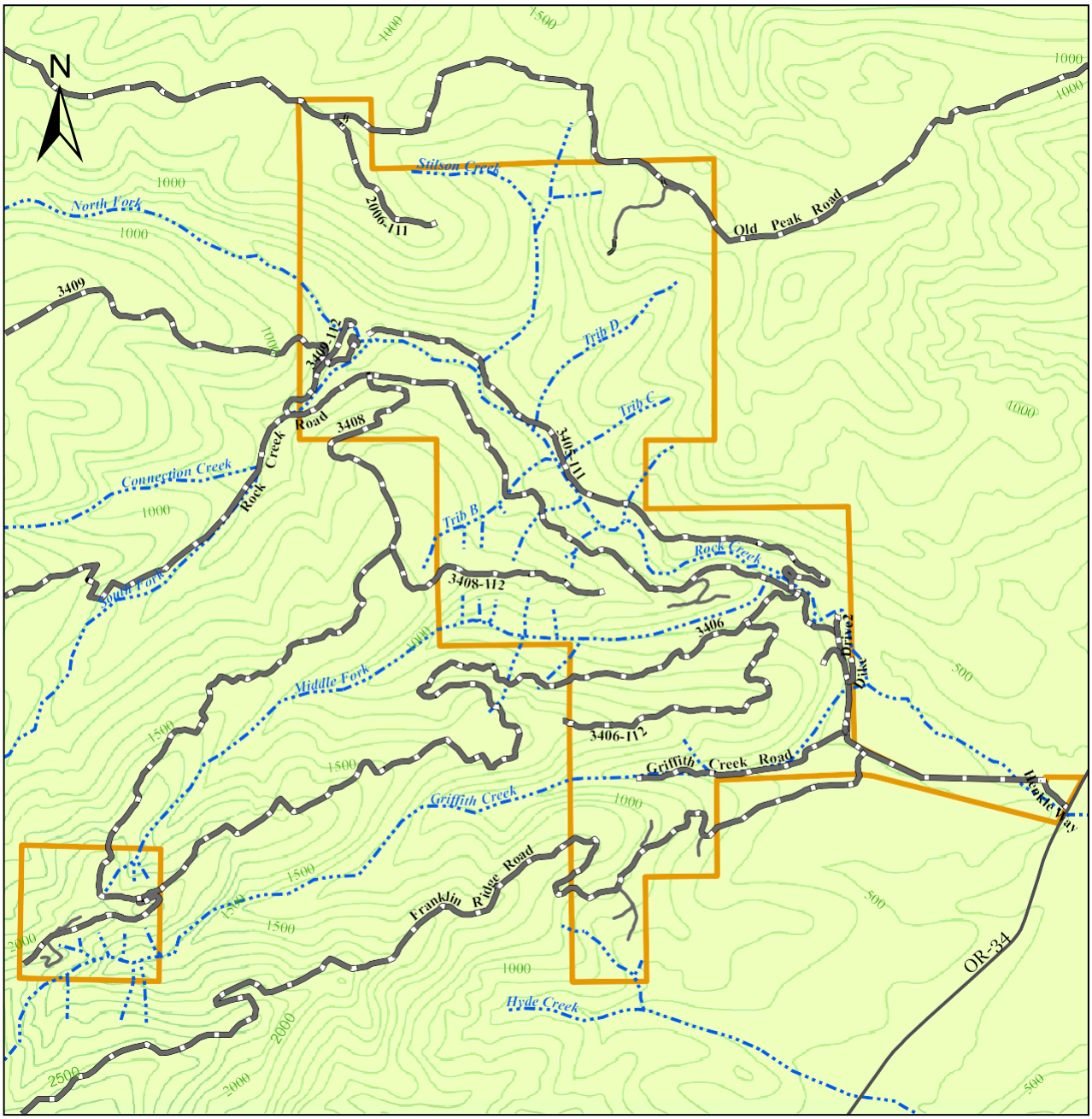
Following a minor surface landslide flow and movement of a deep-seated slump, Franklin Ridge Road (FR3005) was decommissioned by the Forest Service in the late 1990s. It was reconstructed in 2012 to access young forests on Forest Service ownership for commercial thinning activities.

Table 1. *Major roads in the Corvallis Forest*

Road #	Name	Length	Purpose/use	Status/Condition	Culverts
2005-111	Old Peak Road	1/2 mile	Timber management; recreation	Open/well maintained	None
3005	Franklin Ridge Road	¾ mile	Timber management; access to Forest Service land	Open/recently reconstructed	12
3405	Rock Creek Road	3 miles	Main access road; access to intake structure on South Fork	Open/well maintained	21
3405-111	Old Trail Road	2 miles	Pipeline maintenance; access to reservoir	Open/well maintained	9
3406	Griffith Ridge Road	1 ¼ miles	Timber management; access to FS land and outlier City parcel	Open/well maintained	8
3406-112	Middle Fork Spur Road	¾ mile	Ridgeline access for timber management	Open/well maintained	None
3408	Miller Ridge Road	1 mile	Access to Forest Service land and outlier City parcel	Open/well maintained	1
3408-112	Unnamed	½ mile	Ridgeline access for timber management	Open/infrequent use	None
3409	Unnamed	1/8 mile	Access to Forest Service land	Open/well maintained	None

Note: Road numbers based on Forest Service numbering conventions

Figure 4. Road System



Roads

Rock

Dirt

Retired

Streams

Corvallis Forest

0 0.25 0.5 1 1.5 Miles

Forest Stands

The 2,352-acre land base is predominantly forested. Most stands are dominated by Douglas-fir, with minor amounts of western hemlock, bigleaf maple, red alder, grand fir, Oregon white oak, and western redcedar. The forest is diverse in age, reflecting land use history, and contains one of the largest concentrations of non-federal old-growth in Oregon. A comprehensive forest and timber resources inventory was conducted in 2010, and is found in Appendix D, (Natural Resources Inventory) at https://apps.corvallisoregon.gov/webdocs/showdoc.aspx?docID=904960.

- ***Young stands***

Approximately 637 acres (27 percent of the ownership) were logged and replanted between 1955 and 1987. These stands were clearcut using the industry-standard techniques of the day in harvest blocks averaging about 20 acres. Site preparation and prompt reforestation have resulted in young, very dense monocultures of Douglas-fir, with only occasional minor species and very little understory vegetation. These young stands are primarily located south of Rock Creek, occurring at all elevations and aspects.

- ***Middle-aged stands***

A second grouping of stands is roughly middle-aged, from 60 to 110 years old, comprising 660 acres, or 28% of the land base. These middle-aged stands reflect a diversity of origins:

- *Agricultural* – Some areas appear to have been cultivated or grazed. These reseeded naturally following cessation of farming in the early 20th century. Trees are predominantly Douglas-fir at very high stocking densities, with widely scattered residual trees, as old as 300 years. Terrain is gentle, with few streams
- *Succession* – On some ridgetop sites native oak savanna reseeded to fir forest following cessation of native burning. Some areas may have been grazed.
- *Logging* – Logging that occurred in the 1910s through the 1940s resulted in incomplete tree removal, leaving defective or rotten trees standing or on the ground. These areas reforested naturally, often over a period of decades.

These stands are diverse in species and age, and may contain legacies of old-growth stands such as very large trees, snags, and down wood. The stands that became established after logging vary greatly in density, from fairly open with frequent hardwoods and shrubs, to very dense with increasing competition-induced mortality.

- ***Older stands***

Stands that have never been logged comprise 750 acres, or 32 percent of the total ownership. Although federal forestland in the nearby Siuslaw National Forest contains large acreages of old growth, concentrations of older timber in private, state, or municipal

ownership in the Coast Range are relatively rare. These stands typically have widely spaced old-growth Douglas-fir with additional age classes of Douglas-fir, as well as western hemlock, grand fir, and bigleaf maple that have established naturally over time.

Prior to European settlement much of this area was subject to frequent low-intensity burning propagated by native tribes. Old-growth trees, some now 500 years old or more, still show charred bark from the regular burning that kept brush and trees from establishing. Following European settlement in the mid 1800s and the end of burning, a sustained period of natural regeneration began that "filled in" among the open old-growth trees. The resulting stand consists of widely spaced, dominant old-growth trees surrounded by patches of 125-200 year-old Douglas-fir. In many cases the younger cohort now compete with the residual dominants for light, causing the dominants to lose their lower crowns. Over some areas residual Oregon white oak and Pacific madrone, both of which require sunlight to thrive, cling to life under the shade of towering 150 year-old Douglas-fir – a reminder that these areas were once much more open.

While old-growth stands are often characterized by high levels of rot, snags and large down logs, old growth in the Corvallis Forest does not fit that description. Because trees grew in open conditions for centuries, they've retained healthy, full crowns, and large, stable root systems. As a result, only a very few of these giants have succumbed to rot or wind-throw; hence there is a relative scarcity of large snags and down logs.

Vegetation Cover Types

For management and inventory purposes the forest is classified into areas of similar age, species, and condition of trees (Table 2, page 29; Figure 5, page 29). Vegetation cover types also account for past uses, such as agriculture or timber harvest. Classification of old growth forests aligns with Forest Stewardship Council definitions (FSC-US Forest Management Standard, v 1.0), a system the Corvallis Forest is certified under.

Timber Volumes

The 2010 Natural Resources Inventory provides timber volume estimates. Detailed reports and summaries, as well as survey methodology and other details are found in Appendix D, (Natural Resources Inventory) at https://apps.corvallisoregon.gov/webdocs/showdoc.aspx?docID=904960.

A total merchantable timber volume of 134 million board feet (mmbf) was estimated on the Corvallis Forest. Douglas-fir accounts for over 92 percent of total volume. Near half the total timber volume (68.6 mmbf) is contained within older stands that are generally reserved from harvest. Middle-aged stands contain approximately 48.1 mmbf, while plantations make up a relatively small percentage of the total volume at 9.1 mmbf. Riparian stands, also generally reserved from harvest account for 4.65 mmbf.

Table 2. *Vegetation cover types*

Symbol	Vegetation type	Age	Description
M	Middle age	60-110 yrs	Little old forest structure; post-logging or natural origin
M+	Older middle age	110-200 yrs	Single species, single age, undeveloped understory; little old forest structure; post-logging or natural origin
M-ag	Middle age, Ag		Old pasture or agricultural origin
NF	Non-forest		Meadows; water system infrastructure
O1	Old Growth, type 1	≥200 yrs	Late successional structure, never logged, ≥3 ac
O2	Old Growth, type 2	Multi-age	Previously logged stands ≥20 acres, but with significant late successional structure & function
O3	Old Growth, remnant	Multi-age	Natural stands with residual OG trees (>1 tree/ac)
P0	Plantation, pre-merch	1-19 yrs	Pre merchantable, no commercial value
P1	Plantation, part-merch	20-34 yrs	Partially merchantable, limited commercial value
P2	Plantation, merch	≥35 yrs	Fully merchantable, full commercial value
R–	Riparian, low density	varies	Mixed hardwood and conifers, past logging or low density tree cover
R+	Riparian, high density	varies	Mixed hardwood and conifers, full tree cover

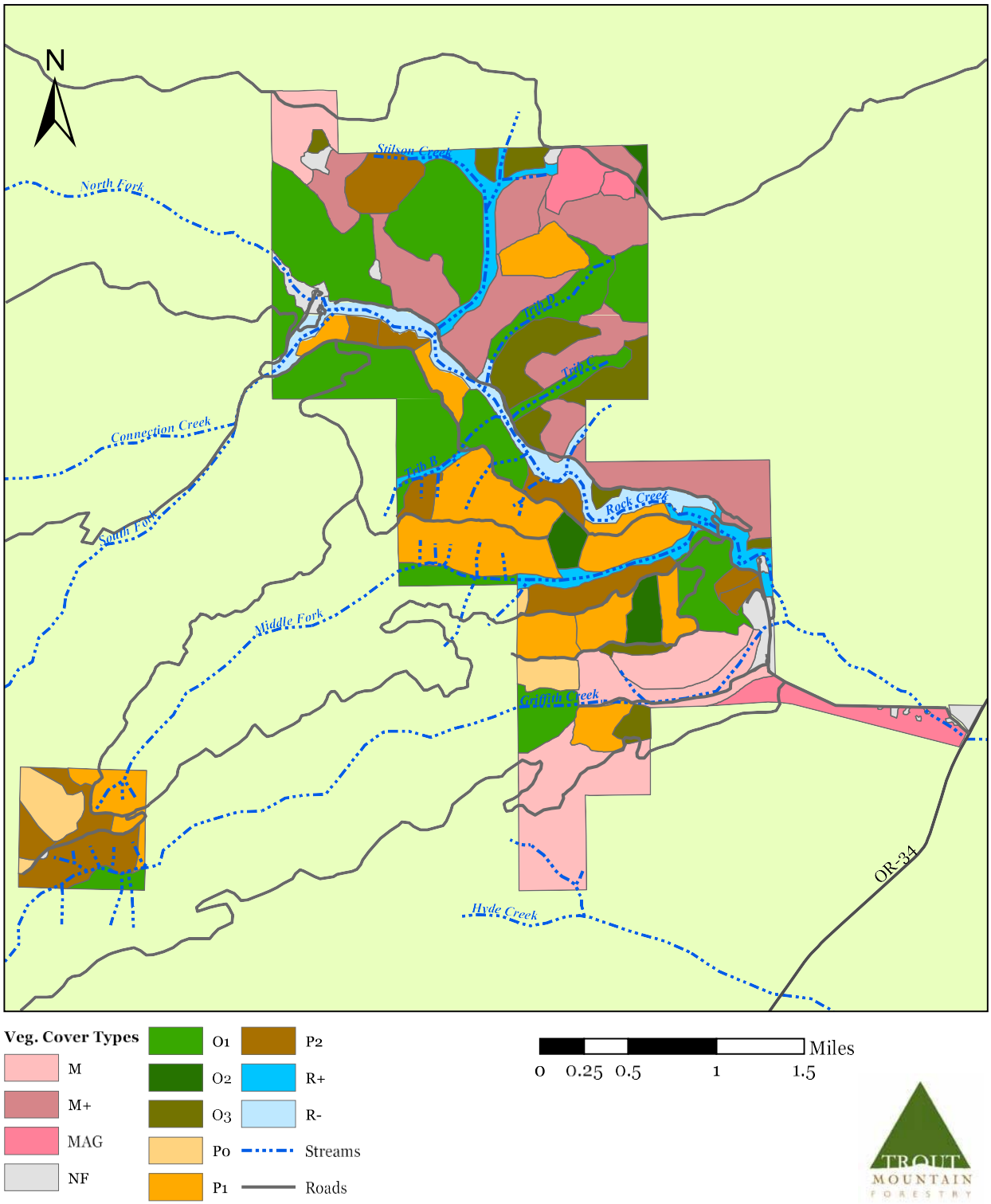
Table 3. *Estimated timber volumes by species*

	Net volume/acre	Total Net Volume	Percentage
Douglas-fir	53,831 bf	123,659 mbf	92.2%
Bigleaf maple	2,055 bf	4,720 mbf	3.5%
Grand fir	1,456 bf	3,345 mbf	2.5%
Western redcedar	608 bf	1,396 mbf	1.0%
Red alder	201 bf	462 mbf	0.3%
Western hemlock	165 bf	380 mbf	0.3%
Other	56 bf	129 mbf	0.1%
Total	**58,373 bf**	**134,091 mbf**	

Table 4. *Estimated timber volumes by vegetation type*

Veg Type	Acres	Net volume/acre	Total
O1	587.0	92,513 bf	52,454 mbf
O2	44.5	118,334 bf	5,267 mbf
O3	118.3	92,285 bf	10,916 mbf
M	295.0	47,150 bf	13,910 mbf
M+	365.0	93,688 bf	34,200 mbf
P2	201.7	20,296 bf	4,094 mbf
P1	387.2	13,428 bf	5,092 mbf
P0	48.9	1,160 bf	57 mbf
R–	98.1	10,693 bf	1,049 mbf
R+	94.1	37,655 bf	3,595 mbf
NF	112.2	0	0
Total	**2,352.0**		**134,180 mbf**

Figure 5. Vegetation Cover Types



Social and Economic Context

Community Impact

The Corvallis Forest is located in rural Benton County, near Philomath. Although the setting is rural, the importance of this asset to the City of Corvallis and surrounding communities cannot be underestimated. The community of Corvallis takes pride in its location at the heart of the Willamette Valley and in the beauty of the surrounding forested hills. The slopes of Marys Peak form an easily recognizable backdrop that defines the city as a blend of its rural resource-based economy (timber and agriculture) and educational and technological strengths (Oregon State University and high-tech industries).

The Rock Creek Watershed is an important source for the community's high-quality water, supplying one-third of the City's water needs. It also provides important habitat for fish and wildlife. Another social benefit (though intangible) is the "sense of place" and connection to the surrounding resource lands that a watershed can foster in a small community. This is evidenced by the concern over early management practices and the public interest in ecosystem function and stream habitat issues in the Corvallis Forest.

The most significant economic impact of the Corvallis Forest is providing a high-quality low cost drinking water supply. The forest also contributes to the local economic climate by providing clean air, clean water, and viewshed protection.

Timber harvests on the Corvallis Forest make a direct and ongoing contribution to the local economy. Logs are harvested by local logging contractors, using equipment and supplies often purchased locally, and are sold to mills located in Benton, Linn, and Lane counties. Restoration activities also often use local crews, utilizing materials and supplies sourced locally. Harvests contribute revenue to the City for reinvestment in the Corvallis Forest and the City's water system, producing expenditures in the private sector, and generating jobs for local contractors and mills.

The City, in its commitment to sustainability, participates in the Forest Certification program of the Forest Stewardship Council. This requires that managers strive to understand the likely social impacts of management activities, and incorporate this understanding into management planning and operations. A social impact analysis can be found in Appendix E, https://apps.corvallisoregon.gov/webdocs/showdoc.aspx?docID=904964.

FSC Certification

The Forest Stewardship Council (FSC) was established in 1993 by business, environmental, and community leaders to create a voluntary, market-based approach to improve forest practices worldwide. FSC has developed a set of Principles and Criteria, and has earned a reputation as the most rigorous, credible forest certification system.

FSC Forest Management certification confirms that a forest is being managed in line with the FSC-US Forest Management Standard. The Corvallis Forest has been certified under Trout Mountain Forestry's Group certification since 2007, allowing some logs from City harvests to be sold to "Green Building" projects and lumber markets.

Recreation and Visual Impacts

There is limited recreation on Corvallis Forest, as the City of Corvallis restricts public access in an effort to protect water quality and public works' facilities. The Corvallis Forest is posted against trespass. Access is strictly controlled; all gates are locked, and keys are strictly monitored. Public recreation is generally not allowed; however, non-motorized access is allowed along Old Peak Road as part of the Corvallis-to-the-Sea Trail. Walk-in deer hunting is a legacy use allowed since the early 1960s, originally as a means to reduce deer browse on planted seedlings. Abutting Forest Service lands in the upper watershed are open to limited public recreation, including some roads, and several segments of trails open to hiking and mountain biking.

There is regular public interest in seeing and visiting the property. A permit process and strict policies for group use are in place; permission is granted on a case-by-case basis. By reciprocal agreement Siuslaw National Forest and the City jointly notify each other whenever permission is granted to an individual or group to enter the watershed.

Education, Research, and Public Outreach

The gated watershed provides excellent opportunities for controlled studies in forestry, hydrology, botany and other disciplines that need areas protected from outside interference. Local schools and colleges, and natural resource researchers use the Corvallis Forest. Group tours average six or more per year. Education and research access to the watershed property is allowed by express permission and with a special use permit. The WMAC, staff and consultants host an annual tour of the Corvallis Forest to inform and engage the community about management efforts.

Fire Management

The City has a policy of active suppression of any fires, and cooperates with the Oregon Department of Forestry for fire protection and monitoring, for which the City pays an annual per-acre fee. Most fire in the Coast Range is human caused. Public access closure of the watershed eliminates the most probable cause of fires. To minimize fire hazards and risks, water plant staff regularly mows roadsides and around facilities to reduce fine fuels, clear large wood on roads to maintain vehicle access, and patrol roads for trespass.

Revenue

The City maintains two funds to support water system operations and projects. The "Water Fund," primarily funded by revenue from water sales receipts, is used for water system operations, planning, and administration. A separate "Water Timber Fund" receives revenue from the Corvallis Forest property, including timber sale receipts. This fund is used for maintenance and projects on the property, and may also be used to fund City water infrastructure expenses.

Partners

Many agencies and organizations help the City accomplish its goals for the Corvallis Forest through technical assistance or grant funding:

- US Forest Service
- Marys Peak Stewardship Group
- Oregon Department of Fish & Wildlife
- Oregon Department of Forestry
- US Fish & Wildlife Service
- Marys River Watershed Council
- Oregon State Weed Board

4. Policies

This chapter documents how the watershed will be managed. The Vision Statement and Guiding Principles were developed in 2005 as part of a public visioning process. Policies for each resource area guide stewardship activities. Standards and Guidelines detail how management actions are implemented. For more information on Monitoring and Public Outreach policies see Chapter 6 and Chapter 7.

Vision Statement

The City-owned portion of the Rock Creek Municipal Watershed is a professionally managed, healthy ecosystem with a diverse forest and productive habitat for all species native to the watershed.

Guiding Principles

- Conservation-based management practices demonstrate that water quality, stream health, wildlife habitat enhancement, and tree harvest can go hand in hand;
- Protecting the health and diversity of the forest and its ecosystems are top priorities;
- We are a "good neighbor" and integrated into the larger landscape, recognizing our connections to the greater watershed;
- Corvallis Forest is managed for a variety of different ages and types of forest to provide diversity of terrestrial and aquatic habitats;
- Corvallis Forest is resilient to fire, invasive species, insects and disease;
- Access is controlled to minimize risk of fire, water contamination, and invasive species introduction;
- Corvallis Forest is available for limited educational, recreational, and research opportunities;
- Corvallis Forest supports high quality water production for the City of Corvallis;
- Corvallis Forest is a generator of revenue that will primarily be used to offset the cost of forest management, and secondarily to help fund the City of Corvallis water utility system.

Desired Future Condition

The desired future forest on the watershed property will include:

- Reserve areas to protect water quality and other sensitive resources

- Plant communities dominated by native species that are vigorous and resilient to disturbance and climate change
- Forest stands representing a variety of different ages and types, to provide a diversity of wildlife habitats
- Healthy streams with high quality water and good aquatic habitat for native fish and other stream dwellers
- Old forest structural features, including large trees, multi-aged stands, and biological legacies, including snags, large cavity trees, coarse woody debris, hardwoods, and shrubby openings
- Special features and unique communities, including savanna/woodland, meadow habitats, riparian forests, and minor species
- An arrangement of forest stands and plant communities across the property that provides connectivity of wildlife habitats, and integrates with that of the surrounding landscape

Resource Policies

Forest Age & Structure

Manage the Corvallis Forest to protect older forest stands and old forest legacies within younger stands, while providing a variety of different ages and types of forest and habitat conditions.

Reserve Areas

Maintain Reserve Areas on the Corvallis Forest to protect streams and water quality, wildlife and other areas of unique habitat or ecological values.

Aquatic Habitat

Maintain and restore high quality aquatic and riparian habitat.

Wildlife Habitat

Protect unique habitats on the Corvallis Forest, and, where possible, to diversify wildlife habitats, promote connectivity between habitats, and increase biological diversity on the ownership.

Water Quality

Protect and where possible enhance the quality of water and the health of the aquatic environment within its ownership. Corvallis seeks to minimize the adverse effects of necessary water withdrawals on stream health.

Native Vegetation & Invasive Species

Promote native plant communities and actively monitor, control, and reduce invasive plant populations.

Roads

Reduce road impacts on water quality within the Corvallis Forest, and to minimize new road construction.

Forest Chemicals

Minimize the use of chemical herbicides, pesticides, and fertilizer in the Corvallis Forest.

Public Access

Prohibit general access to the Corvallis Forest, but implement access controls to allow educational, research, special permitted usage.

Neighbors & Allied Organizations

Cooperate with neighboring landowners and aligned organizations to ensure quality water for the citizens of Corvallis, protect wildlife and stream habitats, and to achieve joint objectives and projects.

Fire

Protect the Corvallis Forest from wildfire and to manage forest stands to reduce fire risk.

Planning, Monitoring & Public Outreach

Implement the Corvallis Forest Stewardship Plan, monitor management to minimize adverse impacts and meet Plan goals and objectives, and to ensure transparency of management by effectively communicating activity goals and objectives with Corvallis citizens and leaders.

Standards & Guidelines

Forest Age & Structure

1. Vegetation types are designated and mapped.
    a. Vegetation types are defined in the Forest Resources Inventory report.
    b. New vegetation types are designated in future inventories as forest conditions change and currently undefined types develop.
2. State-of-the-art silviculture is used on the City Forest
    a. Silvicultural systems are designed and employed to encourage development of a variety of forest ages and habitat conditions, and to meet goals for diversity, resilience, and forest health. Silvicultural prescriptions on the Corvallis Forest may vary widely, depending on age, stocking, species composition, and operability of the site. Site-specific management is designed to meet the broader goals of the CFSP.
    b. Silvicultural methods used include:
        i. *Pre-commercial Thinning (PCT):* PCT thins non-merchantable trees to reduce stocking and modify species composition by slashing and leaving the tree on site rather than removing it for a commercial product.
        ii. *Variable Density Thinning (VDT):* VDT varys thinning intensity across small scales to create a complex forest structure. Wider spacing may accommodate natural or planted regeneration of shade tolerant species, thus allowing recruitment of additional age classes and development of understory plants.
        iii. *Conventional Thinning:* Methods such as “thinning from below” and “thinning from above” are used in conjunction with variable-density thinning. The objective of these methods is generally to remove suppressed, damaged and defective trees, and allocate growth to dominant, healthy trees.
        iv. *Group Selection:* Group selection typically removes small groups of trees within a stand. This is generally applied in conjunction with a thinning operation to provide opportunities for crown development at the edge of the group opening, and establishment of an additional age class within the opening. Whether or not a group selection is planted or left to regenerate naturally depends on presence of seed sources for shade-tolerant plants and size of the opening.
        v. *Individual Tree Selection (ITS):* Individual trees from a range of canopy classes are selected for harvest to favor trees in similar or other canopy classes. ITS is used for favoring growth and establishment of advanced regeneration to promote multi-storied stands.
        vi. *Patch Cut:* Small openings created by removing all or nearly all dominant trees are classified as patch cuts. This harvest method provides larger openings for tree regeneration and/or early seral

conditions. Patch cutting are often integrated with thinning operations to introduce new age classes into the forest.

vii. *Variable Retention (VR):* Variable retention harvests retain significant portions of the original stand, and establish a new age cohort. The retained portion of the stand can be grouped or dispersed throughout the harvest area. VR is used when stand conditions indicate thinning is not effective in promoting desired structural or compositional conditions, when forest pathogens severely impact the viability of a stand, or when operational limits prohibit thinning.

c. Live trees, snags, and woody debris are retained in harvest openings at levels and for periods sufficient to provide desired structural benefits. Retention includes legacies of the older forest, minor tree species and advance regeneration.

3. Harvest levels are sustainable.
    a. Property harvest level calculations consider only areas available for harvesting. Reserve areas are excluded from harvest level calculations.
    b. Total harvest volume does not exceed total growth during any rolling ten-year period.
4. Timber harvesting activities use "best-practices" aimed at protecting the ownership.
    a. Legacy trees, residual trees, snags, large woody debris, and advance regeneration are protected from damage during felling, skidding, and road building. All legacies of the older forest receive high levels of protection.
    b. Logging is conducted in ways that ensure public safety and minimize user conflicts.
    c. Logging equipment is specified to minimize site disturbance and road-building costs. Equipment that does a satisfactory job at a reasonable cost is utilized.
    d. Ground-based logging is limited to slopes averaging less than 35 percent, with operations restricted to dry-season conditions.
    e. Log landings and equipment access routes are kept to the absolute minimum size and number necessary for logging safety and efficiency.
    f. Logging is avoided during early spring to limit bark damage.
    g. Loggers fall trees and process logs to minimize waste and maximize timber yields.
5. Reforestation is assured in forest habitats; natural and planted regeneration can be used.
    a. Natural regeneration is favored where it exists or can be encouraged.
    b. When planting, a variety of native, site-adapted tree species are used. Seedlings from appropriate seed zones are used.
    c. Planted seedlings and natural regeneration are kept vigorous and free to grow by judicious and economical vegetation control. Shrub development is allowed to provide habitat and diversity.
    d. Logging slash is typically left in place. Piling is restricted to landings and regeneration areas where volumes impede plantability or access.

6. Salvage harvest can be considered.
    a. Impacts from wind, fire, insects or disease that kill groups of trees are considered part of the natural disturbances process of a healthy forest. Any salvage harvest plan considers the value of leaving dead trees undisturbed in the forest. Factors such as location, quantity of diseased or dead trees, wildlife habitat value, and economic value are considered when evaluating timber salvage options.
    b. Salvage harvesting is evaluated on a case-by-case basis, and is consistent with polices protecting water quality, forest ecosystem function, and wildlife habitat.
    c. Timber salvage is conducted in a manner that minimizes impacts on resources. Salvage operations that unnecessarily add to forest disturbance, such as new road construction or soil disturbance on steep slopes are avoided.

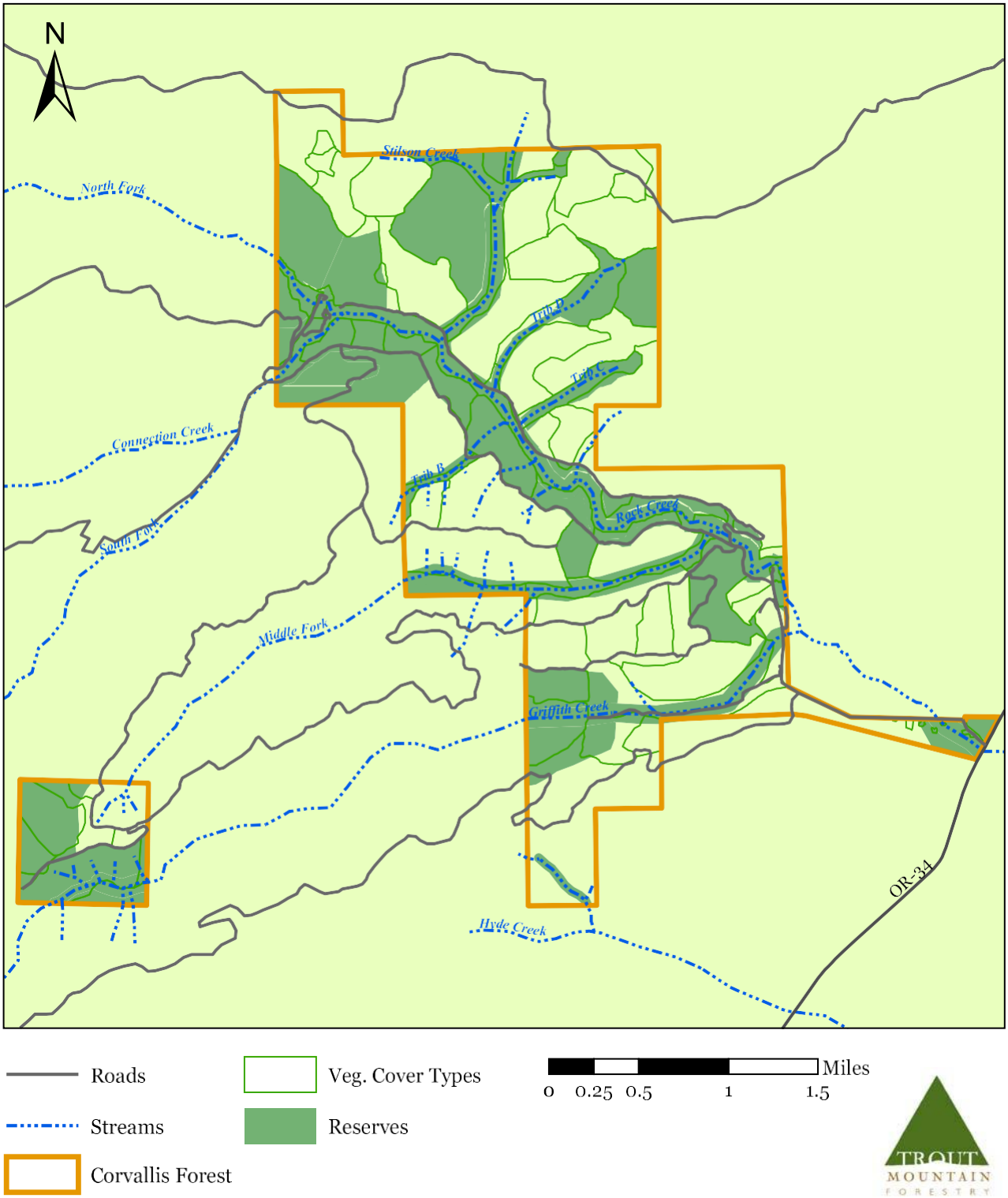
Reserve Areas

1. Certain areas are designated as Reserve Areas (see Figure 6, page 41), with additional allowances for landscape setting, sensitive resources, and terrain, including:
    a. Riparian areas on all streams as mapped by Oregon Department of Forestry (ODF). Minimum reserve distances shall be 200 feet slope distance on each side of Medium and Large streams, and 100 feet for Small fish-bearing streams, as classified by ODF
    b. Other sensitive stream and riparian areas not included on ODF maps, as deemed necessary
    c. Areas within the Rock Creek water system catchment area
    d. Late-seral structurally diverse forests
    e. Landslide prone areas near streams
2. Reserve Areas are identified on a map contained in the CFSP.
3. Reserve areas are reviewed and updated as part of periodic plan update processes.
4. The following silvicultural practices are prohibited within Reserve Areas:
    a. Commercial timber harvesting, except to enhance stand structure and habitat or speed development of desired future conditions
    b. New permanent road construction
    c. Salvage harvesting, unless down or dead trees pose a verifiable risk to forest ecosystem function or public safety

Aquatic Habitat

1. Management planning includes evaluation of aquatic habitat, aquatic resources, and population dynamics, and considers opportunities for fish habitat enhancement.
    a. Restoration projects are prioritized by their potential to create high-quality habitats.

Figure 6. Reserve Areas



b. Management efforts are designed to maintain the full suite of native aquatic organisms.

2. Riparian areas are managed following Reserve Area Standards and Guidelines.

Wildlife Habitat

1. Priority is given to forest management actions that positively impact habitat needs for State and Federal ESA-listed species, promote connectivity between wildlife habitats, and for areas of highest habitat improvement need.
2. Forest management efforts are designed to maintain viable populations of all species native to the site.
3. Wildlife habitat efforts are coordinated with those of neighbors where habitats span ownership boundaries.
4. Active management consider habitat diversity; where possible, unique features will be positively impacted, including but not limited to:
    a. Legacy trees
        i. Trees that are unique for their size, age, species, and/or location are protected. Target numbers are specified in management plans based on best current science and desired future conditions.
        ii. Trees older than 200 years in managed stands are identified and retained as legacy trees.
        iii. Legacy trees are reserved from harvest until target numbers are exceeded. Any future harvest of legacy trees ensure target numbers are maintained.
    b. Wildlife trees
        i. Trees that are unique for their wildlife value are protected.
        ii. In areas without any, wildlife trees are created to provide critical habitat (den cavities, nests, perch sites) or mast (acorns, seeds, or fruit).
        iii. Wildlife trees are retained during management activities for the purpose of continued wildlife values and as future snags and large woody debris.
    c. Standing dead trees (snags)
        i. In areas lacking snag habitat, snags and coarse woody debris are actively created using scientifically valid criteria for snag selection and management. Target numbers are specified in operational plans based on best current science and desired future conditions.
        ii. Where suitable snag candidates are lacking, they can be added over multiple cutting cycles
        iii. Existing snags are retained and allowed to naturally deteriorate, except where posing a safety hazard (e.g. near roads, trails or structures), or deemed suitable for salvage (see Salvage Policy).
    d. Down logs (coarse woody debris)
        i. Slash and cull log sections are left in the woods at time of management activity.
        ii. Tradeoffs between woody debris augmentation and fire, invasive

weed, and other operational risks are considered.

iii. Large down logs are protected during management activity from damage and disturbance.

iv. Where absent, coarse woody debris levels are promoted to enhance soil productivity, and additional recruitment will be encouraged. Target numbers are specified in management plans based on best current science and desired future conditions.

e. Uncommon vegetation types

i. Occurrences of uncommon and sensitive vegetation types associated with springs and seeps, rock outcrops, grasslands, oak woodland, oak savanna, lichen communities, etc., are identified and protected

ii. Inclusions of uncommon vegetation types are encouraged and perpetuated (e.g. hardwood pockets within conifers stands, openings within closed canopy stands, etc.)

Water Quality

1. Management of the Corvallis Forest is designed to meet State and Federally mandated water quality standards, and provide the highest possible quality of water at low cost.
2. Areas of City-owned land above the water intakes are designated as Reserve Areas (see Reserve Area Policy).
3. Forest management operations are planned and conducted using best-practices to minimize erosion and water quality impacts (see Forest Age and Structure Policy).

Native Vegetation & Invasive Species

1. Native plant communities are actively managed for protection from invasive plant species
    a. State and Federal rules to protect listed plant species are met or exceeded. Threatened and Endangered species are given the highest levels of protection.
    b. Plant surveys are conducted prior to all management activities to look for plant Species of Concern (e.g. *Cimicifuga elata* – tall bugbane patches). If Species of Concern are found, management activities are initiated to protect their habitats.
    c. Degraded Species of Concern plant communities are actively managed to enhance ecosystem structure and function.
    d. Collection of Listed or Species of Concern plants or mushrooms is not allowed.
2. Invasive species are actively managed to suppress their spread or eliminated from the ownership.
    a. Invasive species surveys are conducted on areas considered for management activities.

    b. Invasive species such as false brome and exotic blackberries are controlled, with an emphasis on early detection and control of new populations before they become firmly established.
    c. Neighboring landowners are encouraged to institute their own invasive species controls near common boundaries.
    d. Integrated Vegetation and Pest Management strategies, as described in the Corvallis Integrated Vegetation and Pest Management (IVPM) Program, CP 95-7.12 are instituted as a part of routine operations, for example:
        i. Logging equipment is washed before arrival on the site.
        ii. Infestations are pretreated before management operations.
        iii. Disturbed soil areas are seeded with native or fast-growing non-invasive species.
        iv. Follow-up monitoring and control is conducted.
3. Restoration activities will be pursued for Listed or Species of Concern plants.
    a. Uncommon and sensitive plant populations, such as peacock larkspur (*Delphinium pavonaceum*), are protected (see Reserves) and actively managed to maintain and, if possible increase size and vigor.
    b. Restoration activities minimize ground disturbance, unless it is specified an appropriate management technique.
    c. Restoration activities are initiated first on a small scale and on low risk sites. Large-scale efforts are applied only when proven effective on each site.
    d. Local seed sources are used for restoration and revegetation as practical.

Roads

1. A road network is maintained to provide access for water system operations, forest management and monitoring, fire prevention and protection, and public outreach activities.
2. Main roads are maintained as all-season roads. Timing of wet-season use is limited to minimize erosion and road damage.
3. Best practices for road maintenance, as described in the Oregon Department of Forestry Forest Road Management Guidebook, are followed.
    a. Roadbeds and cleared right-of-ways are kept to the smallest size necessary for management operations.
    b. Roads and skid trails are designed to follow slope contours, and use dips, water bars where practical, and seeding as needed to control erosion. Out-sloped roads are preferred.
    c. Haul road grades generally do exceed 20%
    d. Stream crossings are avoided.
    e. Culverts on fish bearing streams are upgraded to allow fish passage.
4. Temporary roads are closed and revegetated upon completion of logging operations. Seeding is used to control erosion and reduce spread of invasive species.

Forest Chemicals

1. Integrated Vegetation and Pest Management strategies, as described in the Corvallis Integrated Vegetation and Pest Management (IVPM) Program, CP 95-7.12, are instituted as a part of routine operations, such as:
    a. Chemical herbicides are used only when other methods are ineffective or prohibitively expensive
    b. The least persistent and lowest toxicity chemical offering effective control are used.
2. Targeted application (e.g. backpack sprayer or single stem injection) is the preferred method.
3. No aerial chemical application is allowed.

Public Access

1. The property is posted to prohibit trespass; gates block all access roads, and keys are strictly controlled.
2. Water system staff patrols the property to help prevent trespass.
3. Public access is allowed for organized educational use, research, and city-sponsored public outreach, managed through the Public Works Department, and approved on a case-by-case basis.
4. When issuing public access permits, impacts on water quality, risk of fire, invasive species, and neighbors are considered.
5. Access to Old Peak Road for non-motorized Corvallis-to-the-Sea Trail use is allowed.

Neighbors & Allied Organizations

1. Siuslaw National Forest and other abutting owners are conferred with when restoration activities are planned, and notified of planned operations.
2. A member of the Public Works staff is designated as a liaison to the Marys Peak Stewardship Group, and participates in regular meetings
3. Cooperative road use and maintenance agreements are developed with Siuslaw National Forest and other neighbors.
4. Development and implementation of monitoring and restoration plans is coordinated with Marys River Watershed Council and other organizations.
5. Neighbors and interested groups are invited on an annual public tour of the Corvallis Forest.

Fire

1. All wildfires occurring on the forest are controlled as soon as possible. There are no “let-burn” areas on the forest.
2. In the unlikely event that controlled burns are deemed necessary, they are managed by or planned with the assistance of the Oregon Department of Forestry.
3. No accumulations of slash remain within 60 feet of roads or landings, except in the case of piles created for wildlife habitat.

4. Stands with high fuel loads or high fire risk are treated to reduce hazards.
5. Areas within 100 feet of structures are treated in conjunction with fire-safe guidelines of Oregon Department of Forestry and US Forest Service (Oregon Forestland-Urban Interface Fire Protection Act, 2006).

Planning, Monitoring & Public Outreach

1. The Corvallis Forest Stewardship Plan incorporates statistically relevant resource inventories and assessments of forest values and functions. The CFSP defines ownership objectives, assesses resource values in the context of the surrounding landscape, and sets policy and guidance for long-term property management direction.
    a. Future stewardship plans and updates are written by a professional forester with direction of the WMAC and staff, and adopted by the City Council
    b. The planning process includes opportunities for public involvement and comment
    c. The plan and resource inventories are updated approximately every 10 years
2. Action plans are prepared at least once every three years to schedule and implement Stewardship Plan activities and periodic harvests. Plans are prepared by a professional forester at the direction of staff, with input from and approval of the WMAC.
3. Operational Plans are prepared to plan and detail harvests and other major management actions prescribed in Action Plans. The focus area is typically be a particular stand or set of stands.
    a. Operational Plans are prepared by a consultant professional forester at the direction of staff, with input from and approval of the WMAC.
    b. Plans are consistent with CFSP goals for forest function and resource protection.
    c. Input from wildlife, fishery, and botany professionals are solicited and incorporated into plans as needed.
    d. Plans include detailed maps and operational details. Maps include stand delineations, reserve areas, sensitive resources, and locations of any landings and skid trails. Operational notes include unit prescriptions, project specifications, intended outcomes, timber harvest volume and value estimates, and implementation details.
4. In cooperation with staff, a professional forest manager supervises all aspects of forestry operations, including:
    a. Resource inventories
    b. Long-term stewardship plans
    c. Design and implementation of silvicultural activities
    d. Accounting and administration
    e. Compliance, contract, and environmental monitoring
    f. Any other activity related to management of the forest
5. Monitoring is conducted to help determine if forest management activities are compliant with CFSP Vision, Guiding Principles, and Policies and Guidelines

(see Chapter 6, Monitoring)

6. Outreach efforts are conducted to increase awareness of and encourage engagement of the Corvallis community and neighbors in the resources and ecology of the Corvallis Forest, management actions, and the CFSP (see Chapter 7, Public Involvement)

5. Management Opportunities

This chapter describes management opportunities on Corvallis Forest, with examples of management activities completed between 2007 and 2012. For a complete summary of management accomplishments see Forest Activities Reports, available at https://www.corvallisoregon.gov/publicworks/page/forest-activities-report. For more information on currently planned activities, please visit the Corvallis Forest website https://www.corvallisoregon.gov/publicworks/page/corvallis-forest.

Given the Forest Age and Structure policy to protect older forest stands and old forest legacies within younger stands, while providing a variety of different ages and types of forest and habitat conditions:

- A wide range of tree ages, and thus diverse habitat structure, can be maintained and expanded:
  - *Thin young and middle-aged stands to variable densities.* From 2007-2013, 235 acres were treated. Additional areas need treatment.
  - *Create forest openings to establish new seedlings.* Harvests since 2008 have included gap creation and replanting. This practice should continue.
  - *Conduct trial thinning in middle aged and old stands.* Harvests since 2008 have included 130 acres for middle age stand enhancement. Trial thinning in old stands should be considered.
- Understory development is lacking or absent in many areas. Opportunities include:
  - *Plant a variety of tree species when reforesting after harvest*
  - *Plant shrub species in areas where understory shrubs are lacking*
  - *Use best practices for road and skid trail location to protect understory plants during harvesting*
- "Legacy" trees, some several centuries old, can be maintained, even in stands experiencing logging activities. Opportunities include:
  - *Mark legacy trees for special protection during logging*
  - *Thin younger trees* that are competing with older legacy trees
- A wide range of tree species can be maintained and expanded:
  - *Create small gap openings for "early seral" habitat*
  - *Use a variety of species in new plantings, including underrepresented species such as western redcedar and western hemlock*

Given the Reserve Area policy to establish Reserve Areas to protect streams and water quality, wildlife and other areas of unique habitat or ecological values:

- Periodic re-evaluation may identify other areas to add to reserve status
- Young planted stands within reserve areas can be actively managed to rapidly achieve desired future conditions:
    - *Thin stands to variable density to increase diversity and wind-firmness*. Portions of 2008 and 2011 treated stands in reserve areas. Additional appropriate areas need treatment.
    - *Create snags and woody debris*. A 2010 snag creation project included reserve areas where snags were lacking. Additional treatments may be needed.

Given the Aquatic Habitat policy to maintain and restore high quality aquatic and riparian habitat:

- Water quality and aquatic systems can be safeguarded by proper road maintenance. Examples of management actions taken to this end include:
    - *Utilizing "best practices" for timber harvesting and road maintenance to protect against erosion and sedimentation.*
    - *Providing enhanced protection to riparian areas*. Designated stream buffers exceed regulatory minimum standards.
- Water quality and quantity information can be enhanced by monitoring stream flows and water quality conditions below intake structures. Examples of management actions taken to this end include:
    - *Monitoring stream flows and temperatures.* Water levels at intakes and the reservoir are monitored regularly. Since 2009, water temperature of Rock Creek has been monitored annually to develop baseline data and identify impacts.
- Water System management procedures can be regularly reviewed, looking for opportunities to increase downstream water quality and quantity. Examples of management actions taken to this end include:
    - *Maintaining back-wash holding ponds and dredging spoil sites to be weed free.* Invasive weeds were controlled 2009-11 using integrated pest management strategies. Future treatments may be needed.
    - *Changing Water System management protocol to improve water quality and quantity.* Since 2009, water temperature monitoring of Rock Creek has helped understand and minimize summer water temperature impacts. Monitoring should continue.

Given the Wildlife Habitat policy to protect unique habitats and, where possible, to diversify wildlife habitats, promote connectivity between habitats, and increase biological diversity on the ownership:

- A rich array of native biodiversity can be maintained and expanded. Examples include:
  - *Thin dense, homogeneous young stands to diversify structure.* 115 acres of young stands have been thinned to variable densities to enhance diversity and to increase tree vigor; additional stands need treatment.
  - *Thin dense, homogeneous middle-aged stands to diversify structure.* 130 acres of middle-aged stands have been similarly thinned; additional areas need treatment.
- Snag and woody debris levels can be increased. Examples include:
  - *Creating snags*. A 2009-2011 grant-funded project created 680 snags by topping trees at various locations across the forest. A variety of snag types were created, as well as treatment to create cavities, bat roosting "flanges," and spotted owl "feeding sites," while protecting and enhancing older trees and forest structure; snags may be lacking in additional areas.
  - *Creating downed woody habitat in conjunction with harvest operations*. Cull logs and some merchantable tree stems are left on the forest floor after harvesting in areas with little or no downed woody habitat.
  - *Leaving brush piles.* Dispersing or piling slash near landings (rather than burning) can provide small mammal, amphibian and reptile habitat.
- Hardwood tree and shrub health and diversity can be increased. Examples include:
  - *Reducing overstory tree density provides more light for understory plants.*
  - *Reducing overall conifer cover in areas with legacy Oregon white oak trees*. In 2012-2013 harvest operations opened up several legacy oaks.
- Meadow and grassland habitat can be expanded and enhanced:
  - *Promoting areas of grassland habitat by removing encroaching trees.* In 2010-11 a historic meadow along Old Peak Road was expanded by removing encroaching trees, reseeding native prairie plants, and adding shrubs at the forest edge; an area of reservoir dredge spoils was restored to meadow habitat. Maintenance of grassland areas will be needed.
- Maturing forests can provide good habitat for many old-forest dependent species:
  - *Thinning allows stands to remain vigorous and wind-firm, and to grow to large size rapidly.* Since 2007 thinning has occurred on 235 acres; additional areas require treatment.
  - *Surveying for spotted owls, bald eagles, and marbled murrelet allows forest managers to monitor populations.* Following species management guidelines protects and enhances habitat.

Given the Water Quality policy to protect and where possible enhance water quality and health of the aquatic environment, while seeking to minimize the adverse effects of necessary water withdrawals:

- Reserve areas can be designated or expanded that protect sensitive locations and slide-prone areas
- Monitoring programs should include the aquatic environment
    - *Continue to monitor stream flows and temperatures below water intakes; research minimum flow criteria for native fish*
    - *Use results of the stream monitoring program to inform and improve stewardship activities within the watershed*
- Riparian area can be managed to grow future large woody habitat and to promote stream shade
- Maintain high-quality road surfaces to reduce sediment delivery to streams

Given the Native Vegetation & Invasive Species policy to promote native plant communities, and actively monitor, control and reduce invasive plant populations:

- "Best management practices" for Integrated Vegetation and Pest Management can be consistently applied across the ownership
- Plant communities can be kept stable and healthy by regular monitoring for invasive weeds
- The presence of invasive weeds on the ownership can be reduced by active control of weed populations and removal of new threats:
    - *Continue weed control protocols for all forest management operations, including pre-operation survey and treatment, and post-op monitoring*

Given the Roads policy to reduce road impacts on water quality, and minimize new road construction:

- Road system infrastructure can be preserved by regular maintenance
    - *Continue to improve the road system by replacing culverts, rocksurfacing and grading as needed*
    - *Continue cooperative road maintenance with Siuslaw National Forest*
- Road impacts on water quality can be managed and reduced
    - *Maintain road surfaces, ditches and culverts during and after operations*
    - *Utilize small scale, environmentally sensitive logging techniques*
    - *Construct temporary roads as needed, and retire roads after use*

Given the Forest Chemicals policy to minimize the use of chemical herbicides, pesticides, and fertilizer:

- Invasive weeds are not widely established across the property, and have been reduced through active, effective early control
  - *Continue to use Integrated Vegetation and Pest Management Control practices to control invasive weeds*
- Forest structure and function can be promoted through non-chemical means
  - *Control forest pests using non-chemical methods* such as promoting mixed-age multi-species stand composition, thinning to promote vigor and diversity, and enhancing wildlife habitat.

Given the Public Access policy to prohibit general access to the Corvallis Forest, allow controlled educational, research, special permitted usage:

- Unauthorized access can be controlled by gating, signage, and patrols by water plant staff.
- Public awareness of and support for the management program can be expanded by providing public tours and group visitation opportunities to the Corvallis Forest
  - *Conduct an annual public tour to showcase recent practices, present planned future actions, and gauge public support for management*
  - *Continue to allow educational and research access by special permit; expand outreach efforts*

Given the Neighbors & Allied Organizations policy to cooperate with neighboring landowners and allied organizations to ensure quality water, protect wildlife and stream habitats, and to achieve joint objectives and projects:

- Close proximity to the City of Corvallis, Philomath, OSU, and public and private schools allows the Corvallis Forest to be used for outreach, tours, and research
  - *Continue annual public tours; invite neighbors and interested groups*
  - *Develop an expanded program of outreach to local schools and groups; seek program funding and partners*
- Habitat connectivity can be optimized by coordinating management activities with adjacent owners
  - *Continue to confer with Siuslaw National Forest and other neighbors when planning restoration activities*
- Funds available for restoration can be leveraged by participating in joint restoration projects

- *Continue to participate in the Marys Peak Stewardship Group.* The City of Corvallis has participated since MPSG inception, and has received nearly $100,000 in grant funding for restoration projects

- A wide variety of restoration projects and restoration prescriptions have been accomplished since CFSP adoption, providing opportunities for sharing our methods and results
  - *Continue to offer tours to interested groups*
  - *Continue reporting on forest activities*; consider wider sharing of methods, results and findings through expanded web presence and other venues
- Engaging education and research partners can leverage monitoring funds, help answer management questions, and inform management direction
  - *Consider a cooperative research program; seek program partners and funding*

Given the Fire policy to protect the Corvallis Forest from wildfire and to manage forest stands to reduce fire risk:

- Silvicultural treatments can be used to reduce fire risks
  - *Continue to reduce fire risks in stand treatments*
- Agency support is available to increase fire preparedness
  - *Continue to cooperate with Oregon Department of Forestry on Fire Plans*
  - *Continue to check that contractors have adequate fire equipment*

Given the Planning, Monitoring, & Public Outreach policy to implement the Corvallis Forest Stewardship Plan, monitor forest management to meet Plan goals and objectives, and ensure transparency by communicating with Corvallis citizens and leaders:

- The Corvallis Forest Stewardship Plan provides a thorough policy framework to guide management direction and decision-making
  - *Maintain a resource inventory*. The 2008-09 comprehensive forest resources inventory updated forest vegetation typing, timber cruise information, and forest biodiversity data
  - *Update forest resources inventory before end of 2013-2018 planning period*, including stand-level timber conditions, understory vegetation, invasive species, and growth and yield modeling
  - *Update management recommendations as needed*
- Property baseline data has been collected on streams, fish populations, wildlife, vegetation, timber condition, and other forest resources, enabling analyses of the impacts of management actions on resource conditions

- *Conduct periodic surveys for Marbled murrelets, Northern spotted owl, and other ESA-Listed species*
- *Engage research partners to answer questions about effects of management and efficacy of management actions.*

- A professional forest manager supervises all aspects of forestry operations, expanding staff resources
  - *Continue to produce and archive maps, plans, and reports of all major management activities*
- Technical experts from various agencies and natural resources fields have been consulted and have provided support in planning field treatments, providing an expanded base of knowledge on the property and easing regulatory processes
  - *Continue ongoing technical peer field review of important management decisions*
- The CFSP contains a Monitoring Plan to gauge how well management actions are meeting Plan vision and guiding principles, policies and guidelines, and desired future conditions
  - *Continue to compile and disseminate an annual Forest Activities Report*
  - *Continue annual stream water quality monitoring*
  - *Refine the monitoring program, seek additional partners.* Continue to partner with agencies and local organizations to provide technical expertise, project support, and monitoring assistance
  - *Consider engaging community volunteers to assist with monitoring*
  - *Develop a restoration and management plan for rare plant populations and special habitats* such as prairie, savanna and oak woodland
- High level public interest in the Corvallis watershed, close proximity to Corvallis, OSU, and other schools, and the wide variety of forest types, management accomplishments, and planned operations offer good opportunities for outreach, education, and research:
  - *Continue to conduct annual public tours to showcase recent practices, present planned future actions, and gauge public support for management*
  - *Broaden target populations of outreach efforts by engaging more students, youth groups, and allied organizations; partner with others as opportunities arise.*
  - *Work with OSU to take advantage of research opportunities;* develop research partnerships to benefit management of the Corvallis Forest

6. Monitoring

This section discusses monitoring needed to gauge the effectiveness of management activities and the types of plans and reports needed to guide effective management and

ensure adequate recordkeeping. A system for monitoring plan implementation and management practices is described.

Plans

The Corvallis Forest Stewardship Plan shall be reviewed about every 10 years, and revised as needed. Operational Plans shall be prepared for timber harvests and major projects. Operational plans include the harvest prescription or project specifications, including maps, stand delineations, reserve areas, intended outcomes and implementation details.

Baseline Data

Baseline information is needed to document the condition of important property resources, and provides the basis for monitoring to assess the effects of management over time. Since 2006 extensive baseline information has been collected for fish and aquatic resources (Appendix B), wildlife surveys (Appendix C), a systematic forest resources inventory (Appendix D), and stream temperature surveys (Appendix F). Cooperative surveys by Oregon State University or volunteers may provide additional baseline information over time.

Monitoring

Monitoring provides information to help determine if the forest management activities are meeting the City's Vision and Guiding Principles, and are adhering to the Plan's Policies and Guidelines. Through the monitoring process determinations may be made as to whether the Plan needs to be amended or management activities need to be redesigned.

Specific reasons for monitoring:

- To keep current information on the forest and all management activities
- To document existing and new occurrences of legally protected species (Endangered Species Act), and assess the effects of management
- To document existing occurrences of forest pests (insects, disease, invasive plants), record new occurrences, and assess the effects of management
- To determine whether activities prescribed in CFSP were carried out, whether they produced the desired results, and their impacts on other resources
- To provide a basis for Adaptive Management over time

Methods

To make monitoring cost-efficient and useful, this plan focuses on integrating monitoring with on-going forest management, rather than creating a separate process. This philosophy emphasizes an integrated approach where, as possible, information is

collected before, during and after operational work, as part of a specific project and multiple projects over time.

Types of Monitoring

There are several kinds of monitoring that can be undertaken depending upon the project objective, standards required, and resources available. These include:

- ***Compliance and Implementation monitoring***: Implementation monitoring (IM) assesses management actions (e.g., timber sale, resource survey) to determine if they were implemented properly. IM documents the type of action, location, and outcome. It does not require extensive data and is usually a low-cost monitoring activity. Compliance monitoring (also known as post-implementation monitoring) tracks compliance with established laws, rules or benchmarks including standards and guidelines. Compliance monitoring is also used in reference to monitoring of projects to see if they are functioning as they were designed or intended (e.g, did the new stream culvert allow fish passage).
- ***Status and trend monitoring***: Status and trend monitoring characterizes existing conditions that can be used as a baseline for future comparisons. Trend monitoring measures specific parameters at predetermined time or space intervals to order to assess change in status over time (e.g., water quality, water temperature, size and number of snags per acre). Status and trend monitoring will provide a means to estimate the status of wildlife populations and their habitats via vegetative cover type and to track, over time, indicators of quantity of habitat, functional diversity, connectivity, threats, and other factors affecting habitat suitability for plants and animals.
- ***Effectiveness monitoring***: Effectiveness monitoring at the project scale measures environmental parameters to ascertain whether the actions implemented achieved a desired change in habitat condition. In addition effectiveness monitoring attempts to establish “cause and effect” or inferential relationships between management actions, habitat conditions and wildlife. It pertains to evaluation of projects and programs meant to enhance habitat conditions with the intent to increase wildlife and plant populations. Normally this requires longer term detailed and technically rigorous studies outside the funding capability of the City. However, opportunities may exist in cooperation with Oregon State University, other agencies and partners.
- ***Resource Project Reports****:* These are project reports, including pre-operational plans and post-operational reports. For example, a timber harvest plan will describe existing conditions, the harvest prescription and how it meets goals for stand development and structure such as tree density, snags, wildlife and legacy trees, down wood, etc.
- ***Special Monitoring Projects****:* There may be cases where special monitoring projects are developed to answer specific questions. These can provide educational opportunities for students or interested citizens who want to be involved in data collection, with coordination and evaluation support from a resource professional. For example, additional wildlife species surveys.

Structure and Management
Monitoring will be a joint effort of city staff and contracted consultants. Staff will provide oversight, overall management direction, serve as the information conduit between consultants, the city, and the public, and be the central data repository. Consultants will provide monitoring system guidance, collect data, provide data analysis, and develop reports, maps, and other data product. In cases where highly technical data collection is required (e.g., fish and wildlife surveys) monitoring may be conducted by private contractors.

The Watershed Management Advisory Commission shall evaluate the progress in plan implementation and discuss what is working well, what problems there are, and suggest possible adjustments to be made. As appropriate, technical review committees may be established to provide input to staff, the Watershed Management Advisory Commission or City Council.

7. Public Involvement

It is a goal of the City of Corvallis to create opportunities to inform and engage the Corvallis community on stewardship, research, and other activities occurring on the City of Corvallis forest, thereby fostering community knowledge of local ecological values and stewardship practices, and obtaining the community's input on policy decisions. The Watershed Management Advisory Commission accomplishes this goal through a variety of public outreach and engagement activities as outlined below.

One objective of the Watershed Management Advisory Commission is to increase awareness and engagement of the Corvallis community and neighbors to the City of Corvallis forest regarding the ecology of the property, forest management, and the CFSP. The following activities will encourage the public to discover how the City is managing the Corvallis Forest to improve ecosystem structure and function, wildlife and fish habitat while protecting water quality and generating revenue to fund these activities.

- ***Forest Activities Report:*** An annual compilation of information, reports, and evaluations of management activities completed during the past fiscal year. The report also includes management activities and public involvement opportunities for the upcoming fiscal year.
- ***Annual Tour:*** An annual tour of the Corvallis Forest is open to interested members of the public. Tours focus on general watershed and management activity implementation. Commission members attend to hear first-hand input that tour attendees have to offer.
- ***Public Meetings:*** Public meetings are held to present issues, as directed by the Commission. All regular WMAC meetings are public meetings. Examples of issues appropriate for public meetings are: adoption of annual operational plans, and changes to CFSP policies.
- ***Volunteer Work Day:*** In the future, if staff resources become available, the watershed staff will work with forestry consultants and the Watershed Management Advisory Commission to prioritize activities for "Volunteer on the Forest Day" one day work sessions. These can focus on weed eradication, trail work, monitoring, etc. These one-day activities can serve as a portal to engage school and environmental groups on property activity.

Tours, public meetings, and workdays are advertised on the City of Corvallis website, The City newsletter, newspapers, flyers and the email distribution list. The Commission will evaluates the success of these programs based on public comment and evaluations of events.

The Watershed Management Advisory Commission

The Watershed Management Advisory Commission (WMAC) is the body dedicated to take public comment on watershed activities. The Meetings of the Commission are open to the public and opportunities are provided for public comment. The Commission is advisory in nature and generally meets monthly to review operation plans, evaluate the

progress in plan implementation and discuss program successes and problems, and suggest possible adjustments to be made. Commission meetings are noticed in the *Gazette Times* and on the City website.

Future Outreach

The capacity to create relationships with local schools, universities, and other education institutions to provide research, educational and volunteer opportunities on the City of Corvallis forest exists, but has been limited by funding and staff resources to coordinate research, and organize field trips. As resources become available, the Commission and City staff will pursue these relationships and look for opportunities to promote the Corvallis Forest as an ecologically interesting and convenient place to conduct natural resource-based research and education.

Glossary

biodiversity The entire spectrum of plants, animals and other life forms, and their associated environments

clearcut Most or all trees in a harvest area are removed: opening size greater than 2 acres

commercial harvest A timber stand improvement or harvest operation that results in a net landowner income

DBH Tree measurement; diameter at breast height (4.5 feet above ground)

even-aged All trees within a forest stand are of the same age

FSC Forest Stewardship Council; an independent, forest certification body that sets international standards for sustainable forest management

group selection Trees to selected to harvest are in groups; opening size is from several tree crown widths up to 2 acres

individual tree selection Trees to harvest are selected individually; opening size is one tree crown width

Late Successional Reserve Land within US Forest Service ownership designated under the Northwest Forest Plan to be managed for the creation of old growth forest conditions

mature Condition of optimal tree value, after tree vigor and growth have slowed, yet before the onset of decay

MBF Log measurement statistic; one thousand board feet. One board foot equals a board one inch thick by 12 inches square

MMBF Million board feet

merchantable Trees of sufficient size and quality to be commercially marketable.

operability Ease with which logging machinery could work a site; often limited by rockiness, steep slopes, wetness, etc.

patch cut A harvest where small areas (0.5-2 acres) are cut, taking most of the standing trees with the exception of clumps of younger conifers and older residual wildlife trees

pre-commercial Trees of insufficient size and quality to comprise a commercially viable harvest operation.

regenerate To establish a new stand of tree seedlings

regeneration Seedlings of commercial tree species

riparian zone Areas next streams, lakes, estuaries and wetlands consisting of wet soils and the transitional habitat between wetland and upland; practices are typically regulated by law.

savanna A plant community characterized by primarily grasses, with shrubs and widely scattered and open trees.

seedling Tree greater than six inches tall but less than one inch DBH

snag Standing dead and/or dying tree. Important habitat element for numerous wildlife species

understory Trees, shrubs, and herbs growing under a canopy of larger trees.

uneven-aged Trees within a forest stand are of two (or more) distinct age groups

variable density thinning Trees to harvest are selected at varied intensities across small scales to create complex forest structure; wider spacing between residual trees allows recruitment of additional age classes and development of understory plants

variable retention harvest A harvest method that retains significant portions of the original stand, and establish a new age cohort; retained trees may be grouped or dispersed throughout the harvest area

vegetation type A generally homogeneous unit of forest, delineated because it supports trees of common species, age, potential, etc.

woody debris Down woody material on the forest floor, ie. fallen and rotting logs and limbs. An important source of organic matter and soil nutrition

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