

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 re-vested 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.

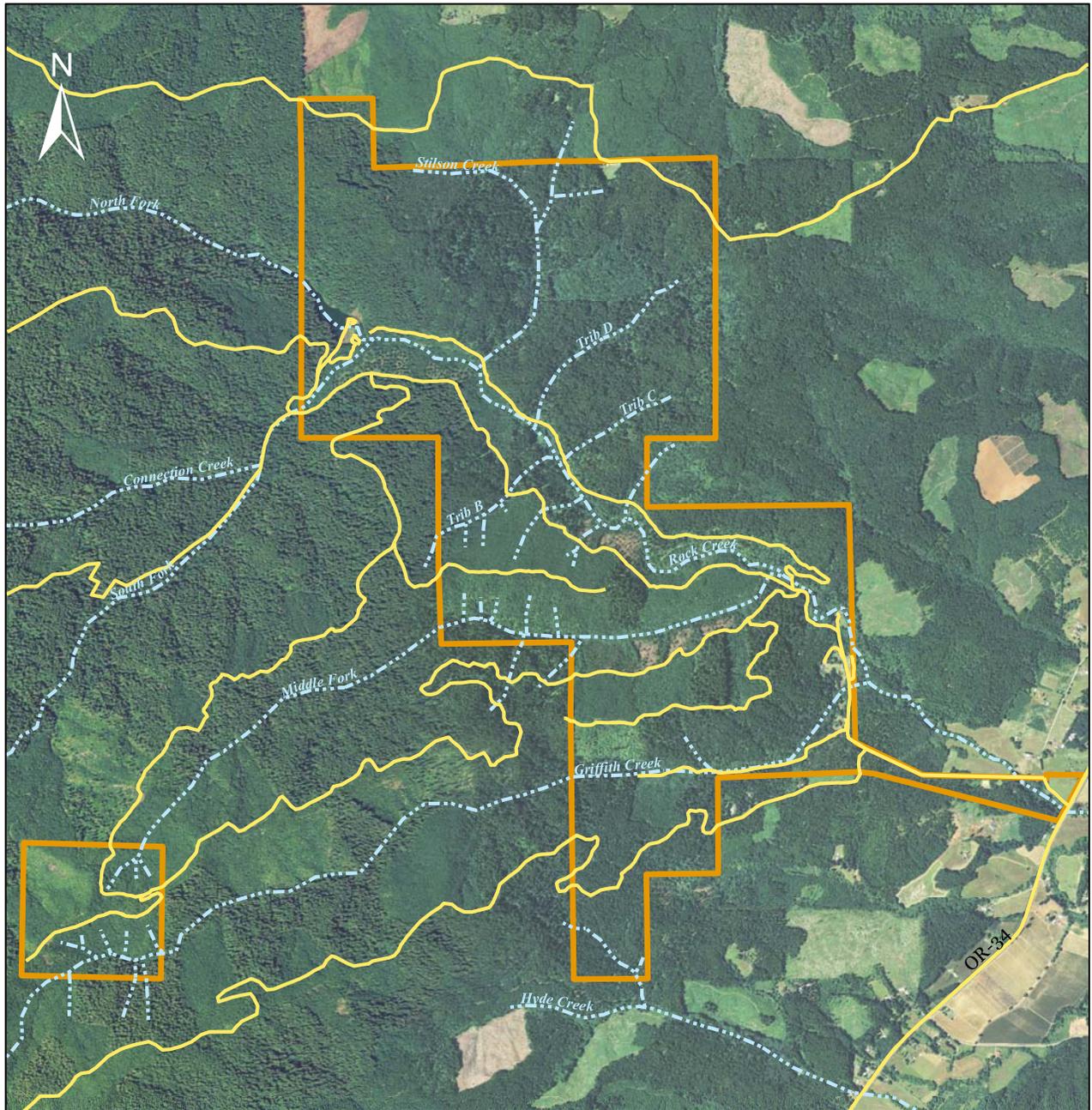
Federal Lands Management

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.

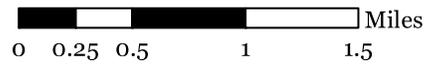
About half of Forest Service lands in the watershed are designated **Riparian Reserve**, which overlie all other land allocations, including LSRs. Riparian Reserves include lands directly coupled to streams, rivers, and lakes, where the objective is to protect aquatic resources, benefit riparian-dependent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



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

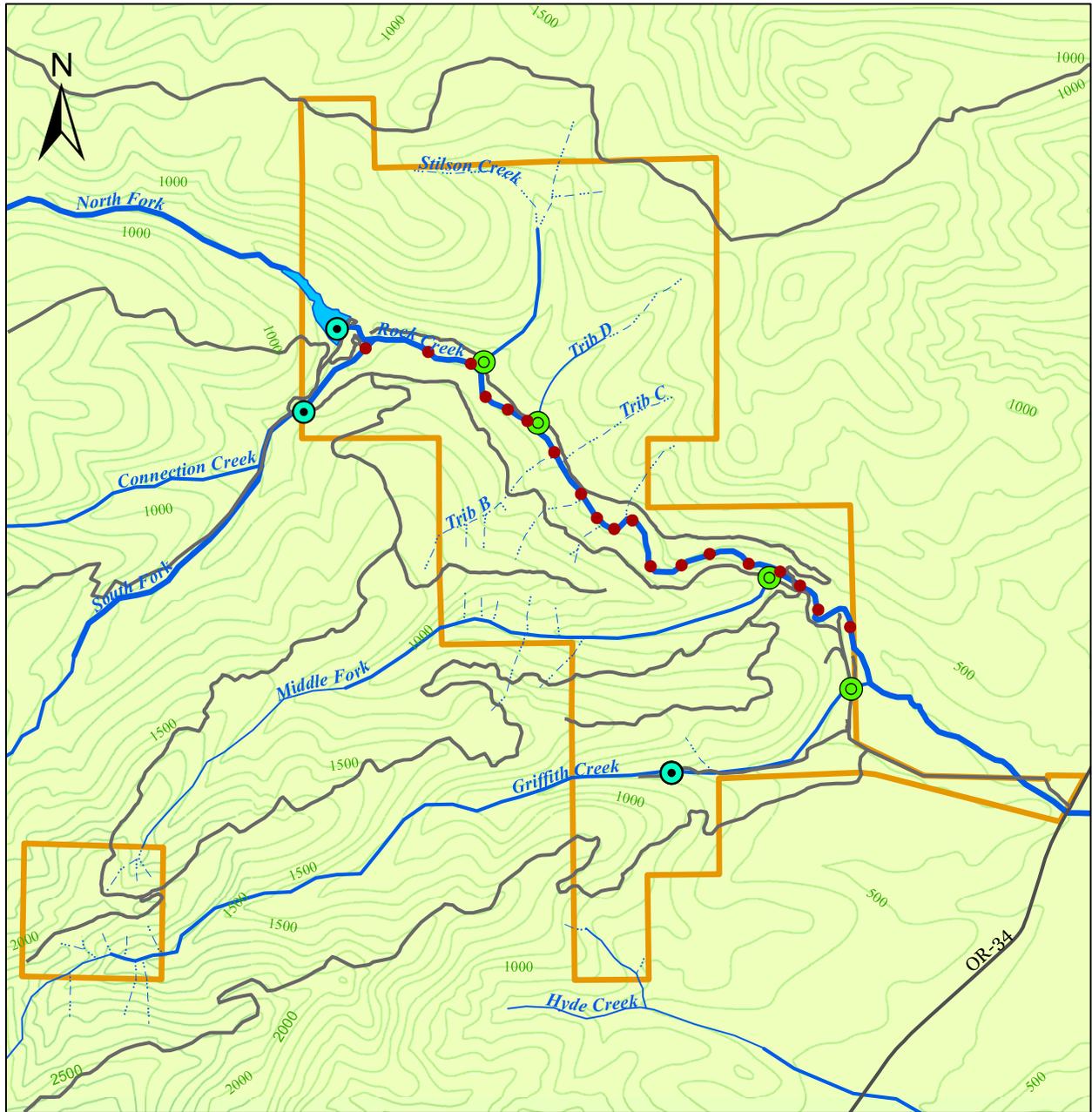
The endemic fish species of greatest concern in the Rock Creek watershed is the coastal cutthroat trout (*Oncorhynchus clarki*). These fish are plentiful, and generally migrate to stream habitats for spawning and incubation. Prior to 2006 there were verified sightings of adult winter steelhead (*Oncorhynchus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

Basin Scale Temperature Regimes

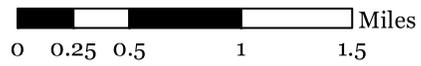
Extremely high water quality exists in the headwaters of the Rock Creek Watershed. All headwater streams originate from high coastal elevations and flow through largely intact “Late Successional Reserves” (old-growth forest reserves) on Forest Service land. Canyons are narrow, steep, heavily shaded, 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



- Streams**
- ▬ Large, fish-bearing
 - ▬ Medium, fish-bearing
 - ▬ Small, fish-bearing
 - - - Small, non-fish-bearing
 - Reservoir
- Log placement
 - Fish passage culvert
 - Water Intake
 - Roads
 - Corvallis Forest



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) at <http://www.corvallisoregon.gov/index.aspx?page=1464>.

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.

- ***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

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.

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.

- ***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

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

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.

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

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.

(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.

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

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

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 <http://www.corvallisoregon.gov/index.aspx?page=1464>.

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.

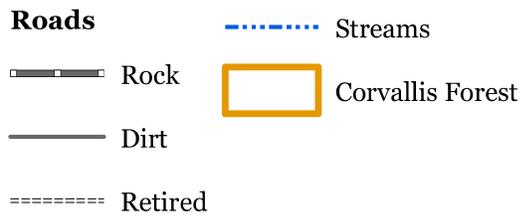
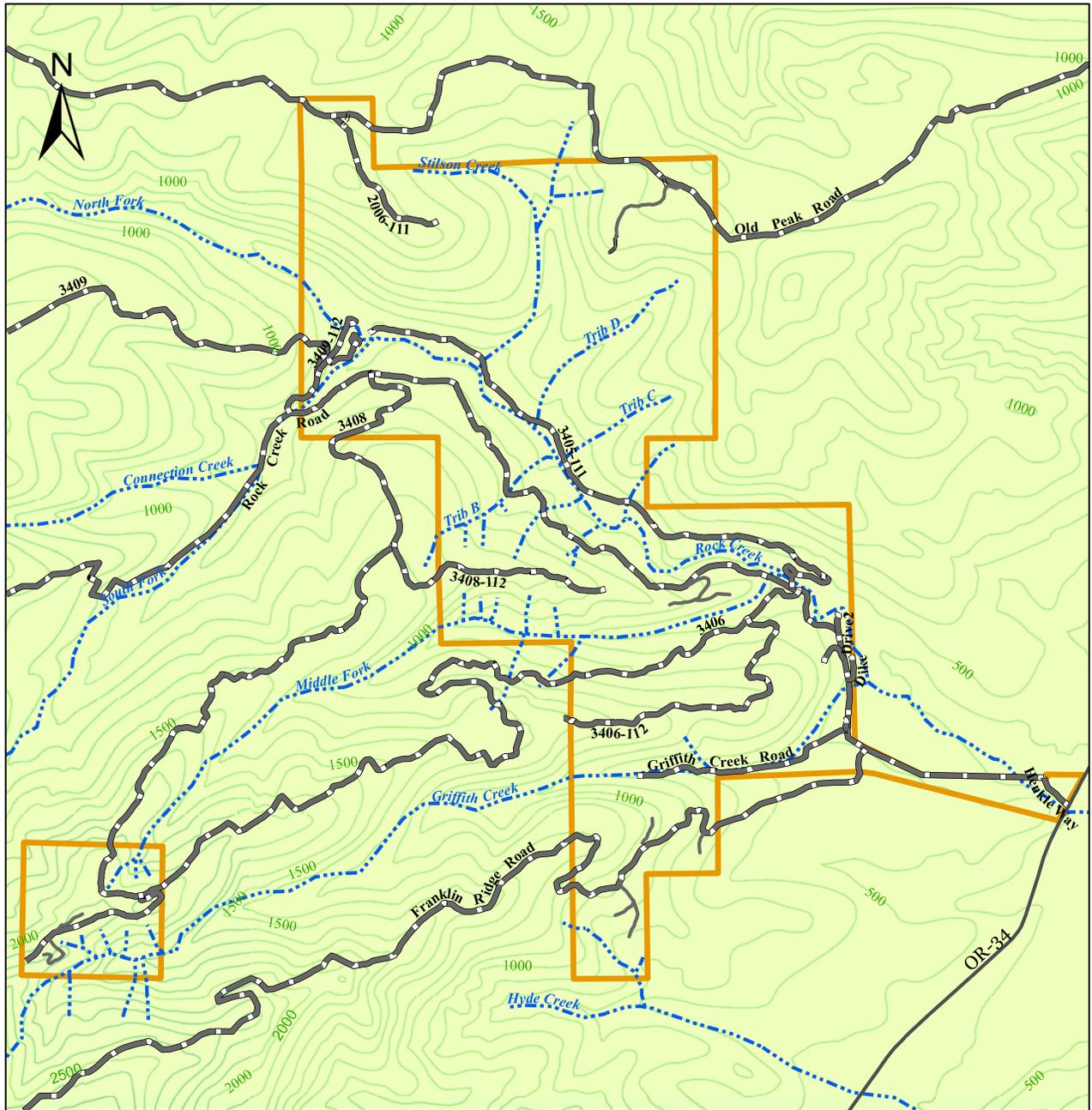
Following a minor surface landslide flow and movement of a deep-seated slump, Franklin Ridge Road (FR3005) was decommissioned by the Forest Service in the late 1990s. It was reconstructed in 2012 to access young forests on Forest Service ownership for commercial thinning activities.

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



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 <http://www.corvallisoregon.gov/index.aspx?page=1464>.

- ***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 <http://www.corvallisoregon.gov/index.aspx?page=1464>.

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

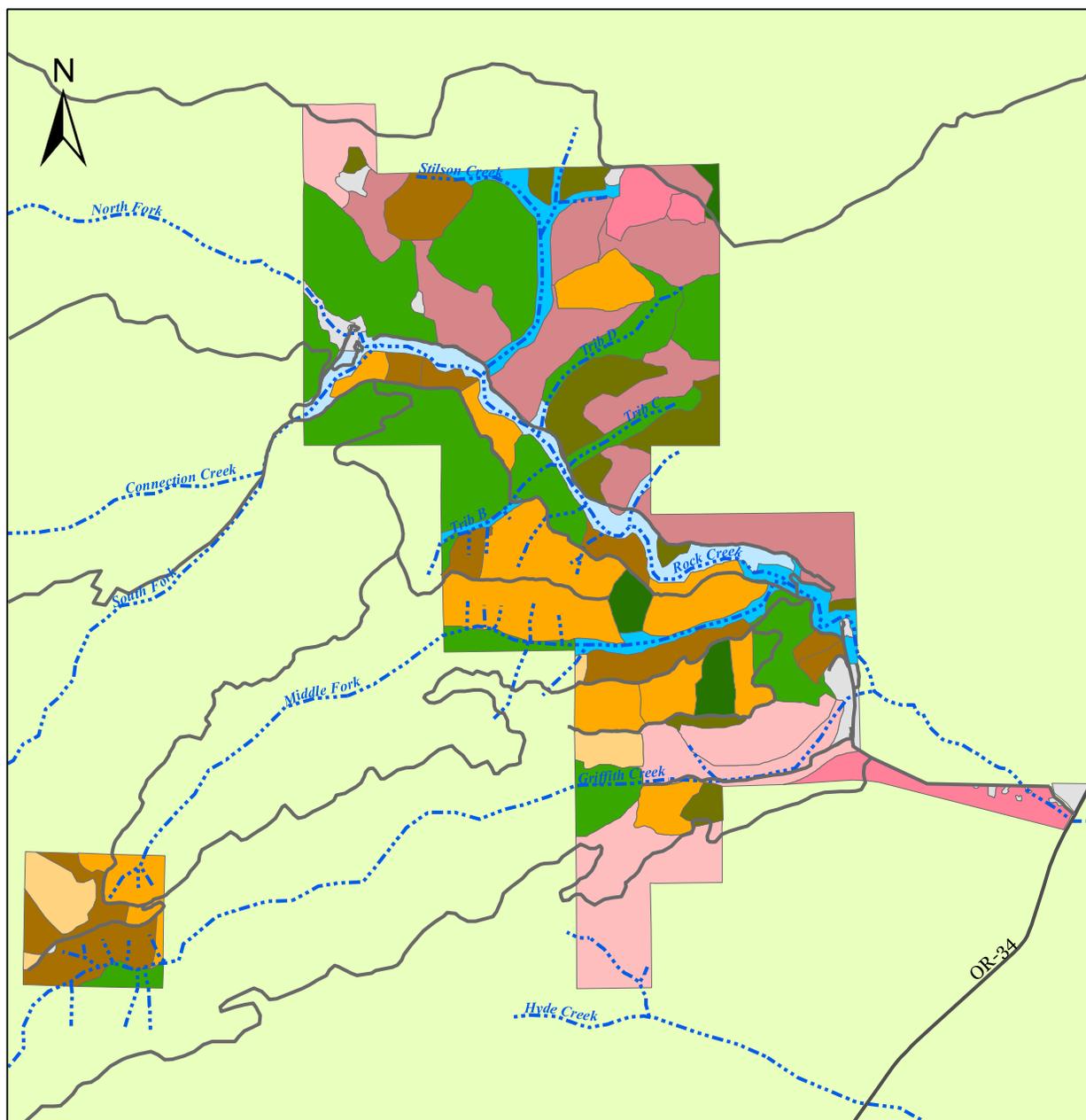
Table 3. Estimated timber volumes by species

	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



Veg. Cover Types	O1	P2
M	O2	R+
M+	O3	R-
MAG	P0	Streams
NF	P1	Roads



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 watershed 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, <http://www.corvallisoregon.gov/index.aspx?page=1464>.

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