

**Resource Stewardship Plan**  
**for**  
**Benton County Natural Areas & Parks Department**

Bezell Memorial Forest  
Fitton Green Natural Area  
Fort Hoskins Historic Park



*Bezell Memorial Forest*

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April 20, 2011



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*Beazell Memorial Forest*

## Executive Summary

This plan covers three large forested Benton County Natural Area and Parks properties, *Beazell Memorial Forest* near Kings Valley, *Fitton Green Natural Area*, on a prominent bald above Philomath, and *Fort Hoskins Historic Park* near Hoskins. Totaling 1,022 acres, these properties are among the premier natural areas in the county. This document is an update of earlier plans developed for each site. Over the past 10-years most recommendations of these earlier plans have been substantially accomplished, and park facilities have been built at each site.

### New Discoveries

The rare Taylor's checkerspot butterfly was discovered at Beazell Memorial Forest in 2004. This spurred a number of prairie restoration projects intended to provide long-term protection for sensitive species and habitats at Beazell. Benton County developed a Habitat Conservation Plan (HCP) to study additional restoration opportunities and emphasize the benefits of sensitive prairie habitat management on all County and appropriate private lands. The HCP was adopted by the County, and approved by the US Fish and Wildlife Service in 2010.

The Beazell, Fort Hoskins and Fitton Green properties encompass five of the eight "Strategy Habitats" identified by the Oregon Department of Fish and Wildlife (ODFW) in their conservation priorities for the Willamette Valley Eco-region, two of which are specifically related to oak habitats

### Ownership Objectives

The primary objectives for the ownership are to:

1. Conserve populations and habitats for prairie species
2. Provide opportunities for public enjoyment and appreciation
3. Promote diverse wildlife habitats to support native biodiversity
4. Promote environmental education and research
5. Demonstrate environmentally sensitive management and harvest techniques
6. Reverse trends of habitat loss; restore degraded habitats
7. Continue conservative harvesting to provide ongoing park funding

This Stewardship Plan recommends a *Policy framework* to guide managers, ensure a consistent long-term management approach, and follow standards for forest certification. The *Desired Future Conditions* promoted in the plan are to provide diverse and productive habitat for a wide variety of native wildlife, with particular emphasis on enhanced native prairie, oak woodlands, and savannas.

## **Resource Inventories**

Included in this plan are updated resource inventories for forest structure, timber products, biodiversity features, and invasive plants. Forest carbon and ecosystem services are analyzed and evaluated.

Conifer forests from 35 to 55 years old are the most common vegetation type on the ownership, though this varies between tracts, for example oak and mixed forests comprise the majority at Fitton Green. Douglas-fir is by far the most common tree in terms of timber volume, though Oregon white oak and other hardwoods are widespread, providing important habitat and diversity.

Nine primary forest vegetation types are described and mapped for the ownership, detailing current conditions, management goals, and desired future conditions. The main forest health concerns on the three properties are oak loss from crowding and fir competition, and the spread of invasive species including False-brome and exotic blackberries. Management actions are prescribed to address these concerns.

## **Trend Analysis**

When viewing stand development over the past decade or more, a number of both positive and negative trends appear. Positive trends include that stands have recovered from earlier thinning, are growing well and maturing, and meadow wildlife is increasing. Adverse trends include overly high conifer density in some areas, potential loss of oak vigor without further thinning, loss of early seral habitat as young stands age, and the spread of invasive plants — actual or latent,

## **Tract Plans**

Detailed findings and recommendations are presented for each property, including a 10-year timeline of specific management actions. Primary actions for the 2011-2020 period include:

- Fir thinning across 285 acres, with harvests of 1,200-1,500 thousand bd.ft.
- Oak release and prairie restoration across 70-130 acres
- Invasive weed control across 60-90 acres
- Tree topping for snag and woody debris creation
- Road rocking for erosion control and property maintenance
- Continued meadow burns

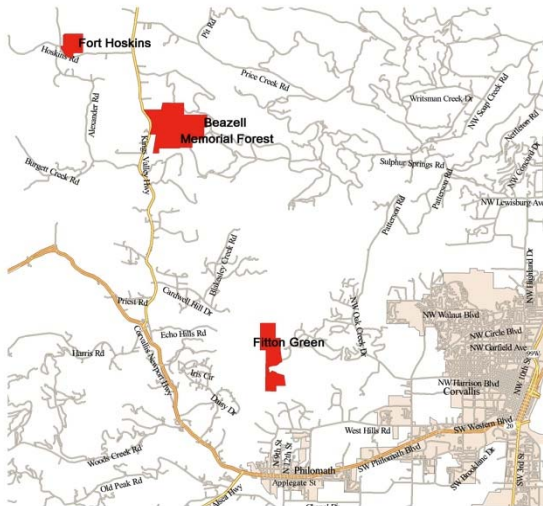
## Background and Overview

*Introductory note: This document is a revision and update of earlier forest stewardship plans developed for the 2000 – 2010 period. This plan covers the 10-year period from 2011 – 2020. Refer to earlier documents for additional historical background, detailed resource inventories, and policy specifications<sup>1</sup>.*

### Introduction

This plan covers three large forested Benton County Natural Area and Parks properties. *Bezell Memorial Forest* near Kings Valley, the largest Benton County ownership, was acquired by bequest from Fred Bezell in 2000 as a memorial to his wife Delores, and is the largest ever gift to the county. *Fitton Green Natural Area*, which sits on a prominent grassy bald above Philomath, was acquired with funding assistance from local land protection leaders Charlie and Elsie Fitton Ross in 1988, and grew with several acquisitions over 10 years. *Fort Hoskins Historic Park* near Hoskins was acquired in 1991 to protect the site of the historic fort that sat on a promontory above the Luckimute River where it enters Kings Valley. Together these properties encompass 1,022 acres, and are some of the premier natural areas in the county.

**Figure 1: Benton County Natural Areas vicinity map**



<sup>1</sup> Fort Hoskins Forest Stewardship Management Plan (ITS Management, 2000), Fitton Green Open Space Natural Area Management Plan (David Reed & Associates, 2000), Bezell Memorial Forest Stewardship Management Plan (ITS Management, 2001)

Amassed over 18 years under the foresight of then parks director Jerry Davis, these properties embody a vision of natural area protection, public recreation, habitat protection, restoration, and sustainable forest management. They contain 8.6 miles of hiking trails, picnic areas, interpretive displays, educational facilities, meadows and vistas. They have been the site of numerous tours and class visits, professional meetings, research projects, and weddings.

Located in the foothills of the Oregon Coast Range, the properties contain a mix of forest sites, including productive Douglas-fir clad slopes, lush mixed riparian forests, oak woodlands and savannas, and moss-draped maple groves, with old forest remnants, well-managed conifer stands, young plantations, and open meadows of rare upland prairie.

The properties provide habitat for regionally significant populations of rare Taylor's checkerspot butterfly, as well as cougar, elk, woodpeckers, raptors, and many common species such as coyote, songbirds, and black-tail deer. Since 2000 the County has engaged in a program of professional forestry assistance to manage the forest and restore prairie and savanna ecosystems. Proceeds from selective timber harvests have contributed funding to parks development, maintenance, and administration. Harvest levels are based on forest health and ecological goals, and are not revenue driven.

### **Relation to Other Plans**

Additional background information can be found in the following documents, on file with Benton County:

- Bezell Memorial Forest Stewardship Management Plan (ITS Management, 2001)
- Fitton Green Open Space Natural Area Management Plan (David Reed & Associates, 2000)
- Fort Hoskins Forest Stewardship Management Plan (ITS Management, 2000)
- Benton County Prairie Species Habitat Conservation Plan (2011)
- Benton County Prairie Conservation Strategy (Institute for Applied Ecology, 2010)

The Bezell and Fort Hoskins plans were the first resource management plans conducted for those properties. They include detailed property history and a forest resources inventory. The Fitton Green plan lacks a resources inventory, but instead emphasizes park development issues. All three plans detail property management policies and present a suite of management recommendations.



Most recommendations of these earlier plans have been substantially accomplished. Over the past 10-years park facilities have been built at each site. A number of prairie restoration projects were conducted following the discovery of Taylor's checkerspot butterfly at Beazell Memorial Forest in 2004. A summary of completed projects is presented in Appendix A.

The Benton County Habitat Conservation Plan (HCP) is the culmination of a 4-year planning and public input process focused on protecting high quality native prairie and oak savanna areas. The project allows the County to provide long-term protection to sensitive species and habitats, and increase restoration opportunities on County and other private lands. The HCP was adopted by the County and approved by the US Fish and Wildlife Service in 2010.

The Benton County Prairie Conservation Strategy, a companion document to the HCP, was developed in 2010 by Institute for Applied Ecology to provide private landowners a range of voluntary conservation actions which can be taken to increase prairie habitats and recover high priority species in proximity to key opportunity areas throughout the County including Beazell Memorial Forest, Fitton Green Natural Area, and Ft. Hoskins Historic Park.

## **Environmental Context**

### *Historic environmental context.*

Though differing in details and location, all three properties share a similar history and environmental setting. In the early 1800's the landscape of the valley foothills was strikingly different than that seen today. The major vegetation types included prairie, riparian forest, upland forest, and open woodland. All types were present at each site.

Settlers were most attracted to the prairie — open grasslands found from the floodplain margins to the hillsides of most valleys in the area. Isolated groves of trees were primarily white oak and Douglas-fir. This prairie condition had been intentionally cultivated by the local Native American tribes, who routinely burned the valley grasses to maintain important food and fiber “crops,” including oak, camas, hazel, and berries, to encourage lush grass growth for game, and to make travel easier.

Riparian forests covered the floodplains of most rivers and major streams, where moist soils resisted Indian burns. These contained a dense mix of ash, cottonwood, bigleaf maple, Douglas-fir, and various shrubs.

Upland forests of large Douglas-fir, hemlock, red cedar, and maple were found on the slopes of the Coast and Cascade Ranges, and on moist north aspects at lower

elevations. In mountainous areas forests were extensive, dense and often contained large trees. Forests nearer the valley were more open and diverse, influenced by frequent fire.

A transition forest called “open woodland” was located between the prairie and the upland forest — open stands of white oak and Douglas-fir, with either a grass or shrub understory. Groves varied from a few trees to several square miles in extent, with Douglas-fir more common near hilltops and floodplain margins, and oak on both drier or wetter sites. Early survey records show this vegetation type was common in the area.

*Current environmental context– Oregon Conservation Strategy*

Currently these Benton County properties encompass five of the eight “Strategy Habitats” identified by the Oregon Department of Fish and Wildlife (ODFW) in their conservation priorities for the Willamette Valley Eco-region, two of which are specifically related to oak habitats (Table 1). The Oregon Conservation Strategy (OCS) is a comprehensive assessment of key habitats throughout the state. The fact that these properties contain five of the Strategy Habitats is a testament to the ecological significance of these parcels.

**Table 1. Strategy Habitats on the Subject Benton County Natural Areas**

OCS “Strategy Habitats”	Relevance to Benton County Properties
Freshwater aquatic habitats	In-stream aquatic habitat on Plunkett Creek at Beazell
Grasslands	Relict oak savanna, grassy balds on each tract
Oak woodlands	Oak stands and mixed oak woodlands on each tract
Riparian habitats	Stream-side forested areas at Beazell, Fitton Green
Wetlands	Wet prairie at Fitton Green; seeps, springs at each tract

**Local Land Use History**

Until the early 1800's the Philomath and Kings Valley area was home range to local bands of the Kalapuya (locally Lakmayut, or Luckiamute) Indian tribes. The Kings Valley area was settled by several members of the King family, who arrived from Missouri in 1846. The Beazell Memorial Forest site is part of the original Hayworth Donation Land Claim, settled in 1849. Cardwell Hill Road, a main wagon road between Kings Valley and Corvallis was constructed in 1854, and served as the primary supply route for Fort Hoskins.

Early farms of the area were primarily sheep and cattle operations, with wheat and oats grown on tillable valley bottoms and middle slopes. Farms often included a

variety of vegetables and fruit and nut trees for subsistence use, as well as for sale. Haying, grain growing, and livestock ranching were widespread in the area into the 1950's, but declined through the 1960s. Wine grape growing was introduced in the northern Willamette Valley in the 1980s, and expanded to suitable foothills soils in mid valley in the 1990s and 2000s.

### **Forest Management History**

Original native forests of the valley bottoms and foothills were largely cleared for agriculture and settlement by the 1850s, cutting trees of all species to clear land and for farm lumber and fuel needs. As the logging and lumbering industry grew it shifted to extensive conifer forests of the Coast Range. There were numerous sawmills in the area, including an early mill established by Rex Clemens on Plunkett Creek, although its exact location is unknown.

In the valley, new forests reclaimed abandoned pastures, beginning on steep slopes and poor soils first, in some areas as early as the 1880s. Cutting of these “second-growth” foothills stands resumed by the mid 1900s, especially during the post-war building boom of the 1950s and 60s. Tree planting for reforestation after logging began in the 1960s on forest industry lands, and became mandated by state forest practice rules in the 1970s.

Commercial logging cut most marketable Douglas-fir at the Beazell property in the early 1950s and 60s, and similarly at Fort Hoskins in the early 1970s and 90s. New trees became established at both sites by natural reseeding. Logging at the various tracts making up Fitton Green was largely widespread clearcutting of all marketable conifers in the 1990s, followed by hand planting of the more open areas.

Following acquisition by Benton County in the late 1990s, management emphasis shifted from commercial timber extraction to selective management for forest diversity and habitat restoration. Most conifer stands were thinned to improve stand structure, enhance species composition, and improve tree quality. Competing conifers were removed from around oaks and other minor species, and select trees cut to create snags and woody debris. Conifer seedlings and invasive weeds were cleared from prairie and meadow areas, and native grasses and forbs re-established.

The forestland has been certified by the Forest Stewardship Council as Well-Managed since 1998.

# Management Objectives and Policies

## Ownership Objectives

General objectives for the ownership include:

- Conserve populations and habitats for prairie species covered in the HCP
- Provide opportunities for public enjoyment and appreciation
- Promote diverse wildlife habitats to support a wide range of native biodiversity
- Promote environmental education and research, ecosystem management, and volunteerism
- Use and demonstrate environmentally sensitive management and harvest techniques to restore habitat, maintain forest health, and improve tree quality
- Reverse trends of habitat loss, and actively restore degraded habitats
- Protect important historic and cultural resources
- Minimize negative visitor impacts on the resource and to neighbors
- Maintain a conservative harvest level to provide ongoing funding for park management
- Adapt management over time to changing knowledge and resource conditions
- Meet Forest Stewardship Council (FSC) standards for forest management

## Management Policy Overview

A policy framework guides future managers, and ensures a consistent long-term management approach, and follows standards for FSC certification<sup>2</sup>. See earlier plans of each property for detailed forest policies.

### *1. Recreation and Visual Resource Management*

Benton County Natural Areas and Park properties emphasize dispersed, day-use opportunities, with a focus on hiking and nature appreciation. Recreational use avoids impacting sensitive areas, wildlife and fish habitats, cultural sites, or other resources. Horses and mountain bikes are allowed only on specified trails. Opportunities for public education are actively promoted. Impacts to neighbors are minimized.

### *2. Wildlife and Fisheries Resource Management*

Active management improves habitat conditions and protects biological resources. Sensitive sites are protected from incompatible uses. Degraded sites are actively

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<sup>2</sup> FSC-US National Standard, August 2010

restored. Wildlife and fish habitat improvements promote species diversity, and ensure that populations of indigenous species are maintained.

### ***3. Vegetation and Botanical Resources***

Maintaining biological richness and native diversity is a top priority, and involves active and diligent management. Oak savanna and woodlands are restored or rehabilitated by controlling conifer encroachment and invasive weeds. Degraded habitats are improved to create a species mix indigenous to native Oregon oak, Douglas-fir, and mixed woodland communities.

### ***4. Timber Management***

Management emphasizes protecting long-term productivity and improving the biological integrity of the entire forest ecosystem. The desired future forest features mixed species stands of older, larger trees, with sufficient harvesting and regeneration to provide early successional habitat and balance the age of the forest. Timber harvests use a variety of silvicultural systems to create structures that benefit wildlife and native biodiversity. Uneven-aged stand structures are favored where possible. Lands on which other resource values exceed timber values are removed from the timber management base, or receive substantially modified practices. Light-touch, environmentally sensitive logging practices are used.

### ***5. Monitoring and Assessment***

Management activities and subsequent conditions are monitored regularly to assure ownership objectives are being achieved. Monitoring results are the basis for evaluating and modifying the management plan, including how the forest changes in response to public use and restoration activities. Resource conditions are re-inventoried every ten years.

### ***6. Revenue***

Park operations are intended to be self-sustaining whenever possible. Funds for facility development, restoration, and maintenance are derived from timber sales associated with forest resource improvements, supplemented by grant funding opportunities. Revenue opportunities from emerging ecosystem services markets will be explored. Any income produced from the properties is used exclusively to sustain park development, operation, and administration.

## Resource Assessment

### SOILS

The following descriptions are summarized from the USDA Web Soil Survey of Benton County Area, Oregon. Maps and related information are found in Appendix F.

Bezell Memorial Forest, Fort Hoskins Historical Park, and Fitton Green Natural Area are located in the foothills of the Coast Range on the margin of the Willamette Valley. Soils are generally colluvium and residuum derived from igneous or sedimentary parent material. Most soils are finely textured silty clay loams, silty clays or their gravelly variants (See Tables 2, 3, 4 below). Most are at moderate or high risk for erosion, with increasing hazard on steeper slopes.

Foothills soils vary in depth and productivity, associated with aspect and landform position. Soils on south and west facing slopes and ridge tops tend to be shallow (10-40”) and droughty, with lower productivity for tree growth. Soils of north and east facing slopes tend to be deep, moist, well drained, and the most productive.

**Table 2: Bezell Memorial Forest Soils Summary**

Map Unit Symbol	Map Unit Name	Site Class *	Hazards	Acres in AOI	Percent of AOI
58	Dixonville-Gellatly complex, 12 to 30 percent slopes	III -	Erosion, Compaction	84.5	13.6%
59	Dixonville-Gellatly complex, 30 to 60 percent slopes	III -	Erosion, Compaction	78.3	12.6%
60	Dixonville-Gellatly-Witham complex, 2 to 12 percent slopes	not rated	Compaction	11.5	1.8%
98	Jory-Gelderman complex, 12 to 30 percent slopes	II	Erosion, Compaction	3.3	0.5%
109	MacDunn-Price-Ritner complex, 60 to 90 percent slopes	III	Erosion, Compaction	23.1	3.7%
113	McAlpin silty clay loam, 0 to 3 percent slopes	I	Erosion, Compaction	4.2	0.7%
137	Price-MacDunn-Ritner complex, 30 to 60 percent slopes	II	Erosion, Compaction	242.5	38.9%
175	Witzel-Ritner complex, 12 to 30 percent slopes	not rated	Erosion, Compaction, Seedling Mortality	113.8	18.3%
176	Witzel-Ritner complex, 30 to 60 percent slopes	not rated	Erosion, Compaction, Seedling Mortality	61.9	9.9%
<b>Totals for Area of Interest (AOI)</b>				<b>623.1</b>	<b>100.00%</b>

\* Site classes range from I to V, with site class I having very high productivity to V having very low productivity

**Table 3: Fitton Green Natural Area Forest Soils Summary**

Map Unit Symbol	Map Unit Name	Site Class	Hazards	Acres in AOI	Percent of AOI
58	Dixonville-Gellatly complex, 12 to 30 percent slopes	III -	Erosion, Compaction	100.6	35.6%
59	Dixonville-Gellatly complex, 30 to 60 percent slopes	III -	Erosion, Compaction	75.6	26.8%
60	Dixonville-Gellatly-Witham complex, 2 to 12 percent slopes	not rated	Compaction	13.4	4.8%
98	Jory-Gelderman complex, 12 to 30 percent slopes	II	Erosion, Compaction	4.7	1.7%
137	Price-MacDunn-Ritner complex, 30 to 60 percent slopes	II	Erosion, Compaction	88.0	31.2%
<b>Totals for Area of Interest (AOI)</b>				<b>282.3</b>	<b>100.00%</b>

**Table 4: Fort Hoskins Historical Park Forest Soils Summary**

Map Unit Symbol	Map Unit Name	Site Class	Hazards	Acres in AOI	Percent of AOI
18	Bellpine-Jory complex, 12 to 20 percent slopes	III+, II -	Erosion, Compaction	11.8	9.4%
19	Bellpine-Jory complex, 20 to 30 percent slopes	III+, II -	Erosion, Compaction	55.1	43.8%
20	Bellpine-Jory complex, 20 to 30 percent slopes	III+, II -	Erosion, Compaction	34.9	27.8%
94	Jory silty clay loam, sedimentary bedrock, 2 to 12 percent slopes	II	Erosion, Compaction	23.9	19.0%
<b>Totals for Area of Interest (AOI)</b>				<b>125.7</b>	<b>100.00%</b>

Valley bottoms are underlain with deep (>80 inches), productive soils, with good to somewhat poor drainage. In some areas tree growth is restricted by excessive wetness.

Many soils types are compactable and should not be operated on when wet. Compaction destroys site productivity by squeezing air out of the soil and reducing the ability of roots to penetrate, grow and breathe. Erosion is a concern on sloping sites. Roads should be designed with side drainage and grade breaks, and disturbed surfaces seeded after operations.

### ***STREAMS***

Streams in Oregon are classified by the Oregon Department of Forestry (ODF) by their type (F, D, or N) and size (small, medium, large). Type F streams have fish and may also be used for domestic water. Type D streams are used for domestic water and have no fish. Type N refers to all other types of streams. These stream classifications are used in Oregon’s forest protection laws to regulate management activities along streams.

Of the three properties, only Beazell Memorial Forest contains a fish-bearing stream (medium, type F), Plunkett Creek, which is a tributary of the Luckiamute

River. The Bezell property includes approximately 1.3 miles of the upper main stem of Plunkett Creek and an additional 1.5 miles of several unnamed tributaries. Approximately 1.8 miles of Plunkett Creek flow downstream of the property before its confluence with the Luckiamute River.

Previous fish surveys in Plunkett Creek have found native cutthroat trout, two species of sculpin, and juvenile steelhead. Although none were found in Plunkett Creek during surveys, lamprey may also be present seasonally if they migrate up from the Luckiamute River.

All other streams are intermittent small Type N streams, and are considered fishless.

### ***FISH AND WILDLIFE HABITAT***

The properties contain a diverse mix of forested and open habitats that support a rich array of wildlife species. It also contains more than three miles of perennial and seasonal streams. Several habitat types are of particular interest:

- Native prairie remnants are found at each site. A once-dominant community type of the Willamette Valley, most remnants are now highly fragmented and degraded. Associated rare and endangered species include Kincaid's lupine, Fender's blue butterfly, Willamette daisy, and Taylor's checkerspot butterfly. The Bezell site is one of only two locations in Oregon with Taylor's checkerspot butterfly, a candidate species for the Federal ESA.
- Wetland/riparian areas on each property are current and potential habitat for a number of listed species (frogs, turtles, and birds).
- Oak woodland and savanna areas are present at each property, and currently providing habitat for a wide variety of species including Western gray squirrel and acorn woodpeckers. This habitat could be greatly enhanced by removing encroaching Douglas-fir and invasive weeds and creating more open conditions for oaks.
- The mixed species forests at each site provide abundant habitat for neotropical migratory songbirds.
- Each property provides good habitat for black-tailed deer and elk.
- Snags provide necessary nesting, caching, roosting, and hiding sites for a variety of birds, mammals, and amphibians. There are relatively few large snags on any property, especially in plantation and conifer stands.
- Down logs are also important habitat elements for a range of species. Down wood levels are generally lacking on all three properties, especially in plantation and conifer stands. Few stands meet the 20 tons/acre target.



### *Management goals*

Wildlife management will be a primary consideration in managing forests and meadows. Restoration and enhancement practices will be implemented as funding is available, and when possible in conjunction with other forest management operations.

### *Desired Future Conditions*

These areas will provide diverse and productive habitat for a wide variety of native wildlife, with particular emphasis on enhanced native prairie, oak woodlands, and savannas.

- Meadows, prairies, and savannas habitats are protected, kept free of invasive weeds and conifer seedlings, and contain native grass and nectar species. Taylor's checkerspot areas are sheltered by edge trees and shrubs for temperature and wind amelioration, and protected from soil compaction.
- Oak in hardwood and mixed stands are kept free of competing conifers; oaks have large, spreading crowns for enhanced acorn production.
- All forest stands contain large numbers of snags and woody debris, and productive understory plant communities dominated by native species.
- Invasive weeds are monitored and carefully controlled.
- Streams are protected from erosion and down cutting, with stable flows and high water quality for Salmonids,
- Properties provide feeding and cover habitat for deer and elk, and a link to other protected lands nearby.

## ***PLANT COMMUNITIES***

The forest overstory is dominated by native species, but the understory vegetation is less intact. Native species commonly found in the understory include snowberry, salal, poisonoak, sword fern, hazel, Indian plum, Oregon grape, trailing blackberry, serviceberry, and thimbleberry. The 2000 management plan for Beazell Memorial Forest included a plant species list with a total of 246 plant species encountered, of which 185 species (75%) were native species. A 2000 plant inventory at Fort Hoskins found 75 species, of which 47 (37%) were native.

Rare and uncommon species encountered at Beazell include tall bugbane (*Cimicifuga elata*) and thin-leaved peavine (*Lathyrus holochlorus*). Tall bugbane is a candidate for listing as endangered by the State of Oregon, and thin-leaved peavine is a Species of Concern with the U.S. Fish and Wildlife Service. Two additional endangered plant species, Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) and Willamette daisy (*Erigeron decumbens*), are documented to occur in King's Valley but were not encountered during our surveys.

The particular mix of species present varies at each site based on soils, exposure, slope, available moisture, and other factors. Plant Associations are described for common communities to indicate common ecological characteristics (McCain and Diaz, 2002. McCain and Christy, 2005). A wide variety of plant associations are present at each property, but a complete understory vegetation inventory was beyond the scope of this project. Table 5 indicated some of the more common upland plant associations present on the ownership.

**Table 5: Select Upland Plant Associations, Benton County Natural Areas**

<b>Plant Association</b>	<b>Tracts</b>	<b>Location/notes</b>
ABGR/HODI/POMU Grand Fir/Oceanspray/Sword Fern	BMF, FG, FH	Mostly on dry, warm, southerly aspects
ABGR/HODI/POMU - OAK <sup>3</sup> Grand Fir/Oceanspray/Sword Fern	BMF, FG, FH	Widespread at low elevations; a combination of the two plant associations
ABGR/COCO6/VAHE Grand Fir/California Hazel/Inside-out Flower	FG, FH	On dry, warm, southerly aspects
ABGR/MANE2-GASH Grand Fir/Cascade Oregon Grape-Salal	FG, FH	Dry to mesic sites
ABGR/ACCI/POMU Grand Fir/Vine Maple/Sword Fern	BMF, FG, FH	Mesic to moist sites adjacent to riparian areas and scattered elsewhere. More common at low elevations.
TSHE/ACCI-GASH/POMU Western Hemlock/Vine Maple-Salal/Sword Fern	BMF	Dry-mesic sites at higher elevations
TSHE/MANE2-GASH Western Hemlock/Cascade Oregon Grape-Salal	BMF, FH	Mesic sites on northerly aspects
TSHE/ACCI/POMU Western Hemlock/ Vine Maple /Sword Fern	BMF, FH	Mesic sites on northerly aspects at higher elevations
COCO6-ACCI/OXALI California Hazel-Vine Maple/Sorrel	BMF, FG	Occurs in drier parts of the riparian zone. Overstory mostly Bigleaf Maple, mixed with Red Alder and Douglas Fir.
RUSP-ACCI Salmonberry-Vine Maple	BMF, FG, FH	Occurs in riparian-upland transition zone mixed with Salmonberry/Sword Fern community and Grand Fir/Vine Maple/Sword Fern plant association.
RUSP/TOME-OXALI group Salmonberry/Piggyback Plant-Sorrel group	BMF, FH	On active flood plains, stream banks and low terraces, usually with an overstory of Red Alder.

<sup>3</sup> Oak is an undefined plant association occurring on low elevation sites in and at the edges of the Willamette Valley.

## ***HIGH CONSERVATION VALUE FORESTS***

The Forest Stewardship Council defines High Conservation Value Forests (HCVF) as those that possess one or more of the following attributes<sup>4</sup>:

1. *High biodiversity value*: containing globally, regionally or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia), including RTE species and their habitats
2. *Landscape-level forests*: containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance
3. *RT&E species*: contain rare, threatened or endangered ecosystems (includes old growth, roadless areas <500 acres, primary forests)
4. *Critical services*: provide basic services of nature in critical situations (e.g., watershed protection, erosion control, local drinking water)
5. *Local needs areas*: fundamental to meeting basic needs of local communities (e.g., subsistence, health)
6. *Local cultural identity*: HCV forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance)

The Beazell tract meadows are the only HCVF area on the ownership. These contain habitat for ESA listed (Fender's blue butterfly, Kincaid's lupine) and candidate species (Taylor's checkerspot, very rare). Measures to protect these conservation values include preventing meadow encroachment by conifers and invasive weeds, maintaining a 100-foot forested edge, and keeping equipment out of meadows during sensitive periods.

There are no other HCVF areas on any of the three properties. Some oak stands could be classified as HCVF in the future if restored to pre-settlement species composition and stocking. Based on FSC definitions<sup>5</sup>, there are no Old Growth stands on the ownership.

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<sup>4</sup> FSC-US National Standard, August 2010.

<sup>5</sup> The FSC-US National Standard defines two types of old growth forests. **Type 1 Old Growth**: three acres or more that have never been logged and that display old-growth characteristics; **Type 2 Old Growth**: 20 acres or more that have been logged, but which retain significant old-growth structure and functions.

## ***ROADS AND TRAILS***

A network of rocked and dirt roads at each property provide access for recreation, timber management, and ecological restoration activities (see property maps). Most roads are dirt surfaced and accessible only during the dry season. This limits season of operations for logging to mid summer, and makes access for post-harvest management difficult. Rocking main haul roads will reduce erosion and allow logging to capitalize on peak markets, which increasingly occur outside of the mid summer period. The cost of rocking can often be recovered in a single harvest based on seasonal log price premiums.

A variety of stream crossing culverts are found throughout the road system. Most are effective and in good condition.

## ***ARCHAEOLOGICAL AND CULTURAL RESOURCES***

Fort Hoskins contains the historic and cultural resources of greatest significance on the ownership, containing the historic fort grounds, the foundation of the old Hoskins School, and a historic residence. Beazell Memorial Forest contains a historic farmhouse that is one of the oldest surviving structures in Kings Valley. The Fitton Green tract contains no known cultural resources apart from Cardwell Hill Road, a historic early travel route.

The history of Fort Hoskins is thoroughly detailed in a cultural resources inventory of the fort and surrounding area by Brauner and Stricker (2006). Fort Hoskins was a small military garrison, used for a brief period between 1856 and 1865. It served a dual purpose — to keep Indians on the recently established Coastal Indian Reservation at Siletz, and to protect Indians from incursions by settlers. The fort contained some 15 buildings, including officer quarters, soldier barracks, munitions and supply storage, a bakery, hospital, barns, corrals, and gardens. Following a short and uneventful history the fort became less strategic, was closed in 1864, its buildings and goods sold at auction, and it reverted to its former use as a private farm.

The historic farmhouse near the Beazell Memorial Forest parking area is the most significant cultural resource on that property. This gothic vernacular farmhouse known as the Henry Plunkett House was built in the 1870s, It was the second farmhouse built on the property, located just downstream from the site of an earlier structure. Nearby walnut trees and a large lilac probably date from the mid to late 1800s. The barn that houses the Beazell Forest Education Center was built in the 1930s and renovated in 2006.

Historic artifacts at Fort Hoskins were examined and inventoried by Brauner in 1976-7. None of the other tracts contain any archeological artifacts. If any sites or artifacts are discovered, activities will be delayed until the significance of the site can be ascertained. As part of its Forest Stewardship Council (FSC) certification, Trout Mountain Forestry is in contact with all regional tribal groups to inform them of forestry activities on these lands. As part of this process, tribal groups have an opportunity to identify any culturally significant sites within the ownership. To date, no sites have been identified.

### ***RECREATION AND AESTHETIC CONSIDERATIONS***

Dispersed and organized public recreation use is an intended use at each site. Individual and group use occurs at Beazell Memorial Forest and Fort Hoskins, while use of Fitton Green is limited to hiking and nature appreciation. Each tract includes extensive trail networks, trailhead facilities, parking, and interpretive and informational displays. Primary recreation uses at each site include hiking, wildlife viewing, and nature appreciation. Other uses include picnicking, geocaching (Fitton Green), mountain biking, horseback riding, and historic reenactment (Ft. Hoskins).

From the inception, a guiding intention of park development has been to integrate public recreation, habitat restoration, and sustainable forest management. Rather than segregating activities, uses are integrated – land management roads serve dual duty as hiking trails, and forest harvest areas are used as opportunities for education and interpretation. The light-touch silvicultural and logging methods used have minor or temporary impacts on visual resources. Management practices are designed to protect scenic beauty as well as sensitive resource values. Aesthetic consideration is given to operations during all phases of project planning and implementation.

Public use is prohibited in sensitive resources, or in the vicinity of active logging or land management operations, using signage and temporary trail closures.

### ***CARBON AND ECOSYSTEM SERVICES***

While forests have long been recognized for their ability to provide important environmental values such as clean water, wildlife habitat, and open space, their role in mitigating climate change and providing key biological benefits is only now becoming more fully recognized. Markets are emerging to allow landowners to be rewarded for management that exceeds norms for amounts of carbon sequestered in the forest, water quality remediation, and endangered habitat

restoration. The management of Benton County Natural Areas and Parks aligns with these environmental values.

***Carbon***

Forests can sequester large amounts of carbon for extended time periods. Forests such as Benton County’s, which are managed for long rotations, large trees, areas reserved from management, and woody debris and snag contain significantly more carbon than short rotation plantation forestry. Pacific Northwest forests are among the highest accumulators of carbon globally.

Forest carbon is the total carbon stored in both living and dead components of standing and down trees, including branches, roots, and forest floor detritus. Carbon content is closely linked to timber volume, and can be accurately estimated from timber inventory measures. Total carbon of the three tracts is 54,445 metric tons (see Table 6).

***Table 6: Forest Carbon of Subject Benton County Forestlands***

	<b>Range (tons/ac)</b>	<b>Average C/ac</b>	<b>Total Tract C</b>
Beazell Memorial Forest	27.2 - 113.4	77.2	39,834 tons
Fitton Green Natural Area	17.6 – 46.4	28.5	7,236 tons
Fort Hoskins Historic Park	31.2 – 67.2	57.3	4,375 tons

Carbon marketing in the US is currently voluntary, with a number of protocols being used to quantify the amount of carbon in a forest, and the extent to which that exceeds a “baseline” and is available for “sale.” Protocols of the Climate Action Reserve (CAR) appear to be the premier carbon protocol in the US. Currently, for public lands the CAR protocol only rewards changes that sequester additional carbon over and above that of the previous 10 years of management, and would produce no new “carbon credits” for Benton County.

Uncertainty over US carbon policy and accounting protocols, and globally low prices for carbon offsets make carbon trading for Benton County not currently advantageous. If future changes create better opportunities for carbon trading, baseline data collected with this forest inventory can be used to model carbon values.

***Other Ecosystem Services***

In contrast to carbon, other ecosystem services markets appear to be expanding. These markets present new opportunities for land managers (sellers) to generate revenue from their land through environmental restoration and protection and to provide lower-cost impact-mitigation alternatives (i.e. offsets) that improve natural ecosystems. Buyers of ecosystem service credits include any public or private

entity with an unavoidable environmental impact (from a legally permitted activity) that is either obligated by regulation or voluntarily chooses to reduce this impact.

In Oregon, The Willamette Partnership ([www.willamettepartnership.org](http://www.willamettepartnership.org)) has devised a locally based accounting and marketing system for environmental restoration and protection. Their Ecosystem Credit and Accounting System (ECAS) includes function-based credit calculation methodologies for wetlands, salmon habitat, upland prairie restoration, and water temperature benefits from riparian restoration. Additional credit calculation methodologies are also being developed for oak habitat and floodplains, among others. The ECAS operates on the principle of “additionality,” whereby sellers are incentivized to go above and beyond business as usual and provide ecological restoration projects (or protection) to the market that would not be required by law or would otherwise not have occurred. Benton County is well positioned to take advantage of these emerging markets and generate revenue for the improvement and expansion of its upland prairies, oak woodlands and savannas, and riparian communities.

**Table 7: Potential Ecosystem Service Markets**

Beazell Memorial Forest	Salmon, upland prairie, oak forest
Fitton Green Natural Area	Upland prairie, oak forest
Fort Hoskins Historic Park	Upland prairie, wetlands, oak forest



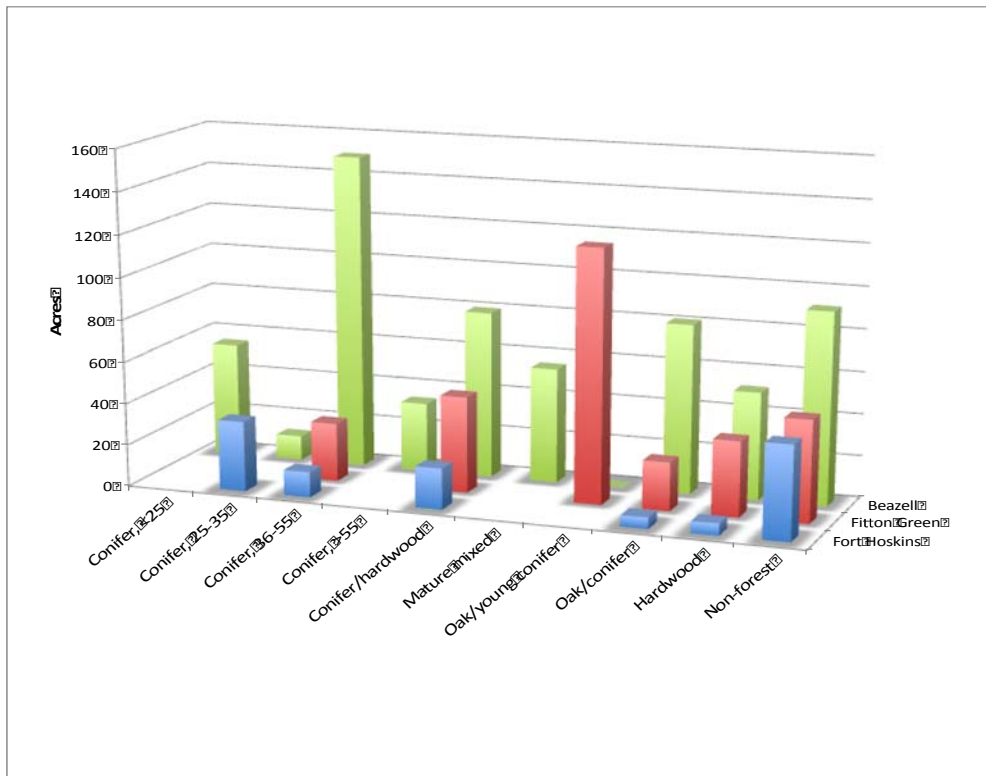
## Forest Resources

### *OVERVIEW OF FOREST COMPOSITION*

The ownership contains a diversity of forest types, with most forest types present on each property (see Figure 2). Conifer types are most prevalent, followed by mixed conifer/hardwood and oak/conifer forest. Hardwood dominated forests are generally limited to streamside zones. Fitton Green is the only property where mixed and hardwood forests dominate.

Most stands are less than 55 years old, though large oak trees are frequently much older. Remnants of the older forest are infrequently scattered through some stands. The only stand with significant residual old forest structure is found at Bezell Memorial Forest.<sup>6</sup>

*Figure 2: Forest type area*



Most stands are dominated by a single age of trees, and are considered even-aged. Exceptions are oak/conifer stands, where oaks are typically much older than the fir,

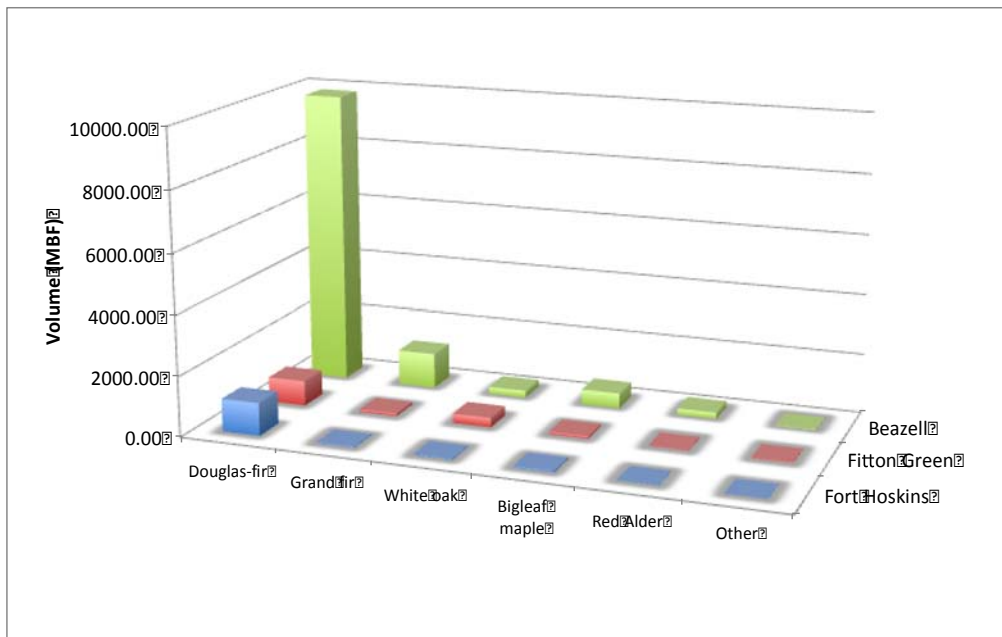
<sup>6</sup> Stand 6



which may be of multiple ages. Conifer stands at Fort Hoskins reclaimed old pasture over time and some areas contain trees of a range of ages.

Forests on each property are well stocked with commercial timber species, primarily Douglas-fir (Figure 3). The management strategy has been to grow the highest quality sawtimber of a variety of species, including Douglas-fir, grand fir, and Oregon white oak. Other species present on the property include western redcedar, and bigleaf maple. Each forest was intensively inventoried in 2010. Maps show current vegetation conditions.

**Figure 3: Timber volumes by species**



The timber inventory data indicate a total of 14,870 thousand board feet (MBF) of merchantable timber on approximately 845 forested acres. Conifer timber volume totals 13,230 MBF, or 88 percent of the total, with 3,644 MBF (28%) in high-quality export grades<sup>7</sup>. Figure 3 depicts the relative areas occupied by each forest type.

### **FOREST/VEGETATION TYPES**

The following sections describe the major vegetation types on the ownership, along with the proposed management approach and the “desired future condition.” These desired future conditions describe the generalized long-term goals of management actions in each of the major vegetation types.

<sup>7</sup> As a public ownership Benton County is prohibited from exporting logs, but other high-quality markets are available, such as veneer, utility cross-arms, and Green Certified lumber.

## ***Conifer Forest***

### *Current conditions*

There are approximately 232 acres of naturally seeded Douglas-fir stands at least 35 years old across the three parks. These stands originated following harvest, cessation of agriculture or grazing, and/or cessation of Native American fire use. Soils are generally deep, well drained, and productive, with small areas of wet or droughty soils. Topography is moderately to steeply sloping. Douglas-fir is the dominant tree, often accounting for >90% of overstory tree stocking. Grand fir and bigleaf maple are often scattered throughout these stands. Many of the older conifer stands have been thinned at least once, particularly those accessible by ground logging.

### *Management goals*

These conifer stands are an important part of the diversity of these three tracts. They contain a substantial proportion of the merchantable volume and will be an important part of future commercial harvests. Visually sensitive areas will be managed less intensively. Some stands<sup>8</sup> will be grown to older age to support wildlife dependent on older forests.

### *Desired future conditions*

These stands will be thinned to produce revenue and develop more complex forest structure with multiple age classes, snags and down wood. When the overstory has too few trees for another thinning and/or growth rates slow sufficiently, patch cuts with tree retention will be used to initiate a new age class. Some of the older, more structurally complex stands (with large crowned trees and a well-developed shrub understory) present opportunities to achieve old forest conditions and will be managed to promote this type of habitat.



*Bezell Memorial Forest*

## ***Conifer Plantations***

### *Current conditions*

There are currently 100 acres of dense, young conifer stands — 66 acres at Beazell and 34 at Ft. Hoskins. Beazell stands range from 20-30 years old, with some past pre-commercial thinning but no commercial thinning. Ft. Hoskins stands are naturally seeded, slightly older at 25-35 years old, and many have been commercially thinned. Topography is gentle to moderately sloping. Douglas-fir is the most common tree, but grand fir and cedar are also present. Stocking ranges from 116-309 trees per acre.. Most areas are fully stocked with a good rate of growth, which will eventually slow as the trees age. Some areas contain blackberry, scotch broom, or hawthorn.

### *Management goals*

Most of the plantations are on productive soils, but are the least diverse forest type in the county's ownership. Management here will initially be more intensive and will focus on timber growth and future harvest potential. As the stands mature, variable density thinning methods will be used to encourage species diversity and habitat development, mimicking more natural stand conditions. Management will build uneven age stand structure, recruit snags, and release hardwoods.

### *Desired future conditions*

These will initially be even-aged stands, shifting to uneven age as the trees mature. Stands will have a diverse structure including hardwoods, large residual trees, and snags and woody debris for wildlife. These stands will be important for future timber harvest as well as aesthetic and habitat values.



*Fort Hoskins*

## ***Conifer-Hardwood Forest***

### *Current conditions*

There are approximately 145 acres of conifer-hardwood forest across the three parcels. These tend to be older, highly variable stands of Douglas-fir, grand fir, Oregon white oak and bigleaf maple. They likely originated after high-grade harvesting, the cessation of Native American burning, and/or the cessation of agriculture or grazing. This forest type typically occupies lower productivity south and west facing slopes, where conifer regeneration did not fully occupy the site or where conifers invaded areas previously dominated by oak. Soils may also be rocky and/or droughty. While these stands may be less commercially productive, they provide valuable wildlife habitat due to their large component of hardwoods and diverse stand structures.

### *Management goals*

Timber values in these stands are moderate, but habitat values are very high. Management activities in these stands will be focused on wildlife habitat enhancement, the preservation of legacy oak trees, and a minor amount of timber production through conifer harvests. Invasive plant species tend to be a greater problem in these stands due to their more open canopy conditions and should be addressed strategically at each property.

### *Desired future condition*

These stands will be maintained as uneven-aged conifer-hardwood forests, with hardwoods comprising a greater percentage of the mix over time. Harvesting conifers over time will maintain this mix and initiate younger age classes. Large, residual conifers and hardwoods will be common throughout, as will snags and down wood.



*Fort Hoskins*

## ***Oak-Conifer Forest***

### *Current conditions*

There are 229 acres of mixed Oregon white oak and Douglas-fir stands across the three properties, including 120 acres of a younger variant described in the following section. These are the result of Douglas-fir seeding into oak savannas and woodlands in the early-to-mid twentieth century or earlier, following cessation of Native American fire use, harvest, and/or cessation of grazing. This type is primarily on upland south and west-facing slopes. Some areas contain large fir stumps, indicating these stands may have been mixed stands of large, open-grown trees for some time. Douglas-fir ages vary widely, as natural regeneration has invaded these stands throughout the past century. Large oaks range in age from 60 to over 200 years old. Other areas have been thinned. Harvests typically removed only conifers, releasing oak. Growth of conifers is moderate to slow, with many defective trees where growing within oak crowns. Oak is growing slowly, and in some cases is being out-competed by fir. Invasive hawthorn, blackberry, and false brome are increasing in the understory of many areas.

### *Management goals*

Maintenance of legacy oak trees and enhancement of wildlife habitat should be the primary management focus in these stands. Conifer cover will be maintained to help control invasive weeds in some areas. Commercial timber harvests will be used as a tool to remove fir where it overtops vigorous oaks. Snag creation may also be employed to release oaks from fir competition and to create additional wildlife habitat.

### *Desired future conditions*

These stands will be thinned to maintain oak vigor and produce revenue. Poorly growing or low quality conifer will be harvested. Stands will be maintained in a relatively open condition. Conifers will generally be allowed to regenerate naturally, but large gaps may be planted where needed to control weeds. Invasive weeds are aggressively controlled to restore native understory vegetation. Snags and woody debris of a wide range of diameters and stages of decay are common.



*Bezell Memorial Forest*

## ***Oak-Young Conifer Forest***

### *Current conditions*

At Fitton Green a 120-acre area was harvested in the early 1990s, and now consists of widely spaced oak and 15 year-old planted fir. The harvest removed only conifers, effectively releasing oak. The area has a similar history and habitat potential as the Oak-Conifer Forest described earlier. Unique to this type are areas of open savanna and pockets of wet prairie and ash woodland. Young fir is not currently impacting hardwoods, but will begin to compete in the next 10-20 years. False-brome is ubiquitous, especially along roads and skid trails.

### *Management goals*

Maintenance of openings and legacy hardwoods, invasive species control, and enhancement of wildlife habitat should be the primary management focus in these stands. Conifer cover will be maintained to help control invasive weeds in some areas. Non-commercial tree felling will remove fir where it threatens to overtop vigorous hardwoods. Snag creation may also be employed to release hardwoods and to create additional wildlife habitat.

### *Desired future conditions*

Openings will be expanded and enhanced with native planting. Invasive species will be controlled, with priority given to roads, trails, wet meadows, and savanna openings. Fir stocking will be controlled to maintain oak vigor. Fir-dominated areas will be managed for future commercial harvest. Snag and woody debris levels will be enhanced.



*Fitton Green*

## ***Hardwood Forest***

### *Current conditions*

Hardwood forests cover 93 acres across the three properties, primarily occurring in riparian areas or associated areas of wet soils. Red alder, bigleaf maple and Oregon ash are the most common species found in these stands with a minor component of grand fir and Douglas-fir. Although no harvesting has occurred in recent times, old-growth fir stumps are common, indicating these stands were high-graded in the early to mid-twentieth century and historically had a component of conifers.

### *Management goals*

These stands will be maintained as riparian reserves with little to no commercial harvesting taking place. Treatment and prevention of invasive species such as English hawthorn and false brome will be the top priority, with some additional enhancements taking place such as snag creation, down wood placement, and conifer planting along streams.

### *Desired future condition*

Over time, these stands will become dominated by maple or ash, with a greater component of conifers to provide in-stream wood recruitment. Alder recruitment will occur sporadically in areas disturbed by flooding or blowdown. Healthy riparian forests are vital to a wide variety of fish and wildlife species and they provide clean, cool water to the greater watershed and its users. Maintenance and enhancement of these stands will ensure these functions are provided into the indefinite future.



*Fitton Green*

## ***Mature Mixed Forest***

### *Current conditions*

This forest type is only present at Beazell Memorial Forest, covering 55 acres on a steep northeast-facing slope that extends from Plunkett Creek up to the ridgeline. The stand structure is variable, with large residual Douglas-fir, brushy gaps, and hardwoods scattered throughout.

### *Management goals*

This stand will continue to be managed as a reserve area for scenic and wildlife values. Some non-commercial activities may include view enhancement as well as snag and down wood creation.

### *Desired future condition*

As a reserve area, this stand will continue to develop the complexity associated with old forests, such as large canopy gaps, large trees with long, full crowns, large snags and down wood, and a well developed mid- and understory of more shade-tolerant tree species and woody shrubs.



*Fitton Green*



## Forest Health and Protection

### *INSECTS AND DISEASE*

Generally, the forest is relatively healthy. Since the acquisition of these properties, management practices have favored species diversity and thinned stands for optimal stocking.

The major forest health concerns on these properties are:

- *Oak crowding, dieback, and mortality from fir competition*: This issue is discussed in detail in the Management Approach section. In some stands, established oak trees are losing their crowns and dying due to lack of light, as surrounding Douglas-fir trees have overtopped them. Older oak became established in an open savanna condition. The crowding found in most oak stands is resulting in crown loss and decreased vigor, especially in legacy trees.
- *Invasive species*: This issue is addressed in detail below. Reducing the levels of invasive species on the property is a high management priority.
- *Root rot disease*: Native root diseases are usually a small and normal part of healthy forests. Root rot is not a major concern in these tracts because much of the land was sparsely forested woodlands or savannas 100 years ago. Over time, root rot pathogens may colonize the more productive sites as forests mature; however retention and inclusion of hardwoods in Douglas-fir stands can help prevent their spread. This is most applicable to young plantations.
- *Insect damage*: There are no significant insect infestations on the three properties. Maintaining hardwoods in conifer stands and ensuring a diversity of wildlife habitats can enhance natural insect resistance.

### *INVASIVE SPECIES*

Several invasive plants are widespread across the three parcels, threatening native vegetation communities, reducing browse for wildlife, and impacting stream hydrology. The relative abundance of these non-native plants is likely due to the long history of grazing, farming and logging on the properties, which created disturbed soil conditions ideal for establishment of invasive plants.

Current status of key invasive weeds:

- False brome (*Brachypodium sylvaticum*) – ubiquitous at Fitton Green, present in smaller amounts Beazell, least common at Fort Hoskins. False brome poses a particularly great threat due to its shade tolerance and ability to colonize the understory of conifer stands

- Himalayan (exotic) blackberry (*Rubus armeniacus*, *R. laciniatus*) – infestations in many forest types, in disturbed sites, and at edges of riparian forests
- Scotch broom (*Cytisus scoparium*) – present along some skid trails and in understories on some drier sites
- English hawthorn (*Crataegus monogyna*) – present in oak/conifer and conifer/hardwood stands at Fitton Green, where it creates dense thickets
- Bull thistle, Canada thistle (*Cirsium vulgare*, *Cirsium arvense*) – present in meadows, recently harvested areas, and along road sides
- Poison-oak – though a native species, it can be a nuisance; found mainly in drier oak, oak/conifer, and conifer/hardwood stands

### *Management Goals*

The overarching goal is to significantly reduce the prevalence of invasive species throughout the three properties. This will be accomplished by: 1) applying carefully selected treatments to eliminate the target plants, and 2) systematically monitoring disturbed areas (i.e., recent harvest areas) to detect infestations early.

Weeds must be aggressively controlled, particularly in active treatment areas, to prevent reestablishment. Monitoring and timely treatment will be critical. In some cases pre-treatment by injection or foliar spray may be advantageous. The preferred method is to reseed disturbed soil areas in September immediately after logging, followed with targeted foliar spray of stump sprouts or new plants the following summer. Subsequent backpack spray treatments may be needed for 1-3 years.

Total eradication of all invasive weeds is not practical. The following can serve as a guide for the relative risks and potential for control for each of the key species identified. This should be revised and updated as new information regarding treatment approaches becomes available, and if/when new invasive species are identified on the property.

- False brome – A number of treatment strategies exist for controlling false brome. For example, combination treatments of foliar application of glyphosate in the late summer/early fall with a pre-emergent such as Surflan will reduce damage to native species and prevent germination of new plants the following spring.
- Himalayan blackberry – This weed can be nearly eradicated with regular monitoring and several years of foliar herbicide application to affected areas (glyphosate or triclopyr)
- Scotch broom – Large plants ( $\geq 1$ " stem diameter) can be controlled by chainsaw cutting; smaller plants can be controlled with thorough foliar

- spray of triclopyr or glyphosate. Seed stays dormant for decades in soil, so limiting soil disturbance is important to limit new populations.
- English hawthorn – Dense thickets requires mechanical removal, followed by foliar spray of resprouts; hack and squirt or cut stumps treatments provide excellent control using imazapyr
  - Thistles – Foliar spray with glyphosate or clopyralid. June application is most effective, with multi-year treatments often required.
  - Poison-oak – Alongside roads and trails, poison-oak should be controlled in conjunction with other weed treatments.

### *Conservation targets*

It is generally not feasible to eliminate all invasive species. Treatments and monitoring are expensive, time-sensitive, and require a sustained, multi-year program. Nevertheless, it is possible and desirable to reduce the prevalence of these weeds. Targets over the next ten-year period are:

- Virtual elimination of False brome from prairie restoration areas
- 90% reduction of False brome along roads and trails
- 95% reduction of English hawthorn from prairies, and forest understory
- 90% reduction in Himalayan blackberry and scotch broom in treatment areas
- Limiting the spread of poison-oak, particularly in areas that receive recreation use
- 90% reduction of thistle in prairie restoration areas; control in conjunction with other weeds in other areas

## ***FIRE PLAN***

### *Fire weather*

In the Willamette Valley area, wildfire season is generally in the hot summer months, but unusually dry weather can occasionally create favorable conditions for the spread of wildfire as early as May and as late as October. In the fall in particular, prior to the onset of the rainy season, windy, dry conditions can create an opportunity for wildfire. Fire ignition is typically human-caused, as lightning strikes in this region are relatively rare. Fire risk is highest during summertime east-wind events, when hot, dry air descends into western Oregon from the high desert east of the Cascade Mountains. During these periods, daytime high temperatures reach the upper 90s and into the 100s, with night-time temperatures remaining higher than normal and the relative humidity staying lower.

### *Fuel types*

The primary fuel types of concern on the property are:

- *Grasses*. In late summer if allowed to go to seed and cure, grass can be highly flammable. Unmanaged, grass can develop a flammable thatch over time. Grass fires ignite easily, move quickly, and can spread into adjacent forest stands. Grazing and/or mowing keeps grassy fuels from accumulating. Prescribed fire on 4 year intervals can reduce fuel loading.
- *Flammable invasive weeds*. Some exotic species can be highly flammable, especially non-native blackberries, which accumulate dead canes beneath new growth. Such conditions are present in some older blackberry thickets across the property. Weed control measures will help reduce this fuel type.
- *Conifer plantations*. Young conifer plantations can be highly flammable in hot and dry conditions due to a concentration of fine fuels in branches and needles, high tree densities, and branches that often extend to the forest floor, creating fuel ladders that allow a ground fire to “climb” into the canopy. Early thinning and pruning edge trees can help reduce the fire risk.

The fuel factors mitigating against fire risk are the abundance of hardwoods, particularly oak, which are relatively inflammable except under extreme conditions, and the relative absence of down wood in the forest understories. Fire trails are maintained at the margins of most pastures.

#### *Fire history*

The ecosystems of the Willamette Valley have a long history of fire disturbance and adaptation. Lightning strikes are uncommon in the region; however, Native Americans used fire extensively prior to European settlement in the mid-1800s. Many of the Valley’s plant communities were defined by frequent, low-intensity fires that prevented tree encroachment into the region’s once vast prairies, savannas, and woodlands.

While most contemporary human-caused fires are unintentional, prescribed fire is increasingly being utilized as a restoration and vegetation management tool, including a number of treatments in upland meadow sites at Bezell, Fitton Green, and Fort Hoskins. Benton County is managing these meadows on a four-year fire return interval, and most of the large meadows at each of the sites have been burned at least once.

#### *Water chance*

In the event of a wildfire, water is available at, or adjacent to all three properties.

- Bezell: Plunkett Creek is available in many locations and flows dependably year round. It crosses beneath the Kings Valley highway just north of the public entrance to Bezell and is also accessible to brush rigs along the Plunkett Creek trail.
- Fitton Green: A small, perennial stream flows along Cardwell Hill Road and provides the only pump chance on the property. A better pump chance

is along Cardwell Hill Road where it borders the Marys River 0.5 miles west of the property.

- Fort Hoskins: The Luckiamute River flows adjacent to the Fort Hoskins property and is easily accessible both west and southeast of the park where Hoskins Road crosses the river.

#### *Access considerations*

Each property contains a good network of roads. Remote areas of each property would be accessible by a brush rig. Only main park roads would be passable by fire engines. ODF fire vehicles can access many upland prairie sites.

#### *Firefighting resources*

Bezell Memorial Forest and Fort Hoskins Park are both located within one to two miles of the Hoskins-Kings Valley Rural Fire station, at the intersection of Kings Valley Highway (Rte. 223) and Hoskins Road. Fitton Green Natural Area is located outside the Corvallis and Philomath urban growth boundaries, nearby the fire departments of both.

### ***HABITAT CONSERVATION PLAN***

In 2006 Benton County began development of a Prairie Species Habitat Conservation Plan (HCP) in order to bring Benton County's activities on its lands into compliance with the Federal and State Endangered Species Act. Without an HCP, the County would be hindered in its routine responsibilities (i.e. park/natural area maintenance and development and road maintenance) with delays and added costs of habitat surveys and regulatory agency consultations. With the HCP the County will avoid and minimize impacts to threatened and endangered species of prairie habitats. Where impacts are unavoidable, the County will mitigate (complete habitat restoration to offset habitat damage) as required.

The County also recognized the liability and added burden faced by rural landowners residing in endangered butterfly habitat who wish to complete a home, outbuilding, or farm or forest structure on their property. Consequently the County Board of Commissioners offers HCP coverage as an option to rural private landowners in endangered butterfly habitat.

Briefly, the overarching vision of the HCP is to achieve long term viability of rare species populations that is compatible with essential public services, public conservation and land management, and home, farm and forest construction on private lands.

Eight species are currently included in the HCP: two butterflies (Fender's blue and Taylor's checkerspot), one bird (Streaked horned lark), and five plants (Willamette

daisy, Bradshaw's Lomatium, Kincaid's lupine, Nelson's checkermallow, and the Peacock larkspur). All are federally listed or candidates to be listed as Threatened or Endangered

The HCP has relevance to, and will be woven into the management goals and actions associated with this Resource Stewardship Plan because:

- Some of the Threatened and Endangered species covered under the HCP are located on the three subject properties, specifically:
  - *Beazell Memorial Forest* contains a significant population of Taylor's checkerspot butterfly. Kincaid's lupine and Willamette daisy have been planted on the property
  - *Fitton Green Natural Area* may contain a very small population of Taylor's checkerspot and Kincaid's lupine has been planted on the property
  - *Ft. Hoskins Historic Park* may contain a very small population of Taylor's checkerspot
- All three properties have been designated as Prairie Conservation Areas under the HCP because they each contain valuable prairie habitats. As such, the HCP sets forth that each will be managed specifically for prairie and Covered species conservation, and as locations where habitat restoration and enhancement activities may occur.
- Management goals and actions prescribed under this Stewardship Plan must not conflict with the Conservation Objectives and Measures stipulated within the HCP. The three broad Conservation Objectives established in the HCP are:
  - *Conserve Covered species populations and habitat*
  - *Enhance Covered species populations and habitat*
  - *Increase the distribution and connectivity of Covered species populations*

Other specific conservation measures and actions are listed in the HCP for each of the above three objectives. Several have relevance to the subject properties, and provide opportunities ensure compatibility between this Resource Stewardship Plan and the HCP.

The HCP not only provides the County a conservation framework and legal protection, it can also serve as a fund raising tool for restoration activities in Benton County that benefit the eight species of concern. Having a clear, publicly-reviewed strategy for habitat conservation and an established relationship with the U.S. Fish and Wildlife Service will increase confidence among funding agencies that Benton County will continue to deliver on its promises to enhance and maintain habitat for these threatened and endangered species.

## **Forest Management Approach**

### ***LANDSCAPE-LEVEL CONSIDERATIONS***

These Benton County parcels contribute to the surrounding landscape in unique and significant ways, especially for rare oak and prairie habitats. Management will attempt to complement regional conservation efforts whenever possible. Other nearby conservation efforts include:

- Several restored oak savanna areas in immediate vicinity of Fitton Green. Best examples are at Pioneer Prairie (1.5 mi SW) and Lupine Meadows (2 mi SE). Limited examples in vicinity of Beazell and Fort Hoskins.
- Taylor's checkerspot habitat enhancement partnerships on several private tracts in vicinity of Fitton Green.
- Several protected properties nearby (Greenbelt Land Trust, City of Corvallis, OSU)
- Few older forests nearby. Best examples are 5+ miles away on USFS and OSU lands

Given the location and surroundings of the ownerships there are excellent opportunities to coordinate management with regional conservation efforts, especially for oak savanna, native prairie, and stream restoration. There are numerous partners eager to assist with these restoration efforts, such as Natural Resources Conservation Service (NRCS), Benton Soil and Water Conservation District (SWCD), Luckiamute and Mary's River Watershed Councils, Greenbelt Land Trust.

### ***ALLOWABLE TIMBER HARVEST***

A scientific basis for setting harvest levels is necessary to ensure long-term forest sustainability. Comparing timber inventories over time allows accurate estimates of forest growth. A forest resources inventory was conducted during spring and summer 2010 to evaluate forest composition, assess biodiversity measures<sup>9</sup>, evaluate the quantity and quality of the timber resource, and determine growth rates and stocking. Highlights of that inventory are presented throughout this report; summary reports are found in Appendix G. Inventory data reside in the offices of Trout Mountain Forestry.

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<sup>9</sup> Biodiversity measures included tree seedling numbers, snag and woody debris evaluation, and presence of invasive species.

A summary of total conifer timber volume<sup>10</sup>, periodic growth and harvests is found in Table 8. Harvests during 2001-2010 removed 2,418 MBF, or approximately 77 percent of accumulated growth during that period. Recommended harvest levels for the 2011-2020 are 2,544 MBF, or 64 percent of periodic growth (see Table 9). Conservative harvest levels are recommended to allow the forest to become more mature, and to provide a buffer for the unforeseen, such as weather, insects or disease, or climate change. A somewhat higher harvest level is recommended at Beazell, as some older trees should be harvested to increase uneven-ages structure. A somewhat lower harvest level is recommended at Fitton Green as some areas are under-stocked. Additional conifer volume may be yielded at each property from one-time conifer removal in oak restoration areas.

**Table 8: Conifer timber volumes, growth, and harvest, 2000-2020<sup>11</sup>**

	Beazell	Fitton Green	Ft. Hoskins	Total
Starting Volume mbf	10,440	unknown	778	±12,200
Harvests 2000-09	2,076	138	204	2,418
2010 Volume mbf	11,203	903	1,124	13,230
10-yr Growth	2,439	155	550	3,144
Annual % Growth	2.0%	1.0%	5.5%	2.3%
Est. 2011-20 Growth mbf	3,138	145	707	3,990
Est. 2011-20 Growth %	2.5%	1.5%	5.0%	2.7%

**Table 9: Recommended Harvest Levels for Subject Natural Areas, 2011-2020**

	Beazell	Fitton Green	Ft. Hoskins	Total
2010 Volume mbf	11,203	903	1,124	13,230
Est. 2011-20 Growth mbf	3,138	145	707	3,990
Rec. harvest % of growth	65%	55%	60%	64%
Harvest 2011-20	2,040	80	424	2,544

## **SILVICULTURAL APPROACH**

Among the stated ownership objectives are to use and demonstrate environmentally sensitive management and harvest techniques to restore habitats, maintain forest health, and improve tree quality, and to provide ongoing funding for park management.

Thinning harvests at each site over the past 10 years have reduced crowding in dense stands, improved tree vigor and timber quality, and increased tree species

<sup>10</sup> Hardwood and old growth volumes are not reported here, since these parts of the stand are generally reserved from harvest, and not considered part of the management base

<sup>11</sup> Starting volume for Beazell is based on a 1998 timber cruise by Duck Creek Assoc.; starting volume for Fitton Green is assumed to be ±950 MBF, though no previous inventory is available.



and age diversity without compromising visitor experiences or environmental quality. Most thinned stands are available for subsequent thinning harvests. Regeneration efforts to date have been limited, and with variable results.

Forest stand management will be accomplished using the follow approach:

- Schedule harvests based on 4 operating units<sup>12</sup>, treating one unit every 2-3 years. Return to each area on average every 10-15 years. Within each operating unit skip over stands lacking current needs.
- Use a variety of silvicultural approaches (even-aged, uneven-aged, multi-species)
- Emphasize thinning harvests for stands less than 50 years old; increase emphasis on regeneration harvests as stands mature
- Use a range of thinning techniques as suited to stand condition (high, low, balanced)
- Regenerate by planting (natural regeneration has been unreliable and slow)
- Designate areas for growing older trees where site and tree conditions allow
- Maintain biological legacies
- Include habitat enhancement practices during harvests, i.e. snag/woody debris creation
- Schedule harvests to take advantage of log market opportunities



*Beazell Memorial Forest*

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<sup>12</sup> Three units at Beazell, and one at Fort Hoskins; harvesting at Fitton Green occurs mainly in conjunction with habitat management activities.

## ***OAK MANAGEMENT***

Benton County oak savanna and woodland stands contain many rare species and sensitive habitats. Ownership goals include promoting diverse wildlife habitats to support a wide range of native biodiversity, reversing trends of habitat loss, and actively restoring degraded habitats.

Restoration activities over the past 10 years have reduced conifer encroachment into meadow and savanna areas, reduced conifer overtopping of legacy oaks, reduced invasive species populations, and enhanced native prairie plant populations.

Oak savanna and woodland stands will be managed using the follow approach:

- Reduce stem density to enhance oak vigor. For oak savanna thin to 30-50 trees per acre (or 10-50% canopy cover); for oak woodland thin to 100-200 tpa (or 90% canopy cover); vary stocking depending on site quality, tree size and condition; leave higher tree density in riparian areas or on steep slopes
- Favor vigorous oaks with well-formed mushroom-shaped crowns; discriminate against smaller, suppressed trees with vase-shaped crowns
- Protect legacy oaks, heavy mast producers, cavity trees, and uncommon species (madrone, dogwood, ash, etc.)
- Protect wildlife habitats (snags, riparian areas, large woody debris, cavity trees, oak >20" dbh, conifers >28" dbh)
- Reduce Douglas-fir by 60-90%, especially where competing with legacy oaks, as invading regeneration; leave some fir for snag creation, cavity or perch trees, and as legacies. Maintain some fir stands for diversity where presence does not compromise high-valued oak.
- Use logging method and equipment best suited to the site and timber condition; preferred equipment for mature stands is a mechanical feller (directional falling protects residual tree crowns)
- Top or girdle firs growing within oak canopies if felling would compromise oak. Consider target liability of this option.
- Manage slash to prevent blackberry invasion: whole tree harvesting (preferred method for stands >8" avg. dbh), piling/burning, or lop/scatter
- Reduce (or eliminate) invasive hawthorn, blackberry, and scotch broom (see below)
- Seed disturbed sites with grass (pasture mix) before October 15 for soil stabilization and weed prevention
- Consider maintenance methods and grazing suitability in treatment design

- Prioritize stands for treatment based on access, weed presence, and oak condition
- Treat as cost share/incentive funding is available and markets allow

### ***INVASIVE SPECIES CONTROL***

Invasive weed populations present the greatest forest health risk to the ownership, and controlling invasive weeds is one of the first steps in accomplishing the stated ownership objective of actively restoring degraded habitats.

Awareness of invasive weeds threats became more pronounced over the previous 10-year period, and knowledge of control techniques has expanded rapidly. Earliest control efforts occurred at Beazell Memorial Forest with false brome and Scotch broom. Successive efforts have built on these results and practices have been refined.

Invasive weeds will be controlled using the follow approach:

- Develop a treatment plan for each site, considering target species, native understory condition, site condition, etc.
- Design treatment methods and timing to protect native plants
- Use a well-timed and concerted approach, including pre-op, post-op, chemical and mechanical treatments
- Clean logging equipment before transport to site
- Monitor treated stands annually and schedule timely follow-up practices
- Integrate treatment schedule with cost sharing/incentive program timetables for best economy



*Beazell Memorial Forest*

## Independent Certification and Monitoring

### *FSC CERTIFICATION, STANDARDS AND GUIDELINES*

These three Benton County sites have been independently certified as being managed according to Forest Stewardship Council (FSC) standards since 1998<sup>13</sup>. The FSC standards address environmental, social, and economic issues, and FSC certification is widely recognized as the most credible forest certification system by non-governmental organizations around the world.



The goals and objectives for these Benton County properties are consistent with the FSC US Standard. Ongoing participation in the FSC program will ensure a system of independent auditing to verify compliance with these standards.

The standards of this plan exceed the minimum requirements of the FSC standard. For example the FSC standard requires retention of trees for wildlife habitat in harvest openings greater than 6 acres. The standards proposed here prohibit harvest openings of that size, and add retention requirements for smaller openings.

The FSC Standard contains more than 50 pages of specific Principles, Criteria, and Indicators that are used during audits to verify compliance. It is available online at [www.fscus.org](http://www.fscus.org). The ten principles are included in the Appendix.

### *ADAPTIVE MANAGEMENT*

Periodically the stewardship plan should be re-assessed. Typically, forest management plans have a ten-year life span. At the end of that period, most inventory information upon which the plan was based are getting out of date, and it is time for a reappraisal of the total property, ownership objectives, and implementation successes and challenges.

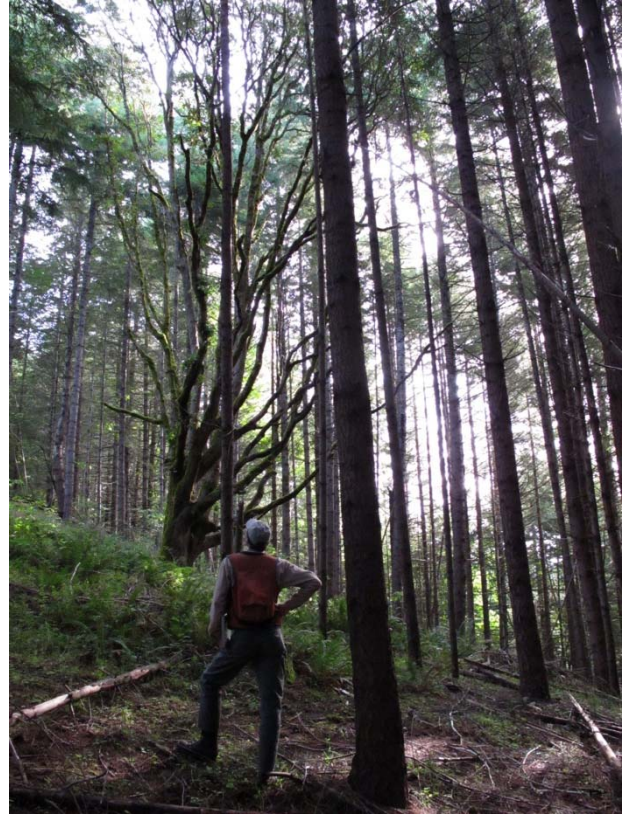
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<sup>13</sup> Trout Mountain Forestry is an FSC-certified resource manager, and administers a group of approximately 60 landowners throughout western Oregon, of which Benton County is a member. Members collectively endorse and abide by the standards of the FSC. Annual audits are conducted by Scientific Certification Systems (SCS), an FSC-accredited certifier based in Emeryville, CA, to ensure that members of the Trout Mountain Forestry landowner group comply with the FSC standard.

A stewardship plan review should involve the following:

- Assess the implementation of the plan and strategies
- Evaluate the effectiveness of the strategies in achieving the expected results
- Assess the assumptions built into the plan
- Evaluate the extent to which goals are being met
- Practice adaptive management

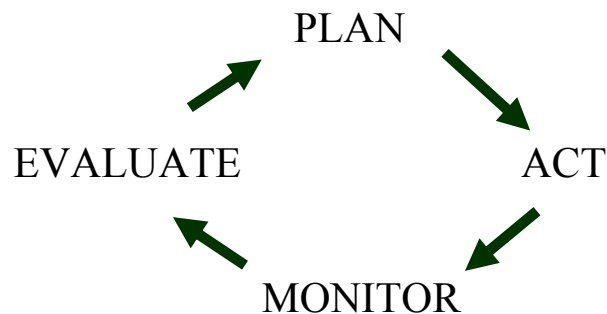
Monitoring is an essential part of an adaptive management loop — a framework for continually improving the state of our knowledge about the forest, and acting on new information. This adaptive management process is shown in Figure 5.



*Fort Hoskins*

From time to time the stewardship plan may be amended or updated particularly to respond to any changes in the FSC standards.

***Figure 5: Adaptive management***





# Tract Findings and Recommendations

## *BEAZELL MEMORIAL FOREST*

### Data Summary Page

**Tract location:**

37283 Kings Valley Highway (Hwy. 223), Philomath, OR

**Management emphasis:**

Prairie habitat restoration, education/demonstration, group and dispersed public recreation (hiking, nature appreciation, facility rental), sustainable silvicultural management.

**Acquired:** 2000

**Total acreage:** 607.4 acres<sup>14</sup>

Forest: 515.8 acres

Meadows, non-forest: 91.6 acres

**Tract legal description:**

Sections 33 & 34, T10S, R6W., W.M. and Sections 3 & 4, T11S, R6W, W.M.

**Latitude and longitude:**

Northing: 44.6503789, Easting: -123.416271

**Facilities:**

- Beazell Forest Education Center
- Interpretive kiosks, 2 trail shelters
- 4.6 miles of trails
- Day-use restrooms
- Historic Plunkett house
- Rental home

**Natural Features:**

- Oak woodland, conifer and mixed forests
- Meadows with restored prairie vegetation
- Plunkett Creek and tributary streams
- Ridge top views

**Watershed in which tract is located:**

Luckiamute River Watershed within the Upper Willamette River Watershed  
(Luckiamute Watershed Council, <http://luckiamute.watershedcouncils.net> 503-838-8804)

**Seed zone:**

Douglas-fir 252, grand fir 4, western hemlock 3, western red cedar 1, red alder 3, Other 4

**Elevation:** 600-1,700'

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<sup>14</sup> Benton County ownership records indicate 586.1 total acres.

## ***BEAZELL MEMORIAL FOREST***

### **Findings**

- Growth response to past thinning harvests is good (little blowdown, tree crowns are healthy and expanding)
- Meadow encroachment has been reversed
- Many oak legacy trees have been stabilized
- Meadow habitats are being restored
- Regeneration success has been mixed (some natural seeding, poor planted tree survival)
- Invasive weeds are widespread (false-brome, geranium); control plans are needed
- Roads, trails, and facilities are largely built out
- Recreation use is moderate, with no significant detrimental impacts

### **Trends**

- ✓ *Stands are maturing*
- *Invasive species are increasing*
- *Oak needs further release and habitat restoration*
- *Early seral forest habitat is lacking*

### **Management Priorities**

1. Further release legacy oaks
2. Expand meadow restoration; consider habitat quality, possible butterfly connection corridors
3. Thinning harvests: 2nd harvest entries for most stands, 1st entry for plantations, use variable-density and gap/patch cuts approaches to expand uneven-aged management
4. Rock main access roads
5. Enhance forest structure with snag/down log creation, gap creation
6. Wildfire risk reduction; consider controlled meadow burns
7. View enhancement
8. Expand education offerings
9. Investigate grant funding (for 2, 5, 6, 8 above)
10. Expand volunteer opportunities



**Table 8: Management Schedule 2011-2020, Beazell Memorial Forest**

Year	Stand	Activity	Acres	MBF	Income	Cost
2011	2,3,4,5	Pre-harvest weed treatments	20-30	0		\$1-3,000
2012	2,3,4,5	Thinning harvest	75±	300-400	\$75-100,000	
	6	Clear view corridors	<1	10	\$0	\$0
		Road rocking (S harvest area only)				\$5-10,000
2013	2,3,4,5	Plant trees in gaps/patch cuts	5-10			\$1,500-3,000
2014	6,14,18,20	Design upland oak restoration project, seek grant funding	20-30			\$2-4,000
	As nec.	Pre-harvest weed treatments	20-30	0		\$2-3,000
2015-6	14,18,20	Oak and wildlife treatments	20-30	0		\$15-25,000
2015	15,16,17,18,21	Thinning harvest	75±	250-300	\$60-90,000	
		Road rocking (N harvest area only)				\$6-12,000
2015-19	As nec.	Pre-harvest weed treatments	20-30	0		\$2-3,000
2016-20	9,11,13	Thinning harvest	85±	350-450	\$90-135,000	
2012		Road rocking (E harvest area only)				\$7-12,000
Ongoing	As nec.	Continue meadow burns				\$???
2020	All	Update management plan				\$12-15,000

### Beazell Memorial Forest Activity Details

2011

1. *Pre-harvest weed treatment.* Survey for invasive weeds during pre-harvest planning. Treat by targeted backpack spray preceding harvest; extent, chemicals, and timing to be determined by prior survey findings. Treat false-brome in May or June, blackberry September-December.

2012

2. *Harvest thinning.* Mark trees for harvest, designate skid trails and log landings. Use a combination of thinning techniques, as suited to stand condition. Release oaks, minor species, and young conifers. Create gaps and patch cuts on 5-10 acres to build age diversity. Mark 1-2 legacy trees per acre. Designate trees for topping where snag numbers are lacking. Time harvest for favorable markets.
3. *Clear view corridors.* Open views to NW from ridge top trail. Combine with thinning harvest in adjacent stands. On steep slopes where access is limited top trees for snag creation, or fall and leave for woody debris.
4. *Road rocking, South.* Rock road for 4-season light-duty access. Grade roadbed with broad dips and/or out-sloping to assure drainage. Top with 3-4" layer of 1.5" minus gravel. Add 6-9" of 3" minus base rock if winter hauling is desired.

2013

5. *Tree planting.* Plant harvest gaps/patches in prior harvest areas January-February, using a mix of site-adapted species. Spot spray for grass or competing vegetation, as site preparation or release, as indicated, extent and timing to be determined.

2014

6. *Upland oak restoration planning*. Design project to release oak, control invasive weeds, top conifers for snag and woody debris creation, create butterfly corridors, seed/plant native species. Include with similar activities on other tracts. Seek grant funding.
7. *Pre-harvest weed treatments*. See details for Activity 1. Monitor 2012 treatment area to determine retreatment needs, if any.

2015

8. *Harvest thinning*. See details for Activity 2
9. *Road rocking, North*. See details for Activity 4

2015-6

10. *Upland oak restoration treatments*. Implement project, in conjunction with Activity 8, as possible
11. *Tree planting*. Plant harvest gaps/patches in 2015. See details for Activity 5

2015-19

12. *Pre-harvest weed treatments*. See details for Activity 1. Monitor 2014 treatment area to determine retreatment needs, if any.

2016-20

13. *Harvest thinning*. See details for Activity 2
14. *Road rocking, East*. See details for Activity 4

Ongoing

15. *Controlled meadow burns*. Continue meadow burns at  $\pm 4$  year intervals, or as fuel levels indicate. Expand extents as appropriate to include new meadow areas.



## ***FITTON GREEN NATURAL AREA***

### Data Summary Page

**Tract location:** NW Panorama Drive, off Cardwell Hill Rd., approximately 4 miles west of 53<sup>rd</sup> and Oak Creek Dr., Corvallis, OR,

**Management emphasis:**

Prairie habitat restoration, public recreation (hiking, nature appreciation), sustainable silvicultural management

**Acquired:** 1988, 95, 98

**Total acreage:** 302.6<sup>15</sup> acres

Forest: 253.9 acres

Meadows, non-forest: 48.7 acres

**Tract legal description:**

Sections 25, 26, 35, 36 T11S, R6W., W.M.

**Latitude and longitude:**

Northing: 44.5783619189, Easting: -123.374140009

**Facilities:**

- Trailhead kiosk
- 2.5 miles of trails

**Natural Features:**

- Ridge-top meadows with restored prairie vegetation
- Ridge top views
- Oak woodland
- Conifer and mixed forests
- Intermittent tributary streams of Marys River

**Watershed in which tract is located:**

Marys River Watershed within the Upper Willamette River Watershed  
(Marys River Watershed Council, <http://www.mrwc.net> 541.758.7597)

**Seed zone:**

Douglas-fir 262, grand fir 6, western hemlock 5, western red cedar 1, red alder 5, Other 6

**Elevation:** 500-1000'

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<sup>15</sup> Benton County ownership records indicate 308 total acres

## ***FITTON GREEN NATURAL AREA***

### **Findings**

- Good survival and growth of 1990s plantings
- Meadow encroachment has been reversed
- Meadow habitat restoration is ongoing (south balds)
- Invasive species have been reduced in places, but false-brome ubiquitous, and hawthorn is poised to expand
- Growth response to past thinning harvests is good (little blow down, tree crowns are healthy and expanding)
- Recreation use is moderate, with no significant detrimental impacts

### **Trends**

- ✓ *Stands are recovering*
- *Invasive species are increasing*
- *Early seral/prairie remnant habitat is decreasing (N)*

### **Management Priorities**

1. Release legacy oaks
2. Control invasive species
3. Halt meadow loss (north); continue meadow restoration (south)
4. Expand trail network (north)
5. Enhance forest structure with snag/down log creation, gap creation
6. Wildfire risk reduction (north); continue controlled meadow burns (south)
7. Investigate grant funding (for all above)
8. Thinning harvests: where appropriate for forest structure enhancement

***Table 9: Management Schedule 2011-2020, Fitton Green Natural Area***

<i>Year</i>	<i>Stand</i>	<i>Activity</i>	<i>Acres</i>	<i>MBF</i>	<i>Income</i>	<i>Cost</i>
2011	1,2,3	Design weed control/trail/prairie restoration project; seek grant funding	50-100			\$4-6,000
2012-4	1,2,3	Trail construction, weed control treatments, snag/down wood creation	50-100	0		\$20-30,000
2014	6,7	Design upland oak restoration project, seek grant funding	20-30			\$2-4,000
2015-6	1,2,3	Oak and wildlife treatments	20-30	0		\$10-15,000
2016-20	5	Evaluate for thinning needs	±20	±150	\$40-50,000	
Ongoing	As nec.	Continue meadow burns				\$???
2020	All	Update management plan				\$8-10,000

## Fitton Green Activity Details

2011

1. *Weed control / trails / prairie restoration planning.* Lay out new trails (and improve old skid trails) to increase access for management and recreation, and to create fire breaks. Trails will divide stands into manageable units. Survey and triage for weed control. Identify and flag relict meadows for restoration. Link meadows with roads/trails to form connected meadow network/butterfly corridor. Mark legacy oaks. *Estimate 10-15 acres of meadows plus 2-5 miles of trail invasive species treatment.*
2. *Seek grant funding.* Combined approach to meadow restoration, weed control and fuels reduction makes an attractive project for funding.

2012-14

3. *Weed control treatments.* Treat false brome along skid trails, roads, and other selected areas; treat all hawthorn and blackberries. Treat by targeted backpack spray preceding harvest; extent, chemicals, and timing to be determined by prior survey findings. Treat false-brome in May or June, blackberry September-December. Multi-year weed treatments will likely be needed.
4. *Trail construction.* Mow old trails; clear and grade new trails. Construct trails to serve as fuel breaks, treat adjacent brush as needed. Using Bobcat or mini-excavator grade trails to 6-8' width to facilitate machine mowing.
5. *Conifer removal.* Remove competing conifer around oaks and within meadows. Girdle or slash trees <6" dbh; Top or fall/slash larger trees for snag /woody debris creation. Volumes are likely insufficient for commercial harvest.
6. *Seed native species.* Plant native grasses and nectar plants, extent and species to be determined.

2014

7. *Oak restoration/weed control planning.* First phase of conifer thinning temporarily stabilized oaks (SE corner of property); subsequent thinning is necessary to prevent future over-topping by conifers. Release oak, control invasive weeds, top conifers for snag and woody debris creation, create butterfly corridors, seed/plant native species. Estimate treatment cost for hawthorn in Stand 7, survey Stand 6 for treatment needs. Combine with Beazell Activity 6 for grant funding request.

2015-16

8. *Oak and wildlife treatments.* Thin conifers heavily around legacy oaks, combine felling and snag creation, leave some down wood on site. Treat hawthorn w/ combination of foliar and cut-stump treatment.

2016-20

9. *Thinning harvest.* Evaluate conifer and mixed stands for thinning and implement as appropriate, taking into consideration stand development as well as enhancement opportunities for wildlife habitat. Time to accommodate log market conditions. Mark trees for harvest, designate skid trails and log landings. Use a combination of thinning techniques, as suited to stand condition. Release oaks, minor species, and young conifers. Create gaps and patch cuts to build age

diversity. Mark 1-2 legacy trees per acre. Designate trees for topping where snag numbers are lacking.

10. *Pre-treat harvest areas.* False-brome is widespread throughout Stand 5. Pre-treat all skid roads and harvest areas. Multiple treatments may be necessary.

Ongoing

11. *Controlled meadow burns.* Continue meadow burns at  $\pm 4$  year intervals, or as fuel levels indicate. Expand extents as appropriate to include new meadow areas.



*Fitton Green*

## ***FORT HOSKINS HISTORIC PARK***

### Data Summary Page

**Tract location:**

38150 Hoskins Road, 1.5 miles west of Kings Valley Highway (Hwy. 223), Philomath, OR

**Management emphasis:**

Group and dispersed public recreation (hiking, nature appreciation, picnic), research, historic education/demonstration, sustainable silvicultural management

**Acquired:** 1991

**Total acreage:** 124 acres<sup>16</sup>

Forest: 77.3 acres

Meadows, non-forest: 46.7 acres

**Tract legal description:**

Sections 29 & 30, T10S, R6W., W.M.

**Latitude and longitude:**

Northing: 44.6768543193, Easting: -123.461943669

**Facilities:**

- Day-use restrooms
- Covered group picnic shelter
- 1.8 miles of trails with interpretive panels
- Historic Frantz-Dunn house
- Caretaker residence

**Natural Features:**

- Oak woodland
- Upland prairies
- Conifer forest
- Intermittent stream
- Ridgetop views

**Watershed in which tract is located:**

Luckiamute River Watershed within the Upper Willamette River Watershed  
(Luckiamute Watershed Council, <http://luckiamute.watershedcouncils.net> 503-838-8804)

**Seed zone:**

Douglas-fir 252, grand fir 4, western hemlock 3, western red cedar 1, red alder 3, Other 4

**Elevation:** 400-800'

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<sup>16</sup> Benton County ownership records indicate 128 acres

## ***FORT HOSKINS HISTORIC PARK***

### **Findings**

- Growth response to past thinning harvests is good (little blowdown, tree crowns are healthy and expanding, uneven-aged structure developing)
- Meadow encroachment is on going
- Meadow habitats are partially restored
- Invasive species are limited and have been reduced, but many areas are susceptible to rapid expansion
- Research projects are completed or ongoing, and are yielding useful results
- Roads, trails, and facilities are largely built-out
- Recreation use is moderate, with no significant detrimental impacts

### **Trends**

- ✓ *Stands are maturing*
- ✓ *Oak and meadows are recovering*
- ✓ *Meadow wildlife is increasing*
- *Conifer density is higher than desired in some areas, with few seedlings*

### **Management Recommendations**

1. Invasive weed control (initial and follow-up treatments)
2. Thinning harvests: 2nd harvest entries for most stands, 1st entry for remainder, expand uneven-aged structure
3. View enhancement
4. Further release legacy oaks
5. Enhance wildlife habitat with snag/down log creation, gap creation
6. Continue controlled meadow burns
7. Investigate grant funding (for 1, 4, 5 above)

***Table 10: Management Schedule 2011-2020, Fort Hoskins Historic Park***

<i>Year</i>	<i>Stand</i>	<i>Activity</i>	<i>Acres</i>	<i>MBF</i>	<i>Income</i>	<i>Cost</i>
2011	2,3,4,5	Weed control treatment	20-30	0		\$5-700
2011-14	2,6	Oak release planning	5	0		\$2-4,000
2015	2,3,4,5	Pre-harvest weed treatment	20-30	0		\$5-700
2015-16	2,6	Oak release treatments	5	0		\$2-4,000
	All	Snag/woody debris creation				\$2-4,000
2016-18	3,4	Thinning harvest	30±	150-200	\$40-60,000	
	4	Clear view corridors	<1	10	\$0	\$0
2017	3, 4	Tree planting in gaps, as necessary	2-5			\$500-1,500
	As nec.	Follow-up weed treatments	??			\$75-125/ac
Ongoing	As nec.	Continue meadow burns				\$???
2020	All	Update management plan				\$12-15,000



## Fort Hoskins Activity Details

2011

1. *Weed control treatment.* Early and aggressive weed treatment is needed to keep relatively small populations at Ft. Hoskins from expanding. Combine with weed treatments at other sites for economy; otherwise treat as soon as possible. Treat false-brome in May or June, blackberry from September-December.

2011-14

2. *Upland oak restoration planning.* Design project to release oak, create snags and woody debris, and enhance native species. Can occur as stand-alone project, or combine with grant application of similar actions at Beazell and Fitton Green.

2015-16

3. *Pre-harvest weed treatment.* Survey for invasive weeds during pre-harvest planning. Treat by targeted backpack spray preceding harvest; extent, chemicals, and timing to be determined by prior survey findings. See details in Activity 1.
4. *Upland oak restoration treatments, snag/woody debris creation.* Release oak, top conifers for snag and woody debris creation, seed/plant native species. Extents and specifications to be determined. Combine with similar actions at Beazell and Fitton Green.

2016-18

5. *Harvest thinning.* Mark trees for harvest, designate skid trails and log landings. Use a combination of thinning techniques to perpetuate uneven-aged stand structure. Create gaps and patch cuts on 2-5 acres to release natural regeneration and build age diversity. Mark 1-2 legacy trees per acre. Designate trees for topping where snag numbers are lacking. Time harvest for favorable markets.
6. *Clear view corridors.* Open views to north and east from ridge top. Combine with thinning harvest in adjacent stands. On steep slopes where access is limited top trees for snag creation, or fall and leave for woody debris

2017

7. *Tree planting.* Plant harvest gaps/patches in prior harvest areas, as necessary. Plant in January-February, using a mix of site-adapted species. Spot spray for grass or competing vegetation, as site preparation or release, as indicated, extent and timing to be determined.
8. *Weed control treatments.* Follow-up treatments, as necessary. See details for Activity 1 and 3.

Ongoing

9. *Controlled meadow burns.* Continue meadow burns at  $\pm 4$  year intervals, or as fuel levels indicate. Expand extents as appropriate to include new meadow areas.



## References

- Apostol, D, and M. Sinclair. 2006. *Restoring the Pacific Northwest: The Art and Science of Ecological Restoration in Cascadia*. Washington DC: Island Press.
- Bormann, B.T., P.G. Cunningham, M. H. Brookes, V. W. Manning, and M. W. Collopy. 1994. *Adaptive Ecosystem Management in the Pacific Northwest*, PNW-GTR-341: Forest Service, U.S. Department of Agriculture.
- Boyd, R.(ed) 1999. *Indians, fire, and the land in the Pacific Northwest*, Corvallis: Oregon State University Press.
- Boyer, L. 2006. Native Willamette Valley oak habitat and prairie restoration – site-preparation and seeding information sheet. Heritage Seedlings, Salem, Oregon.
- Brauner, David R., Ph.D. with Stricker, Nahani A., *Fort Hoskins: An Illustrated History*, Benton County Historical Society, 2006.
- Curtis, R.O.; DeBell, D.S.; Harrington, C.A.; Lavender, D.P.; St. Clair, J.B.; Tappeiner, J.C.; Walstad, J.D. 1998. *Silviculture for multiple objectives in the Douglas-fir region*. Gen. Tech. Rep. PNW-GTR-435. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 123 p.
- Franklin JF, Dyrness CT. 1988. *Natural Vegetation of Oregon and Washington*. Corvallis, Oregon: Oregon State University Press. p. 88-127.
- Goodridge, J. and D. L. Clark. 2001. *Prairie vegetation establishment monitoring report*, Baskett Slough National Wildlife Refuge. Report to the US Fish and Wildlife Service.
- Habeck JR. 1961. *The Original Vegetation of the Mid-Willamette Valley, Oregon*. Northwest Science 35(2): 65-77.
- Hadley, K.S. 1994. Vegetation. In Ashbaugh JG. (ed). *The Pacific Northwest: Geographical Perspectives*. Dubuque, Iowa: Kendall/Hunt Publishing Company. p. 99-116.
- Kohm, K.A. and J.F. Franklin, eds. 1997. *Creating a Forestry for the 21<sup>st</sup> Century: The Science of Ecosystem Management*. Washington DC: Island Press.
- McCain, C. and N. Diaz, 2002. *Field Guide to the Forested Plant Associations of the Northern Oregon Coast Range*. USDA-Forest Service, Pacific Northwest Region, Technical Paper R6-NR-ECOL-TP-03-02.

McCain, C. and J.A. Christy. 2005. Field guide to riparian plant communities in northwestern Oregon. USDA-Forest Service, Pacific Northwest Region. Technical Paper R6-NR-ECOL-TP-01-05.

Menke, C. 2010. Benton County Natural Areas and Parks Prairie Conservation Strategy. Institute for Applied Ecology.

Logan, R. 2002. *Oregon's Forest Protection Laws*. Oregon Forest Resources Institute, Portland, OR.

ODFW (Oregon Department of Fish and Wildlife). 2006. *Oregon Conservation Strategy*. Oregon Department of Fish and Wildlife: Salem, OR. Available on-line at: <<http://www.dfw.state.or.us/conservationstrategy/>>

Vesely, D., and G. Tucker. 2004. *A landowner's guide for restoring and managing Oregon white oak habitats*. Bureau of Land Management, Salem, Oregon.

Whitlock, C. and M.A. Knox. 2002. Prehistoric burning in the Pacific Northwest: Human versus climatic influences. In Vale, T. (ed) *Fire, Native Peoples, and the Natural Landscape* Washington, D.C.: Island Press

Wilson, M. V., and D. L. Clark. 1997. *Effects of fire, mowing, and mowing with herbicide on native prairie of Baskett Butte, Baskett Slough National Wildlife Refuge*. Report to US Fish and Wildlife Service.

Wilson, M. V., and D. L. Clark. 1998. *Recommendations for control of tall oatgrass, poison oak, and rose in Willamette Valley upland prairies*. Report to US Fish and Wildlife Service and the Oregon Natural Heritage Program.

Wilson, M. V., and D. L. Clark. 2000. *Restoration of Fender's blue butterfly and its prairie ecosystem: Management applications of fire to Baskett Slough NWR*. Report to US Fish and Wildlife Service and the Oregon Natural Heritage Program.

## **Appendix A: Accomplishments 2000-2010**

### ***Bezell Memorial Forest***

2000	Property acquired
2001	Stewardship Management Plan completed
2001-2	Road building, Harvest #1 (east)
2001-7	Trail construction projects
2002	Infrastructure construction (restrooms, parking, kiosks)
2002-3	Road building, Harvest #2 (west)
2003	Park Grand Opening
2004	Taylor's checkerspot butterfly discovered in north meadow
2004-5	Road building, invasive species control, Harvest #3 (north)
2005	Forest Education Center completed
2007	Spring Outdoor school program initiated tours
2009	Plunkett House improvements

### ***Fitton Green Open Space Natural Area***

1988	Williamson Tract acquired
1995	Moorefield and Smith Tracts acquired
	Roads improvements, restoration tree planting
1995	Stewardship Management Plan
1998	Bolte Tract acquired
2000	Open Space Natural Area Management Plan
2003, 6, 8	Meadow restoration controlled burns
2004	Parking lot, trail construction
	Park Grand Opening
2006	Oak restoration & weed control (OWEB grant)

### ***Fort Hoskins Historic Park***

1856-65	Fort Hoskins in active use
1976-7	Archeological examinations
1991	Acquired by Benton County
2000	Stewardship Management Plan completed
2000-1	Road building, Harvest #1
2000, 3	Restoration controlled burns
2001	Park infrastructure construction, trail building
2001-4	Meadow restoration research studies
2002	Park Grand Opening
2006	Harvest #2
2007	Uneven-age study begun (OSU)
2009	Fort Tavern acquired
2010	Archeological examination

## Appendix B: Oregon Forest Practice Rules

This plan and all management recommendations must comply with the Oregon Forest Practices Act as administered by the Oregon Department of Forestry. Most forest operations require filing of Notifications of Operations and a 15-day waiting period. The regulations primarily address reforestation requirements after clearcutting and restrictions on harvesting near fish-bearing streams. Oregon's forest protection laws are summarized in Logan (2002). Laws are found in the Oregon Revised Statutes (ORS) Chapter 527. The Oregon Administrative Rules (OAR) contain rules for implementing the laws, found mainly in Chapter 29, Division 600 series.

### Highlights:

- Notification is required for road construction, pre-commercial thinning, harvesting, chemical application, site preparation, and slash disposal. Notification is not required for tree planting, road maintenance, and most wildlife habitat enhancements.
- A Written Plan is required for operations within 100' of a Type F or Type D stream, certain harvesting in riparian management areas (RMAs), operations in critical wildlife habitat, and "alternate practices" that deviate from ODF rules.
- RMAs of various widths are prescribed for various streams. Rules require retention of trees and/or shrubs based on stream size, fish presence, and location.
- Clearcuts greater than 25 acres require retention of at least two green trees per acre ( $\geq 30'$  tall or  $> 11"$  dbh,  $> 50\%$  conifer) and two down logs per acre ( $\geq 6'$  long and  $\geq 10$  cu.ft.,  $> 50\%$  conifer). Clearcuts less than 25 acres have no retention requirement.
- Reforestation is required whenever harvesting reduces stocking below 80 sq.ft. of basal area, or when less than 200 seedlings per acre are present. Reforestation must begin within 12 months of harvest. Trees must be free to grow in 6 years.
- Erosion prevention measures must be taken to assure that road use or harvest operations do not impact "waters of the state".
- Special rules govern road building across or operations in or adjacent to fish-bearing streams.

### ODF Stewardship Forester contact information:

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Philomath OR 97370  
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E-mail : russ.j.anderson@state.or.us

## Appendix C: Indicator Species

The following species will be the focus for management and restoration activities. These species are considered representative of the respective habitats and/or are threatened species. This list is based on the Oregon Conservation Strategy summary list of strategy species for the Willamette Valley Ecoregion, Corvallis area (Conservation Opportunity Area WV-19).

### *Wetlands/Riparian areas*

- Northern red-legged frog
- Northwestern pond turtle
- Short-eared owl
- Western painted turtle
- Western purple martin
- Willow flycatcher
- Foothill yellow-legged frog
- Winter steelhead

### *Oak woodlands*

- Acorn woodpecker
- Chipping sparrow
- White-breasted nuthatch
- Western gray squirrel

### *Oak savanna*

- Vesper sparrow
- Streaked horned lark
- Western meadowlark
- Western bluebird
- Common nighthawk
- Fender's blue butterfly
- Taylor's checkerspot butterfly
- Nelson's checkermallow
- Willamette Daisy

### *Other species of concern*

- Beaver
- Bats

## **Appendix D: Forest Stewardship Council (FSC) Principles**

### *PRINCIPLE #1: COMPLIANCE WITH LAWS AND FSC PRINCIPLES*

Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria.

### *PRINCIPLE #2: TENURE AND USE RIGHTS AND RESPONSIBILITIES*

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

### *PRINCIPLE #3: INDIGENOUS PEOPLES' RIGHTS*

The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.

### *PRINCIPLE #4: COMMUNITY RELATIONS AND WORKER'S RIGHTS*

Forest management operations shall maintain or enhance the long-term social and economic well being of forest workers and local communities.

### *PRINCIPLE # 5: BENEFITS FROM THE FOREST*

Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.

### *PRINCIPLE #6: ENVIRONMENTAL IMPACT*

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

### *PRINCIPLE #7: MANAGEMENT PLAN*

A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long-term objectives of management, and the means of achieving them, shall be clearly stated.

### *PRINCIPLE #8: MONITORING AND ASSESSMENT*

Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

### *PRINCIPLE # 9: MAINTENANCE OF HIGH CONSERVATION VALUE FORESTS*



Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

*PRINCIPLE # 10: PLANTATIONS*

Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

## Appendix E: Standards and Guidelines

This section provides more specific guidance on silvicultural practices, vegetation management, and site-specific management strategies. It reflects FSC standards, and is intended to provide significant detail to assist managers in implementing management activities to achieve the goals and objectives for the property. Additional annual or project-specific operating plans are recommended during implementation to provide further site-specific guidance.

### 1. *Conifer forest*

- 1.1. Trees will generally be grown on rotations that approach culmination of mean annual increment<sup>17</sup>. Although this can vary among sites and species, for Douglas-fir, it is typically 70 years or more.
- 1.2. Forest openings will be limited to five acres or less. This will allow for the regeneration of Douglas-fir while limiting potential impacts on water quality, soils, wildlife habitat, and aesthetics from larger openings.
- 1.3. Harvest openings greater than 3 acres in size must retain at least 5% of pre-harvest basal area to serve as biological legacies for the future stand. This should include at least 3 healthy trees from the largest size class available in the stand to be retained as legacy trees. Such trees will be marked with an “L” for permanent retention.
- 1.4. A buffer of at least 100’ of intact forest must be preserved between harvest openings greater than 2 acres. Preserved buffers cannot be harvested for at least 10 years.
- 1.5. In thinning mature stands (> 40 years) as well as patch cuts greater than 3 acres, at least two trees per acre will be designated as snags and retained during harvesting. These trees will ideally have characteristics that will lead to snag development, i.e., broken top, thinning crown, conk rot, or other indication of decline. Such trees will be marked with a “W” for wildlife. These trees must be of average diameter or bigger.
- 1.6. In thinning mature stands (> 40 years) as well as patch cuts, at least 5 logs per acre shall be left to contribute to large woody debris for wildlife habitat and soil development. The logs will ideally be culls of average diameter or larger for the stand. If no cull logs are available, lower quality merchantable logs will be left. Logs should be a minimum of 12 feet in length and at least 10 inches in diameter on the small end.
- 1.7. Existing skid trails should be used during thinning as much as possible.
- 1.8. Timber species planted and managed must be species native to northwestern Oregon. The only exceptions would be naturalized cherry or species currently limited to southern Oregon such as Coast Redwood that may, in the future, grow well in the local climate.

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<sup>17</sup> Culmination of mean annual increment is defined as the age at which mean annual increment is at a maximum; mean annual increment is the total increment divided by stand age (Helms 1998).

## 2. *Oak savanna*

- 2.1. Protect and/or restore all potentially high quality areas of oak savanna.
- 2.2. Competing Douglas-fir will be removed in commercial logging operations. Protection of residual oaks and minimizing soil disturbance in areas with native forbs and grasses will be emphasized.
- 2.3. Douglas-fir trees growing within oak canopies may be girdled to create snags for wildlife habitat and to prevent excessive damage to oaks during harvest.
- 2.4. All non-native trees such as cherry or hawthorn will be cut.
- 2.5. Other tree species, such as bigleaf maple and Oregon ash, will be evaluated on a case-by-case basis for removal. Generally, if these trees are competing with oaks of any age class, they should be removed.
- 2.6. Hardwood trees that are cut should be treated with herbicide on the stump to prevent sprouting.
- 2.7. In areas of dense young oak trees, thin to a target density of 40 to 50 trees per acre, retaining the trees with the largest and healthiest looking crowns.
- 2.8. Non-native species such as Himalayan blackberry, Scotch broom, and English hawthorn will be treated by a combination of herbicide application and mechanical mastication.
- 2.9. Native woody shrubs such as hazelnut will be evaluated on a case-by-case basis for removal to restore grassland conditions.
- 2.10. Mechanical mowing or mastication should be used to reduce fuel loading and prepare the site for the possible use of prescribed burning.
- 2.11. If practical, prescribed burning should be used as a cost-effective way to eliminate slash from the removal of unwanted trees and weeds; prescribed burning should be planned and executed in cooperation with experienced contractors and/or government agencies.
- 2.12. Following burning, seed with native grasses such as blue wildrye (*Elymus glaucus*).
- 2.13. Consult existing reference material on oak savanna restoration for additional guidance (Boyer 2006; Vesely and Tucker 2004; Hosten et al. 2006).
- 2.14. Oak savanna restoration areas must be monitored at least annually and follow-up vegetation management work, mainly herbicide application, may be necessary to prevent re-establishment of undesirable species.

## 3. *Oak woodland*

- 3.1. These are complex areas with a variety of current conditions. Most areas will be managed for mixed species including Douglas-fir, Oregon white oak, and bigleaf maple, but it is paramount that over the long-term, the oak component must be maintained and not lost to succession. The following general standards will apply:
- 3.2. Thinning will generally remove Douglas-fir and maple in order to release oak. In areas of dense oak, less vigorous oak can be removed to promote large crown development on remaining oak. Target density for residual varies from 100 to 200 trees per acre, based on tree size and site quality.
- 3.3. At least two oaks per acre will be designated as legacy trees and will be protected from any encroachment of Douglas-fir, maple, and cherry by tree

removal. The purpose of this designation is to allow the development of some very large-crowned trees within the woodland matrix.

- 3.4. At least two trees per acre will be designated as snags and retained during thinning. These trees will ideally have characteristics that will lead to snag development, i.e., broken top, thinning crown, conk rot, or other indication of decline. Such trees will be marked with a “W” for wildlife. These trees must be of average diameter or bigger.
- 3.5. During thinning, at least 3 logs per acre shall be left to contribute to large woody debris for wildlife habitat and soil development. The logs will ideally be culls of average diameter or larger for the stand. If no cull logs are available, lower quality merchantable logs will be left. Logs should be a minimum of 12 feet in length and at least 10 inches in diameter on the small end.
- 3.6. Existing skid trails should be used to the extent possible for all thinning operations.

#### 4. *Older forest*

- 4.1. Although much of the forest will be managed to ages of 70 years or older, there is a need for additional protections in areas where old forest conditions are the goal. Within such areas:
- 4.2. No new roads or permanent skid trails will be established.
- 4.3. Management activities will be limited to those that promote or enhance late-successional characteristics, including large old trees, snags, and down wood. Examples could include:
  - Snag creation in areas with few snags
  - Invasive species removal
  - Thinning to favor development of large trees

#### 5. *Riparian areas*

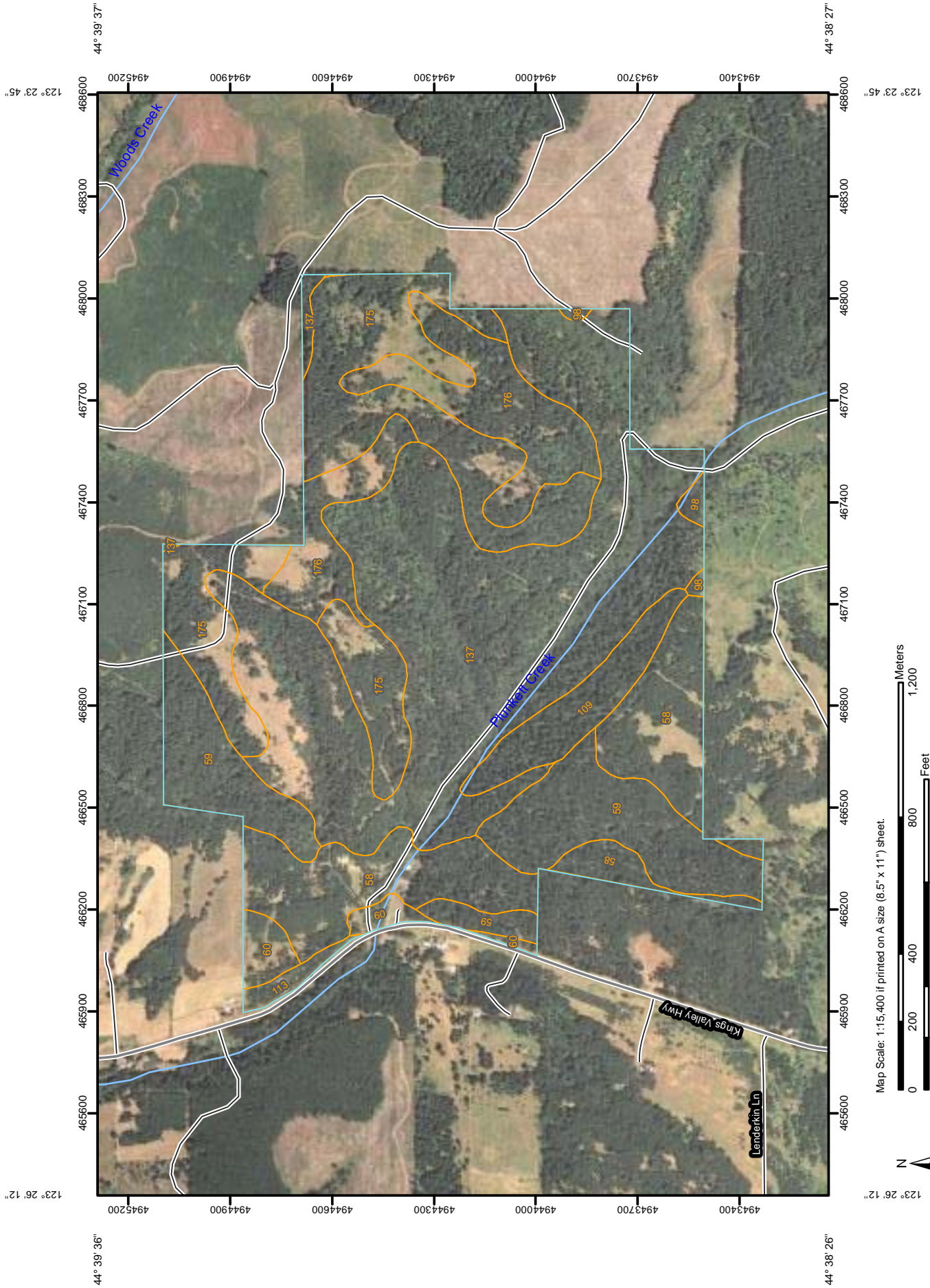
- 5.1. Management in riparian areas will be conservative, with consideration for expanding the designated riparian zone where needed to provide additional buffering of small stream systems. The following standards will guide stewardship of these resources.
- 5.2. Tree cutting will be limited to projects that have restoration objectives, such as removing non-native trees, or possibly thinning to promote large crown development.
- 5.3. The actual buffer area between managed forests or farm fields and the riparian zone varies from about 20 to 300 feet depending on topography and vegetation conditions.
- 5.4. No ground skidding will take place within this zone, except for purposes of placing logs in streams for restoration purposes. Cable yarding is allowed.
- 5.5. No livestock grazing is allowed.
- 5.6. Restoration work will be coordinated with state and federal conservation agencies such as the Oregon Department of Fish and Wildlife and the U.S. Fish and Wildlife Service. Restoration work may include:
  - Planting native trees, shrubs, and herbaceous plants
  - Stream channel work to enhance habitat for target species, including fish habitat and passage
  - Removal of non-native invasive plants

# Appendix F: Soils Maps

Soil Map—Benton County, Oregon

<b>MAP LEGEND</b>	<b>MAP INFORMATION</b>
<p><b>Area of Interest (AOI)</b></p> <p> Area of Interest (AOI)</p> <p><b>Soils</b></p> <p> Soil Map Units</p> <p><b>Special Point Features</b></p> <ul style="list-style-type: none"> <li> Blowout</li> <li> Borrow Pit</li> <li> Clay Spot</li> <li> Closed Depression</li> <li> Gravel Pit</li> <li> Gravelly Spot</li> <li> Landfill</li> <li> Lava Flow</li> <li> Marsh or swamp</li> <li> Mine or Quarry</li> <li> Miscellaneous Water</li> <li> Perennial Water</li> <li> Rock Outcrop</li> <li> Saline Spot</li> <li> Sandy Spot</li> <li> Severely Eroded Spot</li> <li> Sinkhole</li> <li> Slide or Slip</li> <li> Sodic Spot</li> <li> Spoil Area</li> <li> Stony Spot</li> </ul>	<ul style="list-style-type: none"> <li> Very Stony Spot</li> <li> Wet Spot</li> <li> Other</li> </ul> <p><b>Special Line Features</b></p> <ul style="list-style-type: none"> <li> Gully</li> <li> Short Steep Slope</li> <li> Other</li> </ul> <p><b>Political Features</b></p> <ul style="list-style-type: none"> <li> Cities</li> </ul> <p><b>Water Features</b></p> <ul style="list-style-type: none"> <li> Oceans</li> <li> Streams and Canals</li> </ul> <p><b>Transportation</b></p> <ul style="list-style-type: none"> <li> Rails</li> <li> Interstate Highways</li> <li> US Routes</li> <li> Major Roads</li> <li> Local Roads</li> </ul>
	<p>Map Scale: 1:15,400 if printed on A size (8.5" × 11") sheet.</p> <p>The soil surveys that comprise your AOI were mapped at 1:24,000.</p> <p>Please rely on the bar scale on each map sheet for accurate map measurements.</p> <p>Source of Map: Natural Resources Conservation Service            Web Soil Survey URL: <a href="http://websoilsurvey.nrcs.usda.gov">http://websoilsurvey.nrcs.usda.gov</a>            Coordinate System: UTM Zone 10N NAD83</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Benton County, Oregon            Survey Area Data: Version 9, Feb 5, 2010</p> <p>Date(s) aerial images were photographed: 7/18/2005</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>

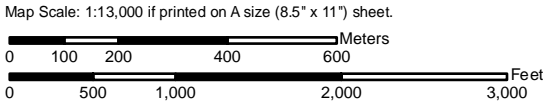
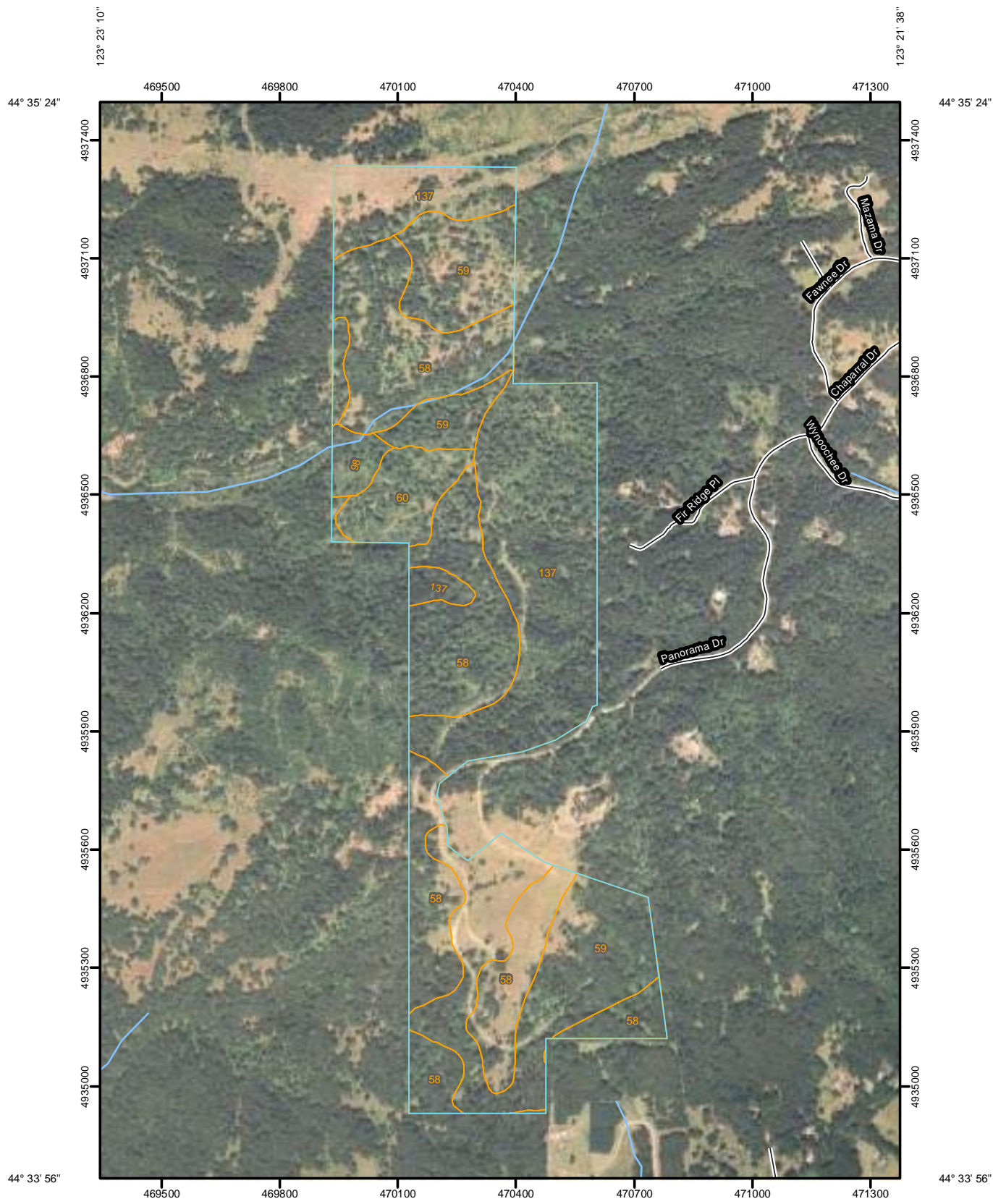
Soil Map—Benton County, Oregon



## Map Unit Legend

Benton County, Oregon (OR003)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
58	Dixonville-Gellatly complex, 12 to 30 percent slopes	84.5	13.6%
59	Dixonville-Gellatly complex, 30 to 60 percent slopes	78.3	12.6%
60	Dixonville-Gellatly-Witham complex, 2 to 12 percent slopes	11.5	1.8%
98	Jory-Gelderman complex, 12 to 30 percent slopes	3.3	0.5%
109	MacDunn-Price-Ritner complex, 60 to 90 percent slopes	23.1	3.7%
113	McAlpin silty clay loam, 0 to 3 percent slopes	4.2	0.7%
137	Price-MacDunn-Ritner complex, 30 to 60 percent slopes	242.5	38.9%
175	Witzel-Ritner complex, 12 to 30 percent slopes	113.8	18.3%
176	Witzel-Ritner complex, 30 to 60 percent slopes	61.9	9.9%
<b>Totals for Area of Interest</b>		<b>623.1</b>	<b>100.0%</b>

Soil Map—Benton County, Oregon





## Map Unit Legend

<b>Benton County, Oregon (OR003)</b>			
<b>Map Unit Symbol</b>	<b>Map Unit Name</b>	<b>Acres in AOI</b>	<b>Percent of AOI</b>
58	Dixonville-Gellatly complex, 12 to 30 percent slopes	100.6	35.6%
59	Dixonville-Gellatly complex, 30 to 60 percent slopes	75.6	26.8%
60	Dixonville-Gellatly-Witham complex, 2 to 12 percent slopes	13.4	4.8%
98	Jory-Gelderman complex, 12 to 30 percent slopes	4.7	1.7%
137	Price-MacDunn-Ritner complex, 30 to 60 percent slopes	88.0	31.2%
<b>Totals for Area of Interest</b>		<b>282.3</b>	<b>100.0%</b>

Soil Map—Benton County, Oregon



## Map Unit Legend

Benton County, Oregon (OR003)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
18	Bellpine-Jory complex, 12 to 20 percent slopes	11.8	9.4%
19	Bellpine-Jory complex, 20 to 30 percent slopes	55.1	43.8%
20	Bellpine-Jory complex, 30 to 60 percent slopes	34.9	27.8%
38	Chehalis silt loam, 0 to 3 percent slopes	0.0	0.0%
94	Jory silty clay loam, sedimentary bedrock, 2 to 12 percent slopes	23.9	19.0%
<b>Totals for Area of Interest</b>		<b>125.8</b>	<b>100.0%</b>

## Appendix G: Forest Inventory Reports

A forest resources inventory was conducted in March through June of 2010, that included 367 measurement plots systematically located across 8 forest vegetation types. A concentric set of nested plots was used: a variable radius plot to measure trees  $\geq 5.5$ " dbh; a 0.01 acre plot (11.78' radius) for trees 4' tall to 5.4" dbh; and a 0.05-acre plot (16.65' radius) to measure snags and invasive species. Two 33' transects were used to measure woody debris.

Each property was cruised separately, using consistent forest type designations. This allowed for greater accuracy for a given number of measurements. The error of the cruise for board foot volume (90% confidence limit) was 3.3% for Beazell Memorial Forest, 9.1% for Fitton Green, and 9.2% for Fort Hoskins.

Inventory data were processed using FSP forest projection and modeling software. Data can be analyzed and summarized in a wide variety of ways. Reports of total timber volume and stocking statistics follow. Other reports are available from Trout Mountain Forestry or Benton County.

**Catalog - Merch Species, Volumes Report by Flag**  
**Benton County - Beazell**

Page: 1 of 1  
 3/2/2011

*\*Only Trees over Minimum Merch DBH*

Flag	Site	Area	Sp	QDbh	Htt	Per Acre						Totals		
						Basal	Stems	Logs	CF/Log	Bf/Log	NetCF	NetBF	CUNITS	NetMbf
1	0	516.2												
			BC	24.0	94	0	0	0	30	126	5	22	27	11
			BM	14.6	73	22	19	39	8	32	322	1,253	1,662	647
			DF	16.9	92	137	88	171	25	112	4,254	19,069	21,959	9,843
			GF	18.3	98	15	8	18	29	132	504	2,335	2,604	1,205
			RA	13.4	77	4	4	9	10	43	89	370	458	191
			WH	25.5	131	0	0	0	32	155	9	45	48	23
			WO	15.4	60	9	7	12	11	43	140	533	725	275
				<b>16.5</b>	<b>87</b>	<b>187</b>	<b>126</b>	<b>249</b>	<b>21</b>	<b>95</b>	<b>5,324</b>	<b>23,628</b>	<b>27,483</b>	<b>12,197</b>
<b>Sum:</b>		<b>516.2</b>		<b>16.5</b>	<b>87</b>	<b>187</b>	<b>126</b>	<b>249</b>	<b>21</b>	<b>95</b>	<b>5,324</b>	<b>23,628</b>	<b>27,483</b>	<b>12,197</b>



## Summary Listing of Stands

*Benton County - Beazell*

Stand ID	Merchantable Statistics / Acre							Totals		
	#	Area	Dbh	Stems	Basal	Cord	Tons	Cubic	Cords	GrnTons
8	18	15.5	173	227	70	192	5,864	1,235	2,951	103,801
9	33	16.2	182	260	98	264	8,566	3,219	7,561	282,671
10	7	10.8	404	256	60	164	5,057	418	998	35,400
11	69	12.0	268	211	65	178	5,480	4,441	10,605	375,408
12	13	18.5	126	234	80	220	5,615	1,016	2,426	71,308
13	11	12.4	369	310	94	257	8,346	1,063	2,523	94,307
14	49	10.6	353	215	66	180	5,753	3,222	7,676	282,450
15	16	11.2	309	210	49	133	4,305	766	1,830	68,022
16	32	11.8	232	175	64	177	5,531	2,077	4,960	178,654
18	33	18.8	116	223	89	245	7,583	2,949	7,042	251,754
20	20	11.7	256	190	52	142	4,378	1,011	2,416	85,818
21	17	7.9	384	129	14	39	1,266	239	571	21,138
2	61	15.3	156	198	69	189	5,874	4,208	10,049	359,515
3	12	16.4	116	170	58	160	5,304	680	1,625	62,059
4	22	11.6	252	186	42	116	3,849	928	2,217	84,678
5	5	10.0	515	282	101	278	9,213	485	1,158	44,222
6	55	12.7	209	183	62	170	3,982	3,409	8,142	219,428
7	45	15.1	105	131	42	116	3,413	1,880	4,494	151,890
<b>Total:</b>	<b>516</b>							<b>33,248</b>	<b>79,245</b>	<b>2,772,522</b>

**Catalog - Merch Species, Volumes Report by Flag**  
**Benton County - Fitton Green**

Page: 1 of 1  
 3/2/2011

*\*Only Trees over Minimum Merch DBH*

Flag	Site	Area	Sp	QDbh	Htt	Per Acre						Totals		
						Basal	Stems	Logs	Cf/Log	Bf/Log	NetCF	NetBF	CUNITS	NetMbf
1	0	253.7												
			BM	14.7	55	12	10	19	6	19	117	372	296	94
			CH	13.0	57	1	1	1	6	20	8	26	21	7
			DF	14.4	73	34	31	46	19	73	851	3,336	2,158	846
			GF	11.9	53	6	7	6	17	59	107	379	272	96
			OA	18.3	71	1	1	2	14	57	25	102	64	26
			RA	14.4	66	1	1	2	13	48	25	95	64	24
			WO	15.1	60	30	24	48	8	30	400	1,408	1,015	357
				<b>14.5</b>	<b>64</b>	<b>86</b>	<b>75</b>	<b>124</b>	<b>12</b>	<b>46</b>	<b>1,533</b>	<b>5,719</b>	<b>3,890</b>	<b>1,451</b>
<b>Sum:</b>		<b>253.7</b>		<b>14.5</b>	<b>64</b>	<b>86</b>	<b>75</b>	<b>124</b>	<b>12</b>	<b>46</b>	<b>1,533</b>	<b>5,719</b>	<b>3,890</b>	<b>1,451</b>



## Summary Listing of Stands

*Benton County - Fitton Green*

Stand ID	Merchantable Statistics / Acre							Totals		
	#	Area	Dbh	Stems	Basal	Cord	Tons	Cubic	Cords	GrnTons
1	57	8.1	207	74	14	39	1,009	800	1,913	57,505
2	36	8.6	302	122	26	73	1,852	954	2,276	66,674
3	63	5.5	370	61	10	29	818	664	1,590	51,837
5	28	9.4	320	154	34	92	2,969	941	2,233	83,141
6	46	10.9	222	144	29	81	2,288	1,358	3,235	105,466
7	23	6.9	480	124	21	59	1,509	496	1,190	35,003
<b>Total:</b>	<b>254</b>							<b>5,213</b>	<b>12,438</b>	<b>399,626</b>

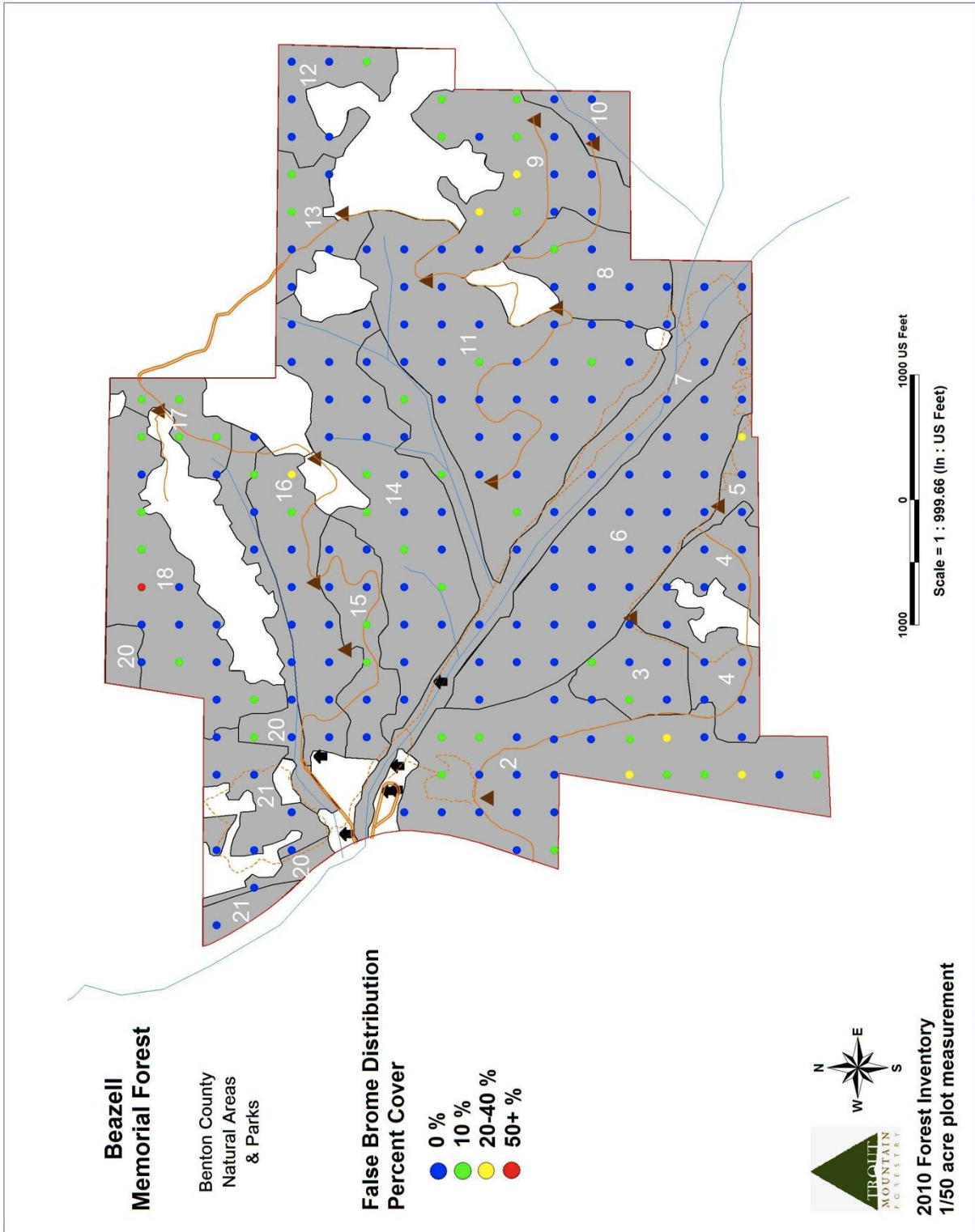






# Appendix H: False-brome Occurrence

Note: No False-brome was recorded at Fort Hoskins

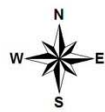


# Fitton Green Natural Area

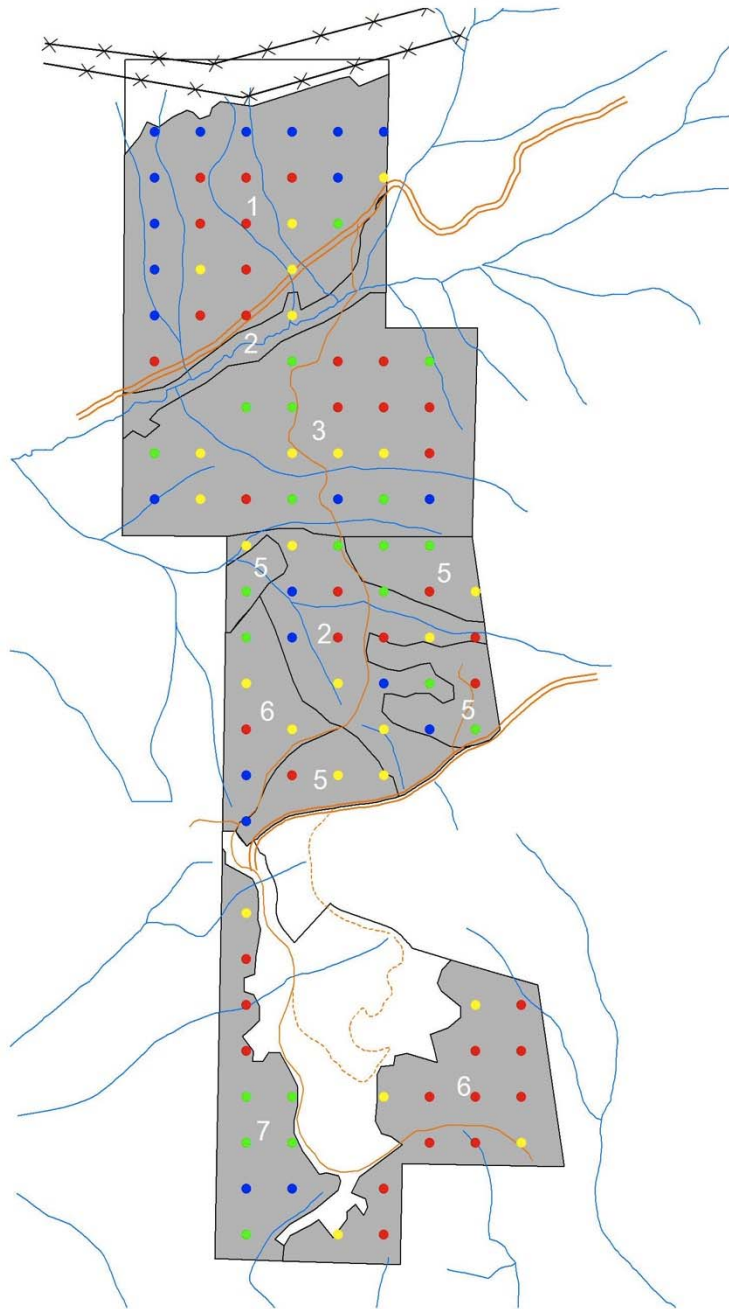
## Benton County Natural Areas & Parks

### False Brome Distribution Percent Cover

- 0 %
- 10 %
- 20-40 %
- 50+ %



2010 Forest Inventory  
1/50 acre plot measurement



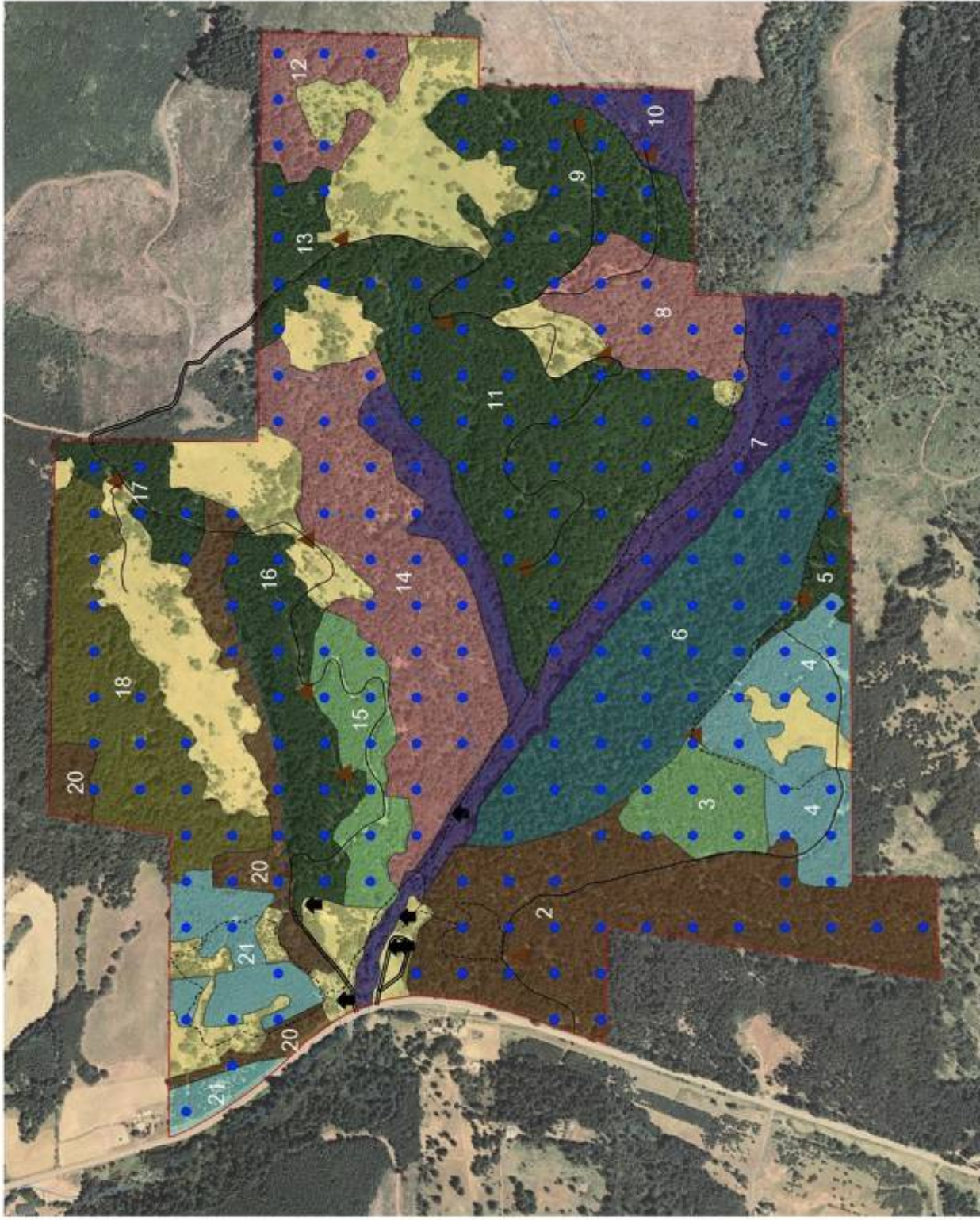
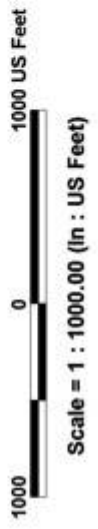
1000 0 1000 US Feet

Scale = 1 : 999.66 (In : US Feet)

# Bezell Memorial Forest

Benton County  
Natural Areas  
& Parks

- Grid Points
- Park Boundary
- Streams
- Trails
- Roads (by TYPE)
- 'Dirt'
- == 'Rock'
- ♣ Buildings
- ▲ Log Landing
- STANDS
- 'Conifer, 25-35 yrs'
- 'Conifer, 36-55 yrs'
- 'Conifer, <25 yrs'
- 'Conifer, >55 yrs'
- 'Conifer/hardwood'
- 'Grass'
- 'Hardwood'
- 'Mature mixed forest'
- 'Oak/conifer'
- 2005 Orthophoto

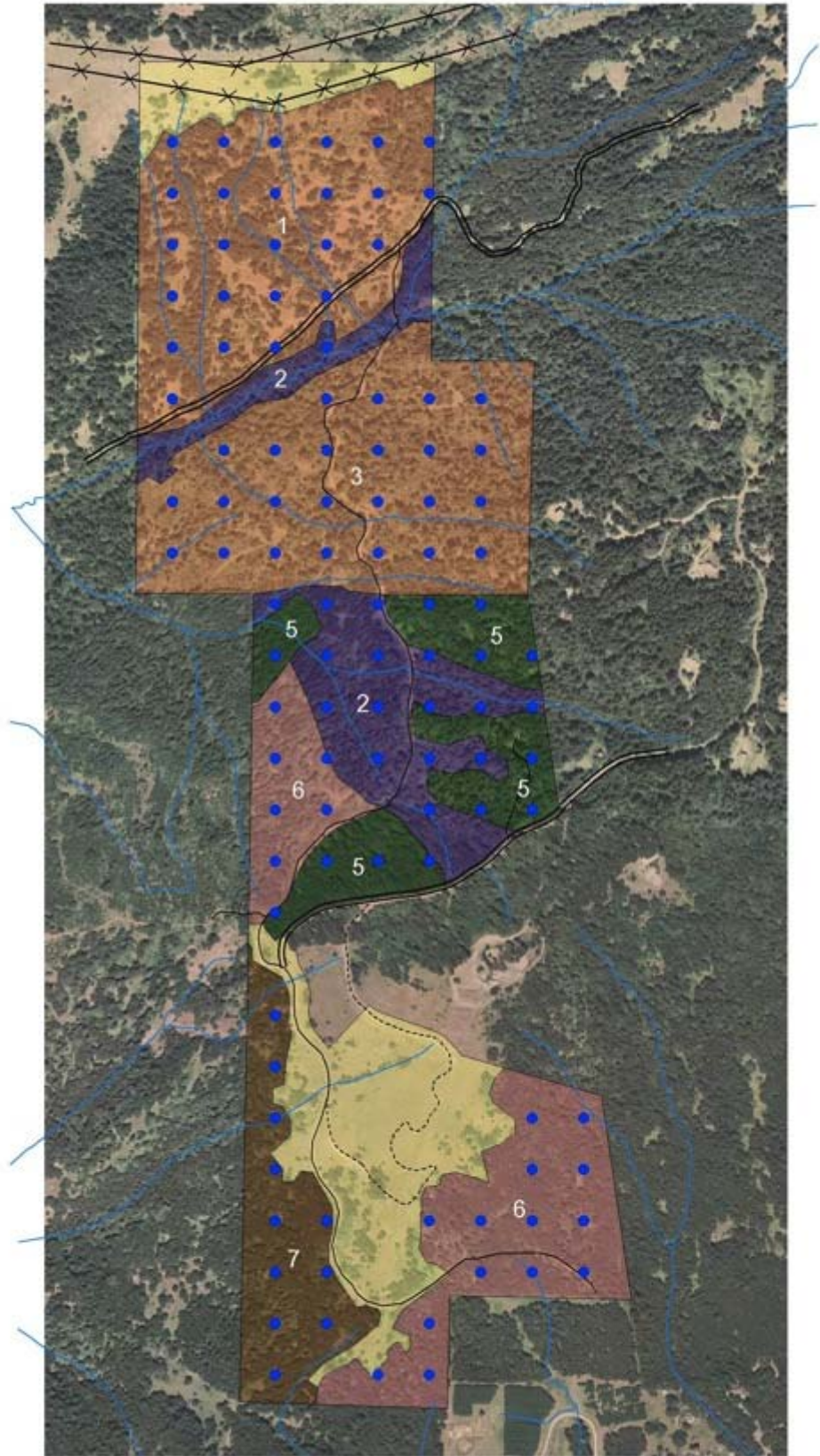


M. Miller  
02-24-2011

# Fitton Green Natural Area

## Benton County Natural Areas & Parks

- Grid Points
- roads(by Type)
  - 'Dirt'
  - == 'Rock'
- trails
- ← POWER LINES
- water
- STANDS**
  - 'Conifer, 36-55 yrs'
  - 'Conifer/hardwood'
  - 'Grass'
  - 'Hardwood'
  - 'Oak/conifer'
  - 'Oak/young conifer'
- 📷 2005 Orthophoto



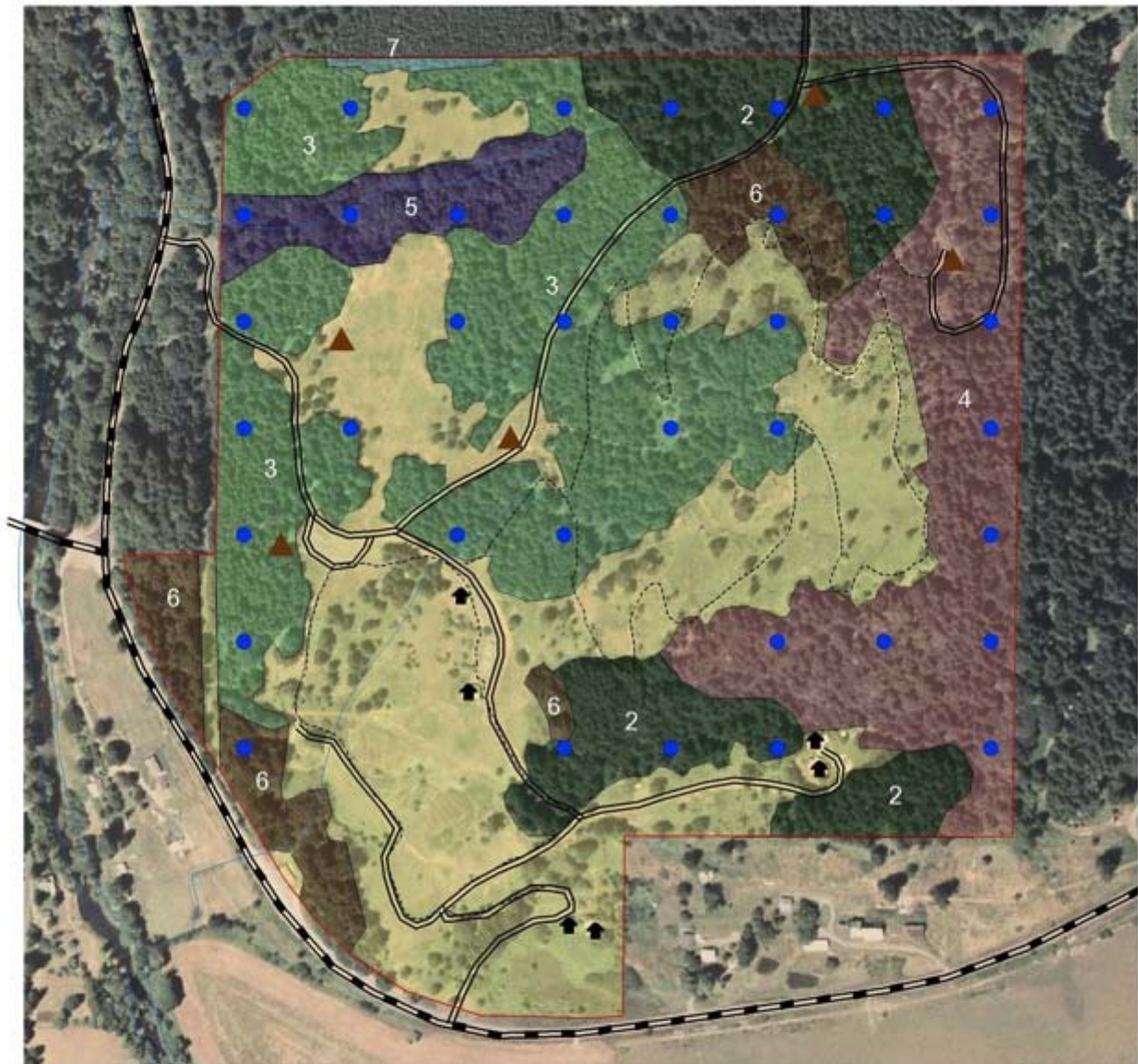
M. Miller  
02-24-2011

1000 0 1000 US Feet

Scale = 1 : 1000.00 (In : US Feet)

# Ft Hoskins Historic Park

## Benton County Natural Areas & Parks



- Park Boundary
- Grid Points
- water
- trails
- ▲ Buildings
- ▲ Log Landing
- Roads
- STANDS**
- 'Conifer, 25-35 yrs'
- 'Conifer, 36-45 yrs'
- 'Conifer, <25 yrs'
- 'Conifer/hardwood'
- 'Grass'
- 'Hardwood'
- 'Oak/conifer'
- 2005 Orthophoto



500                      0                      500 Feet

Scale = 1 : 500.00 (In : Feet)

**M. Miller**  
02-24-2011