HOOD RIVER COUNTY TREE FARM

FOREST MANAGEMENT PLAN

For

Hood River County Forestry Department
918 18th Street, Hood River, OR 97031
(541) 387-6888

View: South Area Tree Farm

Prepared July 7th, 2015 under authorization of
Hood River County Board of Commissioners
By

Edwin Baird
Creative Resource Solutions, LLC
PO Box 676, Union, OR 97883
(541) 562-1099
ebforestry@gmail.com

Irene K. Jerome
Jerome Natural Resource Consultants, Inc
408 SE Hillcrest Rd, John Day, OR 97845
(541) 620-4466
ijeromejnrc@gmail.com

LANDOWNER, PROPERTY & PLAN INFORMATION
PREFACED SUMMARY of FINDINGS
for the
HOOD RIVER COUNTY TREE FARM 10-YEAR PLAN; 2015-2025

Watershed:	**Hood River**
Parcel Size:	**31,117 Acres**
Production Forest:	**28,914 Acres**
Fire Protection District:	**Central Oregon District, Oregon Dept. of Forestry**
Elevation:	**1,000 to 4,000 feet (range)**
Forest Seed zone:	**661**

Hood River County's primary purpose in owning and managing Hood River County forest lands is for the production and sale of timber. It is recognized that the forest landscape is a fluid environment, ever changing, and future outcomes based on present information are subject to some degree of variation. While most management practices will be realized as anticipated over time with defined outcomes, there remains the basic need to apply adaptive management as current conditions arise.

The Hood River Board of County Commissioners authorized the development of this Tree Farm Plan for the county forest with oversight from the Hood River County Forest Manager.

Hood River County
Overview Map

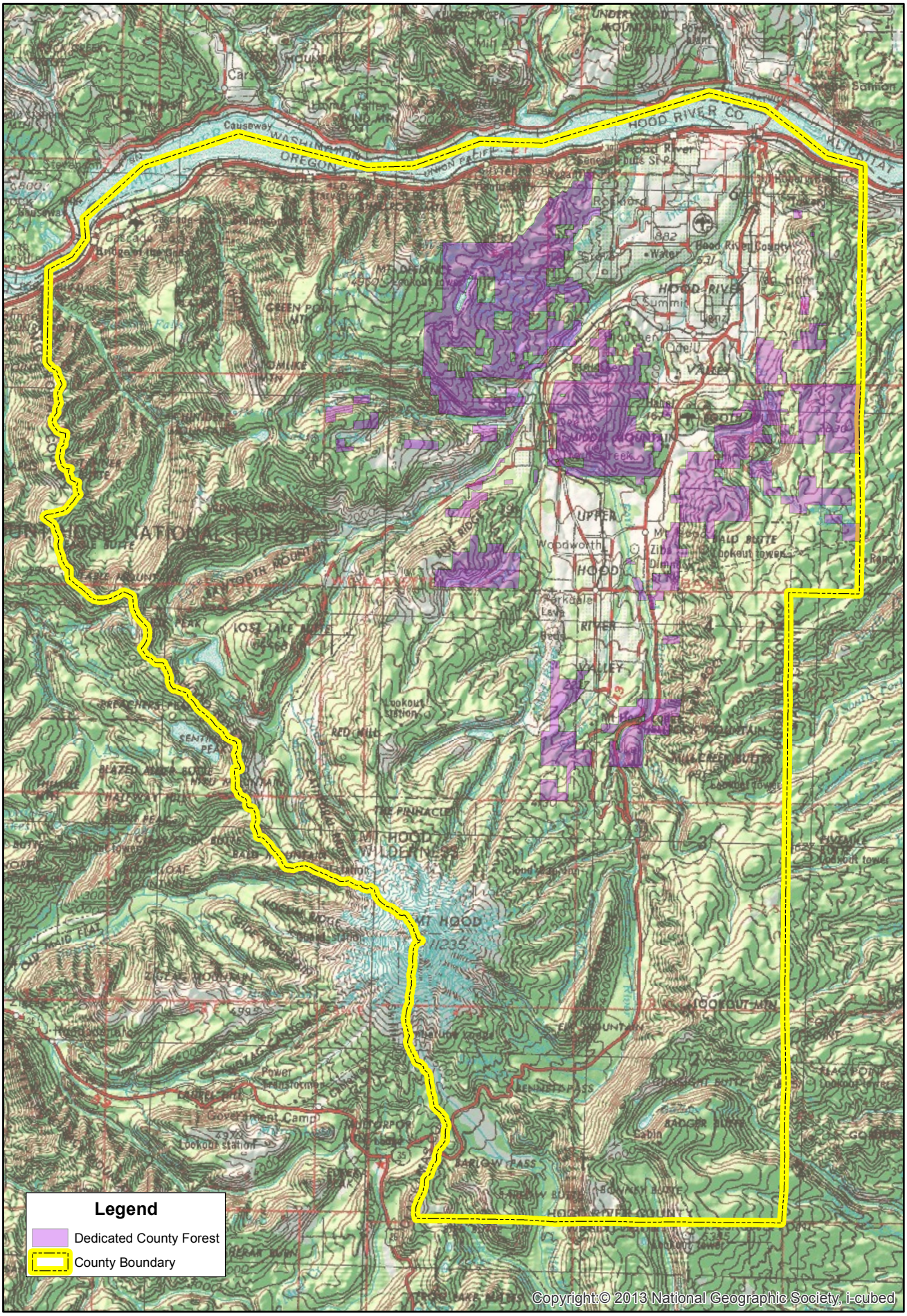

TABLE of CONTENTS

INTRODUCTION 1

PROPERTY DESCRIPTION 1
- **Background & History** 1
  - **General Description** 2
  - **Terrain and Topography** 2
  - **Social Context** 2
  - **Economic Resource** 3
  - **Current Uses** 3
  - **Landscape Context** 3

GOALS & ACTIONS 3
- **Timber Production** 4
- **Recreation** 4
- **Natural Resources** 4
- **Public Relations** 4

DESIRED FUTURE CONDITION 4

HOW TO USE THIS PLAN 5

WHERE TO GET ASSISTANCE 5

SOILS 6
- **Soils Information** 6
- **Soil Type Description Table** 7
- **Soil Management Problems** 7
- **Management Recommendations** 8

AIR QUALITY 8
- **Management Recommendations** 9

WATER RESOURCES 9
- **Hydrology of Hood River Basin** 9
- **Riparian Vegetation Values** 10
- **HRC Forest Streams** 10
- **HRC Stream and Riparian Problems** 11
- **Management Recommendations** 11

FOREST VEGETATION 11
- **Timber Production Sites** 12
  - **Douglas-fir Type** 12
  - **Ponderosa pine Type** 13
  - **Mixed Conifer Type** 13
  - **General Timber Management & Harvest Schedule** 14
  - **Management Recommendations** 15
  - **Silvicultural Opportunities** 16

NON-COMMODITY EMPHASIS SITES 16
Conservation Sites 17
Special Use Lands 17
Forest Forage Resource 17
High Conservation Forests 17
Oregon White Oak Woodland 18
Western Red Cedar 19

INTEGRATED PEST MANAGEMENT 19
Conifer Pests & Pathogens 19
Douglas-fir 20
Ponderosa Pine / Western White Pine / Lodgepole Pine 21
Western larch 22
True Firs / Western Hemlock 22
Western Red Cedar 22

NOXIOUS WEEDS 22

FISH & WILDLIFE 23
Fishery 24
Wildlife 25
Desired Wildlife Species and Habitats 25
Safe Harbor Agreements 25
Threatened and Endangered Species 25
Rare, Sensitive & Other Unique Resource Sites 25
Wildlife Related Damage & Problem Wildlife 26
Browse Damage 26
Root Damage 26
Tree Girdling 26

ROAD ACCESS & SECURITY 27
Management Recommendation 28
Harvest Systems 28

WILDFIRE PROTECTION 29
Management Recommendation 29

RECREATION 30
Trails 30

AESTHETICS 31

EDUCATION 31

CULTURAL RESOURCES 31

BUSINESS MANAGEMENT 32
County Policy & Practice 32
Land Exchange & Acquisition 32

Marketing Opportunity 33
Sort Sales – Washington DNR Model 33
Small Wood Products Opportunities 33
Chip Yard Opportunities 34
Woody Biomass for Electricity Production 34
Other Biomass Utilization Opportunities 35
Small Diameter Thinning Opportunities 35
Animal Bedding 35
Marketing Recommendation 36

REGULATORY COMPLIANCE 36

PAST ACTIVITIES 38

PROPOSED ACTIVITIES 38

CONCLUSION 39

APPENDIX

APPENDICES

Appendix A - Glossary of Terms	**40**
Appendix B - Common Trees of Eastern Oregon	**48**
Appendix C – Log Markets & Forest Product Associations	**49**
Appendix D – Hood River County Forest History	**51**
Complete Reference List	**53**

MAPS

Parcel Cover Type Map
Parcel Resource Map West
Parcel Resource Map South
Parcel Resource Map Middle Mountain
Parcel Resource Map East
Parcel Soil Type Map
Oregon Tree Farm System Parcel Map
Hood River County Precipitation Map

COUNTY POLICY, CODES & DOCUMENTATION

County Codified Forest Management Policy
Trail Ordinance
Trail Management Plan
Trail Master Plan

STEWARDSHIP PLAN SIGNATURE PAGE

INTRODUCTION

HOOD RIVER COUNTY TREE FARM
FOREST MANAGEMENT PLAN

INTRODUCTION

The Hood River County (HRC) Forestry Department manages 31,177 acres of land in HRC. The primary purpose in owning and managing these forest lands is for the production and sale of timber to provide a consistent and sustainable stream of revenue to the county. The initial forest management plan for the county was developed and adopted in 1972 and was subsequently revised and updated in 1987 and 2001. In 2002 the HRC Forestry Department prepared a Tree Farm Plan for County forests to meet criteria for certification through the American Tree Farm System. The terms HRC Forest, HRC Tree Farm and Tree Farm are used interchangeably throughout this document.

The Hood River County Board of Commissioners seeks a revision of the HRC Forest Management Plan approximately every ten years. Since the 2001 management plan revision, numerous changes have taken place on the HRC Forest including land exchanges, participation in the American Tree Farm System, and adoption of the trail ordinance. Many of these changes will be incorporated into the updated plan as well as new components required by the American Tree Farm System (ATFS). To be a certified Tree Farm, the county forest must meet the American Forest Foundation's (AFF) 2015 – 2020 Standards of Sustainability for Forest Certification which promote the health and sustainability of America's forests. The standards are designed as a tool to help woodland owners be effective stewards of the land and are based on international sustainability metrics and North American guidelines for sustainable forest management. These standards serve as the basis for the ATFS third party certification program.[i]

Policies for managing the county forest are based on the Board of Commissioners Forest Management Policy Statement, the Administrative Code, and applicable statutes. The timber program is guided by the principles of sustained yield and even flow and is managed to provide a sustained revenue contribution for Hood River County government. The production of timber by the HRC Forestry Department is consistent with best management practices designed to protect soils, water, fish and wildlife habitat, as well as enhance recreational opportunities and other forest values.

PROPERTY DESCRIPTION

Background and History

HRC acquired the majority of forestland it currently owns through tax foreclosures during the early 1900s. The forestland was dedicated "county forest" in May of 1945 with a Cooperative Agreement signed between the U.S. Department of Agriculture and the Hood River County Commissioners. In 1951 the Board of Commissioners rededicated the forestland as county forest. On April 6, 1955 the HRC Board of Commissioners and the U.S. Forest Service entered into a "forest management agreement" which was subsequently terminated on July 1, 1962.

Firewood and fence posts were the first forest products sold by the county in 1936. Eventually a timber products program was developed in addition to programs for other products such as Christmas trees, shake bolts, fence rails, rock, firewood, cones and standing timber. The U.S.

Forest Service established an allowable cut based on a system used within their agency using a 100 year rotation, which was included in the plan for the entire Mt. Hood National Forest. HRC has managed these forest lands since 1962 (for more detailed history refer to Appendix D).

General Description

HRC Forest ownership is widely scattered although past land exchanges for consolidation have taken place and more are planned for the future. The county owns approximately 31,177 acres of dedicated county forest land. Of those acres, 1,379 are grass-oak savannah, 343 are exposed soil and rock, 201 are rivers and waterways, 180 are designated as county parks and the county landfill, and 160 are power line rights-of-way. Overall 28,914 acres are estimated to be available for timber production.

Elevation of the HRC Tree Farm ranges from 1,000 to 4,000 feet and includes two climatic zones. The west side includes about 43 percent of the ownership and is influenced by moderate temperatures with early fall and late spring rains which provide for good conifer tree growth. The east side of the Tree Farm is a semi-arid humid transition zone characterized by winters that can be very cold with strong winds and summers that are usually hot and dry. Due to precipitation, elevation and aspect there are three distinct growing areas in HRC (reference Precipitation Map in Appendix). The west side is considered a medium growing site for Douglas-fir; the eastern and middle parts of the county are considered transition zones of Douglas-fir, White Fir and Ponderosa Pine with lower growing sites; and the south side supports higher elevation mixed conifer sites with low to medium productivity, occupied by Douglas-fir, various true firs, pines and other coniferous species.

Terrain and Topography

Generally the topography on the west side of the HRC Forest is rugged and steep interspersed with some moderate slopes which contain many ridges and swales. Ridges tend to run west to east and the forestland is characterized by south to southeast aspects.

On the east side of the Tree Farm slopes are largely gentle (less than 20 percent slope) to moderate (20 to 40 percent slope) intermingled with some areas that are extremely rugged and steep. Ridges on the east side tend to run southeast to northwest and the forestland has a west to southwest aspect.

Social Context

Hood River County's population has experienced significant growth over the last two decades. In 2000 the county experienced a 21 percent increase in growth over 1990 and another 9 percent increase thru 2010. U.S. census data indicates that the upward population trend is continuing in the county. The close proximity to Portland has influenced the influx of new residents who are seeking a place to live, work and play. Agriculture, including the forest products industry, is the principal industry in the county although recreation and tourism have been steadily increasing and the demographics of the county population are changing.[ii]

Of special relevance to the HRC Forestry Department is the dramatic increase in the development and use of trails on the HRC Forest. The types of trail users include mountain bikes, quads and side by sides, motorcycles, four by fours, equestrians, hikers and runners. While the Hood River area has achieved an international reputation as a mountain biking destination, the maintenance and management of these trails has imposed a financial burden on the county as the extremely popular trail systems on the HRC Forest provide no direct revenue to the General Fund.

Economic Resource
The sale of raw forest products by the HRC Forestry Department is a critical source of revenue for the county, contributing about 33 percent of the general fund revenue annually through sustainable harvest of their forest lands. Historically, harvests from the Mt. Hood National Forest provided substantial funding for county roads and schools by providing 25 percent of the annual contract value sold. However, changes in federal forest management have all but eliminated that source of revenue (recognizing that the government has provided some relief in the past.)

A comparison of one year in each of the past five decades highlights this issue:

Fiscal Year	Mt. Hood National Forest Revenue[iii]	Hood River County Forest Revenue[iv]
1974	$1,027,631	$ 460,709
1984	$ 756,419	$ 24,057
1994	$ 180,501	$2,452,666
2004	$ 0	$6,222,396
2014	$ 0	$3,612,897

The importance of a consistent flow of revenue to the county from the HRC Forest is critical. The increasing population and burgeoning recreation industry has led to the associated increased needs for county services.

Current Uses
The primary use of the HRC Tree Farm is the production of timber on an even flow sustainable basis which provides revenue for the county. However numerous other special forest products are collected for personal and commercial uses on the county Forest. These special products include firewood, posts, poles, rails, mushrooms, boughs, plants, cones, and ornamental rock. As these special products have had marginal value to date, the development and management of them for financial revenue has been limited. The Tree Farm provides numerous recreation opportunities and is popular for hiking, camping, hunting, cross country skiing, bike riding and OHV use.

Landscape Context
A landscape is defined as "a spatial mosaic of several ecosystems, landforms, and plant communities across a defined area irrespective of ownership or other artificial boundaries and repeated in similar form throughout".[v] Landscapes are often used for coarse grain analysis. Landscapes are systems that can be divided or decomposed into a hierarchy of nested geographic different sized units. HRC Forest lands are scattered and fragmented across the landscape and analysis on a landscape basis would require inclusions of multiple ownerships including private holdings, industrial forests and U.S. Forest Service lands.

---

[i] American Tree Farm system
ii Rural Living Handbook, Hood River County
[iii] Forest Service data provided by Timber Data Company, Eugene, Oregon
[iv] Data from Hood River County fiscal records.
[v] Society of American Foresters, Dictionary of Forestry, June 2008

GOALS & ACTIONS

The primary goal of HRC is to manage the Tree Farm to benefit Hood River County citizens through revenue to county government derived from the sale of forest products managed in a

sustainable manner in compliance with applicable laws.[vi] The objective is to comply with all state and federal protection standards. Forest management activities of the past and present have been designed to meet or exceed standards and this objective is intended to continue on future projects. The actions taken to meet this goal will provide for biodiversity and integrity of resources found on or near county lands. By making provision to sustain all resources, this inclusive ecosystem management approach ensures that all resources are considered, potentially improved, and maintained for the benefit of all forest users.

The basic objectives of the HRC Forestry Department are as follows:

Timber Production
Maintain sustained long-term revenues to HRC through active silvicultural practices that optimize timber production. Prudently market the timber resource and increase management efficiency to further maximize revenue by using the latest science available and by using best management practices as defined by the ATFS and regulatory agencies. Maintain forest health through active management of forest pests and diseases in a timely manner to ensure continued production of timber.

Recreation
Provide recreational opportunities on the HRC Forest without compromising the county's ability to manage the tree farm.

Natural Resources
Provide, protect, retain and manage for the broad range of natural resources found on the HRC Tree Farm forests. These resources include, but are not limited to wildlife, soils, water, timber and air quality. Provision for these resources will be made through management practices that comply with federal, state and local regulation. Protection of these resources will be realized by meeting or exceeding current regulatory standards, through policy development as necessary, and through education of forest user groups. Retention of these resources may be realized through implementation of the above mentioned management practices using the best available science in a timely manner.

Public Relations
Continue to educate the public on how a working forest functions. Minimize conflict with user groups and reduce negative impacts to forest resources through public meetings, advertisements, bulletins and field trips.

DESIRED FUTURE CONDITION

Successful implementation of this management plan will result in a healthy diverse forest that provides a consistent long term revenue stream to the county. The core natural assets will be stable and resilient to the effects of pests, pathogens and fire. A well maintained system of roads and trails will provide for a variety of recreation activities that are enjoyed and performed in an environmentally responsible manner by the user groups. An informed public will be knowledgeable and supportive of forest management activities.

HOW TO USE THIS PLAN

This plan is intended to be a guide for the HRC Forestry Department to use in reaching the desired level of forest management on the tree farm. It also provides information to manage other resource values found on the parcel. The county has the final decision as to what management practices will be carried out and the timing of those activities. The goals listed above are identified and addressed by specific resource areas in this plan.

The forestland has been inventoried. The text section entitled "*Forest Vegetation*" includes a brief summary of the management recommendations. Descriptions of each soil type are included and described in detail. The appendices of this plan contain reference material and detailed descriptions of the information contained in this plan. In addition, it contains general background information on several forestry-related subjects. Agencies capable of providing assistance and additional information for specific resource areas and the phone numbers are included below.

WHERE TO GET ASSISTANCE

There are numerous agencies that provide technical assistance to woodland owners on a wide variety of forest topics. Technical assistance is available from several state or federal agencies and from related resource professionals. These agencies are partners in providing assistance and often share personnel and information resources.

Oregon Department of Forestry (ODF)
The local ODF Unit office is in The Dalles, Oregon at: (541) 296-4626 or
http://www.oregon.gov/ODF/centraloregon/pages/index.aspx
In addition to guiding forest practices compliance, this state agency provides advice and information on the management of forest resources and their potential including resource assessments related to forest health issues, forest engineering assistance, and education on forestry Best Management Practices.

Oregon Department of Fish & Wildlife (ODFW)
The local field office is located in The Dalles, Oregon (541) 296-4628 or
http://www.dfw.state.or.us/
This state agency provides guidance for conservation and promotion of fish and wildlife species found in Hood River County.

USDA Natural Resource Conservation Service (NRCS)
The local service center is located in The Dalles, Oregon (541) 298-8559 or www.nrcs.usda.gov.

OSU Extension Service
The local office is located in Hood River, Oregon (503) 655-8631 or
http://www.extension.oregonstate.edu/hoodriver/forestry

[vi] *Section 21A.0 – Forestry Department Policy*

SOILS

Soils are among the fundamental elements crucial to the health and well-being of forests. The care, protection, and enhancement of the soil resource is imperative to maintaining productive and resilient ecosystems. A variety of soil types are present on the HRC Tree Farm.

Soils Information

The soil survey for Hood River County describes the seventeen soil types found on the Tree Farm.[vii] The following is a general description of the soil types, productivity, and limitations of the soils found on the Tree Farm.

Most of the soil types are forest soil types or support forest cover types. The dominant forest soil type is Bins-Bindle (Map symbols 3E, 3F). See *Soil Type Description Table* and *Soils Map* for illustration.

The growth potential is high on most of the Tree Farm soil types and Douglas-fir is listed as the best tree species to grow on most of the Tree Farm soils. Less commonly recommended trees to grow on the Tree Farm soils are Ponderosa Pine and Western Red Cedar. Ponderosa Pine is suitable particularly where growing sites are warm / dry or where soil pathogens limit the ability to grow susceptible tree species. Western Red Cedar is more suitable on warm moist sites and also considered more resistant to many soil pathogens.

The soil mapping unit limitations and mixing of soil types dictate that the soil survey be used as a guide. No management approach trumps field surveys for determining actual site capability and species suitability when planning reforestation activities.

The basic component of all the soils on the Tree Farm is loam with mixed degrees of silt, cobble or stones. These variants of a silt loam or a stony silt loam, mean they are well drained but do not all have a high moisture holding rate. Erosion hazard is typically moderate on slopes less than 30 percent and high on slopes over 30 percent due to the potential for moisture runoff to carry fine material in the topsoil down slope. Erosion during dry periods is higher than usual where the silt component is higher. Maintaining ground cover and preventing exposure of bare mineral soil is the best way to mitigate erosion on all soil types. Mass sliding and rill erosion is common to all soil types found on slopes exceeding 20 percent, particularly where moisture holding capacity is lower. Maintaining ground cover in the form of live vegetation or woody debris on steep slopes will also help minimize erosion where the potential for this is high. Compaction is higher during periods (winter and spring) of high soil moisture for all soil types. Ground disturbing activities should be limited to dry or moist soil conditions to minimize negative impacts. Soil compaction aids tree pathogens by stimulating root and heart rots and minimizing soil moisture-holding capacity.

Soil Type Description Table

Soil Name / (Map Unit Number)	Percent Coverage by Soil Type	Range of Slope in %	Soil Depth (inches)	Erosion Hazard	Common Use / Type [1)]
Bald (1E, 2F)	12	5-45, 45-75	20-40	Mod - Hi	T, W, R
Bins-Bindle (3E, F)	41	1-30, 30-70	40-60	Mod - Hi	T, W, R
Bodell (4E, 5F)	1	5-45, 45-75		High	T, W, R
Culbertson (6B, C, D, E, F)	8	0-50	40-80+	Mod	T, W, R
Dee (9B)	@	0-8		Mod	T, W, R
Divers (10E, F)	2	3-30, 30-65		Low - Hi	T, W, R
Frailey (11F)	1.5	30-70		Mod - Hi	T, W, R
Hutson (13E, F)	7	0-30, 30-65	40-80	Mod - Hi	T, W, R
Ketchly (14E, F)	3	3-30, 30-60		Mod - Hi	T, W, R
Lava Flows (15)	1.5	-	-	-	W, R
Oak Grove (16C, D, E, F)	5	8-60		Low - Hi	T, W, R
Parkdale (17B, C, D, E)	2	0-40		Low - Mod	T, W, R
Wyeth (29E, F)	9	5-45, 45-75	40-80+	Low - Hi	T, W, R
Xerofluvents (30A)	@	Level		Low	F, W
Xerumbrepts (31F)	@	Steep			W, R
Yallani (32E, F)	7	8-30, 30-65	40-80	Low - Hi	T, W, R
Water (W)	@	-	-	-	W, R

T = Timber Production, W = Wildlife, R = Recreation, F = Floodplain, riparian.
@ = Less than one percent of area.

Soil Management Problems

The general condition of the soil on the Tree Farm is stable. In most cases, soil management problems are associated with minor areas that are frequently disturbed on steep slopes, such as roads or trails, creating a bare mineral soil condition lacking vegetative cover. Areas where persistent or constant bare mineral soil exists will allow for soil instability during high moisture events that produce water run-off and drought periods where the soil may be subject to wind or sliding. This is due to lack of root structure or cover that prevents soil movement. This type of bare mineral soil condition typically also leads to plant composition / noxious weed problems. Because many undesirable plants are pioneering by nature, they take over recently disturbed growing sites. Without proper management, these sites will lose productivity and impact resource values such as water quality due to erosion and high potential for sediment delivery to water bodies.

Soil management problems are typically associated with native surface road and trail features. This is particularly true where these features on the landscape do not have proper drainage structure incorporated into the surface of the travel corridor. Any areas of heavy use where traffic counts are high, may contribute to erosion. Presently, the amount of travel on most of the unimproved road system does not greatly exceed the ability of grass vegetation to keep native road surfaces stable. Where travel increases, or surface issues develop, spot rocking and rolling dips is a minimum recommendation in lieu of putting a rock surface on the entire length of a spur road.

Trails are typically native surface and these features on steeper slopes may invite greater risk of soil erosion and increased delivery of sediment to water bodies.

Management Recommendations

Given the current information from the Hood River County Soil Survey and current best management practices, the following recommendations are made:

- Direct all land management activities toward reducing soil impacts by operating during periods of acceptable soil moisture conditions (dry, moist, frozen).
- Use existing skid trails and roads where possible for ground disturbing activities (harvesting and heavy equipment use) to prevent unnecessary soil disturbance and compaction and to minimize the erosion potential.
- Construct water bars on skid trails on completion of harvest operations.
- Maintain drainage features on existing recreation trails, reduce the length of steep runs and prevent the location of trails near waters of the state.
- Leave organic material where possible to minimize exposure of bare mineral soil.
- Use native forest grass seed mix on exposed soils (as determined appropriate by HRC forest manager and ODF stewardship forester) to further prevent erosion, to help maintain desirable plant cover, and to help reduce the potential establishment of invasive or noxious weed species.

AIR QUALITY

Air quality is important to every aspect of life. Two events that occasionally occur on the Tree Farm, with the potential to negatively affect air quality, are prescribed burning and wildfire. Prescribed burning is a planned and coordinated management tool whereas wildfire is unplanned. The effects of wildfire may be minimized by active forest management and rapid suppression response as is the current practice on the Tree Farm. The Oregon Smoke Management Plan regulates prescribed burning to ensure that the timing of this activity is coordinated in a manner

that ensures compliance with the Clean Air Act as coordinated by Oregon Department of Forestry, Environmental Quality Commission and Department of Environmental Quality.

Management Recommendations
The HRC Tree Farm will comply with the Oregon Smoke Management Plan and the following recommendations will help achieve that objective:

- Limit burning to specific areas that will complement other resource objectives.
- Reduce slash loads and/or competing vegetation that compromise tree planting on reforestation sites.
- Follow "risk rating" guidelines for slash loading provided by the Oregon Department of Forestry.
- Burn slash during weather and fuel moisture conditions that minimize the risk of significant fire escape.
- Continue to protect the forest from wildfire through public education, prevention and suppression activities.
- Take advantage of future market based opportunities for utilizing biomass.

[vii] Soil Survey of Hood River County

WATER RESOURCES

The Oregon Conservation Strategy (OCS), prepared by ODFW, provides an overarching state strategy for conserving fish and wildlife. The OCS states "Freshwater aquatic habitats include rivers, streams, ponds, lakes and reservoirs, and are defined as occurring above the influence of tides and salinity fluctuations. Freshwater aquatic habitats typically contain water year-round, while wetlands may dry out through the season. The headwaters of many of Oregon's streams and rivers are located in the Cascade mountain range, and many drainage basins empty into the Columbia River and eventually into the Pacific Ocean."[viii] The HRC Forest is characterized by abundant water in many forms including rivers, streams, and reservoirs and the forestry department provides conscientious stewardship for these resources.

Hydrology of Hood River Basin
The hydrology of HRC, and consequently the HRC Tree Farm, is dominated by the Hood River and its tributaries. The Hood River watershed is about 340 square miles and originates on the eastern flank of the Cascade Mountains. From the 11,245 foot peak of Mt. Hood its rivers flow north into the Columbia River at an elevation of 74 feet. The dramatic change in elevation over a relatively short distance (less than 40 miles) is reflected in steep gradient streams with coarse streambed material and glacial-silt laden water. Over 80 percent of the basin is forestland with ownerships consisting of about three-quarters USFS and the remaining quarter split between HRC Forest and private timberland. About 7 percent of the watershed is in orchards with the remainder of the basin in a mix of rural residential and urban land.[ix]

The 2014 Hood River Watershed Plan describes the hydrology of the Hood River basin as "characterized by highly variable stream flows and rapid runoff caused by the watershed's steep gradient and rain on snow events. Mt. Hood glaciers and snowmelt are a significant source of summer base stream flows and during typical summer and fall periods, stream flows are naturally low". Infrequent but catastrophic glacial melts can have substantial influences on the

physical environment of the Hood River and its tributaries and the aquatic life contained in them.[x]

Numerous ponds, streams, seeps and springs occur on the HRC Forest however the upper and lower Green Point Reservoirs (also known as Kingsley Reservoir) are the only large bodies of water. The reservoirs are inholdings owned and managed by the Farmers Irrigation District.

Riparian Vegetation Values

Adequate riparian (streamside) vegetation is a vital part of good water quality. Vegetation controls water pollution by providing cooling shade, minimizing stream bank erosion and filtering sediments and nutrients from overland flows. It also slows water running overland increasing the ability for water to soak into the soil rather than running directly into the stream. Riparian zones can be identified by the presence of vegetation that requires free or unbound water or conditions that are more moist than normal. Riparian zones can vary considerably in size (Oregon Forest Practices Act OAR 629-635-220 through OAR 629-635-0310) and vegetative complex because of the many combinations that can be created between water sources and physical characteristics of the site. Such characteristics include gradient, aspect, topography, soils, stream bottom morphology, water quality, elevation and plant community. Riparian zones are a critical source of diversity within the forest ecosystem. Riparian zones have greater availability of water to plants, frequently in combination with deeper soils. This increases plant biomass production and provides a suitable site for plants that are limited elsewhere by inadequate water. The combination of these factors lead to increased diversity of plant species and structural diversity in the community.

HRC Forest Streams

Major streams that flow through or otherwise influence the HRC Forest, in addition to the Hood River and its East, Middle and West Forks, are Neal Creek, Ditch Creek, Pine Creek, Tony Creek, and West Fork Evans Creek. The upper reaches of streams such as Mosier Creek and Rock Creek are also present on the Tree Farm. Numerous small fish bearing streams and small streams where fish presence is unknown exist on the HRC Forest as well. The county forest has many other water resources including reservoirs, ponds, springs and wetlands. HRC supports five irrigation districts with miles of irrigation canals and numerous diversions as well as several domestic water sources.

The Oregon Forest Practices Act (FPA) regulates logging practices within riparian areas and next to waters of the state. Riparian management area widths, herbicide application, and operation requirements for timber harvesting and road construction are specified. Mitigation practices are required to minimize erosion from skid trails, stream crossings, and roads during and after harvest operations. The HRC forestry department meets or exceeds buffering requirements on fish bearing streams of all size classes (large, medium, and small). Irrigation ditches are buffered like streams and instead of using aerial application, hand application of herbicides is employed next to them to avoid non-target application and drift. HRC Forest currently supports 54 miles equaling 522 acres of riparian stream buffers[xi]. The buffer acres were calculated using an average of 40 feet on each side of the stream. HRC forestry department employees work very closely with representatives from ODF and ODFW to optimize stream and riparian values while maintaining HRC management objectives.

TREE FARM STREAM CLASSIFICATIONS FPA Requirements				
Stream Size	**Type F** **Miles**	**Type F** **Buffer Width Ft**	**Type N** **Miles**	**Type N** **Buffer Width Ft**
Small	11.8	50	61.9	**
Medium	6.7	70	3.3	50
Large	14.8	100	0.3	70
Irrigation Canals	0	NA	17.2	NA

** Apply specified water quality protection measures, and see OAR 629-640-0200.

HRC Stream and Riparian Problems

With the increase in recreation trails, the Tree Farm has sustained additional resource impacts to localized areas. Various types of off highway vehicles (OHVs) heavily utilize the HRC Forest on roads, trails and for cross-country travel. Cross-country use is heaviest on the east side of the forest. This is due to gentle terrain and vegetation that does not restrict OHV travel. Heavy trail use including but not limited to quads, side by sides, motorcycles, and mountain bikes has led to numerous impacts to streams and riparian areas due to erosion, compaction, and the effects of heavy and frequent use by various recreationists. Common problems include constant widening of trails from heavy use, creation of additional trails through "short-cuts", and creation of unauthorized routes. These situations may occur directly adjacent to or on actual stream crossings, as well as in upslope areas that trigger sediment delivery directly into waters of the state. Public awareness regarding these recreation impacts to water and soil resources appears to be limited. The HRC forestry department is working diligently to educate various forest users on the effects and impacts of certain practices. When necessary, new policy is developed in conjunction with the Hood River Trails committee. These efforts will be ongoing as new trail enthusiasts frequent the county every year.

Management Recommendations

- Consider input provided by the Hood River Watershed Group.
- Invite representatives from the Hood River Watershed Group, ODFW, ODF or other appropriate natural resource agency to give presentations to the Hood River Trails committee on sound recreation practices near waters of the state.
- Encourage regular participation from a member of the Hood River Watershed Group, ODFW, ODF and other natural resource agencies at Hood River Trail committee meetings.

[i] Oregon Conservation Strategy 2006, p. 265.
[ii] Hood River County Watershed Plan
[iii] Hood River County Watershed Plan
[iv] Hood River County Forestry department calculated buffer acres using 20 feet on each side of the stream.

FOREST VEGETATION

The Tree Farm contains a variety of growing sites, productivity levels, age classes, stand densities and species composition. Commercial timber growing sites (Production Sites) account for 28,914 acres and non-commercial forest areas (Non-production Sites) total 2,263 acres.

Intensive use of forest cover inventory data (*1999-2004 Inventory*) and stand modeling with "FPS" (Forest Projection and Planning System) aids in the planning process for analyzing various silvicultural treatments. This information then provides a basis to calculate growth and a sustained yield while allowing for an even flow of harvest from the Tree Farm. Another Tree Farm inventory is planned within the next couple of years to update standing volume and re-evaluate future allowable harvest levels.

Timber Production Sites

Production site objectives require that these acres grow at or near full site potential. Meeting this objective is directly related to producing ample wood fiber on a sustained yield that meets economic needs for continued operation of HRC services.

There are seven major commercial tree species recognized on the Tree Farm. These species are narrowed into three major cover types: Douglas-fir, Ponderosa Pine and mixed conifer. The mixed conifer type is a conglomerate of multiple species consisting of White Fir, Noble Fir, Western Red Cedar, Western Hemlock, and Western White Pine.

The following discussions and tables provide a "snapshot" in time of current age classes, stocking levels, and high risk conditions for each major cover type on the HRC Forest. HRC Forest inventory models provide the capacity to closely monitor stocking densities and other indicators that trigger active forest management. As inventory data is updated in the future the tables will be refreshed.

Douglas-fir Type

By far the largest forest vegetation cover type is a Douglas-fir (*Pseudotsuga menziesii*) dominated forest. Due to growing site attributes such as precipitation, soil and growing season, Douglas-fir grows naturally on and is best suited to most of the sites on the Tree Farm. This cover type ranges in age and stocking from seedlings to large mature trees, from a few years old to over 100 years old, and from poorly stocked areas to dense stands of trees. The Douglas-fir vegetation cover type is an estimated 25,547 acres on the HRC Forest.

COVER TYPE – Douglas-fir 25,547 Acres							
Age Class	Age Range	Average dbh*	Trees per Acre*	Basal Area*	Average Height*	Net BF per Acre*	% of Cover Type
1	**< 20	1.09	433	8	10	7.15	25
2	21 - 40	5.06	524	82	42	2,416.27	16
3	41 - 60	9.51	346	143	78	11,607.83	6
4	61 - 80	13.44	219	193	96	18,772.82	13
5	81 - 100	14.84	157	180	104	20,972.64	22
6	101 - 120	16.45	146	203	111	25,145.96	17
7	120+	15.10	174	229	104	27,531.88	1

*Weighted average by acres for each age class.
**Includes unplanted clearcut acres.

Ponderosa Pine Type
Where soil is shallow, with aspects of west and south exposures or lower rates of precipitation, Ponderosa Pine (*Pinus ponderosa*) may be found. Within this narrow set of growing site conditions, Ponderosa Pine thrives on the Tree Farm and is a distant second for cover type acreage by species composition. Ponderosa Pine occupies about 2,358 acres on the HRC Forest.

COVER TYPE – Ponderosa Pine 2,358 Acres							
Age Class	Age Range	Average dbh*	Trees per Acre*	Basal Area*	Average Height*	Net BF per Acre*	% of Cover Type
1	< 20	1.92	417	13	16	5.41	48
2	21 - 40	4.32	547	61	30	739.07	43
3	41 - 60	7.50	290	81	42	4,155.96	4
4	61 - 80	10.51	140	84	40	6,231.31	1
5	81 - 100	12.03	291	231	86	15,829.71	2
6	101 - 120						0
7	120+	12.08	160	128	63	12,535.96	2

*Weighted average by acres for each age class.

Mixed Conifer Type
Through fire suppression large areas of dense forest cover on the Tree Farm including mature, climax or shade tolerant species have been allowed to thrive. Historically, wildfire would have significantly reduced the numbers of these climax species in a forest stand because they are intolerant to the heat generated from a wildfire. Climax species are a component of every stand cover type and are the dominant cover species in several stands although they comprise a small proportion of the overall Tree Farm forest cover.

The mixed conifer cover type consists of Noble Fir, Western Red Cedar, White Fir (or Grand Fir), Western Hemlock, and Western White Pine totaling 1,009 acres. The table attributes were developed using a weighted average of the cover type by acres with White Fir being by far the dominant species at 79 percent of the acreage in the mixed conifer type.

COVER TYPE – Mixed Conifer 1009 Acres							
Age Class	Age Range	Average dbh*	Trees per Acre*	Basal Area*	Average Height*	Net BF per Acre*	% of Cover Type
1	< 20	0.43	315	5	4	0	47
2	21 - 40	6.49	681	173	45	5,965.53	8
3	41 - 60	10.76	279	146	86	11,166.21	5
4	61 - 80	12.34	177	140	93	13,365.64	26
5	81 - 100	13.37	193	187	105	21,383.13	8
6	101 - 120	15.95	182	254	113	30,495.46	6
7	120+	0.43	315	5		0	0

*Weighted average by acres for each age class.

General Timber Management and Harvest Schedule

Because of the intensive management that occurs on the Tree Farm, activities are typically scheduled based on stand age, species and topography. Periodic inventory information and actual changing site conditions provide direction for the need to harvest specific forest stands. The table below depicts a simple but relatively accurate cycle of how vegetation is managed on the Tree Farm. HRC forestry department has established 1,506 detailed stands on the forest to assist with the intensive forest management program.

Timber Production Site Management Table					
Stand Treatment	Stand Age 1-10	11-25	26-45	46-65	65+
1) Planting (reforestation)	X				
2) Pre-commercial thin		X			
3) Commercial thin			X	X	
4) Selection / salvage			X	X	X
5) Clearcut					X

Based on species composition, age and stand density there are management criteria that need to be considered so economic forecasts, affected resources, and positive forest growth and health objectives may be realized. The annual sustained harvest is calculated at 9.5 million board feet (MMBF) for the Tree Farm, based on current inventory data and growth modeling.

The HRC forest manager considers a variety of factors when determining which stands should be harvested each year. The decision making process includes querying the Forest Projection System Harvest Scheduler (FPS) for detailed timber stand information on the Tree Farm. FPS is

a general inventory model that provides growth and yield projections for the HRC Forest based on actual data collected from the Tree Farm. The 9.5 MMBF annual harvest was developed from analysis of data provided by FPS combined with empirical experience.

After analyzing inventory data, other factors the HRC forest manager considers in developing the harvest program annually include:

- Evaluating mature stands with poor growth and/or health attributes.
- Capturing mortality from disease, insect and weather damage.
- Balancing harvest costs with a mix of tractor and cable yarding.
- Mixing high and low volume stands.
- Distribute the spatial intensity of harvesting across all Tree Farm areas.
- Protecting residual stand edges from windthrow by harvesting from east to west.
- Avoiding planning adjacent clear-cut units until regeneration is five to 10 years old for aesthetics.
- Maintaining large sales of 1 to 3 MMBF with individual units that average less than 50 acres.
- Planning other improvement activities to coincide with sale areas to minimize disturbance and reduce cost.

Challenges exist in maintaining the sustained yield and even flow timber program on the HRC Tree farm, as indicated by the above factors the HRC forest manager must consider. Natural disturbances such as wildfire, insect and disease outbreaks, and severe storms can require accelerated harvests or shifting locations in order to capture the value of the timber in a timely manner. Unbalanced age class distributions on the Tree Farm due to natural disturbances or past harvest schemes have the potential to affect even flow in the future. However, it is important to note that conditions are dynamic and the even flow sustained yield concept should be evaluated as an average over a period of time such as on a decadal basis.

Management Recommendations

- Manage diameters and basal area densities in Douglas-fir stands through clearcut, thinning or selection / salvage harvest to prevent Douglas-fir bark beetle outbreaks (See *Integrated Pest Management* section).
- Follow up on ice storm damage areas and salvage to prevent further spread of Douglas-fir bark and pole beetles.
- Manage high basal area stands of Ponderosa Pine through selection, thinning or clearcut harvest to prevent outbreaks of engraver beetles or Western pine beetle (See *Integrated Pest Management* section).
- Increase the amount of Western Red Cedar on appropriate growing sites for species diversity, stand resiliency, disease mitigation and future marketing potential.
- Reduce planting of Ponderosa Pine component on sites better suited to Douglas-fir.
- Update HRC Forest inventory in the near future.

Potential cut-to-length thin site background left vs. previously PCT site in foreground right.

Silvicultural Opportunities

The HRC forestry department generally utilizes the silvicultural regimen that is described in the Production Site Table. While variance occurs on individual sites, these practices have been successful historically and continue to be today. The Douglas-fir cover type represents 84 percent of the HRC Forest and maximum fiber production in this cover type is well suited to the management practices that are being used. ***The Ecology and Management of Eastern Oregon Forests***, a publication by the Oregon State University Extension Service, provides an excellent overview of different silvicultural systems and the forest conditions that lend themselves to the various applications.

In the past the HRC forestry department has utilized other silvicultural activities to enhance growth on the Tree Farm. One such example is fertilization with Urea after commercial thinning. Studies have shown mixed results of recapturing the fertilizer investment due to the hurdle of initial cost, however this may still be of interest in the future. Another opportunity being pursued in some parts of the timber industry is improved seed which involves procuring or developing genetically superior tree seed. Smaller ownerships have more difficulty justifying the development costs involved but it is possible that cooperative relationships could be identified in the Columbia Gorge area. Preliminary research suggests there are definite benefits in using improved seed over the long term.

NON-COMMODITY EMPHASIS SITES

Non-commodity emphasis site objectives differ from production sites due to resource, social values, or other attributes that are not compatible with maximizing wood fiber production. Numerous circumstances such as the need for roads, existing power transmission line corridors, county parks, wildlife corridors, rock outcrops, riparian zones, and poor suitability sites for

growing timber fall into this category. These areas are recognized as resources that lend value to the Tree Farm in other ways. Non-commodity emphasis sites have been broken into four categories for purpose of discussion in this document: conservation sites, special use lands, forest forage resource, and high conservation forests. Note that it is not uncommon for some overlap between these categories to occur.

Conservation Sites

Conservation sites on the Tree Farm are areas such as wildlife habitat, wildlife corridors, stream and riparian protection zones, and similar resources that provide values that are more important than maximizing wood fiber production. However, these areas may occasionally generate some revenue or other forest products on a site specific basis, such as salvaging down trees in riparian areas.

Rock outcrops and exposed soil areas, which comprise 343 acres and occur primarily on the east side of the HRC Tree Farm, provide values such as diverse wildlife habitat and open areas. In some locations these areas allow for scenic vistas along trails and roads.

Special Use Lands

Special use lands often consist of infrastructure such as roads, existing power transmission line corridors, county parks, and the county landfill. Roads, power lines, irrigation systems and natural gas line right-of-ways are necessary infrastructure that occurs on the HRC forest. Roads account for 639 acres and utility corridors for 160 acres on the Tree Farm. HRC forestry department manages and maintains the roads. Rights-of-way are managed by the appropriate entities. Tree harvesting, thinning, brushing, spraying and other forms of vegetation control will be conducted in order to enable continued use of these corridors.

The Farmers Irrigation District owns and operates Green Point Reservoir which is an extremely popular fishing spot for local residents. Although scenic values and visual aesthetics are very important, and commodity production is not the primary goal for the immediate park areas, forest management, such as pre-commercial thinning and sanitation salvage, is implemented as necessary to maintain and improve forest health. There is a total of 201 acres of lakes on the Tree Farm. It is recognized that areas immediately adjacent to the parks which are part of the HRC Forest may be managed as usual for timber production.

Forest Forage Resource

The HRC Tree Farm does not allow livestock grazing and the general philosophy has been that domestic forage production is not compatible with long term timber production, wildlife and water quality goals. Past attempts to conduct fee grazing resulted in damage to reforestation sites. With the added management costs and increased damage to plantations, fee based forage management was not feasible on the Tree Farm.

High Conservation Forests

Every forest has some degree of environmental and social value. The value it contains may include rare species, recreational sites or resources used by local residents or an individual landowner. Where these values are considered to be of outstanding significance or critical importance the forest may be defined as a High Conservation Value Forest. This term was first used by the Forest Stewardship Council to certify sustainable managed forests.

The Tree Farm, by definition, contains the elements of both critical habitats and species of concern that inhabit them. Conservation measures to promote habitat that the Tree Farm supports will continue to provide for the species that reside within.

Oregon White Oak Woodlands

The HRC Forest supports 1,379 acres of grass-oak savannah the majority of which lies on Middle Mountain. The Hood River Watershed Action plan identifies two important areas in the watershed: Middle Mountain and the basin's eastern edge (e.g., Surveyor's Ridge, Fir Mountain, The Dalles Mountain and Neal Creek).

Oregon White Oak can reproduce from acorns (oak seeds) or from sprouts, and trees may attain a life span of 500 years. This seral species may persist on sites prone to drought or naturally occurring fire and has low shade tolerance. Because it is slow growing, it can be shaded out by faster growing competitors such as the Ponderosa Pine and Douglas-fir on some sites on the HRC forest. However, while some of these sites may be suitable for moderate conifer growth, others may not be suitable due to poor soils or low precipitation.

When oak woodlands become crowded with other species the oak tend to lose crown volume and it is only a matter of time before the mature oaks begin to lose their crown spread and die due to competition for sunlight. The loss of crown reduces the capacity of these trees to produce acorns which reduces an important food source for wildlife. Further, oak can no longer successfully re-seed in their shade. In order for that oak to survive and flourish, overtopping by conifers must be reduced. Occasional thinning stands to address disease concerns should be considered. Tighter stands of Oak woodlands than suggested in 2001 plan may provide increased wildlife habitat value and decrease noxious weed invasion potential. A primary objective in this strategy habitat should be addressing conifer encroachment and noxious weed control.[xii]

Oregon White Oak savannas and woodlands are among the most endangered ecological communities in some parts of Oregon. Without active management, the natural process of forest succession will gradually lead to the replacement of oaks by faster growing trees such as Ponderosa Pine and Douglas-fir. Thinning and removing unhealthy oak trees from these areas will help promote productivity. These sites generally do not support thrifty and productive stands of conifer. Therefore, managing them as oak woodlands may be more desirable. Oak is outstanding firewood, however the lumber demand is limited for special uses such as cabinets and furniture. In some instances careful management of these areas may still be desirable from an economic standpoint as well as an ecological one.

The Hood River County Watershed Plan identifies oak enhancement as an action item with the objectives to restore structure and ecological function to oak savannah and woodlands. The primary action would include thinning or removal of conifers and to release legacy oaks.[xiii]

Western Red Cedar – East Side

Western Red Cedar commonly occurs on the west side of the HRC Forest, although generally not in pure stands. The HRC forestry department is promoting this species in conjunction with production sites on the west side. However, the occurrence of Western Red Cedar on the east side of the Tree Farm is unusual and provides a good opportunity to preserve diverse and valuable habitats where the species has established. These stands occur in riparian areas and may benefit from limited management in order to enhance and promote these stands. Western Red Cedar is a highly desired species for various products and will generate some revenue when it is harvested which would offset the costs of management designed to preserve the habitat.

INTEGRATED PEST MANAGEMENT

Controlling pests, which include insects and disease, on the HRC Tree Farm is integrated with the ongoing forest management activities. Strategies involve using a variety of complementary efforts with aggressive forest management being the primary approach. Other approaches include but are not limited to mechanical devices, chemicals, genetic, biological, and cultural management methods.

Conifer Pests and Pathogens

The first and foremost criteria to maintaining healthy and productive forest stands is to recognize the limitations of a growing site in terms of productivity and familiarity with forest pests and pathogens that may impact the Tree Farm. In some instances gaining control of one forest pest or pathogen may allow for or exacerbate another. One constant recommendation for managing forest pathogens is to never plant off-site seedlings regardless of species.

Knowing how many and which species of trees can be grown on any given acre of land can help prevent overstocking, loss of tree vigor and unnecessary susceptibility to forest pests and pathogens. Also, by recognizing forest pests and pathogens, periodic harvesting can address the removal of host trees so that pest and pathogen populations are kept below epidemic levels. Within any given forest stand the presence of pest or pathogens may be found at endemic levels, which is natural and should be expected. The main focus should be aimed at preventing these damaging agents from becoming epidemic. The following is a description of tree damaging agents, by tree species and general diseases that affect all species, found on the Tree Farm. For both insect and disease information visit the USDA field guide and associated forest insect and

disease leaflets (FIDL's) at: http://www.fs.usda.gov/detail/r6/forest-grasslandhealth/insects-diseases/?cid=stelprdb5300513. Also, OSU Extension Service and ODF have online information at:http://extension.oregonstate.edu/union/sites/default/files/EM_8980_June_2009_ConiferGuide_OregonState_0.pdf. and http://www.oregon.gov/odf/privateforests/pages/fhpests.aspx.

Currently, laminated root rot (*Phellinus weirii*) and armillaria root disease (*Armillaria ostoyae*) appear to be causing minor damage. These are the most damaging and commonly found root pathogens in Oregon forests. Armillaria may be found, or is more apparent, where tree stress is an issue. However, both types of fungus will be present in the soil before the stressing event or events begin. Armillaria is generally encouraged by negative soil disturbing events and may lie dormant in old stumps for many years. Poorly planned grazing or logging practices, particularly those contributing to soil compaction and tree wounding, can exacerbate these pathogens. Removal of infected host trees through thinning and reducing root contact will help limit the effects of these diseases. Also, planting or encouraging growth of non-host species is often the most cost effective method of reducing root damage. All conifers are host species of these diseases. Tree species that show resistance are Western Red Cedar, Western White Pine, Western Larch and Ponderosa Pine. Growing resistant species will reduce or eliminate root disease but the process takes several decades.

Annosus root disease (*Heterobasidion annosum*) is less prevalent on the Tree Farm, but is having an effect. Like other root diseases, it affects all species and silvicultural treatment is the same for Annosus root disease. However, the true firs, hemlock and pines are most susceptible. Douglas-fir, larch, Western Red Cedar and spruce are the most resistant.

Douglas-fir

The Douglas-fir beetle (*Dendroctonus pseudotsugae*) function like most bark beetles in that the beetle is typically a symptom, not the cause, of the problem where forest conditions have favored the beetle population. Typically stands of high density, large diameter and mature trees are most susceptible. Well-managed Douglas-fir stands may sometimes be attacked by Douglas-fir beetles, but never have been known to sustain a Douglas-fir beetle outbreak.

The recent ice storm event on the Tree Farm resulting in fallen and damaged trees allowed increases in this bark beetle population and provided for increased brood sites. In this case, it is recommended that damaged and downed logs be salvaged before broods emerge. Since the damage is widespread and not entirely feasible to salvage or locate every instance of attack, yearly monitoring for beetle activity and alleviating stand conditions that favor outbreaks is highly recommended. Adjacent ownerships where no salvage is being conducted may also be sources of future beetle population increases. There are limited cases where pheromones are used to combat the Douglas-fir bark beetles, however it is not practical for the entire expanse of the county forest. When regeneration harvests are anticipated, the presence of root diseases should be determined. If available, alternative non-host species should be planted to prevent further disease issues.

Ponderosa Pine / Western White Pine / Lodgepole Pine*:*
Regarding pine trees, the greatest potential pest is bark beetles. Engraver beetles (*IPS* spp.) and Red Turpentine beetle *(Dendroctonus valens*) pose the single greatest threat of catastrophic timber stand damage. This is typically due to tree stress from high tree densities (overstocking) or a combination of stressing events (drought) that predispose the pine stands to beetle infestations. When overstocking on a site occurs, the trees become stressed from lack of available nutrients and emit a terpene that attracts bark beetles. This problem is easily corrected when beetle populations are endemic by reducing the number of trees per acre through thinning. This allows the remaining trees to grow freely or under a condition that allows for more moisture, nutrients and light. Trees that are free to grow do so at a rate that does not predispose them to infestation because they are able to produce ample sap. The production of this sap is a tree's defense system, which drowns the bark beetles or "pitches them out" when they attempt to bore into the cambium and phloem layer beneath the tree-bark.
One recent exception to the beetle characteristics above involves the recent attacks by the California 5 spined Ips in the gorge area. Fortunately, attacks have mostly occurred below the 2,000 foot elevation zone and have not greatly encroached onto County Forest. Management will need to continue monitoring the progress of this pest locally.

Western gall rust (*Endocronartium harknessii*) is present at endemic levels but has potential to cause reduced tree vigor throughout the Tree Farm. Periodic sanitation harvest of infected trees will remove or reduce this disease, improve general species vigor, prevent the spread to adjacent or understory trees and reduce opportunity for bark beetle populations to increase.

Black pineleaf scale (*Nuculaspis californica*) affects most pines and sometimes Douglas-fir. Small outbreaks have been observed on the Tree Farm. Areas near dirt roads, locations sprayed for mosquito control, or agricultural fields with pesticide use are most at risk due to the adverse effect of dust and insecticides on natural predators of black scale. Natural predators are the best defense on the broad scale and introduction of wasps or predatory beetles may be an option. Weather patterns such as long cold snaps and prolonged cold aid in reducing this pest but do not necessarily occur when needed. Silvicultural treatments to improve tree vigor, such as thinning, appear to be minimally successful since the time elapsed from appearance of the pest and reduced vigor to treatment may not allow for recovery soon enough. Dust control and preventing drift during spraying of pesticides is also helpful to prevent or reduce impacts from black scale.

White pine blister rust (*Cronartium ribicola*) is a non-native pathogen that affects western white pine. Mortality is generally the result of infection and the best management practices are planting of non-host species or planting rust resistant seedlings when reforesting this species is desirable.

Western Larch
The only pathogen that commonly has a major adverse effect on this species locally is Western Larch dwarf mistletoe (*Arceuthobium laricis*). This pathogen is currently at endemic levels on the property and not causing significant damage to commercial timber values. Any changes in this status should be easily corrected through salvage harvesting and removal of host trees. Western Larch may function as a transitional species since it is relatively resistant to most of the pathogens that affect other conifer species on the Tree Farm.

True firs / Western Hemlock
Many root and heart rots affect these species. Root diseases are discussed at the beginning of this section. The most prevalent heart rot in this region is rust red stringy rot. Rust red stringy rot (*Echinodontium tinctorium*, also known as Indian paint fungus) on the Tree Farm has mostly infected the older true fir. A vigorous timber stand and / or rotations under 100 years are the best management strategy for keeping fir species healthy. Salvage harvest of infected or poor growing trees, favoring non-host species, age and stocking control will address the problem with heart rots. The fir engraver (*Scolytus ventralis*) has been moderately successful in causing mortality. As with all bark beetles, reducing or maintaining endemic populations of beetles is directly proportional to controlling the tree population on a given acre of land. True fir stand types are relatively minor, however it is a component of most forest stand types on the Tree Farm.

Western Red Cedar
There is no major species specific pathogen causing damage to cedar on the Tree Farm. This species is generally most resistant to pathogens that affect all other conifers on the Tree Farm. However, in areas where cedar is established, mechanical damage to the thin barked species may invite bole decay. In these areas timber harvesting must be carefully planned to avoid causing bole damage to residual cedar trees.

NOXIOUS WEEDS

There are a number of noxious weed species found on the tree farm. These plants are not native to the region and are classified as noxious because of their ability to compete with native flora and in many instances are toxic and reduce the quality of forage that would otherwise be available to local wildlife. On the County Tree Farm, Scotch broom can aggressively take over disturbed areas and compete quickly with reforestation efforts. These plant species may not appear to be a nuisance early in their life cycle, making early identification and control efforts more critical. Also, some species of noxious weeds reduce usability of recreation areas due to plant characteristics that cause damage to both recreational users and equipment.

The following is a partial list of noxious weeds found on the tree farm by common and scientific name.
Knotweed (*Polygonum sp*.)
Knapweed (*Acroptilon repens*)
Loosestrife (*Lythrum salicaria*)
Ivy (*Hedera helix*)
Himalaya berry (*Rubus discolor*)
Puncture vine (*Tribulus terrestris*)
Scotch broom (*Cytisus scoparius*)
Tree of heaven (*Ailanthus altissima*)
Yellow starthistle (*Centaurea solstitalis*)

A complete list of all noxious weed species and identification literature may be found at the Natural Resource Conservation Service website; http://plants.usda.gov.

Many of these noxious weed species readily "pioneer" or become established on disturbed sites that are in or near a bare mineral soil condition. Where practical, the best control is by maintaining native species vegetation to prevent the potential for becoming established. Areas of particular concern are roads, campsites, trails and right-of-ways where a bare mineral soil condition is common. Since these areas of concern also happen to be associated with travel corridors, the potential for spreading noxious weeds is high. The Middle Mountain area is one of the highest risk areas. This is due to extensive public access, lower elevation and wide variety of plant cover types that provide more potential for invasive establishment.

Once located, control measures for noxious weeds typically includes hand-pulling, bagging and burning of plants, where infestation is limited to small areas. On the larger scale of infestation, control measures typically require the use of herbicides, biological controls or some combination of both. Road corridors are the source of most invasive plant issues with minor problems on trails. The Forestry Department contracts implementation of weed control measures on these affected areas.

All control measures for noxious weeds will also require knowledge of endangered species found on the tree farm. This will ensure that harm to sensitive or endangered plant species does not occur while attempting to control noxious weeds.

Early detection and identification of noxious weed species is critical to control, or preferably eradication. The following measures will help reduce introduction and establishment of noxious weeds:

Management Recommendations

- Maintain current lists of noxious weeds and their identification.
- Train Forestry Department personnel to identify noxious weeds.
- Install reader boards at trailheads and campsites to help the public identify these species and how to prevent their spread.
- Identify OHV/ATV off-trail use as a major contributor to the spread of noxious weeds and provide mitigating measures.

---

[i] Oregon Conservation Strategy
[ii] Hood River County Watershed Plan

FISH & WILDLIFE

The OCS provides an overarching state strategy for conserving fish and wildlife. Conservation actions are focused on the maintenance of natural habitats likely to benefit a wide range of organisms rather than conservation actions developed for single species. "It is the best way to maintain diverse and healthy wildlife communities. In addition, conserving larger areas of terrestrial or freshwater habitat preserves system-wide ecological processes critical to the viability of the ecosystems and the survival of wildlife species inhabiting them."[xiv] HRC forestry department works closely with ODF and ODFW to maintain and enhance habitats for fish and wildlife while meeting HRC policy for even flow sustained yield of timber from the county forest.

Fishery

Human disturbance throughout the Hood River basin has partially degraded and limited aquatic habitat productivity due to activities such as road building, logging, irrigation and municipal water withdrawals, agriculture, and development. These activities have contributed to passage barriers, low instream flows, lack of habitat complexity, and impaired water quality. The Hood River watershed has a high diversity of anadromous and resident fish species, including winter and summer steelhead, spring and fall Chinook, coho, coastal cutthroat trout, bull trout, rainbow trout, brook lamprey, and Pacific lamprey. Most of these fish populations are thought to be much lower than they were historically. [xv] The following table shows the current status of protected fish in the Hood River watershed.

HOOD RIVER BASIN – Aquatic Species			
Bull Trout	Threatened – Federal & State	1998	Middle Fork Hood River (HR), Lower East Fork HR, West Fork HR, Mainstem HR
Summer Steelhead	Threatened – Federal & State	1998	West Fork, Mainstem HR, Lake Branch Creek, Cat Creek
Winter Steelhead	Threatened – Federal & State	1998	East Fork HR, Middle Fork HR, Mainstem HR
Spring Chinook	Threatened – Federal & State	1999	East Fork HR, Mainstem HR, Middle Fork HR, West Fork HR, Lake Branch Creek
Fall Chinook	Threatened – Federal & State	1999	Mainstem HR
Coho	Threatened – Federal Endangered -State	2005	Middle Fork HR East Fork HR, West Fork HR, Mainstem HR, Neal Creek, Cat Creek

Habitat diversity is a function of stream gradient, channel confinement, riparian conditions, and amounts of large woody debris (LWD). The reduction in flood plain and instream LWD is one of the primary reasons for loss of habitat diversity in the Hood River basin. Channel instability is a normal state in the Hood River Basin, and is mostly due to the watershed's steep gradient and glacial influence.

The most recent information shows that the Hood River sub-basin continues to be the home to a rich and diverse collection of fish. Desirable habitats for fish are developed and enhanced by maintaining streamflow, habitat diversity, key habitat quantity, channel stability, sediment load and vigorous, abundant and appropriate species of riparian vegetation. The Hood River Watershed Plan identifies several projects for stream improvement including a project at Green Point Reservoir to improve riparian and wetland conditions on the reservoir and Ditch Creek. HRC Forestry Department works very closely with ODFW to maintain and enhance conditions on the Tree Farm for aquatic species. Riparian buffers on the HRC Tree Farm consistently exceed requirements of the Oregon Forest Practices Act and comprise 522 acres.

Wildlife
The diversity of forest stands by age and species provides wildlife habitat on the Tree Farm that will support a wide array of wildlife. The Tree Farm supports a variety of forest species and age classes from warm, dry oak-savanna to cool, moist true fir stands and young, dense forest stands to old, large diameter forest stands.

Many birds and mammals use all or a portion of the Tree Farm due to the broad range of ecotypes present. Tree Farm parcels encompass a wide range of terrestrial conditions from the lower valley to surrounding ridge-tops. Protection and conservation of special wildlife use areas is critical to promoting continued use of the Tree Farm by these species. Large snags are important nesting and denning sites for birds and mammals. Snag retention standards on the Tree Farm meet or exceed state standards of two standing trees or snags/acre and two down logs per acre.[xvi]

Desired Wildlife Species and Habitats
In general, the HRC Forest provides a wide range of habitats that may serve a diverse array of wildlife during different seasons. The opportunity or potential to see a wide variety of wildlife on the forest is high. Due to the varied habitat types and the size of the parcels on the Tree Farm, the opportunity to hold or maintain wildlife populations on an annual basis is good. The objective is to manage, promote and provide for all the habitats and wildlife species the Tree Farm will support.

Safe Harbor Agreement
The Tree Farm currently offers a diversity of habitats from small wetlands to dry meadows, from mixed conifer forests to dry ridge open pine stands, from ledge or cliff features to rock screes and associated oak-shrub lands and savanna. Because of the many habitats provided through careful management of the Tree Farm, a wide variety of species are able to reside within its boundaries. Consideration of a Safe Harbor Agreement with the US Fish and Wildlife Service may provide future benefits to Hood River County.

Threatened and Endangered Species
The Tree Farm includes habitat that would support threatened and endangered (T & E) wildlife species. Appropriate protection measures will be taken, as required by the Oregon FPA, if any T & E species are identified on the HRC Forest. Potentially harmful or site-disturbing activities will be halted until mitigation measures can be developed in cooperation with ODFW.

Presently, the Tree Farm hosts northern spotted owl, bull trout, summer steelhead, winter steelhead, spring Chinook, fall Chinook, and Coho (see Fishery section above) which are all listed species. Mitigation measures are taken to protect habitat areas during routine forest management in order to promote these species. Retention buffers or non-treatment areas are designated to promote at-risk species wherever they may occur.

A comprehensive listing and status of either federally or state listed (or both) in Oregon can be found on the Oregon Department of Fish and Wildlife website at: http://www.dfw.state.or.us/conservationstrategy/.

Rare, Sensitive and Other Unique Resource Sites
Significant wetlands and riparian zones along perennial streams are important niche habitats that serve all forms of fish and wildlife. Buffer zones along these areas will continue to promote effective habitat and wildlife use. Larger resource sites such as the Oak savanna and lava beds

are identified as individual stand or management units. Smaller, however important, resource sites such as cliffs and den sites are located within the larger stand units and are protected from incidental management activities to protect the integrity of these features.

Wildlife Related Damage and Problem Wildlife

While management generally encourages a diversity of native wildlife species on the Tree Farm, some individual species can cause damage to important resources. In particular, the establishment of tree seedlings has been a challenge where mountain beaver, pocket gopher, deer and elk populations are concentrated. The activities of these species typically cause mortality to the affected trees and in many cases, if not addressed, loss of entire plantations.

Browse Damage

During periods of heavy snowpack, minor elk and deer browse on young plantations typically occurs below 2,500 feet elevation. This problem is seasonal and infrequent, due to variation in snowpack and severity of winter weather. In the past, affected areas have been treated with a non-toxic repellant that has proven relatively effective. Other options include bud caps or tree tubing.

Root Damage

Pocket gopher damage occurs mostly on the east and south portions of the Tree Farm. Young seedlings and even sapling size trees are at risk within gopher colonies. Trapping and baiting are effective control methods for pocket gopher. When damage to seedlings covers large areas, baiting gophers is the preferred control and has been successful in controlling damage in the past.

Pocket gopher caused mortality to Douglas-fir sapling – South end area.

Tree Girdling

Periodically mountain beaver damage occurs on the south end of the Tree Farm and the activity is usually associated with small stream and wetland features. Mountain beaver are not actually beavers, rather are more rodent-like similar to a ground squirrel, and are not a species of concern.

Mountain Beaver have a negative impact on young trees, seedling to sapling size, and occasionally some pole size trees. Girdling and clipping of small branches is the most apparent damage. However mountain beaver can also cause root damage and can consume or remove entire trees. The most effective method of control is a combination of trapping and baiting. The use of both methods reduces the amount of bait necessary to control local populations and reduces potential of baiting non-target species.

---

[i] OCS, p. 11
[ii] Hood River County Watershed Plan
[iii] Oregon Forest Practices Act

ROAD ACCESS & SECURITY

The Tree Farm has a variety of roads that serve many purposes from short, native surface spurs to main access roads used for everything from recreation to log hauling. There are over 239 miles (639 acres) of roads on the Tree Farm. Since the HRC Tree Farm is a public entity, security measures are typically aimed at reducing or preventing resource damage, rather than prevent trespass. Vandalism does occur in various forms on the HRC Tree Farm to roads, at trailheads and campsites, and in the forest itself. Vandalism impacts limited county resources and all forest users.

The HRC forestry department is responsible for maintaining approximately 288 miles of road within the HRC Forest boundaries, with approximately 61 miles maintained for other landowners through agreements. The HRC public works department is responsible for maintenance of about 12 miles of road on the Tree Farm. Other infrastructure includes 88 gates and 14 existing rock pits. New bridges are constructed to handle 100 year peak flows and new culverts are specified to handle 50 year peak flows to protect from wash-outs. Where fish presence is known, bridges are favored over culverts to prevent fish passage issues. Current annual maintenance budgets on the Tree Farm allow for approximately $167 per mile of existing forest road or $50,000 per year. This level of maintenance is well below actual replacement and construction road costs of $12,000 to $23,000 per mile of forest road. When possible, construction and maintenance expenses are incorporated into timber sales.

Roads are one of the greatest assets on the HRC Forest, however they are also the largest expense due to the costs of construction and maintenance. Tree Farm rock sources are limited and developing pits, and crushing rock for road construction and maintenance is expensive. Heavy use from public activities and some forest management activities require that certain roads need more maintenance than other roads.

Main access or “primary” roads are typically improved with a rock base and sometimes a gravel surface. There are 55 miles of primary road that access multiple landowners, and are open to the public all year with limited seasonal closures. Despite the level of improvement on the primary roads, most do not have enough base rock to allow for heavy use during all weather conditions. As a result, to protect road surface integrity and associated resource values, seasonal closures are necessary.

Secondary roads are primarily maintained for management access and account for 80 miles of road surface. Many of these roads are rocked, primarily with pit run, and others are native surface. Many of these roads are gated and typically closed to year-round traffic.

Spur roads are essential for access to specific forest areas on an intermittent basis and account for approximately162 miles of mostly native road surface. Since these roads provide access for management activities, they are crucial to Tree Farm management. Native surface roads are used on a seasonal basis when soil conditions are dry or frozen. The practice of minimizing or eliminating wet soil condition travel, particularly, on the spur roads through the Tree Farm benefits the soil resource and road surface integrity. Some of these roads are gated to prevent resource damage and often are allowed to grow over with brush between management activities.

Developing main roads for year round use in the future should incorporate an all season rock surface and spurs should have rock armored rolling dips for adequate drainage. Rolling dip drainage features work well on open roads and are passable by all manner of traffic. Rolling dips are similar to a water bar as water is directed away and off of the road. Unlike a water bar, rolling dips are incorporated into the road base and armored with gravel or rock to prevent failure from rutting or being flattened from continual use. Often even use by wildlife, horses and ATVs will cause earthen water-bars to fail on roads. Another benefit to using rock-armored rolling dips is that they replace culverts in many instances which eliminates potential plugged culverts. Plugged culverts can capture accumulating moisture runoff on the road prism and damage or wash out roads. Preventing road issues protect the road resource and maintain and/or improve water quality and fish habitat.

Management Recommendation:

- Utilize harvest activities taking place and continue to use this opportunity to make local road improvements in the sale area. This approach will improve existing roads in conjunction with other activities and help achieve reduced soil loss, reduce negative impacts to associated resources and an improved transportation system in a timely, economical and coordinated manner.
- Track recreational and public use activities that have heavy impacts to road surfaces and the resulting costs of maintenance and rock replacement from those activities. This will allow for a cost-benefit analysis of the benefits of activities compared to road impacts. Continue to minimize severe impacts by limiting access during wet weather periods on certain roads.

Harvest Systems

Logging systems are typically dictated by slope of the terrain. The distinction between ground based or conventional logging systems and cable or helicopter logging systems is made for the safety of equipment operators as well as the protection of natural resources. On sustained adverse slopes over 40 percent, skyline or helicopter yarding is the method used to remove trees from the forest and deliver them to a landing. The landing is where whole trees or sections of trees are limbed and bucked into logs that are then ready to be loaded on a logging truck and hauled to a milling facility. On favorable slopes less than 40 percent, conventional ground based equipment is typically used to move trees from the forest to a landing. Road location plays a factor in determining harvest systems needed to remove timber and additional road construction is required to reduce harvest costs. At present the Tree Farm has approximately 64 percent tractor skidding ground and 36 percent skyline yarding ground.

WILDFIRE PROTECTION

The best way to handle a forest fire is to *prevent* one from occurring. Conducting activities, using fire-safe equipment, within the operational periods specified by the Oregon Department of Forestry will help prevent a potential fire from starting. If a fire is started or observed it should be reported immediately by dialing 911 or the local ODF office in The Dalles (541-296-4626).

Prevention only accounts for human activities. Public relations with user groups about the potential for wildfire will help increase awareness and reduce activities that increase wildfire risk. Since natural fire events are a part of the landscape, fuel management and planning for potential fire starts is the other part of the equation.

Fire start in dense forest near HRC land.

In the event of a fire, a properly maintained road system with good access to the Tree Farm and to water sources, such as the streams, ponds and reservoirs, will greatly benefit fire suppression efforts. Water availability, particularly in the form of pond developments, increases the potential for suppressing fire starts. Maintaining roads and trails by preventing brush encroachment helps provide defensible spaces. Defensible space promotes suppression efforts and provides safe access for fire crews and vehicles. HRC has created 15 fire ponds for fire protection and will continue to do so. In addition, forest operators are contractually required to follow ODF fire suppression and prevention protocols. As a result, contractors have fire suppression equipment on forest operations during fire season that may help reduce or prevent a fire start from escaping.

The systematic forest management program on the Tree Farm produces a mosaic of vegetation age classes across the landscape which serves many purposes including a fire mitigation tool. The mosaic breaks up the fuel loads that a wildfire consumes in its path. The Oregon FPA requires that fuels be mitigated and the HRC forestry department generally requires contractors to pile slash after logging operations are complete. Piles are normally burned in the fall.

Management Recommendations:

- Continue outreach and public education efforts on wildfire mitigation.
- Continue developing water sources as opportunities arise.

RECREATION

Providing for recreation opportunity is a secondary priority for the Tree Farm. Establishment of trails is mandated through county ordinance *ORD 277– Chapter 12.10*. Through recreational activities, the county is able to share the forest resources and educate visitors and forest users on management activities that take place on the HRC Forest. There is opportunity for, and frequent use by, hikers, runners, hunters, campers, bikers, horseback riders, motorcycles, quads, side by sides, and four by fours. Other activities include wildlife viewing, fishing and gathering of various forest products. Tree Farm personnel estimate that over 30,000 users visit the county forest to engage in various recreation activities each year.

Tollbridge, Dimmick and Routson Parks are located within the Tree Farm and are managed by the HRC public works department. Kingsley Campground, also within the county forest boundary, is jointly managed by the HRC forestry and public works departments due to grant funding forestry receives in connection with the recreational trails.

The forestry department continues to manage the forest resource in and around the Kingsley Park. Other formally recognized County parks, Tollbridge, and Dimmick are part of the Tree Farm acreage but are isolated from trail systems and managed by public works. Routson and Dimmick Parks are not currently in operation and may revert back to forest management in the future.

Trails

The growing popularity of the county forest by various types of trail users and recreationists precipitated the need for clear policy outlining the objectives of and uses for the HRC Forest. In 2003 the HRC Board of Commissioners signed the Forest Recreation Trails Policy to be implemented on the HRC Tree Farm. A "Hood River County Trails Committee" was created from a cross section of various users to provide input to the county on the program. Detailed information regarding trails may be found in ***Hood River County Forestry Department – Forest Recreation Trail Management Plan and Trail System Master Plan.*** County trail policy explicitly states "*No activity authorized in this section shall be allowed to limit the County's ability to manage its forest." (Section 12.10.010 Forest Recreation Trails Policy).*

The trail system on the Tree Farm is by far the largest recreational type of use. As popularity increases these trails require a growing amount of administrative resource to maintain. At present there are 105.7 miles of trail within the HRC Tree Farm and a total of 145.7 miles of trail, 40 additional miles, that link to county trails from cooperating adjacent landowners. Within the Tree Farm there are 84 miles of motorized and 21.7 miles of non-motorized trails. In addition, 226.4 miles of forest roads are open to motorized OHV use. The practice of user group maintenance and the trail adopter system has been helpful toward reducing administrative costs. It is likely that increased support to facilitate the growing trail system, that is seeing more use with each passing season, will be needed in the future. In past years the HRC forestry department has been successful in securing grants to assist with the management and administration of the motorized trail system. However, these grants fund only a portion of the total administrative costs to forestry department.

The expanse of the HRC Forest provides ample space for illegal trail construction and trail structures. In each case, limited administrative resources are stretched further to remediate the situation and often natural resource values are compromised. Because unauthorized trails are frequently constructed without regard to trail density standards or wildlife concerns, all forest

resources, particularly soil and water, suffer as a consequence. In addition these activities create conflicts with Tree Farm goals and objectives to promote and protect all resource values.

Continued public relations, trail committee meetings, and public education will help reduce instances of resource damage and waste of administrative resources. Revision and / or further development of trail policy as necessary will better integrate recreational uses with Tree Farm activities. It is recognized that like the county forest, the recreation trail system is dynamic and will change over time.

AESTHETICS

The principal use of the Tree Farm is mandated for the production of wood fiber, primarily in the form of timber. However the Tree Farm is a host for a variety of recreational activities. Scenic values are important to visitors because most people want to recreate in an area that is visually appealing. The Tree Farm offers a variety of viewsheds, from the Columbia River, Hood River Valley to nearby Mount Hood and Mount Adams. Often timber harvests provide additional opportunities to take in panoramic views around the valley. A forested viewshed that provides for a wide variety of surrounding scenery is desirable. Management activities may be considered from an aesthetic resource perspective to ensure the Tree Farm continues to provide a visually pleasing landscape. The Oregon FPA regulates timber harvest and road construction activities for scenic purposes along major highways including Highway 35. Full site stocking of healthy trees is a major consideration for promoting an aesthetically pleasing environment. Harvest unit size and location may be planned so that viewsheds are improved and the resulting mosaic of tree age classes across the landscape also benefit forest diversity for wildlife.

EDUCATION

Most of the Tree Farm is readily accessible to the public and serves as a model for forest management and education to the many visitors who range from recreational users to local school students. Tree Farm signs are posted on many of the forest tracts and tree planting signs are posted on numerous reforestation units to inform the public about the efforts required to operate a Tree Farm. A new kiosk is planned at “Family Man” Staging Area to illustrate how the Tree Farm operates and what it provides for Hood River County. Tours and presentations on Tree Farm management are occasionally provided to interested groups. Annual tree plantings offer basic forestry education for the public and neighbors of the Tree Farm.

Continued tours, website information and additional kiosks at trailheads are good methods to educate future visitors about management of the Tree Farm.

CULTURAL RESOURCES

Prehistoric archaeological and historic cultural sites are known to exist. Cultural sites include remnants of homesteads and those representing a variety of Native American activities.

Management activities and resource developments on the Tree Farm are performed with respect to protecting cultural sites and assessment of known potentially impacted areas. As in the past, if cultural sites are identified through ODF agreements with the State Historic Preservation Office (SHPO), appropriate measures will be taken to mitigate activities that may damage potential cultural sites.

If more sites are discovered, additional confidential site assessment may be requested from the State Historical Preservation Office (SHPO) at 503-986-0674 or https://www.oregon.gov/oprd/HCD/SHPO/Pages/index.aspx

BUSINESS MANAGEMENT

Record keeping of all transactions (expenditures and income) is the first step to good property management. Tracking activities serves as a guide to accomplishments but may also help with planning, coordinating and funding of future projects.

County Policy and Practice

The HRC Forest KV files, inventory and reforestation activity databases track activities and conditions on the entire tree farm. Information such as acres harvested, volume sold, revenue generated is closely tracked by fiscal year. County policy dictates the method by which general fund revenue is allocated from forest generated revenues.

Land Exchanges and Acquisitions

The HRC forestry department occasionally engages in and continues to seek opportunities for land exchanges and acquisitions that are advantageous to the county. Especially desirable are opportunities that allow the forestry department to exchange or acquire parcels of land that reduce fragmentation and isolated parcels. The benefits include improved forest management through reduction in property line miles as well as reduced costs of surveying, road construction, and logging. Conflicts across property lines are reduced and access is often improved.

The HRC and statutory process requires that exchanges be in the best interest of the County and be of equal value. A quasi-judicial hearing is required at which the Board of Commissioners (BOC) acts as a panel of judges. Reports are given by the County Assessor and the County Forester or other qualified agent and written and oral comments are accepted from the public. The BOC must determine the exchange is equal value and in the best interest of the public.

Marketing Opportunity

The BOC has expressed significant interest in pursuing a variety of marketing opportunities to incrementally increase revenues generated from the HRC Forest and to promote utilization of forest products that currently have low or no value. The following information gathered from various sources provides a starting place for consideration of options. The HRC Forestry Department has significant latitude and flexibility to adapt these options to the counties specific needs.

Sort Sales – Washington Department of Natural Resources (DNR) Model

- Washington DNR is charged with maximizing revenue to the state of Washington. From that mission "Sort" sales were born with the concept that on certain projects this type of sale would provide incrementally increased value over traditional timber sales. Criteria that DNR uses to identify potential Sort sales generally consist of projects with a large number species and potential Sorts to different processing facilities. The DNR has a different fund account for Sort sales and additional timber sale administrators are required to handle these projects. It is critical that sale administrators for the Sort sales understand logs and the forest products industry and can clearly identify which logs go to which sorts.

- DNR puts out a Request for Proposal (RFP) for a Sort sale and then contracts with the successful bidder to harvest and put the sorts out. A separate contract is issued by the state for selling the actual sorted logs. Logging contractors must clearly understand the provisions and requirements of the RFP and the resulting contract. Separate road construction contracts administered by DNR are subject to the much higher Davis Bacon wage rates.

- DNR has had mixed results from the Sort sale process. During the recession logging was cheaper because contractors were having trouble finding work, however in the current environment DNR is having trouble getting the logging contracted at a low enough rate. There have been instances when DNR has had to put cash out in advance to get roads constructed prior to logging. The largest benefit to DNR has been the shortened revenue stream since monies from the sorts are received in 3 to 6 months rather than up to 2 years.

Small Wood Products Opportunities

- The HRC small diameter wood group has been working to establish a "campus" based on the model currently used by Wallowa Resources in Wallowa, Oregon to provide markets for small diameter material. These types of operations are "community specific" with different areas of the region having different local needs. The group is looking to establish a fixed base of operations locally to help contractors get started. HRC has agreed to provide a location on HRC land to assist in this enterprise.[xvii]
- Experience in other areas has shown that it requires the right contractor and the right company to work. Some business acumen is critical to the success of these operations.

- The goal is for these small operations to create a few local jobs and utilize forest residues that are currently going to waste.
- The group is looking for opportunities to establish renewable energy utilizing small diameter and non-merchantable material.

Chip Yard Opportunities[xviii]

- Wood chipping operations are not generally feasible on the HRC forest due to the road systems. Chip vans are long and low and require moderate road grades, wide corners and turnouts, and well surfaced road systems. These trucks have been constructed for highway operations.
- The potential wood yard site proposed by the Hood River Small Diameter group would work as it is close to Highway 35 and located on suitable topography.
- Although opportunities for a post and pole option merit more research, it is important to recognize that at this time the predominant species would be Douglas-fir which does not treat well. Ponderosa pine treats well enough but the amount available on the Hood River County Forest would not support investing in the infrastructure. There may be opportunities for the white fir and hemlock.
- A good opportunity exists for the establishment of a mobile chipper on the proposed wood yard site. Stable supply would be critical for this option to be viable and it is likely that the chip logs from the HRC commercial sales would be necessary. It will be critical to research how this concept fits with the needs of existing and established local infrastructure (High Cascade, Inc. and SDS Lumber Company).

Woody Biomass for Electricity Production[xix]

- In the past 5 years, Oregon has produced over one million bone dry tons (BDT) of forest biomass residues from forest harvest and fire reduction thinning operations. About half of that biomass accumulates at landings and is potentially available for domestic energy production although less than 20 percent is recovered for that use.
- Biomass residuals, not suitable for clean pulp or composite material for chips, posts, poles or bedding shavings make up 40 to 50 percent of the non-sawlog forest biomass residuals. Although there have been increases in Oregon wood pellet production in recent years, only woody biomass electricity production has the capacity to produce markets for the enormous quantity of biomass (estimated to be in excess of 500,000 tons per year) that need to be removed.
- Lower natural gas prices reduce the cost utilities pay for the next kilowatt-hour of electricity and that price is lower than the cost of biomass electricity production from anything other than mill residues produced on site. Current Oregon Green Ton Tax Credits for biomass are inadequate to support increased forest thinning or to overcome the costs of woody biomass electricity generation.
- Current costs that utilities pay for the next new megawatt hour (MWH) of electricity are projected to be between $30 and $40 MWH through 2020. Cost to produce a MWH of woody biomass electricity from recovered forest residuals exceeds $85 per MWH in most all cases and depends on the location and distance the fuel is from the electricity producer. Oregon regulated electricity purchase rates currently provide solar photovoltaic electricity generators with between $120 and $180 per MWH with none of the benefits of biomass utilization, fuels reduction, fire mitigation, etc.
- Essentially, Oregon ratepayers must be willing to pay a premium for biomass-fired electricity.

Other Biomass Utilization Opportunities

- Woody biomass remains a difficult material to utilize in any type of a cost-effective manner. Numerous pellet plants have been established throughout Oregon, Washington and Idaho during the past decade however it remains very difficult to produce pellets as a stand-alone product created from logs hauled from the forest. Most pellets are created from sawmill residuals in conjunction with a primary milling facility. Slash piles and other similar materials usually contain too much dirt and bark for pellet manufacture.
- Forecasts on the wood products industry in the Pacific Northwest provided by the Beck Group in January of 2015 indicate that the supply of biomass will exceed the demand over the next couple of years. The biomass surplus from mill residues is estimated to be approximately 7,140,000 bone dry tons (BDT) in 2015 and 6,540,000 BDT in 2016. The nature of economics based on "supply" and "demand" will always be dynamic based on definition, however until a viable economic baseline is available for biomass in the woods, utilization of these materials will remain problematic.
- Mill residues are always preferred as biomass material when available due to the quality (clean) and ready availability.

Small Diameter Thinning Opportunities

- The HRC forest has a significant backlog of acres in need of pre-commercial thinning and acres that have age/size classes that are beyond the pre-commercial thinning window but with diameters too small for economically viable commercial sales. Opportunities exist for "cut-to-length" operations in these areas. This type of operation would utilize the materials on the site by merchandizing small commercial wood and non-merchantable materials. These types of operations often work well as "goods for services" contracts where by the thinning work is traded for the value of the products removed. HRC Forestry Department would need to develop a different type of contract vehicle for this type of operations since traditional utilization specifications for commercial material do not work well in this type of operation. These types of operations would work well in conjunction with the proposed sort yard/small diameter wood campus.

Animal Bedding[xx]

- The JTS Animal Bedding Company in Redmond, Oregon utilizes chip log material for animal bedding material. The company has developed significant markets throughout the west. Information on JTS can be found at http://jtsanimalbedding.com/. JTS allows the logs to dry in decks prior to debarking and planing logs into shavings.
- JTS is consistently challenged by supply issues. Dead lodgepole pine works extremely well for the company's product line however it is difficult to procure on a consistent basis. Competition from commercial firewood cutters and the occurrence of most lodgepole pine on national forest system lands is problematic. Ponderosa pine is not particularly desirable because horses are often allergic to a chemical in the air dried pine shavings. This chemical is not present in pine that has been kiln dried prior to being converted to shavings for animal bedding.
- Douglas-fir is extremely desirable for bedding material. JTS has been limited in expanding production capacity for this product due to difficulty in procuring sufficient quantities of raw materials in direct competition with the chip log markets.
- Opportunities may exist for HRC given the large quantity of Douglas-fir on the HRC forest. Exploration of creating animal bedding from smaller diameter material should be researched.

Marketing Recommendations
In the present day wood products industry the number one threat to continued operations is the consistent and stable supply of raw materials. However, this leaves HRC Forestry Department and Hood River County positioned very well to maximize revenue from county forest products. One of the significant advantages HRC forestry has is its ability to be nimble in the face of opportunity. Sans the heavy blanket of regulation and policy that often surrounds state and federal timber programs, HRC can respond in a timely manner to both markets and to ecological conditions on the ground.

Opportunities for incrementally increasing revenue to the County would be increased by:

- Increasing the dollar limit on small sales to $15,000 or 50 MBF. The current statute which dictates that small sales be less than $5,000 in value was set in 1979. Residual values for logs have tripled since that time and the $5,000 limitation for small sales is no longer relevant. It is critical that the time and effort required by HRC Forestry Department be less than the increased value of specialized material to make the effort of selling specialized materials cost effective.
- Offering some marginal thinning projects (example would be dense young stands with significant pre-commercial and limited commercial sizes mixed) to operators trading the material for the thinning work – "the goods for services" concept. The potential cut-to-length opportunities could fall into this area.
- Consider "sample" marking or "designation by prescription or description" on areas with marginal value products. This method is especially effective on thinning projects.
- Offer occasional timber sales with longer expiration dates.
- Continue to strategically establish all weather road systems to allow for extended logging seasons and continue to improve road systems in general.
- Offer commercial firewood sales in areas with heavy amounts of Oregon white oak, such as the oak savannah areas on Middle Mountain, to improve the habitat and provide a desirable product.

REGULATORY COMPLIANCE

In addition to compliance with the Oregon Forest Practices Act Rules, activities on the HRC Forest are guided by this Tree Farm Management Plan and Hood River County Ordinances.

Most forest activities require a notification to ensure compliance with current forest regulations. Compliance is particularly important where there is risk of wildfire associated with a forest activity. Notification of activities reduces personal risk exposure to actions that may otherwise be deemed negligent. Copies of the Oregon Forest Practices Act Rules may be obtained or downloaded from the internet;
http://www.oregon.gov/odf/privateforests/pages/fpaguidance.aspx

STATE OF OREGON PERMIT and NOTIFICATION REQUIREMENTS

Oregon Revised Statute, ORS 477.625 states that every person conducting an operation using power-driven machinery shall first obtain from the State Forester a written permit for the calendar year. "Operation" means any industrial activity, development, and improvement on or within one-eighth mile of forest land. "Forest land" means any forested land, woodland, brush-land, cutover land, and land clearing which during any time of the year contains enough flammable forest growth, slash, or debris to constitute a fire hazard.

Operations requiring permits are:

1. Logging
2. Sawmilling
3. Clearing of land on rights-of-way
4. Thinning and/or pruning
5. Well drilling
6. Blasting
7. All uses of fire in any form
8. Use of Power Driven Machinery

Oregon Revised Statute, ORS 527.670 states that an operator, timber-owner, or landowner, before commencing an operation, shall notify the State Forester. "Operation" means any commercial activity relating to the growing, harvesting, or processing of forest tree species. In addition, this notification will be required at least 15 days prior to commencement of the operation.

Operations requiring notifications are:

1. The harvesting of forest crops
2. Road construction or reconstruction of existing roads
3. Site preparation
4. Application of insecticides, herbicides, rodenticides, and fertilizers
5. Clearing forest land for change to non-forest use
6. Treatment of slashing after completion of operations
7. Pre-commercial thinning or release

Both the "Permit to Operate Power-Driven Machinery" and the "Notification of Operation" can be filled out on the same form through the ODF website using "*FERNS*" and at offices of the State Forester when assistance is required. The local office for these permits is located at: Oregon Department of Forestry, 3701 W. 13th St. The Dalles, OR 97058. Phone: (541) 296-4626.

PAST ACTIVITIES FISCAL YEAR 2004/05 to FISCAL YEAR 2013/14

Review of past activities is a sound documentation practice and provides a good tool for comparison purposes especially for fiscal and logistical considerations. An occasional review provides an important historical perspective and can be very valuable for new employees to the HRC forestry department and to new members of the BOC.

ACTIVITY	ACRES	VOLUME (MBF)	REVENUE	NOTES
Large sales (clearcut)	3,225.86	79,987.84	$27,892,772.32	
Salvage sales	57,334.9	9,648.86	$ 1,872,442.49	
Commercial thinning	3,578.7	13,037.74	$ 4,310,507.49	
Pre-commercial thin	156.6	0		
Tree Planting	6,720.3			2,149,491 seedlings
Trail improvements / Grants			$745,390.94	Trailhead kiosks

PROPOSED ACTIVITIES 2015 – 2025

Following is a summary of planned activities for the next ten years. Each activity is priority ranked:
(1) = High, or conduct annually.
(2) = Medium, or conduct within three to five years.
(3) = Low, or conduct as ongoing, needed or desired improvement.

1) Annual harvest, 9.5 MMBF; approximately 300 - 400 acres per year.
1) Reforestation, Average 200M to 300M seedlings/year total;
Planting 400 – 600 acres per year (full and inter-plant)
1) Commercial thin / cut-to-length sales – sample or “auto” mark, 200 - 400 acres per year. Designation by prescription.
1) Stocking control (PCT) (recent costs $250/ac) on 100 - 300 acres per year (2,500 acre backlog – County is incrementally increasing PCT - ideally would PCT as much as annual clearcut ~300 acres).
1) Salvage annual damage / disease areas.
1) Annual road maintenance.
1) Trail administration.
1) Trail maintenance (grant funded).
1) Update tree farm inventory.
1) Seek opportunities for land exchanges and acquisitions.
2) Improve and implement log marketing.
2) Seek opportunities for niche markets.
2) Improve small sale program.
2) Develop trail policy.
3) Control animal damage.
3) Improve primary road system to all-season surface.

Additional items of concern must be addressed as they arise based on actual current forest stand and parcel conditions. Environmental variations must also be recognized. As such, all out-year planning is limited to current stand conditions and anticipated future outcomes. In addition,

market conditions will play a role in the timing of stand management and the effect this has on the County tree farm must be accounted for in the annual planning process.

CONCLUSION

The overall forest condition is good. Tree mortality from overstocking or decadent forest stands is at acceptable levels and will benefit from a continued salvage program as needed. Additional pre-commercial and commercial thinning will be needed to keep growth rates and future revenue streams at desirable levels due to past shortfalls in these stand improvement programs. Continued education and public relations with forest users will help prevent future resource damage as these groups become more aware of how the tree farm and associated natural resources function.

It is recognized that the forest landscape is a dynamic environment, ever changing, and future outcomes based on present information are subject to some degree of variation. While most management practices will be realized, as anticipated over time with defined outcomes, there remains the basic need to apply adaptive management as current conditions arise.

Timely implementation of the recommended harvest and resource improvement projects will further enhance the host of resources that the tree farm has to offer and increase financial rewards for years to come. Following the recommendations and activities in this plan will ensure that desired conditions, goals and objectives are realized.

APPENDICES

APPENDIX A

GLOSSARY of TERMS

Adaptive management - A dynamic approach to forest management in which the effects of treatments and decisions are continually monitored and used, along with research results, to modify management on a continuing basis to ensure that objectives are being met.

Age class – One of the intervals into which the range of ages of trees in a stand are divided for descriptive purposes.

Allowable cut – The volume of timber that may be harvested during a given period (usually a year) that is specified by a sustained-yield forest plan —*synonym* allowable sale quantity (ASQ, a USDA Forest Service term).

Anadromous – Those species of fish that mature in the ocean and migrate to freshwater rivers and streams to spawn.

Annual ring – The growth layer of one year on a tree, as viewed on the cross-section of a stem, branch, or root. One year's growth consists of a layer of lighter-colored wood (springwood) and a layer of darker-colored wood (summerwood).

Aspect – The direction toward which a slope faces (north, south exposure).

Basal area – a. The cross-sectional area of the bole of a tree 4.5 feet (breast height) above the ground. It is expressed in square feet per acre and is calculated by: diameter of tree squared times 0.005454.
b. The sum of all the individual tree basal areas for a stand of trees; it is expressed as "square feet of basal area per acre". This serves as an indicator of how well a stand is occupying a given piece of land.

Best Management Practices (BMP's) – 1) Forest management practices recognized for using the best, current science aimed at protecting a broad range of forest resources.
2) The State Board of Forestry shall establish best management practices and other rules applying to forest practices as necessary to insure that to the maximum extent practicable nonpoint source discharges of pollutants resulting from forest operations on forestlands do not impair the achievement and maintenance of water quality standards established by the Environmental Quality Commission for the waters of the state. Such best management practices shall consist of forest practices rules adopted to prevent or reduce pollution of waters of the state.

Biodiversity – The variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global.

Blowdown – Trees that have been knocked over by wind.

Blue stain – A fungus discoloration, predominantly bluish, but sometimes grayish or brownish in appearance; it is confined almost exclusively to sapwood, usually in pines. Blue stain is usually introduced to trees by bark beetles boring into the inner bark and cambium.

Board foot – A volume measure of lumber: 1 foot wide by 1 foot long by 1 inch thick.

Bole – The main trunk or stem of a tree.

Broadcast burn – Prescribed fire that burns over a designated landscape to meet management objectives.

Cambium – A layer of cells between the woody part of the tree and the bark. Division of these cells results in diameter growth of the tree through formation of wood cells (xylem) and inner bark (phloem).

Clearcut – A regeneration or harvest method that removes essentially all trees in a stand.

Climax plant species – Species that are self-perpetuating in an ecosystem environment in the absence of perturbing, degenerating of disturbing influences.

Climax stage – The last, highly stable stage of ecological succession. Once an ecosystem reaches this stage, ecological succession is halted until disturbance affects the process to begin again.

Cohort – A group of trees of similar age and size that regenerated after a disturbance, such as a fire or timber harvest.

Commercial thinning – A forest operation that consists of removing saw timber-sized trees from a developing young stand that is in need of thinning. The harvested trees have a commercial value.

Conk – A hard, spore-bearing structure (mushroom) of a wood-destroying fungus which projects outside the bark of a tree. It is most commonly observed on fir trees.

Conventional harvest – Harvesting timber by methods using ground based (tractors) equipment, whether it be forwarders, processors, feller-bunchers and / or skidders.

Crown – The canopy of green leaves and branches formed by a tree. The amount of ground shaded by crowns is often referred to as “crown cover” and is expressed as a percent of the total ground area shaded.

Crown closure – When a stand of trees grows to a point that individual tree crowns are crowded or intermingled. Typically a condition of over stocking and slow tree growth.

Crown ratio – The amount of functional live tree crown in proportion to the total height of the tree.

Cruising timber – Measuring standing trees to determine the volume of wood on a given tract of land (in thousands of board feet). Used for harvesting, purchasing, and general management.

Cull – A segment of, or the entire, tree that does not have any commercial wood value.

DBH – Diameter of a tree outside the bark at breast height, which is 4.5 feet off the ground on the uphill side of the tree.

Defect – Any irregularity or imperfection in a tree or log that reduces the volume of sound wood and consequently reduces the volume cruised (and scaled) from the tree.

Delivered value – The value of logs at a milling facility (AKA – Pond Value) without consideration of delivery cost.

Ecosystem management – Management guided by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on the best understanding of ecological interactions and processes necessary to sustain ecosystem composition, structure, and function over the long term.

Environmentally sensitive – The sum of all external conditions affecting the life, development, and survival of an organism that is sensitive to change due to a single or variety of factors.

Even-aged – Refers to a stand of trees in which relatively small age differences exist between individual trees.

Even flow – Maintaining an annual harvest that provides a desirable forest timber yield and associated revenue to meet management goals.

Ephemeral stream – Streams that carry surface run-off only during or immediately after a rain event or snow melt. Channels may not be well defined and covered with forest litter.

Forest type – A descriptive term used to group tree stands of similar character in composition and development, differentiating them from other stands.

Fuels – Any herbaceous material, slash, etc. that may promote a wildfire. In terms of fuel or fire hazard rating, the greater the fuel load, the greater the hazard for uncontrollable fire events.

Gall or Canker – Hardened round limb or bole deformities that weaken trees and reduce timber values.

GIS – Geographic information system; a computer system that stores data and provides tabular and map data for forest management.

Host – An organism that provides nourishment for the life cycle of another organism.

Indicator species – Plant or animal species that, if present, indicate the developmental or seral stage of a plant community.

Induced landscape diversity – Landscape characteristic change that occurs as a result of disturbance(s) by fire, weather, human or animal activities. May be a combination of more than one of these agents.

Inherent landscape diversity – Landscape characteristics that are relatively static such as climate, soil type, topography and aspect.

Integrated pest management (IPM) – The maintenance of destructive agents, including insects at tolerable levels, by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable —*note 1.* it is implicit in IPM that the actions taken are fully integrated into total resource planning and management, including either the life span of the tree crop or the entire resource-planning horizon —*note 2.* IPM is an evolving concept that recognizes ecological, social, and economic values.

Intermittent stream – Any drainage feature having a defined channel with evidence of annual scour or deposition that does not flow water during all seasons of the year. This may include ephemeral streams if they meet these two physical criteria.

Ladder fuel – Foliage, live or dead, that is arranged so that fire may climb from the ground into the crowns of trees.

Large saw timber – Trees with commercial harvest value, larger than 20” DBH.

Landing – A natural or constructed area large enough to process logs from trees skidded from the woods, deck logs for hauling to a mill and piling slash.

Late Successional Habitat – An older forest stand with multi-layered structure dominated by large overstory trees. Species and size features vary by elevation, aspect and plant community.

Leader – The growing top (terminal shoot) of a tree. The distance between each whorl of branches up a tree’s stem generally represents one year of height growth.

Leave trees – Trees retained after a harvesting operation.

Log deck – A stack or pile of trees that have been processed into logs for milling.

Mature – The age at which a tree’s growth rate begins to decline, and decay begins to reduce salvageable tree volume in a stand. This occurs sometime between 90 and 200 years of age.

MBF – Abbreviation for 1,000 board feet of timber.

MMBF – Abbreviation for one million board feet of timber.

Merchantable timber – Trees that can be converted into saleable products. Generally this includes trees 10” DBH or greater. Also referred to as “saw timber”.

Native surface – A road surface constructed from natural or "native" soil material. Temporary and seasonal roads are not typically improved with surface rock.

Non-declining yield – Managing for a level of harvest that does not exceed growth. Therefore, in principal, the level of harvest or yield may be sustained for decades.

Noxious weed – An introduced plant that disrupts the cycle of native plants and animals.

Overstocked – A condition of a stand, indicating that there are more trees present than desired.

Overstory removal – A type of harvest designed to remove larger and over-mature trees which overtop the remainder of the stand.

Pathogen – Any agent that is the cause of disease.

Percent slope – The amount of vertical rise or fall, measured in feet, over 100 feet of horizontal distance: ie, 20 percent slope = 20 foot rise over 100 feet.

Plant community – A relatively homogenous composition of plants that may persist over time; indicator of site productivity and successional stage (*aka – Plant Association*).

Pole timber – Trees with a DBH of approximately 5-9".

Pre-commercial thinning (PCT) – Removal of some of the trees, typically sapling and pole size, in a young stand to reduce overall competition for water and nutrients. Trees thinned from these stands have no commercial value, hence are "pre-commercial".

Prescribed fire – Controlled burning under specified conditions in order to realize management objectives.

Pulp – Pole size and larger trees that have no saw timber value but may be chipped for converting to pulp and ultimately processed to make paper products.

Reach – A short length of stream channel; typically a section between two bends.

Reforestation – The natural or artificial restocking of an area with forest tree species. The natural restocking of a site is often referred to as "natural regeneration".

Resident fish – Fish species that complete their life cycle in a specific body of freshwater; non-anadromous fish.

Residual stand – Trees, often of commercial size, left in a stand after thinning to grow until next harvest. Also referred to as "leave trees", these trees are also important for natural regeneration of a site.

Riparian management area – An area with specific boundaries established by the Oregon Department of Forestry to promote riparian resource values; the width varies according to the stream classification or special protection needs.

Riparian zone – An area or fringe parallel to a water body / stream that is essential to proper riparian function.

Sanitation/salvage harvest – An operation in which trees that are dead or in poor condition are harvested before they no longer have any commercial value. This is common where insect-infested or diseased timber is dying or is already dead and should be removed from a stand. This practice also releases healthy trees for additional growth and cleanses the stand of disease.

Sapling – A tree that is 1 to 4 inches DBH.

Second growth – A forest of trees that develops after harvest of the original stand. These stands are generally between 40 and 90 years of age. Also a stand of trees that are less than 30 inches DBH and do not have old-growth characteristics.

Seedling – Any tree, either naturally existing or hand planted that is less than 1" DBH.

Seed Zone – Areas of relatively similar growing conditions established for designating where seed stock was collected and where the sown seedlings should be planted.

Seral plant species – Species that begin or pioneer a seral stage of succession that do not self-perpetuate in the absence of disturbance and are replaced by climax plant species.

Seral Stages – Stages of forest development or ecological succession that occur as a plant community changes over time.

Significant wetland – As defined in OAR 629-680-0310, significant wetlands are "wetlands that are larger than eight acres; estuaries, bogs; and important springs in eastern Oregon." This includes forested and non-forested wetlands larger than eight acres (OAR 629, Division 645).

Site index – A measure of forest site quality, based on the height (in feet) that dominant trees reach at a given age. It is generally expressed in 50 or 100 year site index. Site index is an indication of the productivity of a forested site. Site indexes are often grouped in "site classes", which give a numerical rating of a site's productivity, generally from I to VII, with 1 being the highest productivity and 7 the lowest.

Silviculture – The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Skid – Yarding or pulling trees or logs to a landing, typically with a tracked or rubber tired tractor also called a "skidder".

Skyline Harvest – A log yarding system that uses cables suspended above the ground by fastening the trailing end to a spar tree. The running end of the cable is fed out to retrieve logs by a motorized yarder with a spool of wire rope.

Slash – Tree tops, branches, bark, and other debris left after a forest harvest operation.

Small Saw timber – Trees with commercial harvest value, generally 10 to 20" DBH.

Stagnation – The condition in a stand where tree growth occurs at a very slow rate due to close tree spacing (overstocking) and high competition.

Stand – A group of trees in one geographic area which are uniform enough in species composition, age, and arrangement to be distinguishable from adjoining areas of forest.

Stand density – A relative measure of the amount of tree stocking per unit area.

Structure – The physical parts of an ecosystem or plant community such as the size and condition of trees, shrubs, grasses and forbs.

Stumpage value – The standing value of timber on the stump or the value a company pays for the right to harvest timber from a given land base.

Succession – A series of developmental stages (Seral) in a plant community where one or more groups of organisms are replaced.

Sustained yield – An average level of timber harvest that may occur for one or more rotations based on individual stand growth and total inventory without impairment to the land.

Thinning – Cutting in a stand to increase the growth rate of the leave trees. It can be pre-commercial or commercial depending upon whether the trees removed during thinning have a commercial value.

Timber – A term loosely applied to forest stands or their products; also wood in forms suitable for heavy construction (beams, poles or pilings).

Turbidity – The relative clarity of water, which may be affected by material suspended in the water.

Understory – That portion of the trees or other vegetation in a forest stand below the dominant or mature canopy.

Uneven-aged – Term applied to a stand in which there are considerable differences in the age of the trees present.

Waters of the State – Includes lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, wetlands, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

Watershed – The drainage basin of a defined body of water.

Wetland – Oregon Forest Practices Act Rule OAR 629-600-0100 (92) definition: "those areas that are inundated or saturated by surface or ground water for a frequency and duration

sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions".

Whole tree skidding – Removing entire trees from the woods to a landing for processing into log form, and eventual hauling to a mill. This method helps reduce slash in the woods and places it on the landing for piling or chipping.

Written Plan – A document required by ODF and prepared by an operator, landowner or timberowner that describes how the operation is to be conducted relative to protecting resources and complying with the Oregon Forest Practices Act.

Yarding – Pulling trees or logs to a landing with a cable. Generally this term applies to skyline and helicopter applications where logs are suspended in the air.

APPENDIX B

COMMON TREES of NORTH-CENTRAL OREGON

All plants are given Latin names. This is to ensure some degree of clarity among resource professionals when referring to a particular species; because common names are not specific and are quite often "localized" a scientific name for a plant remains the same throughout the World.

Latin Name	Common Names(s)
Abies amabilis	Pacific silver fir
Abies concolor	White fir
Abies grandis	Grand fir
Abies procera	Noble fir
Acer macrophyllum	Bigleaf maple
Acer glabrum	Douglas maple
Alnus rubra	Red alder
Betula occidentalis	Water birch
Calocedrus decurrens	Incense cedar
Castanopsis chrysophylla	Golden chinquapin
Fraxinus latifolia	Oregon ash
Juniperus occidentalis	Western juniper
Larix occidentalis	Western larch, Tamarack
Picea engelmannii	Engelmann spruce
Pinus contorta	Lodgepole pine
Pinus monticola	Western white pine
Pinus ponderosa	Ponderosa pine, bull pine, yellow pine
Populus tremuloides	Quaking aspen
Populus trichocarpa	Black cottonwood
Prunus emarginata	Bitter cherry
Pseudotsuga menziesii	Douglas-fir, Red fir
Quercus garryana	Oregon white oak
Sequoiadendron giganteum	Giant sequioa
Taxus brevifolia	Pacific yew
Thuja plicata	Western Red cedar
Tsuga heterophylla	Western hemlock
Tsuga mertensiana	Mountain hemlock

APPENDIX C

LOG MARKETS AND FOREST PRODUCTS ASSOCIATIONS

American Forest Resource Council
Contact: Irene Jerome
Office: 541-620-4466

Bell Timber Inc
Contact: Frank Gribble
Office: 503-444-1891

Boise Cascade Wood Products, LLC
La Grande: Contact; Bruce Skvarch,
Office: 541-962-2044
Pilot Rock: Contact; Tony McKague,
Office: 541-443-5647

Frank Lumber Company
Office: 503-897-3003

Jared Gidley
Phone: 541-399-2896

Hampton Tree Farms, Inc.
Contact: Mark Kemp
Office: 503-876-2322

High Cascade, Inc.
Contact: Jeremy Beddingfield
Office: 509-427-8413

Murphy Company
Contact: Nate Root
Office 360-482-7422

SDS Lumber Company
Contact: Jeremy Grose
Office: 509-493-2155

Warm Springs Forest Products
Office: 541-553-1131

WyEast Timber Service, Inc.
Contact: Paul Jones
Phone: 209-840-1919

Banks Lumber Company
Contact: 503-324-2681

Blue Mtn Lumber Products
Contact: Ed Pearson
Office: 541-276-4304

Columbia Vista Corporation
Contact: Ed Martin
Office: 360-892-0770

Gabbster LLC
Contact: Dean Rowley
Phone: 503-260-5172

Gilkerson & Sons, Inc.
Contact: Scott Gilkerson
Phone: 541-806-0503

Hegerberg Timber Services, LLC
Contact: Matthew Hegerberg
Phone: 503-317-9449

Interfor Pacific
Contact: Jay Sandmann
Phone: 503-539-9350

RSG Forest Products
Office: 503-829-2200

Stimson Lumber Company
Office: 503-357-2131

Washington Hardwoods Association
Contact: Dave Sweitzer
Office: 360-835-1700

ZZ Logging, Inc.
Contact: Robert Zeman
Phone: 541-352-7414

POTENTIAL BIDDERS FOR LOGS AND FIBER

Kriege Logging
Rick Kriege
Prineville, Oregon
541-419-2323

Quicksilver Contracting
John Williams
Bend, Oregon
541-419-9446

T-2 Contracting
Jeremy Totman
Sweet Home, Oregon
541-401-0878

Miller Logging
Chris Miller
Prineville, Oregon
541-419-9395

SDS Lumber Company
Jeremy Grose
Bingen, WA
519-493-2155

High Cascade, Inc.
Jeremy Beddingfield
Carson, WA
509-427-8413

APPENDIX D

HISTORY AND PAST MANAGEMENT OF THE COUNTY FOREST**

Hood River County obtained the majority of forestland it presently owns through tax foreclosures during the early 1900's. The forestland was dedicated County Forest in May of 1945 with a Cooperative Agreement signed between the U.S. Department of Agriculture and the Hood River County Board of Commissioners. In 1951, the Hood River County Board of Commissioners rededicated the forestland as County Forest. On April 6th, 1955, the U.S. Forest Service and the Hood River County Board of Commissioners entered into a Forest Management Agreement. The agreement was terminated on July 1, 1962.

A lawsuit was filed against Hood River County April 17, 1961, because of apparent improper deed filing and declaration of County Forest. Evergreen Timber Company and Western Tree Farms, Inc. (William & Bruce Deardorff) filed a suit to quit claim their many parcels of land. In preparation for the lawsuit, it was found that Hood River County had acquired the majority of land by tax foreclosures between 1922 and 1938 and after 1938 generally by land exchanges. The Hood River County Board of Commissioners had dedicated most of these parcels as Hood River County Forest three separate times May 2nd, 1945; September 19th, 1951; and September 20th, 1956. The majority of the 1961 litigation brought about by the Evergreen Timber Company was finally settled in 1967. The Hood County Board of Commissioners rededicated the County Forest in fall of 1967. A summary copy of the litigation is available in the Public Works Department vault.

On April 5, 1967, the Board of Commissioners created the Timber Stand Improvement (TSI) budgets for reforestation and forest establishment.

Firewood and fence posts were the first products sold by the County in1936. Jaymar Lumber Company removed the first timber products from the County Forest from the Fir Mountain area in 1943. There appears to be a gap between 1943 and 1946 before additional timber removals occurred. During this period there were some small sales. There is no record to confirm the removed volume, but it appears that there was about 4 million board feet (MMBF) removed annually from1946 to 1950. In 1950, more accurate records of timber volume and location of sales were recorded and are available in the courthouse records area. Products removed from the County included Christmas trees, sold to individuals and commercially, shake bolts, fence rails, surplus seedlings, rock, firewood, cones and standing timber.

From 1936 to 1959, there was no adopted forest management plan. Timber was sold and cut to meet the budget needs. The U.S. Forest Service implemented an allowable cut based on projected growth in 1955, of 3.2 MMBF per year to be in place until 1995. This was based on a model system of the U.S. Forest Service in the regional office using a 100-year rotation with little consideration for regeneration growth and was included in the plan for the entire Mt. Hood National Forest. In 1959, the U.S. Forest Service implemented a special forest management plan for Hood River County that remained in place through 1971. During this period, the U.S. Forest Service provided an inconsistent harvest average of 2.92 MMBF/year.

Since 1950, there have been several land exchanges for consolidation purposes. There have also been many right-of-way exchanges for access to properties not only to the County Forest, but also to adjacent landowners, as mutual benefit to both parties. From 1952 to 1962, the County did sell some forestland after having approval of the voters. Since 1962, there have been no forestland sales presented to or approved by the voters.

In May of 1971, Hood River County started one of the first in-place inventories for the County's forest holdings. They established and numbered the permanent plots, numbered individual trees and took base measurements that could be re-evaluated on a periodic basis. There was a presentation to the Forest Advisory Committee and the Board of Commissioners in December of 1971. The inventory determined that six million board feet could be clear-cut, one million board feet could be partial cut and if available, 500 MBF salvage cut. This sustained yield was based on growth (allowable cut) on twenty-two thousand acres for a constant non-declining even-flow harvesting schedule calculated from the Washington, Department of Natural Resources (DNR) allowable cut program, which was based on the tree volume tariff program. The County was able to use the local telephone company's computer and, were able to update and interface with the DNR program.

The permanent field plot measurements were re-measured in 1976 and partially reviewed in 1981 and 1982. They determined age class distribution in ten-year increments up to age 120. Any stand over 120 was considered mature timber. The allowable cut was based on a growth projection to determine the rotation age. The rotation age adopted was 90 years. Verification of the available County forest acres with no restrictions, determined what could be harvested on a sustained basis. In 1982, the Forestry Department determined after several conversations with the DNR that because of policy changes, we were not going to continue use of the DNR programs.

This led to a problem since the County did not have our own growth program for our small computer system. Also, there were no computer programs available or small enough for use on the County's computer or available to share until 1985. This caused over an eight year delay before the County could review the allowable cut as approved in the forest management plan adopted in 1971. The recommended review of growth was about every ten years.

The Forestry Department compared the actual volume harvested from timber sales with the projected harvest using modern growth models. The cut out is very close to the volume projected by the growth simulations.

The County Forest contains a wide variation in the forest stand and species composition. For management convenience in 1976, the County was separated into the four working units of Parkdale, Middle Mountain, Fir Mountain, and West Side working units.

******Hood River County Forest Management Plan (2001). Ken Galloway, Hood River County Forester. Section I, History of Establishment and Past Management of the County Forest, pages 3 – 4, with edits provided by Doug Thiesies, current Forest Manager.

COMPLETE REFERENCE LIST

[i] American Tree Farm system
[ii] Rural Living Handbook, Hood River County
[iii] Forest Service data provided by Timber Data Company, Eugene, Oregon
[iv] Data from Hood River County fiscal records.
[v] Society of American Foresters, Dictionary of Forestry, June 2008
[vi] *Section 21A.0 – Forestry Department Policy*
[vii] Soil Survey of Hood River County
[viii] Oregon Conservation Strategy 2006, p. 265.
[ix] Hood River County Watershed Plan
[x] Hood River County Watershed Plan
[xi] Hood River County Forestry department calculated buffer acres using 20 feet on each side of the stream.
[xii] Oregon Conservation Strategy
[xiii] Hood River County Watershed Plan
[xiv] OCS, p. 11
[xv] Hood River County Watershed Plan
[xvi] Oregon Forest Practices Act,
[xvii] Information provided by Nate Ulrich
[xviii] Information in this section provided by personal conversations with John Williams, Quicksilver Contracting, Bend, Oregon.
[xix] Information in this section was excerpted from a "Legislative Proposal" developed in 2014 by Grant County Oregon Economic Development.
[xx] Information provided by personal conversation with Jim Wilson, JTS Animal Bedding, Redmond, Oregon.