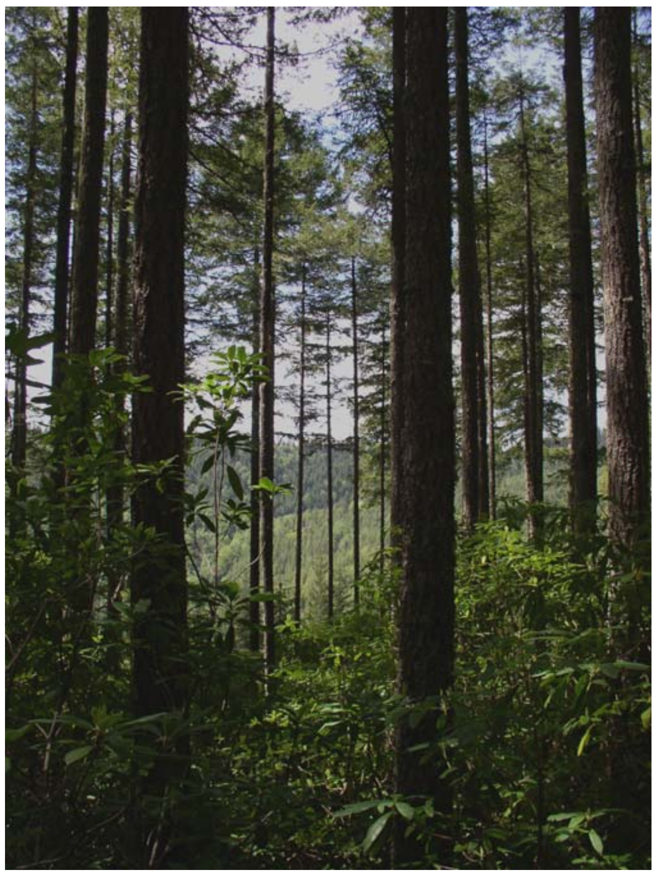
Elliott State Forest Management Plan

Oregon Department of State Lands

Oregon Department of Forestry



FINAL PLAN

OREGON DEPARTMENT OF STATE LANDS

HONORING A CENTURY OF SERVICE

November 2011

Acronyms and Abbreviations

AOP	Annual Operations Plan
APHIS	USDA Animal and Plant Health Inspection Service
BLM	Bureau of Land Management
BMP	best management practices
BOF	Board of Forestry
BOFL	Board of Forestry Land
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CI	confidence interval
CSF	Common School Fund
CSFL	Common School Forest Lands
CWA	Clean Water Act
DBH	diameter breast height
DEQ	Oregon Department of Environmental Quality
DOGAMI	Oregon Department of Geology and Mineral Industries
DSL	Oregon Department of State Lands
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FC	federal candidate species
FE	federal endangered species
FMP	Forest Management Plan
FPA	Forest Practices Act
FT	federal threatened species
GIS	geographic information system
GTR	General Technical Report
HCP	Habitat Conservation Plan
HUC	hydrologic unit code
IP	Implementation Plan
IPM	integrated pest management
ITP	Incidental Take Permit
LCDC	Land Conservation and Development Commission

LMCS	Land Management Classification System
LW	large wood
MBF	thousand board feet
mg/L	milligrams per liter
MMBF	million board feet
MMMA	Marbled Murrelet Management Area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries (formerly National Marine Fisheries Service)
NTMB	Neotropical migratory bird
OAR	Oregon Administrative Rule
OBIC	Oregon Biodiveristy Information Center
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ONHP	Oregon Natural Heritage Program
ORS	Oregon Revised Statute
OSU	Oregon State University
PNW	Pacific Northwest Research Station (part of USDA Forest Service)
RMA	Riparian Management Area
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SDI	stand density index
SE	state endangered species
SG	state game species
SHPO	State Historic Preservation Office
SOC	federal species of concern
SSC	state sensitive species, critical status
SSP	state sensitive species, peripheral or naturally rare
SSU	state sensitive species, undetermined status
SSV	state sensitive species, vulnerable status
ST	state threatened species
SUV	steep, unique and visual
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior

USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRC	Oregon Water Resources Commission

Preface

A Visionary Past

The year 2010 marked the 80th anniversary of the establishment of Oregon's first state forest—the Elliott State Forest. For over 50 years, the Oregon Department of Forestry has been managing the forest for the State Land Board and the Department of State Lands.

In 1912, Governor Oswald West and the first State Forester, Francis Elliott, envisioned a state forest that would provide a boon of social and economic values to the state. It took 18 years for their vision to come to fruition. Since that time, the Elliott State Forest has produced a wide range of economic, environmental, and social values for Oregonians.

Revenues generated from timber harvests flow into the Common School Fund, where it is carefully invested. A portion of the income from those investments is distributed twice yearly to every public school in the state. The Common School Fund was quite small during the early years of management; however, timber harvesting revenues over the years have made significant contributions to a fund that now totals over $900 million.

Through active management, the forest continues to provide important habitats for fish and wildlife, recreational opportunities for people, good water quality, and numerous other social and environmental benefits.

Over the years, management plans for and operations in the Elliott State Forest have evolved in response to new science regarding the relationships among the forest, fish and wildlife, watershed health, and people. The earliest plans focused on managing the forest for timber and building a road system that would provide access for management, fire control, and the removal of forest products. Water quality and fish and wildlife habitat became important areas of focus in later plans. In 1995, endangered species concerns led to the development of a new *Elliott State Forest Management Plan* and approval of a Habitat Conservation Plan through the federal Endangered Species Act. Important provisions in the Habitat Conservation Plan have expired, and revised information about landscape management and the resources in the forest make updates necessary.

A Promising Future

This Forest Management Plan is the next step in the continuing legacy started by Governor West and State Forester Elliott, and reflects their confidence in the capability of the Oregon coastal forests to provide a multitude of benefits to Oregonians.

Ten years have been devoted to the development of this Forest Management Plan. The process has included consideration of alternatives, public comments, and scientific review. The Forest Management Plan acknowledges the interdependence of economic, environmental, and social values. It is designed to deliver benefits that include sustainable timber harvests and revenue, diverse habitat for native species, properly functioning stream systems, and recreational opportunities.

The Forest Management Plan is structured to ensure that management will respond to new information through monitoring, application of the strategies, and responses of the forest to management activities. The responses of the forest will be evaluated relative to the goals and assumptions in the Forest Management Plan, and appropriate adjustments will be made.

Addressing Today's Concerns

For the past several years, Oregon has been facing significant economic challenges. The economic needs of our schools are a major concern. In addition, Oregonians' dedication to a healthy environment remains strong. To sustain long-term revenues, management must ensure that the forest and aquatic systems continue to function properly.

Managers, planners, and resource specialists have worked diligently and creatively to develop a Forest Management Plan that will ensure increased harvest levels and the development and maintenance of high-quality fish and wildlife habitats and healthy watersheds.

The Elliott State Forest continues the tradition of demonstrating that state forests can achieve the vision of Governor West and State Forester Elliott, as well as the current vision: a forest that helps to support Oregon schools and provides for a wide range of social and environmental values that are important to Oregonians.

The planning team hopes that readers find this Forest Management Plan informative, and that it entices members of the public to visit and see for themselves the rugged beauty, richness, and productivity of the forest called "The Elliott."

Acknowledgements

This Forestry Management Plan (FMP) was developed through a team effort of many talented individuals from government agencies, organizations, and the general public. The hard work and expertise of this team has led to a FMP that will guide management of the Elliott State Forest into the future.

I extend my sincere thanks and appreciation to all who participated in the planning process. The core team, steering committee, and other resource specialists are all current or former Oregon Department of Forestry employees, except where otherwise noted.

Specifically, I wish to thank:

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In any attempt to acknowledge a body of contributors, some names inevitably will be omitted. I apologize to any individual whom I have neglected to acknowledge for this project. We greatly appreciate the contributions of everybody who participated in developing this FMP.

Doug Decker
Oregon State Forester

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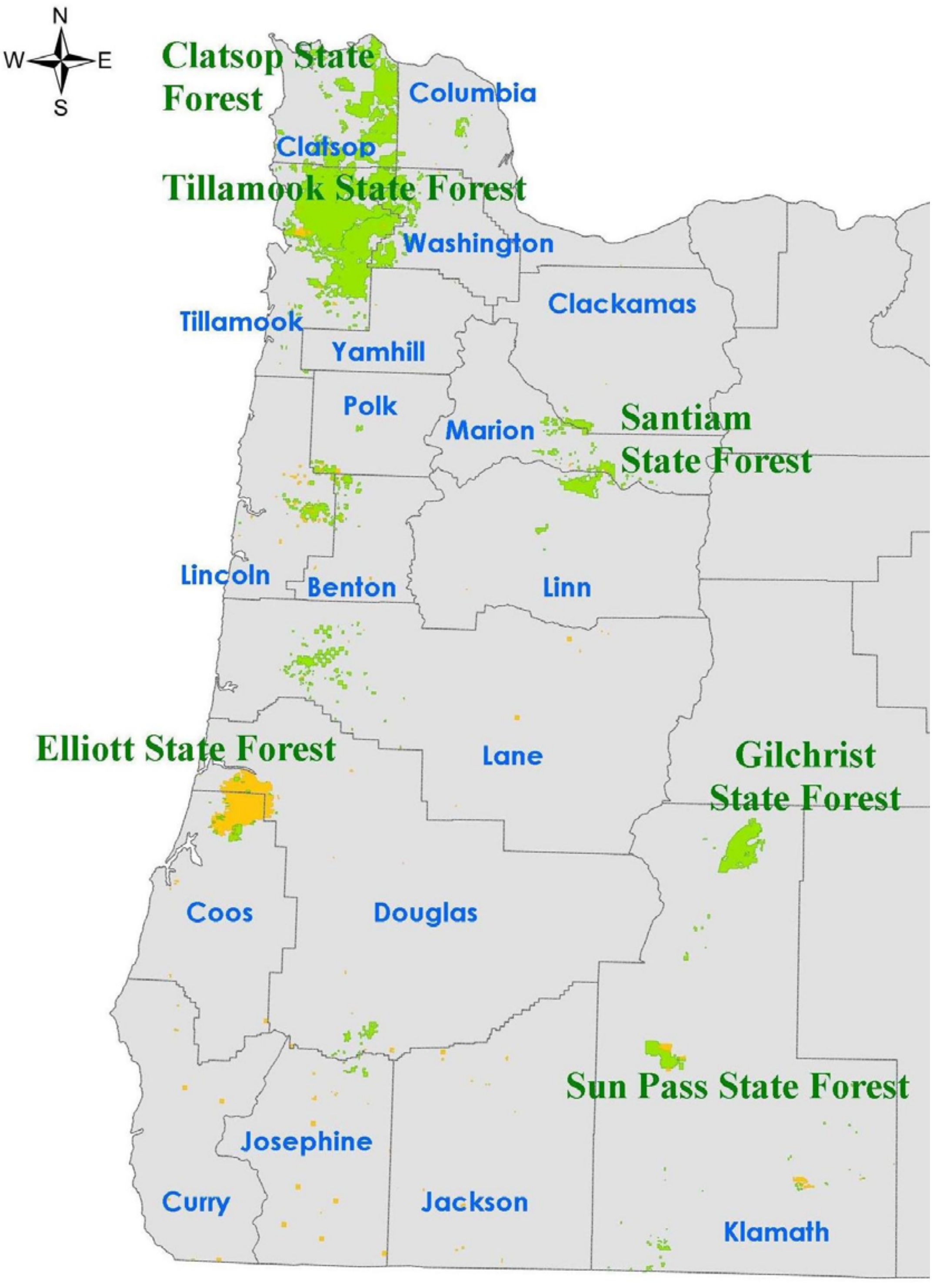
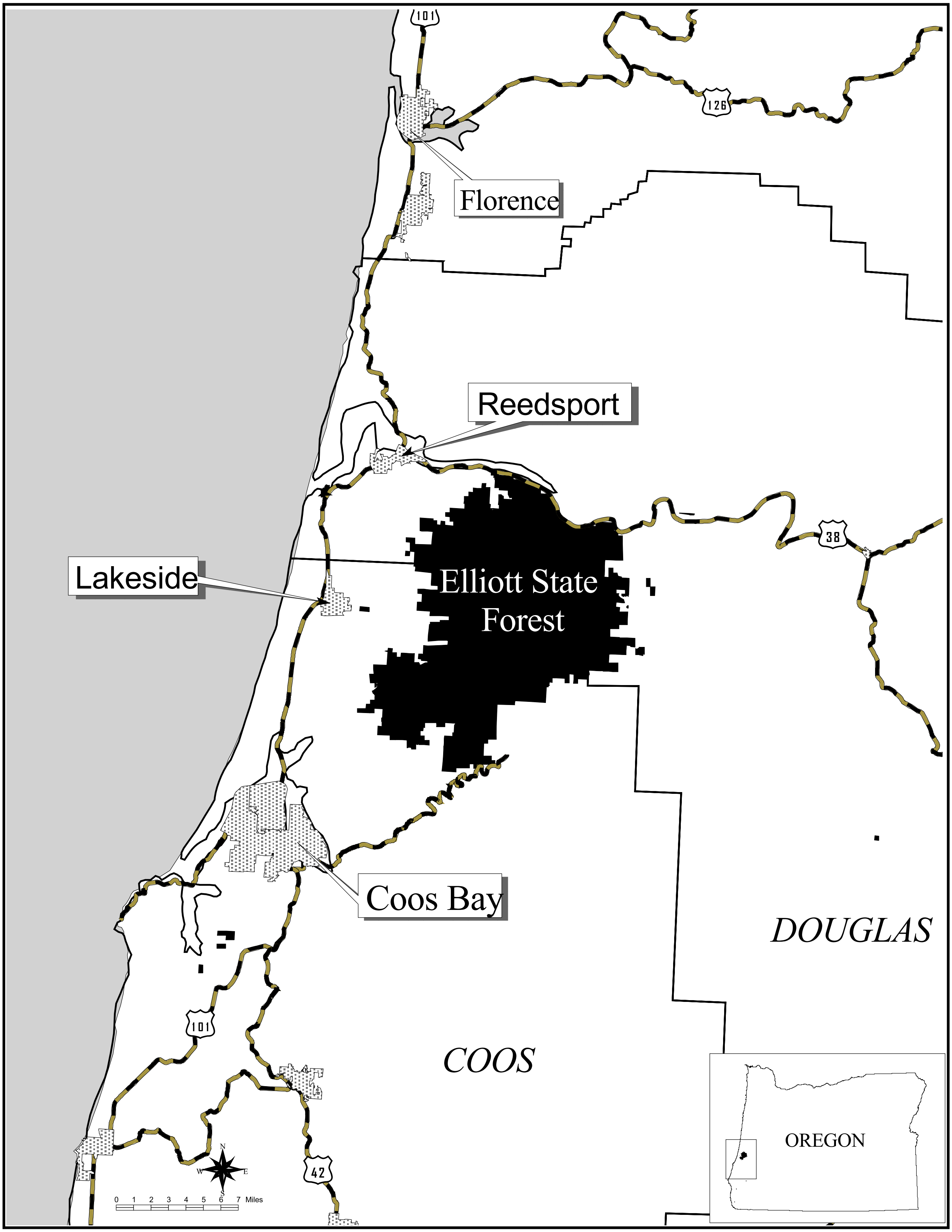


Elliott State Forest Vicinity Map



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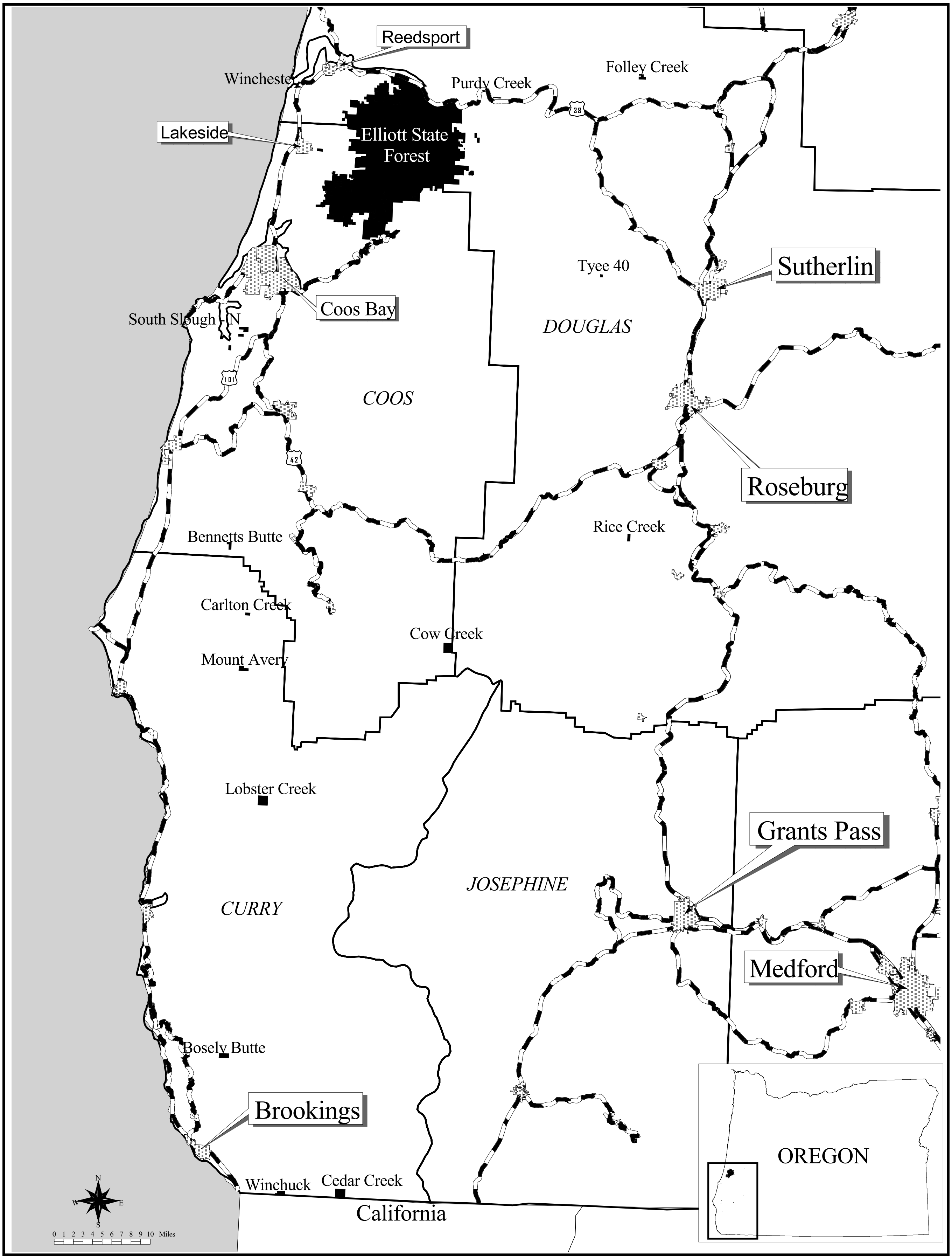
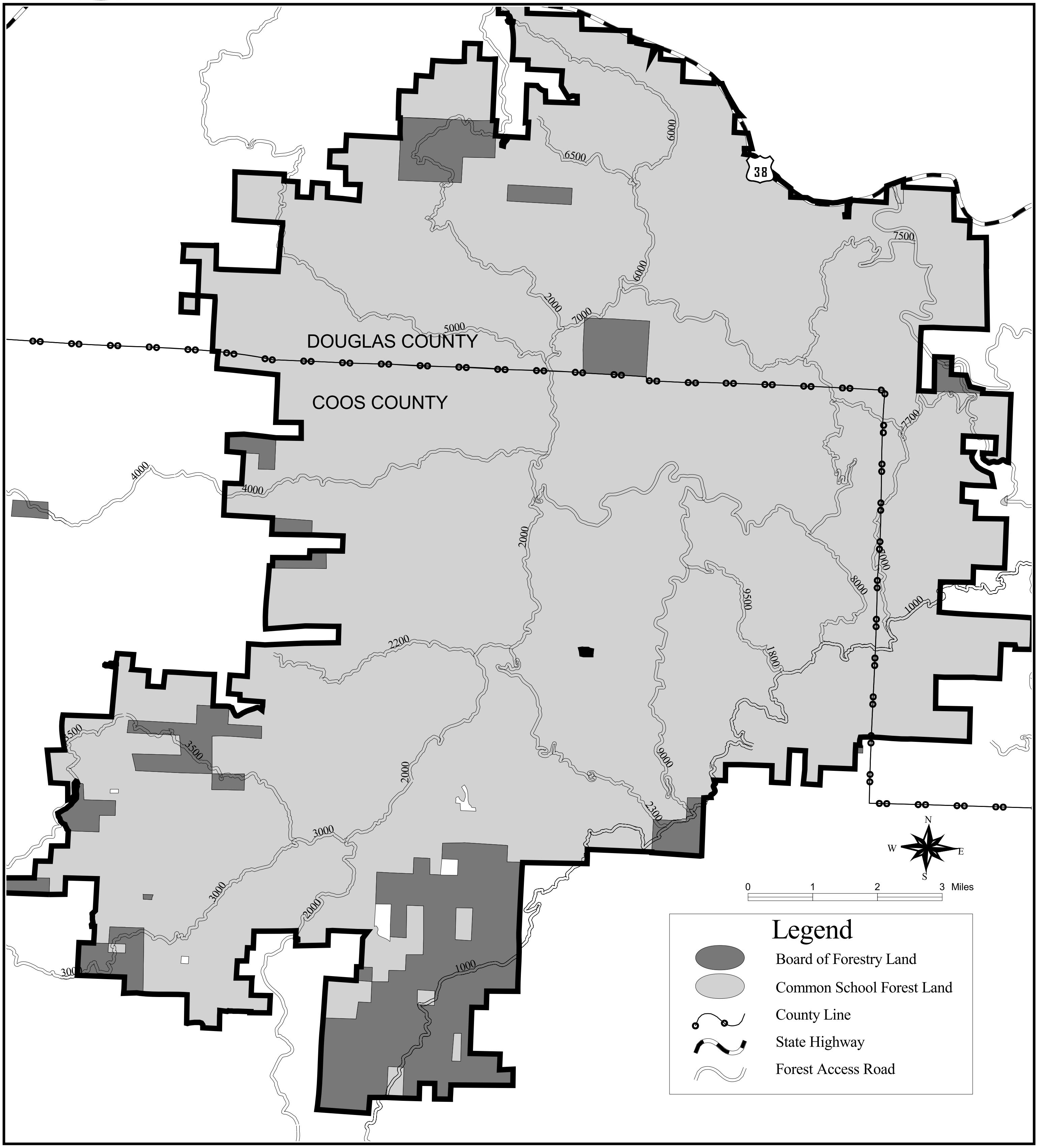
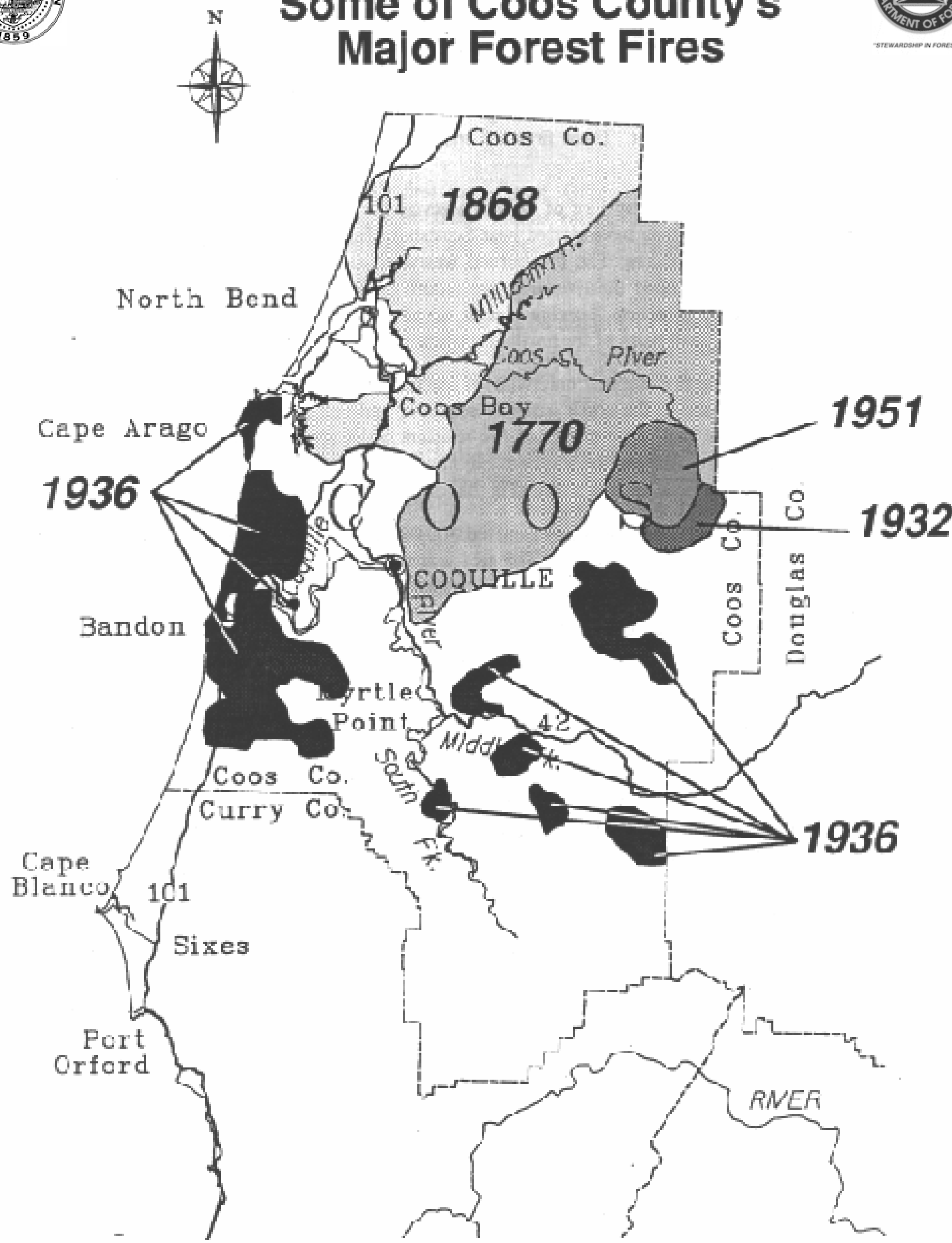


Elliott State Forest Ownership

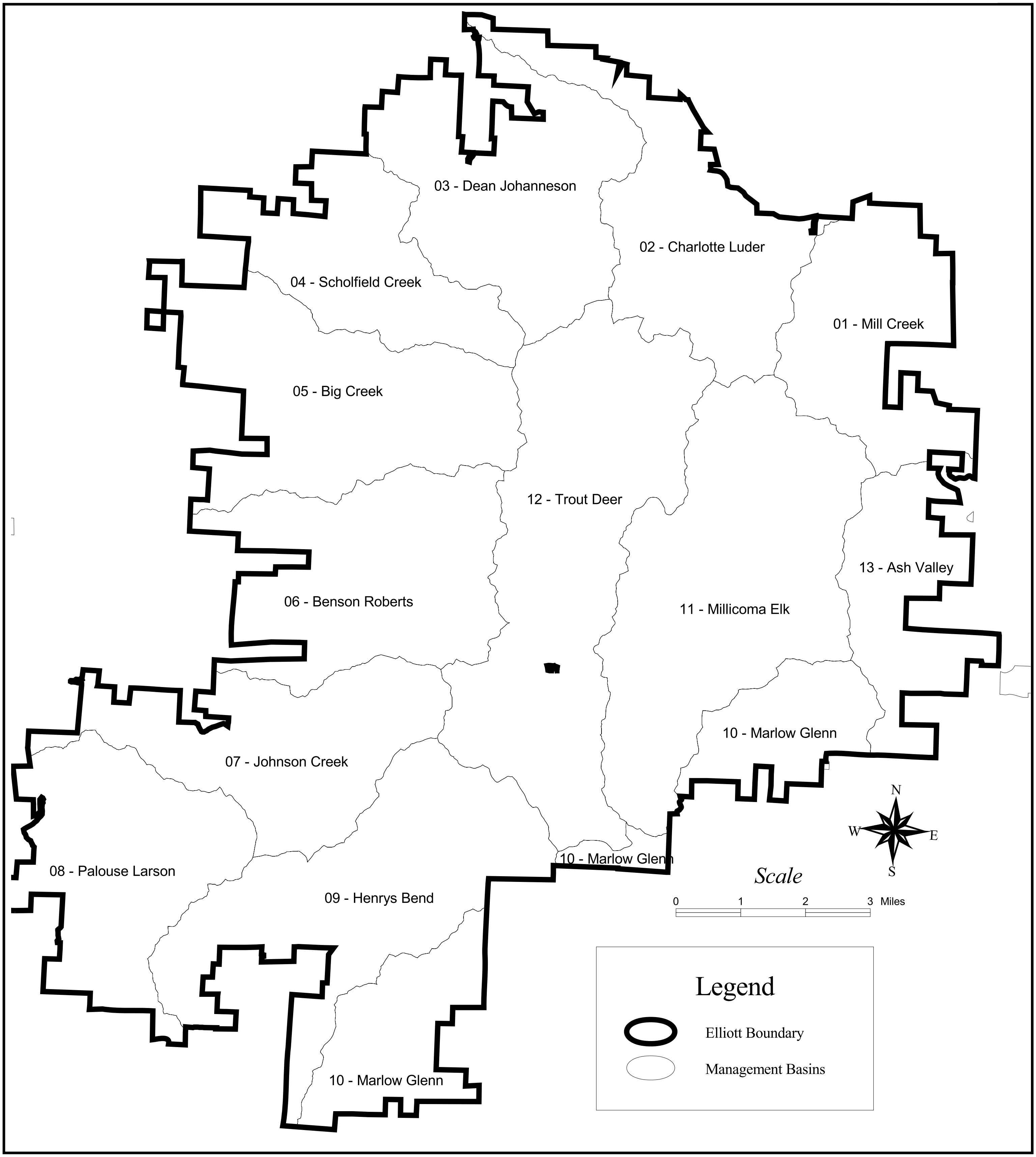


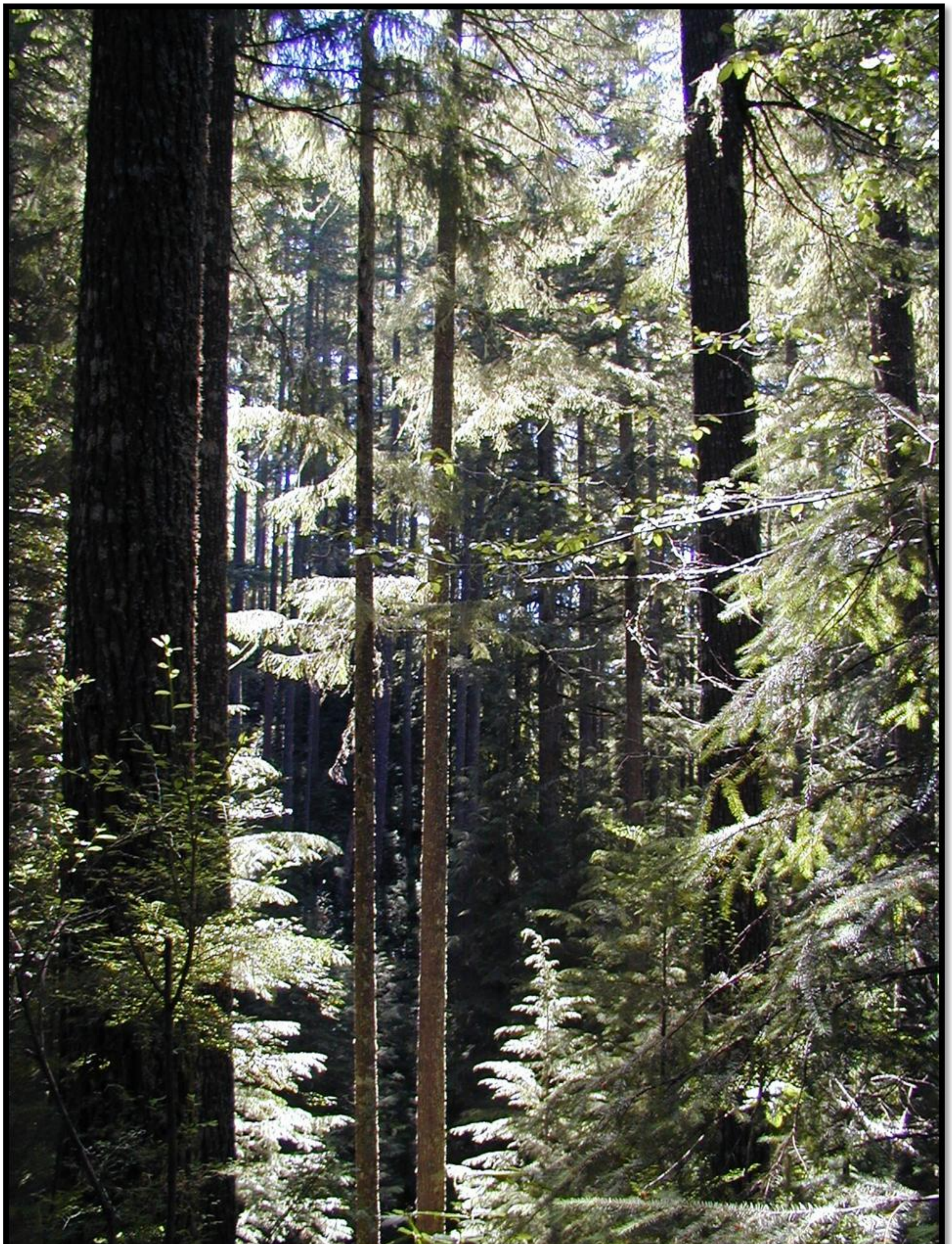
Some of Coos County's Major Forest Fires



Source: Jerry Phillips

Management Basins on the Elliott State Forest





Executive Summary

This Executive Summary covers the key points from each chapter of the *Elliott State Forest Management Plan* (FMP).

Reference citations are omitted from this Executive Summary.

Chapter 1. Purpose, History, and Planning

The FMP provides management direction for all Common School Forest Lands (CSFLs) and Board of Forestry Lands (BOFLs) managed by the Coos District. This includes the Elliott State Forest proper, as well as scattered tracts of state forest lands in Coos, Curry, and Douglas Counties, totaling 95,273 acres. In this FMP, all lands managed by the Coos District are referred to as the Elliott State Forest. This FMP supersedes and replaces the previous *Elliott State Forest Management Plan*.

This FMP takes a comprehensive, multi-resource approach to forest management, as did the 1994 FMP. It includes a description of each forest resource, information about its current condition, and management for each. The resource management goals and strategies are intended to achieve a proper balance among the resources through a system of integrated management. For example, the key set of management strategies seeks to concurrently produce revenue through harvesting of forest products, while maintaining and developing desirable fish and wildlife habitats and forest biological diversity.

Location—The Elliott State Forest is located in the Oregon Coast Range. Coos Bay and North Bend are the nearest cities to the southwest of the Elliott; Reedsport is the nearest town to the northwest. The forest is a contiguous block of land approximately 18 miles long (north to south) and 16 miles wide (west to east). The Umpqua River is located immediately north of the forest. To the west, the Elliott extends within six miles of the ocean. On the east, it extends approximately 21 miles inland, to the crest of the Coast Range. The contiguous Elliott State Forest covers 93,003 acres, mostly located in Coos and Douglas Counties.

In addition to the main block of the Elliott State Forest, the Coos District manages 2,270 acres of scattered CSFLs located in Coos, Curry, and Douglas Counties. These scattered tracts are distributed across a broad geographic area ranging from the California border to just north of the Umpqua River, and from the Pacific Ocean to Sutherlin in the interior Umpqua River valley.

Land Ownership—State forests were acquired in different ways, and the two types are owned by different entities within state government. Some state forest parcels were granted to the state by the federal government when Oregon became a state in 1859; these are the CSFLs, owned by the State Land Board. The BOFLs are lands owned by the Board of Forestry (BOF).

Each land ownership has its own set of legal and policy mandates. These mandates are discussed under "Land Base and Access" in Chapter 2, and also in Appendix D. The guiding principles in Chapter 3 provide more information about how state forests of both ownerships are managed under this FMP.

Most (90.7 percent, or 86,367 acres) of the state forest lands in the Coos District are CSFLs; the remaining 9.3 percent (8,906 acres) are BOFLs.

Origin of the Elliott State Forest—The origin of the Elliott State Forest dates back to 1859, when the Oregon Territory became the State of Oregon. At that time, the

Admissions Act granted to Oregon sections 16 and 36 in every township, or lands in lieu of those if they were unavailable. Oregon was to use these lands to finance public schools. This land grant, the Common School Trust Lands (of which the current CSFLs are a subset), amounted to approximately 3.5 million acres.

Between 1859 and 1912, all but 130,000 acres of the forested lands passed out of state ownership by sale as a matter of policy. Approximately 70,000 acres of the remaining lands were scattered inside the newly established national forests in Oregon.

The Oregon Department of Forestry (ODF) was created in 1911. Its main purpose was to control forest fires, but it was also authorized to acquire forest land to manage. However, the ODF did not actually acquire any lands until legislative actions in 1925 and 1939 made it more feasible.

To turn the isolated parcels of CSFLs into one manageable block of state-owned forest land, State Forester Francis Elliott and Governor Oswald West decided to trade the state parcels inside the National Forests with the federal government for one large block of federal land. This block of land became Oregon's first state forest in 1930.

In 1940, Coos County deeded 6,500 acres of tax-delinquent forest land next to the Elliott to the BOF. Nearly 1,800 acres of BOFLs are also located in Douglas County, most of which was deeded by the county in the 1930's and 40's. In return, the counties were to receive two-thirds of the revenue from these lands. In the 1970s, a focused land exchange effort began that traded approximately 7,000 acres scattered parcels of state land for privately-owned land within or next to the forest.

Management Planning for State Forests—Management planning for Oregon state forests involves three planning levels, and fiscal and biennial budgeting. As shown in Figure ES-1, planning begins with broad-scale, long-range planning documented in the Forest Management Plan. Intermediate level planning is done at the district level and is documented through district Implementation Plans (IPs). Annual Operations Plans (AOPs) are designed to achieve the IP objectives for shorter periods of time (one or two years). Development, implementation and revision of the three integrated planning levels are dependent upon division and district budgets developed on a biennial and annual basis.

The long-range FMP provides overall direction for managing the state forests in the planning area. This FMP is guided by legal and policy mandates and administrative rules, which are described in Chapter 1.

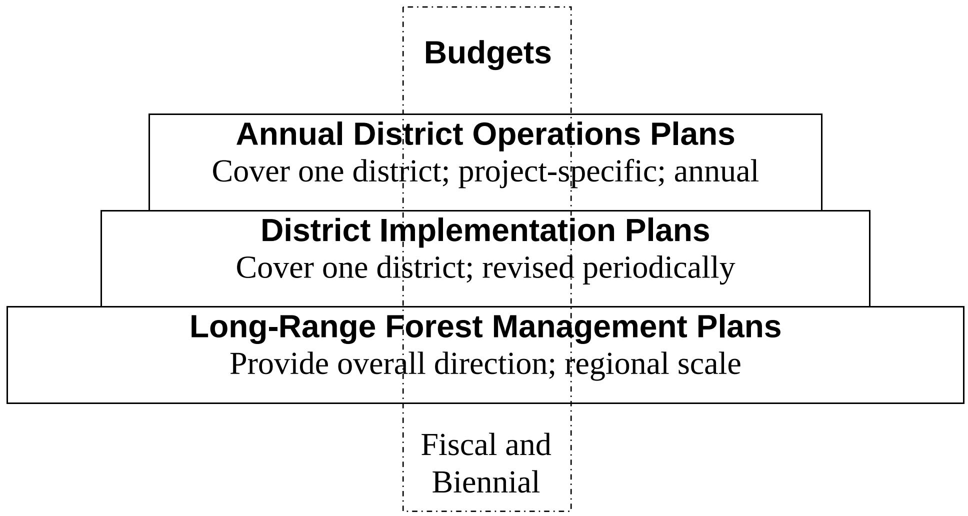


Figure ES-1. Elements of Planning for Oregon State Forests

Chapter 2. Understanding the Forest – Planning, Resources, and Conditions

This chapter describes the process used to develop this FMP, and presents information about the forest resources.

Elliott State Forest Planning Process—During the late 1980s, there was growing concern about several wildlife species. The northern spotted owl (*Strix occidentalis*) was listed as a federal threatened species in 1990, and the marbled murrelet (*Brachyramphus marmoratus*) was listed as a federal threatened species in 1992. Previously, long-range plans for the Elliott State Forest were primarily timber management plans. In 1991, the State Land Board directed the ODF to work with the Oregon Department of Fish and Wildlife (ODFW), the Department of State Lands, and other state agencies to develop a new long-range FMP to address the entire forest ecosystem, consistent with the timber management contract between the State Land Board and the ODF.

A new FMP was approved for the Elliott State Forest in 1994; in 1995, a habitat conservation plan (HCP) for the northern spotted owl and the marbled murrelet was approved by the U.S. Fish and Wildlife Service (USFWS). The USFWS issued the ODF a 60-year Incidental Take Permit (ITP) for the northern spotted owl, and a six-year ITP for the marbled murrelet. The latter permit expired on October 3, 2001, and was the prime driver for revision of the FMP and HCP.

Revision of the 1994 FMP and 1995 HCP began in 2000 with the formation of a planning team and steering committee. The core planning team included both field and program staff from the ODF and representatives from the ODFW. The core team consulted many additional resource specialists. A steering committee provided policy direction to the core planning team, and a key link to program managers, the counties, and the State Land Board. After a ten-year planning process, the ODF, DSL, USFWS and National Marine Fisheries Service were unable to agree to an HCP that would be consistent with the CSFL mandate and meet the issuance criteria for Incidental Take Permits. As directed by the State Land Board and the Board of Forestry, the ODF developed a “take-avoidance plan” by modifying the draft 2006 FMP to accommodate a take-avoidance approach for compliance with the federal endangered species act.

The FMP includes the following technical elements:

- **Guiding Principles—**The overall rules, goals, and responsibilities that guide the planning process
- **Resource Descriptions—**Information about the resource’s current status and future trends
- **Resource Management Goals—**The broad goals to be achieved through the management of each resource

- **Resource Management Concepts**—The concepts used to develop and support the strategies contained in the FMP
  - **Resource Management Strategies**—A set of integrated strategies, including landscape management, aquatic and riparian, and forest health strategies; strategies for specific species of concern; and additional strategies for specific resources

Public Involvement—The planning team started a comprehensive public involvement process in 2000, and continued it throughout the planning process. Public involvement included public meetings, newsletters, field tours, communication with local tribal leaders, and community outreach with a number of local groups.

A scientific review of FMP fundamental concepts and integrated strategies was conducted in late 2003 and early 2004 for the FMP's fundamental concepts and initial set of integrated strategies. Eight notable and credible scientists from a variety of fields participated in the review.

This FMP requires the approval of both the BOF and the State Land Board.

Resource Descriptions—The first step in forest management is a substantial one: to gain an understanding of the resources involved. Soil, water, air, lupines, bark beetles, owls, steelhead (*Oncorhynchus mykiss*), Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis)*, forest fires, and floods are just some of the aspects to be considered. The resource descriptions are a first step in the task of fully comprehending the complexities of the resources in the Elliott State Forest.

This section of Chapter 2 provides summary information about the following resources and conditions:

- Agriculture and Grazing
- Air Quality
- Aquatic and Riparian Systems
- Carbon
- Climate
- Cultural Resources
- Ecology and Disturbance History
- Energy and Minerals
- Fish and Wildlife
- Forest Health
- Geology, Topography, Soils, and Geotechnical Issues
- Land Base and Access
- Plants
- Recreation
- Scenic Resources
- Social and Economic Resources
- Special Forest Products

- Timber

Following are summaries of some of the key resources.

Aquatic and Riparian Systems—Water affects virtually every other resource: trees, plants, fish, wildlife, soils, and recreation. In the Elliott State Forest, aquatic and riparian resources include surface water (streams, lakes, and wetlands), groundwater and aquifers, riparian areas, water supply (for instream and out-of-stream uses), and water quality.

The Elliott State Forest drains into three major basins. The eastern and northern portions of the forest drain into the Umpqua River. The west side of the forest drains into the Tenmile Lake system. The West Fork Millicoma runs through the center of the forest toward the south and is part of the Coos River system. The Elliott State Forest contains parts of two lakes. Loon Lake, a popular recreation site has approximately 1 mile of shoreline on the Elliott. Elk Lake, also known as Gould's Lake, is a small lake located within the forest on Elk Creek. Outside the Elliott State Forest, Tenmile Lake is influenced by waters draining from the forest.

Carbon— Older forests, especially in the Pacific Northwest, store large amounts of carbon in live and dead trees, as well as the forest floor. Harvest levels on the Elliott State Forest in the range of 35-40 mmbf would store approximately 60 percent of the maximum carbon storage possible in the forest by 2050, while also capturing some carbon in long-lived forest products. Carbon storage is expected to increase over time under the 2011 FMP.

Ecology and Disturbance History—Forests along the Oregon coast, including the Elliott State Forest, result from a typical progression of stand structures following large, relatively infrequent disturbance events and subsequent smaller, more frequent disturbances. Relatively recent, large-scale events such as the Coos Bay Fire (1868) and the Columbus Day Storm (1962) influenced the distribution, composition, and structure of vegetation across the forest. Small-scale disturbances caused by subsequent less severe fires, windstorms, disease, insects, and harvesting also significantly affect forest landscape characteristics.

Fire is the primary coarse-scale disturbance agent in the western hemlock (*Tsuga hererophylla*) zone of the Oregon coast. Historically, large fires have been important to the development of forests in the hemlock zone. The Coos Bay fire of 1868 burned 90 percent of the area that is now the Elliott State Forest.

The continuum of disturbance by wind is difficult to characterize. Wind can cause coarse-scale disturbances, such as the Columbus Day Storm of 1962, or fine-scale disturbances that are more chronic in nature. Depending on the intensity, large-scale wind disturbances can create even-aged stands or increase the complexity of stand structures.

Disease and insects combine with wind damage to create patchy stands. The interactions of wind, root disease, and bark beetles create canopy gaps, mix soils during tree uprooting, and increase structural and biological diversity in stands.

Landslides are a dominant erosion factor on steep, forested slopes in western Oregon. A landslide is the movement of a mass of soil, rock, and organic debris down slope.

Floods are generally restricted to more predictable areas than fires or windstorms, and their magnitude and frequency of occurrence can be estimated for a given river.

Fish and Wildlife—The Elliott State Forest provides habitats for most native species found in forests in the Oregon Coast Range. Appendix E lists the native fish and wildlife species currently known or likely to exist in or adjacent to the Elliott State Forest. Approximately 209 species are included: 58 mammals, 103 birds, 23 amphibians and reptiles, and 25 fish.

Fish—The streams, rivers, lakes, and other water bodies in the Elliott State Forest and scattered tracts provide habitats for a variety of fish species. At least 30 species of fish use habitats in the FMP area for part or all of their life history, or use habitats downstream from the forest that may be influenced by forest management.

- One fish species listed under the federal ESA, coho salmon, inhabits the Elliott State Forest. Coho in the Southern Oregon/Northern California Coasts evolutionarily significant unit (ESU) were listed as threatened in 2005. After several listing, delisting, and review processes, Oregon Coast coho were finally listed as threatened in 2008.

  The State of Oregon also lists both the Southern Oregon/Northern California Coasts and Oregon Coast coho ESUs as threatened.

Wildlife—Of the many wildlife species potentially found in the Elliott State Forest, three bird species are listed as threatened or endangered under either the federal or state Endangered Species Act (ESA), or under both ESAs.

- **Bald Eagle—**State listed as threatened in Oregon. In 2010, there were three occupied bald eagle (Haliaeetus leucocephalus) nesting territories in the Elliott State Forest.
- **Marbled Murrelet—**Federally and state listed as threatened in Oregon. The marbled murrelet is a seabird that nests in mature or old growth coniferous forests within 50 miles of the ocean. As of 2010, approximately 11,500 acres were protected in Marbled Murrelet Management Areas (MMMAs) in the Elliott State Forest. Additional acres of potential habitat have not been surveyed for marbled murrelets.
- **Northern Spotted Owl—**Federally and state listed as a threatened species. Research on the demographics, habitat use, and habitat characteristics of northern spotted owls on state forest lands, including the Elliott State Forest, took place between 1993 and 1998. Although an apparent loss of territories occurred over the five years of the study, the rate of population change remained relatively steady, largely due to high survival and fecundity. Density surveys of all suitable northern spotted owl habitat in the Elliott State Forest in 2003 and 2010 located a similar number of northern spotted owl sites as the last similar survey in 1996.

Forest Health—Most definitions of a healthy forest are based on the premise that management objectives can be achieved only within the limits of an ecologically viable and sustainable ecosystem. The following concepts are common to most current definitions of forest health: 1) the forest can vigorously renew itself across the landscape and recover from a wide range of disturbances; 2) it provides for the human needs of values, uses, products, and services; and 3) it offers a diversity of stand structures that provide habitat for many native species and all essential ecosystem processes.

Key indicators of forest health include damage from biotic agents such as insects, diseases, and animals, as well as damage from abiotic stressors such as fire, weather extremes, and air pollutants. Evaluations must determine the level of change that indicates a significant forest health trend within the context of normal and historical variability.

Non-native (or "invasive") species often require special measures such as eradication, quarantine, or direct suppression.

Recreation—Recreation use within the Elliott State Forest is concentrated in several small areas of the forest. The remainder of the forest has little recreation use. The heaviest use occurs on long holiday weekends in the summer, and during deer and elk hunting seasons in the fall. Most forest visitors are local residents who enjoy the state forest because it is undeveloped and relatively unregulated, with little competition for favorite sites.

Social and Economic Resources—In addition to timber harvest levels, other resources, costs, and issues such as forest health, aesthetics, recreation, biodiversity, livability, climate change and other values play important roles in the calculus of social, environmental, and economic benefits provided by the Elliott. State and local economies have changed dramatically over the last two decades but the Elliott State Forest still significantly contributes to local economies. In Coos County and in southwest Oregon the forest sector accounts for approximately 6 percent of employment. Each change in timber harvest from the Elliott State Forest of one million board feet (MMBF) is projected to affect 11 jobs in southwest Oregon, with an average annual wage of $36,000.

Timber—The Elliott State Forest is an asset to the Common School Fund (CSF), counties, and local taxing districts. Prudent and careful management of the timber resource is an important theme in all planning and management of the forest. The primary objective for CSFLs is the maximization of revenue in the long-run for the CSF, consistent with sound techniques of land and timber management. Administrative rules require that BOFLs be managed to secure the greatest permanent value to the citizens of Oregon by providing healthy, productive, and sustainable forest ecosystems, that over time and across the landscape provide a full range of social, economic, and environmental benefits to the people of Oregon.

During the six-year period from 1991 through 1996, the volume harvested in the Elliott State Forest was heavily influenced by the presence of the northern spotted owl and the marbled murrelet (both federal threatened species, as stated above). The average annual volume harvested during this period was 17.74 MMBF. Harvest volume under the 1995 HCP averaged approximately 25 MMBF through 2010.

Chapter 3. Guiding Principles, Vision, and Goals

Chapter 3 presents the guiding principles, forest vision, management goals, and monitoring assumptions. These values and goals set the overall direction for the FMP.

Guiding Principles—The FMP's guiding principles, discussed in Chapter 3, are listed below.

- The FMP will recognize that the goal for CSFLs is the maximization of revenue to the CSF over the long term, consistent with sound techniques of land management. The goal for management of BOFLs is to secure the greatest permanent value to the citizens of Oregon by providing healthy, productive, and sustainable forest ecosystems, that over time and across the landscape provide a full range of social, economic, and environmental benefits to the people of Oregon.
- The FMP will be developed within the context of the Elliott State Forest as a managed forest.
- Economic, environment, and social values are important elements of sustainable forest management and are interdependent.
- The FMP will recognize that the forest is intended to be an important contributor to timber supply for present and future generations.
- The FMP will be comprehensive and integrated, taking into account a wide range of forest values.
- Lands will be identified and managed for long-term revenue production while providing for a sustained contribution to biological capability and social values. The FMP will recognize that trade-offs will exist between revenue-producing activities and non-revenue-producing activities.
- The FMP will examine opportunities to achieve goals through cooperative efforts with other agencies, user groups, or organizations.
- The FMP will be developed through a collaborative and cooperative process involving the State Land Board, the BOF, the public, local and tribal governments, and other resource management agencies.
- The FMP will be goal-driven.
- The FMP will view the Elliott State Forest in both a local and regional context.
- The FMP will consider the overall biological diversity of state forest lands, including the variety of life and accompanying ecological processes.
- The FMP will consider management plans and overarching planning documents of other agencies when managing for fish and wildlife (e.g., Oregon Conservation Strategy, Oregon Coast Coho Conservation Plan, ESA recovery plans).

- The forest will be managed to meet state and federal ESAs while fulfilling the State Land Board's responsibilities under the Oregon Constitution and the BOF's statutory responsibilities.
- The ODF will employ an adaptive management approach to ensure that the best available knowledge is acquired and used efficiently and effectively in forest resource management programs.
- The FMP will satisfy the constitutional mandate for CSFLs, and will recognize that ecosystem and watershed health are among the goals of this FMP.
- The FMP will be designed to achieve a diverse range of stand types across the landscape, without a highly prescriptive approach.

Forest Vision—The vision for the Elliott State Forest is a view of the future composition of the forest. The management strategies in Chapter 5, as well as the district IP, describe how the forest will progress from the current forest condition toward its future composition while meeting the purpose of the lands. The vision for the Elliott State Forest is of a working forest that produces a sustainable timber harvest, generating jobs and revenue for the benefit of the state, counties, and local taxing districts. Diverse forest structures contribute to the range of fish and wildlife habitats necessary for all native species, and contribute to broad biological diversity. The Elliott State Forest provides a range of conditions to achieve the goals for all resources, and the strategies used to achieve these goals have substantial and broad scientific, stakeholder, and public support.

Resource Management Goals—Goals were developed for individual resources, in the context of legal and policy mandates for the management of state forests. The goals are general, non-quantifiable statements of direction. The management strategies in Chapter 5 describe how the ODF will achieve the goals.

Goals were developed for the following resources: agriculture and grazing, air quality, aquatic and riparian, carbon, cultural resources, energy and minerals, fish and wildlife, forest condition (health and ecology), land base and access, plants, recreation and scenic resources, social and economic resources, soils, special forest products, and timber.

See Chapter 3 for the complete text of the management goals.

Working Hypotheses—The ODF's understanding about forest systems is substantial, but incomplete. More is learned, on a continual basis, through monitoring and research. At the center of this FMP, and fundamental to the strong adaptive management framework included in this FMP, is a set of working hypotheses. These key working hypotheses are related to broader assumptions and beliefs, and are described in Chapter 3.

Chapter 4. Resource Management Concepts

Chapter 4 presents the resource management concepts underlying the management strategies to be implemented in the Elliott State Forest. Resource management is designed to generate an appropriate balance of economic, environmental, and social values from this state forest.

Basic Concepts for Managing the Elliott State Forest

The management approach for the Elliott State Forest synthesizes the knowledge from various disciplines, including forestry, fisheries, wildlife, and hydrology. This management approach seeks to meet the legal mandate for the land and achieve a broad range of resource goals that provide economic, social, and environmental benefits from the forest over time. In addition, this approach manages forested ecosystems utilizing silvicultural tools that emulate natural disturbances to provide forest products, maintain forest health, and retain a high level of social value.

The basic concepts for managing the Elliott State Forest in this FMP focus on:

- Sustainable economic and social benefit
- Sustainable forest ecosystem management
- Integrated resource management

Sustainable Economic and Social Benefit—Providing economic and social benefit is essential to sustainable management of the forest. The concept that economic, environmental, and social values of the forest are interdependent is basic to the design of the FMP. All three elements of sustainable forest management are woven throughout the FMP and within the strategies.

The basic concepts for sustainable economic and social benefit in this FMP focus on:

- Legal mandates and trust obligations
- Predictable and dependable products and revenues
- Social benefit through forest management

Sustainable Forest Ecosystem Management—Sustainable forest ecosystem management is the application of silvicultural tools to attain the desired landscape condition that will meet the resource management goals of the FMP. Specifically, it is expected to result in an array of forest stand structures and habitats that provides for the economic, social, and environmental benefits called for in the management direction for these lands. These benefits include a high level of sustainable timber harvest and revenue, diverse habitats for native species, properly functioning aquatic systems, and a forest that provides for diverse recreational opportunities.

The following five key concepts are the foundation for sustainable forest ecosystem management:

- Recognize forest disturbance regimes and stand development processes.
- Contribute to biological diversity at the landscape level.
- Provide for biological diversity at the stand level.
- Provide for a diverse and healthy forest ecosystem through the principles of integrated pest management.
- Maintain properly functioning aquatic systems.

Integrated Resource Management—Integrated resource management designs and applies management practices to consider the effects and benefits of all forest resources such that those effects and benefits lead to achievement of the FMP goals over time and across the landscape. Integrated management does not treat all resources equally or provide for all resources on every acre at all times. The integrated resource management concepts include active management resulting in a landscape of diverse stand types, combined with site-specific strategies for other resource values.

Chapter 5. Resource Management Strategies

The FMP presents a set of integrated strategies that are the basis for managing the forest as a whole. They are designed to be applied through a system of active management that realizes a high level of timber production from these lands, and thus a high level of revenue to beneficiaries. The strategies are presented under the following headings:

- Strategies for Sustainable Economic and Social Benefit
- Strategies of Sustainable Forest Ecosystem Management
- Strategies to Integrate Resource Management

Strategies for Sustainable Economic and Social Benefit

The economic and social benefits of managing the Elliott State Forest are two important legs of sustainability; the third leg is environmental benefit, and all three are interdependent. To provide these benefits, it is essential to meet the legal mandates for managing these lands. These mandates include constitutional and statutory requirements related to the purpose of the lands, as well as other state and federal laws designed to protect environmental and biologic values.

1. Meet legal mandates and trust obligations.

The most fundamental of these mandates is to maximize revenue for the CSF, and to produce revenue for counties and local taxing districts. This mandate will be met primarily through regular timber harvest and marketing, along with the sale of special forest products. Other important legal mandates include complying with the Oregon Forest Practices Act and complying with state and federal ESAs.

2. Provide predictable and dependable products and revenues.

The economic outputs from this FMP were analyzed and identified during its development. It is essential that these outputs provide reliable revenues to the beneficiaries and meet the constitutional mandate to maximize revenue to the CSF. The harvest level in the FMP will be designed to meet these obligations by taking a long-term view of maintaining the productivity of the resource. The forest will be managed to produce a sustainable, even-flow harvest of timber, subject to economic, environmental, and regulatory considerations.

3. Provide social benefits and values through forest management.

Social benefits from this FMP include the production of commodities that result in a regular source of employment for the local and regional economy, products used by businesses of the forest industry, and revenue to support education and other public programs. Recreational opportunities will mainly be dispersed and undeveloped where compatible with other forest management activities. Management of the forest will produce diverse forest conditions valued by many people; these conditions include the existence of plants, fish, and wildlife for hunting, trapping, viewing, and collecting, and simply for the pleasure of knowing that these populations and habitats exist.

Strategies of Sustainable Forest Ecosystem Management

Current landscape design methodologies incorporate site history, natural disturbance regimes, and successional processes. In what is called a triad approach, three land use types are distinguished that can coexist at some level within a region without compromising the goal of sustaining biological diversity. The types are: 1) commodity production areas, 2) areas with little or no resource use by people except low-intensity recreation, and 3) areas in which modest resource use is allowed (maintenance of diversity and ecosystem function takes precedence over commodity production). These three land use types are generally represented in this FMP: by: 1) stand structure types that are managed primarily for intensive commodity production and are in early and intermediate structure stages; 2) conservation areas that have little or no resource use; and 3) areas that remain in advanced structure for a period of time as a result of a sustainable harvest level. The triad concept does not suggest an equal allocation of land use types.

1. Actively manage for a diversity of stand structures.

The planning area will be managed to achieve a sustainable harvest level resulting in three stand structure types: early structure, intermediate structure, and advanced structure. The expected outcome of each of the three stand structures are shown in Table ES-1.

Table ES-1. Percent of the Elliott State Forest Expected in Different Stand Structures

Advanced structure	30 to 50 percent
Intermediate structure	30 to 60 percent
Early structure	10 to 20 percent

Over time, the configuration of stand structures will change across the landscape as early and intermediate structure stands mature and some advanced structure stands are harvested and regenerated. Specific decisions on the location and arrangement of stands will be made through the district implementation planning process.

2. Manage conservation areas to protect special resources and avoid take of T&E species.

Conservation areas are designed primarily to maintain habitats known to be important to threatened and endangered species, such as northern spotted owls and marbled murrelets. In addition, conservation areas may fulfill other functions, such as providing benefits to other species using these habitats, providing stepping stones of advanced structure between late-successional reserves on adjacent federal forest lands, maintaining unique or special habitats, contributing to diverse forest conditions, and providing reference areas when testing overall landscape strategies.

Several types of conservation areas are identified in this FMP:

- **Marbled Murrelet Management Areas MMMAs), Northern Spotted Owl Circles—** These conservation areas are designed to protect specific wildlife habitat to avoid “take” of T&E species associated with advanced structure conditions. MMMAs and owl circles may change in number, location, or size over time as a result of occupancy by these species.
- **Steep, Unique, and Visual Lands** —SUV conservation areas include lands where little management is expected for reasons that may not be associated directly with sites used by T&E species. Although they are not specific to wildlife habitats, these lands can provide valuable wildlife habitats in addition to their primary function.
- **Riparian Management Areas, Stream Bank and Inner Zones—**Riparian Management Areas (RMAs) function to protect streams and riparian areas from disturbance; filter sediment from uplands; and supply food, cover, shade, and large wood recruitment to streams. Riparian corridors provide diverse habitats and connectivity throughout the stream network of a watershed. RMA standards promote these functions to benefit aquatic species such as salmon, steelhead, and resident trout.

3. Actively manage to provide key legacy structural components.

This strategy presents approaches for managing post-harvest legacy components, including live trees, snags, and downed wood. Although these approaches were developed specifically for retention in clearcut harvest units, retention of these structures in all stand structure types provides valuable wildlife habitat and other ecological values. Individual stands may exceed or fall below these standards; however, it is expected that, harvested stands on average will meet these structural retention standards for a given Annual Operating Plan (AOP).

4. Actively manage for a diverse and healthy ecosystem applying the principles of integrated pest management.

4a. Actively manage the forest to maintain or improve forest health.

4b. Detect and monitor pest populations, damage levels, and trends.

4c. Use the Integrated Pest Management process to implement suppression or prevention actions when pest populations or damage exceed acceptable levels.

4d. Assess and manage forest genetic resources.

4e. Implement strategic plans to address insect and disease outbreaks.

4f. Participate in research and cooperative programs that align with Elliott State Forest management objectives, to improve knowledge and actively enhance forest health and biodiversity.

4g. Cooperate with other agencies and associations to prevent the introduction of non-native pests.

5. Manage aquatic and riparian systems.

5a. Use watershed analysis to inform management decisions.

A watershed analysis for the Elliott State Forest was completed in October 2003. The purpose of the watershed analysis is to measure current resources and assist in improving the understanding of natural processes that influence fish habitat, wildlife habitat, and water resources throughout the Elliott State Forest. Consequences of human activities on these resources are also addressed through the analysis. Information in the watershed analysis will be considered and, as appropriate, applied through IPs. This current watershed analysis will be supplemented with additional resource information as data become available through future management activities, planning efforts, research, and monitoring.

5b. Apply management standards for aquatic and riparian management areas.

RMAs adjacent to all streams will be maintained in accordance with the standards described in Chapter 5 of this FMP. RMAs contain four zones: the aquatic zone, stream bank zone, inner RMA zone, and outer RMA zone. Determination of the applicable management standards is based on a stream classification system. Streams are grouped based on the presence or absence of certain fish species (Type F or Type N), and by size (estimated annual average flow). Small non-fish-bearing streams (Type N) are further classified according to flow pattern in normal water years, as perennial or seasonal. Some seasonal

Type N streams are seasonal high energy streams or potential debris flow track reaches.

5c. Maintain or improve aquatic habitats.

The aquatic habitat maintenance or improvement strategies are intended to correct human-induced conditions in the forest that may contribute to aquatic habitat deficiencies, or that may limit desired aquatic habitat conditions. These strategies will increase the likelihood of attaining properly functioning aquatic habitat conditions in a timely manner, and will encourage forest conditions that create and maintain complex aquatic habitats on a self-sustaining basis. The Elliott Watershed Analysis will be used to help identify potential factors that could be contributing to undesirable aquatic habitat conditions.

5d. Apply alternative vegetation treatment to achieve habitat objectives in riparian areas.

The term “alternative vegetation treatment” refers to the application of silvicultural tools and management techniques in riparian management areas, using standards that differ from general riparian management standards, for the purpose of changing the vegetative community to better achieve the plan’s aquatic and riparian habitat objectives.

Potential projects include silvicultural treatments such as the conversion of hardwood stands to conifer species; selective removal of hardwoods from mixed-species stands and the establishment of shade-tolerant conifer seedlings; the creation of gaps in hardwood stands to establish conifer seedlings (shade-intolerant and shade-tolerant); and other similar practices not specifically described in the management standards for riparian areas. These projects will be implemented in a way that maintains diverse riparian plant communities (heterogeneity) at the landscape and basin scales, and that minimizes the potential for adverse effects to aquatic resources.

5e. Apply specific strategies to other aquatic habitats.

The management objectives for these waters are generally similar to the objectives for streams, but the specific prescriptions are sometimes different. The strategies for other aquatic habitats will maintain the productivity and hydrologic functions of these habitats, and contribute to conditions needed for the maintenance of other native wildlife species of concern.

5f. Manage slope stability.

Landslide and slope stability strategies minimize the occurrence of management-induced slope failures and mitigate any potential negative impacts on aquatic and riparian habitats. This will be accomplished through application of risk-based management principles and best management practices. Minimizing road-related landslides and chronic erosion (sedimentation to streams) is fundamental to this objective. Hazard assessment and risk-based management for in-unit slides, and ensuring that large wood is available in the track of potential debris slides and torrents, will promote properly functioning conditions for future aquatic habitat inputs. Monitoring and hazard assessment, combined with adaptive management, will ensure that this objective is realized.

5g. Manage forest roads.

The road system will be managed to keep as much forest land in a natural, productive condition as possible; prevent water quality problems and associated impacts on aquatic resources; minimize disruption of natural drainage patterns; provide for adequate fish passage where roads cross fish-bearing streams; and minimize exacerbation of natural mass-wasting processes.

This strategy will be accomplished by using the Elliott Watershed Analysis to supplement the existing road inventory; by planning forest road design, construction, improvement and maintenance in accordance with processes and standards in the *Forest Roads Manual*; and identifying and prioritizing roads for closure and/or abandonment.

Strategies to Integrate Resource Management

Chapter 5 also includes strategies for the following specific resources:

- Agricultural and Grazing Resources
- Air Quality
- Carbon
- Cultural Resources
- Energy and Minerals
- Fish and Wildlife
- Land Base and Access
- Plants
- Recreation
- Scenic Resources
- Soils
- Special Forest Products

Chapter 6. Implementation

Chapter 6 describes guidance and standards for processes and activities that will be undertaken to implement the strategies.

Implementation Guidelines—This section describes who is responsible for implementing the FMP, and how implementation will be carried out. It discusses responsibilities, FMP scope, FMP duration, implementation levels based on funding, IPs, AOPs, and the team concept in implementation.

Asset Management—Assets are defined as the tangible resources and infrastructure on state forest lands.

- Applying the 2005 cost/benefit analysis to the 2010 acreage of the Elliott State Forest and scattered tracts results in an estimated market value between $300 and $554 million.
- Carbon inventory on the Elliott State Forest is estimated to be about 24,500,450 metric tonnes of CO_2-equivalent (tCO_2e).
- Populations of deer, elk, and bear support a recreational hunting and trapping industry. Populations of trout, salmon, and steelhead support a recreational fishing industry. Hunting, trapping, and fishing have significant local and regional economic benefits.
- Hunting is the main recreation use in the Elliott State Forest. Growth of other recreational activities on the forest is expected to be moderate because of the steep terrain, distance from major metropolitan areas, and relative lack of access. These activities generate revenue for local and regional businesses.
- The waters that flow from the Elliott State Forest are a major asset to local communities. These streams and rivers support key populations of fish and provide recreational opportunities.
- Approximately 550 miles of active forest roads currently exist in the Elliott State Forest. These roads and their related infrastructure such as bridges and culverts have an estimated value of over $58 million.

Implementation of FMP strategies is expected to result in significant revenue to the CSF, state, counties, and local taxing districts. In addition to generating annual revenue, the base asset value of the land and timber is expected to increase as a result of implementing this FMP.

Chapter 7. Adaptive Management

Chapter 7 discusses the concepts for adaptive management, what is involved in adaptive management, the four planning levels where change might occur through adaptive management, and the State Forests monitoring program.

Adaptive Forest Resource Management—Adaptive management is an approach to resource assessment and management that explicitly acknowledges uncertainty about the outcomes of management policies, and deals with this uncertainty by treating management activities as opportunities for learning how to manage more effectively. This section describes the concepts, process, and strategies of adaptive management; the importance of research and monitoring in obtaining the information necessary for decision-making; the role of stakeholders in adaptive management; and the process for dealing with changes in policies and practices when needed.

Adaptive Management Concepts—Adaptive management for state forests is defined as a scientifically based, systematically structured approach that tests and monitors FMP assumptions, predictions, and actions, and then uses the resulting information to improve management plans or practices. Through the application of adaptive management techniques, the ODF will continually improve management policies and practices by learning from the outcomes of operational programs. Adaptive management requires that managers and decision-makers are willing to learn by doing, and to acknowledge that making mistakes is part of learning.

Adaptive management will include public participation, to identify and incorporate public concerns and values into the process.

The key concepts for adaptive management are:

- Adaptive management is a system of decision-making that recognizes that ecosystems and society are always changing.
- Adaptive management is not a replacement for decision-making at any level, but a system for making better decisions.
- Successful adaptive management requires a well-designed process that includes a strong monitoring program.
- Adaptive management requires a well-defined framework for dealing with change.

Implementing Adaptive Management

The range of decisions that will be made in implementing adaptive management, how they will be made, and who will make them are described in Chapter 7.

When ODF managers and staff receive new information, they recommend changes to the appropriate official for each of four planning levels. This official makes the final decision. At all four levels, various sources of information can trigger change: public input, monitoring information, research information, and operational input.

Public involvement in implementation—The ODF is committed to public participation in land management decisions. The public involvement program should be appropriate for the scale and complexity of the project. Chapter 6 describes details of public involvement in district IPs and AOPs.

State Forests Monitoring Program

The Forest Management Plans for State Forests emphasize the need for adaptive approaches to management, in which the results of management actions are measured and compared to pre-determined objectives, and changes are made where necessary. The state forests research and monitoring program was reduced in July 2010 due to budget constraints but currently supports some research cooperatives, such as the Hardwood Silviculture Cooperative, Vegetation Management Cooperative, etc., as well as providing support to specific research projects, such as the Trask Watershed Study and to RipStream. As the budget situation improves ODF will re-establish the research and monitoring program, concentrating on priority issues as identified in research and monitoring plans..

Following adoption of the FMP, a 10-year research and monitoring plan will be developed as a separate document, linked to the FMP and Implementation Plan. The plan will describe the general monitoring issues that are anticipated to be addressed; provide a framework to aid prioritizing and developing specific monitoring projects to assess the effectiveness of the management strategies; guide development of annual operations plans to support monitoring projects; and describe funding mechanisms and how available funding will be prioritized among projects.

Appendices

The FMP includes the following appendices:

A. Glossary

B. References

C. Sustainable Forest Ecosystem Management Strategy Information

D. Legal and Policy Mandates

E. Wildlife and Fish Species Lists

F. Public Involvement

Chapter 1
Purpose, History, and Planning

The *Elliott State Forest Management Plan* (FMP) provides management direction for all Common School Forest Lands (CSFLs) and Board of Forestry Lands (BOFLs) that are managed by the Coos District. This includes Elliott State Forest proper, and scattered tracts of state forest lands in Coos, Curry, and Douglas Counties, with a combined total of 95,273 acres as measured by GIS. However, for the purposes of this FMP, all lands managed by the Coos District are referred to as the "Elliott State Forest." This FMP supersedes and replaces the previous FMP that was completed in 1994 (Oregon Department of Forestry 1994a), while taking a similar comprehensive, multi-resource approach to forest management.

This FMP includes a description of each forest resource, information about its current condition, and the management methods to be applied. The goals and strategies of this FMP are designed to achieve a proper balance between all forest resources through a system of integrated management (e.g., generating revenue through harvesting of forest products, while concurrently maintaining and developing desirable fish and wildlife habitats and forest biological diversity).

This chapter introduces the FMP, with a brief history of the relevant forest lands and a general description of Oregon state forest planning. Main headings in this chapter are:

Location

The Elliott State Forest is located in the Oregon Coast Range. The nearest cities to the southwest are Coos Bay and North Bend; Reedsport is the nearest town to the northwest. The forest is a contiguous block of land approximately 18 miles long (north to south), and approximately 16 miles wide (west to east). The Umpqua River is located immediately north of the forest. To the west, the Elliott extends within six miles of the ocean. On the east, it extends approximately 21 miles inland. The contiguous Elliott State Forest covers 93,003 acres, mostly located in Coos and Douglas Counties.

In addition to the main block of the Elliott State Forest, the Coos District manages 2,270 acres of scattered CSFLs located in Coos, Curry, and Douglas Counties. These scattered tracts are distributed across a broad geographic area ranging from the California border to just north of the Umpqua River, and from the Pacific Ocean to Sutherlin in the interior Umpqua River valley.

Land Ownership

State forests consist of CSFLs and BOFLs. The State of Oregon acquired the two types of land by different methods, and both land types are owned by different entities within the state government. The CSFLs are owned by the State Land Board, and BOFLs are owned by the Board of Forestry (BOF). Each land ownership has its own set of legal and policy mandates. These mandates are discussed under “Land Base and Access” in Chapter 2, and also in Appendix D. The guiding principles in Chapter 3 provide more information about how state forests of both ownerships are managed under this FMP.

Most (90.7 percent, or 86,367 acres) of the state forest lands in the Coos District are CSFLs, and the remaining 9.3 percent (8,906 acres) are BOFLs.

History of the Elliott State Forest

Introduction

The Elliott State Forest has the honor of being Oregon's first state forest. Officially established in 1930, today it is well known for producing high-quality timber, habitat for fish and wildlife species, and recreational opportunities.

Prior to its official creation, 84 percent of the Elliott State Forest was national forest land administered by the U.S. Forest Service (USFS). All other non-federal forests in Oregon were predominantly owned by private landowners.

Two catastrophic events in Oregon over the past 150 years have affected the Elliott State Forest: the Coos Bay Fire of 1868, and the Columbus Day Storm of 1962. However, the healthy, growing forest and thriving wildlife populations that exist today demonstrate the Elliott State Forest's ability to recover from catastrophic disturbances. Despite the fire and windstorm, the Elliott State Forest currently has the oldest timber stands found in any of Oregon's state-owned forests.

Prehistory and History to 1868

Native Americans, including the Coos and Umpqua tribes, originally lived in and near the area that is now the Elliott State Forest (Beckham 2001). Trappers were the earliest Euro-American presence, moving up and down the coast between northern California and Fort Clatsop in Astoria, Oregon from the 1820s to the 1840s.

The United States received clear title to the Oregon Territories from Great Britain in 1846 with Oregon established as a Territory in 1849. Early settlements in the Elliott area began in the 1850s, with the establishment of Scottsburg at the beginning of the gold rush. Coos County was formed in 1853, and Empire City was declared the county seat. Oregon became a state in 1859. After the discovery of gold in southwest Oregon in 1851, land and resource conflicts led to the Rogue River Indian Wars. By 1860, almost all Native Americans in the region had died from violence, starvation, or disease, or had been displaced to reservations.

Early descriptions of the Elliott State Forest area mention vast stands of Douglas-fir, western hemlock, western redcedar (*Thuja plicata*), Port Orford cedar (*Chamaecyparis lawsoniana*), and large stands of Sitka spruce. Settlers mentioned stands of red alder (*Alnus rubra*), willow (*Salix spp*.), and maple (*Acer spp*.) along the rivers and streams.

Coos Bay Fire of 1868

The earliest known fires in the Elliott area include two large fires of unknown size, one along the Elliott's eastern edge in 1770, and the other along the northeast portion of the Elliott State Forest in 1840. These fires left untouched most of the area that is now the Elliott State Forest.

In contrast to the earlier fires, the historic Coos Bay Fire of 1868 burned 90 percent of the area that is now the Elliott State Forest. It is believed that this fire started near Scottsburg from a settler's clearing fire, in an area known as Greenacres. The fire burned westward along the north bank of the Umpqua River until it jumped the river near the mouth of Mill Creek. From there, it blazed in a southwesterly direction, burning nearly all of the Elliott State Forest area except for the southeast portion and small parts of the northwest portion.

Generally, the fire stopped only when it reached the sand and the water of Coos Bay. However, in two locations—one to the north near Reedsport, and one to the south by Coos Bay—evidence suggests that large stands of fire-resistant Sitka spruce contributed to the slowing and halting of the fire. In addition, in the southern area of the Elliott State Forest, a younger stand that matured after a 1770 fire helped to slow the fire's spread in that direction.

The Coos Bay Fire severely burned approximately 300,000 acres of forest, some of which was estimated at 300 years old. Within 20 years, however, most of the burned area supported thick stands of young Douglas-fir.

Acquisition as a State Forest

The origin of the Elliott State Forest dates back to 1859, when the Oregon Territory became the State of Oregon. At that time, the Admissions Act granted to Oregon two sections (16 and 36) in every township, or equivalent lands if those were unavailable, for the financing of public schools. This land grant, known as the Common School Trust Lands, comprised approximately 3.5 million acres.

Between 1859 and 1912, all but 130,000 acres of forested lands in Oregon passed out of state ownership. The state sold most of the lands to fund the building of schools and pay teachers' salaries, but some lands changed ownership through fraudulent land deals. Approximately 70,000 acres of the remaining lands were scattered inside the newly established national forests in Oregon, with 37,000 acres located in eastern Oregon, and 33,000 acres in western Oregon.

The Oregon Department of Forestry (ODF) was created in 1911 for the purpose of controlling forest fires. The 1925 State Legislature passed a law allowing the BOF (part of the ODF) to accept gifts or donations of forest land. In 1939, the State Forests Acquisition Act created procedures for the BOF to acquire tax-delinquent forest lands from the counties, manage the land, and return most net revenues to the counties. In later years, amendments fine-tuned the distribution of revenues and legal direction for forest management on these lands (Fick and Martin 1992).

To turn the isolated parcels of CSFLs into one manageable block of state-owned forest land, State Forester Francis Elliott and Governor Oswald West decided to trade the state parcels inside the national forests with the federal government for one large block of federal land. This block of land became Oregon's first state forest.

Congress amended the 1911 Weeks Law "... to allow for the exchange of lands and timber ... for any lands situated within the exterior boundaries of a National Forest, so long as those lands were found to be chiefly valuable for the purposes of the law." In 1927, President Calvin Coolidge signed into law a bill allowing the proposed exchange.

In July 1930, just weeks before the final deeds were acquired, Francis Elliott died. Following his death, and as a special honor recognizing his commitment to establishing the first state forest, the BOF named the land parcel the Elliott State Forest.

The new Elliott State Forest was to be managed as a demonstration forest, to show private landowners the value of investing in forest management. However, the year the Elliott State Forest was officially dedicated, 1930, was the first year of the Great Depression. Although the Oregon Legislature placed the State Forester in charge of administering the forest, he was given no funds to complete the work. Despite the forest's potential to produce timber, formal management did not commence.

The State Forester assigned his few employees, who were all firefighters, to survey the boundaries of the Elliott State Forest. He then garnered the aid of the Civilian Conservation Corps, a Depression-era federal work program, to build ridgetop access roads. The Civilian Conservation Corps built 30 miles of roads by the time World War II interrupted the program. The State Forester dropped plans for more roads when the program ended.

In 1940, Coos County deeded to the BOF 6,500 acres of tax-delinquent forest land located next to the Elliott State Forest. Nearly 1,800 acres of BOFLs are also located in Douglas County, most of which was deeded by the county in the 1930's and 40's. In return, the counties were to receive two-thirds of the revenue from these lands.

Management by the State

Before the 1950s, the timber market was sluggish, and timber prices remained low. The ODF facilitated only two timber sales, at the request of a mill owner who paid approximately $2 per thousand board feet (MBF) for stumpage. By the end of World War II, demand and prices for timber increased significantly.

In the 1950s, timber management became a greater priority for the State of Oregon. In 1955, the Oregon Legislature created a revolving fund for monies collected from timber sales of CSFLs within the Elliott State Forest. This fund made intensive management of the forest possible. Forest management began with the inventory of all south coast state timberlands, and the establishment of an ODF timber management office in Coos Bay. By 1958, the inventory was complete, and Coos District timber sales finally reached the calculated allowable annual timber sale level of 36 million board feet (MMBF).

In the 1960s, the Elliott State Forest expanded again when the state acquired 7,700 acres of public domain lands owed to the state through school indemnity claims. These lands are known as "lieu lands" because the federal government offered them to the state to compensate for original land grants that had conflicting claims. For example, some grant lands were located within federal ownerships and were unlikely to be surveyed.

In 1962, the historic Columbus Day Storm had a major effect on the management of the Elliott State Forest. In just a few hours, the storm's high winds blew down an estimated

100 MMBF of timber. Most of the blowdown was in the western half of the forest, where few roads existed because the trees were younger. Salvaging the timber before it rotted required the building of many miles of roads at a hectic pace. Nearly one-third of the 550 miles of road that exist today in the forest were built at that time to obtain the blowdown timber. Foresters cut an additional 200 MMBF of timber to access the blowdown, increasing the total to 300 MMBF of timber harvested in a short amount of time.

In 1968, the Coos District was managing the 85,000-acre Elliott State Forest and another 11,000 acres in scattered isolated state parcels. A focused land exchange effort began in the 1970s, in which many of these isolated parcels were traded for privately owned land within or next to the forest. A total of 7,000 acres of CSFLs was added to the main block of the Elliott State Forest, resulting in a contiguous forest that is easier to manage.

In 2010, the Department of State Lands (DSL) sold 1,470 acres of scattered CSFLs within the Coos District in accordance with DSL's 2006 Asset Management Plan bringing the total district acreage of both BOFLs and CSFLs to 95,273.

Most of the mature trees in the forest are 100 to 130 years old. Douglas-fir is the dominant species, with minor amounts of western hemlock, western redcedar, red alder, and bigleaf maple (*Acer macrophyllum*). The Elliott State Forest contains an estimated 2.7 billion board feet of timber.

In addition to the economic benefits, the Elliott State Forest also provides excellent recreational opportunities. Many people visit the forest each year to camp, picnic, swim, hunt, trap, fish, or enjoy other recreational activities in the forest environment.

The ODF has not developed any campgrounds, picnic tables, or fire rings in the forest. However, this makes the forest more popular with those seeking dispersed recreation.

In the early 1990s, foresters continued to learn more about the non-timber resources within the Elliott State Forest. Surveys located northern spotted owl and marbled murrelets, two species listed under the federal Endangered Species Act (ESA), and forest managers established protection for sites occupied by these species. The planning process as detailed in this FMP holds the key to future management of the Elliott State Forest.

Planning for State Forests

CSFLs currently are managed in accordance with the Oregon State Constitution, the 1859 Admissions Act, and the State Land Board's Asset Management Plan (Department of State Lands and State Land Board2006). The ODF looks to statutory and administrative rules for management of BOFLs.

In addition, the Department of State Lands (DSL) Asset Management Plan (Department of State Lands and State Land Board 2006) states, as part of the management prescriptions for managing CSFLs:

> *Forest land is managed primarily to produce merchantable timber on a sustainable basis in accordance with a plan developed by forest managers. The Land Board contracts with the Oregon Department of Forestry to manage the majority of CSF Forest Lands, referred to as certified Forest Lands.*

Management planning for Oregon state forests involves three planning levels, and fiscal and biennial budgeting. As shown in Figure 1-1, planning begins with broad-scale, long-range planning documented in the Forest Management Plan. Intermediate-level planning is performed at the level of ODF administrative districts, and is documented through district Implementation Plans (IPs). Annual Operations Plans (AOPs) are designed to achieve the objectives of the IPs for short-term periods (1 or 2 years). Development, implementation and revision of the three integrated planning levels are dependent upon division and district budgets developed on a biennial and annual basis.

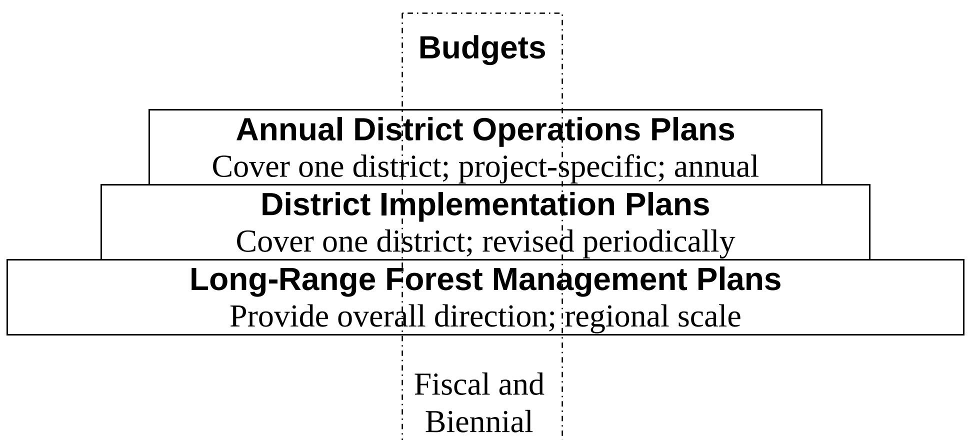


Figure 1-1. Planning for Oregon State Forests

The Long-Range Forest Management Plan

A long-range FMP such as this one offers overall direction for managing the state forests in the planning area, and provides for a comprehensive, integrated approach to management planning. This FMP presents the overall goals and strategies for managing the vast resources of the Elliott State Forest, and advances a specific set of strategies for integrating the management of several key resources—timber, fish, wildlife, and forest health. These strategies are based on the premise that forest resources are not mutually exclusive (i.e., requiring trade-offs against each other), but are interrelated resources that can be managed to achieve multiple benefits.

The following legal and policy mandates and information sources guide the development of the goals and strategies in long-range FMPs for state forests:

- Oregon Constitution mandates and the 1859 Admissions Act for management of CSFLs
- Federal laws, including the ESA
- Statutory and administrative rules
- Oregon Supreme Court rulings
- Advice from the Oregon Attorney General
- Policies of the State Land Board, the BOF, and the State Forester
- Agency obligations under the state ESA
- The DSL Asset Management Plan (for CSFLs)
- Guiding principles for the FMP
- Resource assessments and available resource data
- The most current scientific information available, supplemented by input from a comprehensive independent scientific review
- Consultation with the Forest Trust Lands Advisory Committee (required by statute)
- Advice and recommendation from other state and federal natural resource agencies
- Input from comprehensive public involvement in the planning process

Forest Management Planning for Common School Forest Lands

The State Forester is authorized to manage the Elliott CSFLs under Oregon Revised Statute (ORS) 530.500. A CSFL agreement among the State Land Board, ODF, and DSL sets forth the requirements for developing long-range management plans for CSFLs, which are then approved by the State Land Board.

According to the agreement, the primary objectives for management of Common School Forest Lands are identified in the State Land Board's Asset Management Plan and include: maximizing return to the Common School Fund (CSF); managing CSFL's primarily to produce a sustainable, even flow harvest of timber; maintaining forest management costs at a level comparable to similar lands managed by public and private entities; and investing in improvements to CSFL's when justified through investment and return analysis. The agreement specifies that unless the Land Board directs otherwise, long-range management plans for CSFL's will be consistent with Oregon Administrative Rule (OAR) 629-035-0110 which states:

> *Common School Fund Lands managed by the State Forester under an agreement with the State Land Board shall be managed consistent with OAR 629-035-0030 through 629-035-0100 if the Agreement or the State Land Board so directs.*

These OARs describe elements to be included in long-range FMP's, such as management goals, a land classification system, a determination of the annual sustainable harvest level, a monitoring program, and are further described below.

Forest Management Planning for Board of Forestry Lands

The statutory mandate for management planning of BOFLs is found in ORS 526.255. This law requires the State Forester to report to the Governor and legislative committees on "long-range management plans based on current resource descriptions and technical assumptions, including sustained yield calculations for the purpose of maintaining economic stability in each management region." In 1998, the BOF adopted a set of administrative rules that provide further direction to the State Forester in planning for the management of these lands. OAR 629-035-0030 states:

> *In managing forest lands as provided in OAR 629-035-0020, the State Forester shall develop Forest Management Plans, based on the best available science, that establish the general management framework for the planning area of forest land. The Board may review, modify, or terminate a plan at any time; however the Board shall review the plans no less than every ten years. The State Forester shall develop implementation and operations plans for forest management plans that describe smaller-scale, more specific management activities within the planning area.*

The rules also require that the following key elements be included in the FMPs.

- **Guiding Principles —** These include legal mandates and BOF policies. Taken together, these principles shall guide development of the FMPs.
- **Resource Descriptions —** These include assessments of the resources on state forest lands. Resources on surrounding lands are also considered, to provide a landscape context.
- **Forest Resource Management Goals —** These are statements that express what the State Forester considers desirable to achieve for each forest resource within the planning area (consistent with OAR 629-035-0020).

- **Management Strategies —** These strategies describe how the State Forester will manage the forest resources, and what management techniques the State Forester may use to achieve the goals of the FMPs.
- **Asset Management —** This section states general guidelines for asset management, which provide overall direction on investments, marketing, and expenses.
- **Implementation, Monitoring, Research, and Adaptive Management —** These sections provide general guidelines for these items.

The administrative rules specify that the State Forester shall be guided by the following stewardship principles in developing and implementing FMPs:

- The FMPs shall include strategies that provide for actively managing forest land in the planning area.
- The FMPs shall include strategies that:
  - Contribute to biological diversity of forest stand types and structures at the landscape level and over time: a) through application of silvicultural techniques that provide a variety of forest conditions and resources; and b) through conserving and maintaining genetic diversity of forest tree species.
  - Manage forest conditions to result in a great likelihood of: a) maintaining and restoring properly functioning aquatic habitats for salmonids, and other native fish and aquatic life; and b) protecting, maintaining, and enhancing native wildlife habitats, recognizing that forests are dynamic and that the quantity and quality of habitats for species will change geographically and over time.
  - Provide for healthy forests by: a) managing forest insects and diseases through an integrated pest management (IPM) approach; and b) utilizing appropriate genetic sources of forest tree seed and tree species in regeneration programs.
  - Maintain or enhance long-term forest soil productivity.
  - Comply with all applicable provisions of ORS 496.171 to 496.192 and 16 United States Code (USC) § 1531 to 1543 (1982 & supp 1997) concerning state and federally listed threatened and endangered species.
- The FMPs shall include strategies that maintain and enhance forest productivity by:
  - Producing sustainable levels of timber consistent with protecting, maintaining, and enhancing other forest resources.
  - Applying management practices to enhance timber yield and value while contributing to the development of a diversity of habitats for maintaining salmonids and other native fish and wildlife species.
- The FMPs shall include strategies that use the best scientific information available to guide forest resource management actions and decisions by:
  - Using monitoring and research to generate and apply new information as it becomes available.

- Employing an adaptive management approach to ensure that the best available knowledge is acquired and used efficiently and effectively in forest resource management programs.

District Implementation Planning

The long-range plans provide overall management direction and establish specific strategic approaches for meeting resource management goals. Most ODF districts also develop IPs, which describe in more detail how the management strategies will be applied in that district. These IPs delineate forest management activities for a 10-year period, and are revised at least every 10 years. However, new technical information or changing conditions may call for updates to individual district IPs within a shorter time frame. Chapter 6 of this FMP describes the process and information that will be included in the current IP for the Elliott State Forest.

Annual Operation Planning

Annual operation planning is the fourth level of planning. Each state forest district prepares an AOP, which describes the location and nature of management activities that are proposed for a given fiscal year. These documents are the most detailed level of planning conducted by the ODF.

District staffs develop initial AOPs that are then reviewed by resource specialists from program and area staff to ensure consistency with the relevant district IP, as well as with the goals and strategies of the FMP. Resource specialists involved in AOP review include the geotechnical specialist, silviculturist, forest engineer, wildlife and fisheries biologists, and recreation coordinator; others are enlisted on a case-by-case basis.

The district submits final AOPs to the program staff in Salem for review and comment, and ultimately, approval by the district forester. The district forester considers any written comments from resource specialists and the public before approving or denying an AOP.

Budgeting

Budgeting is accomplished at two levels: fiscal year and biennial (two-year). The Department prepares biennial budgets every two years and submits them to the Legislature, through the Governor’s Office, for legislative approval. Biennial budgets are designed to provide sufficient spending authorization to implement the FMPs.

Because the state forests program operates on a fixed percentage of the revenue received from management of BOFLs, and is reimbursed from the Common School Fund (CSF) for management costs on CSFLs, actual expenditures from year to year are managed through preparation of fiscal year budgets. Annual budgets contain a detailed assessment of the actual resources needed to accomplish the AOPs. Periodic revenue estimates are used to project the level of expenditure that can be supported for a given fiscal year, within the overall biennial authorization. If revenues are lower than what was anticipated during the biennial budgeting process, an individual fiscal budget may reflect lower expenditure levels.

Looking Ahead

The *Elliott State Forest Management Plan* is a comprehensive view of the history, ecological development, and resources of one of Oregon's most productive forests. Through careful short- and long-term planning, wise stewardship, and adaptive management, the Elliott State Forest is expected to sustain economic, social, and environmental goals of Oregonians well into the future.

Chapter 2

Understanding the Forest: Planning, Resources and Conditions

This chapter describes the process used to develop the *Elliott State Forest Management Plan* and presents information about the resources within the Elliott State Forest.

The planning process involved the participation of many people, including individuals from local communities and the regional community, as well as agency specialists and scientists. This inclusive process was based on the conviction that public awareness and public involvement leads to the most effective FMP.

Forest management begins with an understanding of the various resources that exist within the forest. The resource descriptions in this chapter briefly describe what is currently known about the Elliott State Forest. The resource descriptions are updated and supplemented over time through continuing research, monitoring, and on-site experience.

The main headings in this chapter are:

Elliott State Forest Planning Process

During the late 1980s, biologists expressed growing concern about the status of several wildlife species. The northern spotted owl was listed as a federal threatened species in 1990. In response, the ODF began to survey for the presence of northern spotted owls in and near existing and planned timber harvest units. Many northern spotted owl sites were located, thus affecting sold timber sale contracts. Following federal guidelines for take avoidance (since rescinded), the ODF established circles with a 1.5-mile radius around each northern spotted owl site, and severely limited management activities within the circles (USDI Fish and Wildlife Service 1990). This resulted in a net reduction in the acres available for sustainable timber production, and a corresponding reduction in the harvest objectives for each district with northern spotted owl sites.

The marbled murrelet was listed as a federal threatened species in 1992. This new listing resulted in a similar process of surveying, establishing habitat areas around occupied sites, and reducing the acres available for timber production and district harvest objectives.

In December 1991, the State Land Board initiated a new long-range FMP for the Elliott State Forest. The ODF was directed to work with the Oregon Department of Fish and Wildlife (ODFW), the Oregon Department of State Lands (DSL), and other state agencies to develop the FMP.

A new FMP was approved for the Elliott State Forest in 1994 (Oregon Department of Forestry 1994a). In 1995, an HCP for the northern spotted owl and the marbled murrelet was approved by the USFWS (Oregon Department of Forestry 1995a). The USFWS issued the ODF a 60-year ITP for the northern spotted owl, and a 6-year ITP for the marbled murrelet. The marbled murrelet permit was limited to six years because little was known about the murrelet at that time. This permit expired on October 3, 2001.

Part of the HCP strategy called for the ODF to fund research on the murrelet. Information learned would be used to revise the murrelet strategies, if needed, and used to seek a longer-term ITP for the murrelet. The ODF used information from this research, as well as research conducted by other scientists and additional information on northern spotted owls from ODF sponsored studies, to develop revised management strategies for both the marbled murrelet and the northern spotted owl. See Appendix B for references to the ODF sponsored studies: Anthony et al. 2000a, 2000b; Tappeiner et al. 2000; Glenn et al. 2000; Perkins and Ellingson 2003).

In addition, ODF chose a multi-species approach to the HCP planning process that would include both fish and wildlife. Since the signing of the original Elliott State Forest HCP in 1995, coastal coho salmon were listed as “threatened” under the federal ESA. In 2004, coastal coho were delisted under the federal ESA and then relisted in 2008. A status review of the species was announced by the NOAA Fisheries in fall 2009. At a minimum, the ODF intended to include the northern spotted owl, marbled murrelet, and coastal coho salmon in a revised HCP. The ODF also considered other species at risk for federal listing that may be found within the Elliott State Forest, and for which there was suitable scientific knowledge for inclusion in the HCP.

The ODF concentrated initial efforts in the planning process on revising the long-range FMP for the Elliott State Forest. The concurrent development of a revised HCP was to facilitate compliance with the federal ESA, and help to fully implement the Elliott State Forest's revised FMP. After a ten-year planning process, the ODF and the federal services were unable to agree to an HCP that would be consistent with the CSFL mandate and meet the issuance criteria for Incidental Take Permits. As directed by the State Land Board, the ODF developed a "take-avoidance plan" by modifying the draft 2006 FMP to accommodate a take-avoidance approach.

Planning Team, Resource Specialists, and Consultants

The core planning team consisted of both field and program staff of the ODF, along with representatives from the ODFW, USFWS, and NOAA Fisheries. This core team was directly responsible for managing all technical aspects of the planning process.

The core team included foresters, fish and wildlife biologists, and other specialists. These professionals have expertise in wildlife biology, fish biology, forestry, silviculture, threatened and endangered species, monitoring and adaptive management, public involvement, and technical writing.

The core team consulted many additional specialists in fields such as geotechnical studies, soils science, geology, hydrology, air quality, geographic information systems (GIS), forest technical analysis, forest pathology, forest inventory, forest economics, special forest products, botany, cultural resources, and recreation resources.

A steering committee was formed to provide overall direction to the core planning team and provide a key link to the district level and program managers, the counties, and the State Land Board. From the ODF, the committee included the Southern Oregon Area director (chair), the assistant state forester, the state forests program director, the state forests policy and planning manager, and the Coos district forester. Other committee members included the assistant director of the DSL, the southwest regional supervisor of the ODFW, an attorney from the State Attorney General's office, a county commissioner from Coos County, and the superintendent of the South Coast Education Service District.

Technical Planning Elements

The technical planning process included the development of an integrated set of goals and strategies for managing forest resources, and the development of specific processes and procedures for district-level implementation of the strategies.

Guiding Principles

The guiding principles listed in Chapter 3 directed the planning process for the Elliott State Forest. These guiding principles were derived from the following sources:

- **State Constitution, Oregon Admissions Act, and State and Federal Laws and Administrative Rules—**Statutes and mandates governing state forest management include those in the Oregon Constitution involving maximization of revenue from CSFLs to the CSF over the long term, consistent with sound techniques of land management (Article VIII, Section 5). Other laws recognize the special interests of counties and local governments, and address the importance of salmon and other native species.
- **Board and State Agency Policies—**These include policies of the State Land Board, BOF, and State Forester.
- **Other Sources—**These include recommendations from steering and planning team members, resource specialists, formal reviewers, and the public, consistent with good stewardship of the forests.

The core planning team developed the guiding principles using those listed in the 1994 FMP as a basis, and including those developed during the northwest Oregon state forests management planning process.

Resource Descriptions

Technical specialists developed descriptions of each resource, including information about current status and future trends. Resource descriptions are found in the subsequent sections of this chapter, with more detailed information available in the appendices and supporting documents of this FMP.

Development of Goals

The resource goals listed in Chapter 3 describe the broad objectives of the management of each resource, and are intended to be qualitative rather than quantitative in nature. Goal statements were developed initially from several different sources, including:

- **State and Federal Laws and Administrative Rules—**Some goal statements identify the relevant legal standards pertaining to the resource, and state that the specific law will be followed in managing that resource.
- **Board and State Agency Policies—**These include policies of the State Land Board, BOF, State Forester, and other natural resource agencies participating in the planning process.
- **Other Sources—**These include recommendations from steering and planning team members, resource specialists, and the public. These goals are not mandated in law or policy, but are consistent with good stewardship of the forests.

The core planning team again referenced the 1994 FMP in developing these goals, along with those developed during the northwest Oregon state forests management planning process.

Development of Strategies

Utilizing the guiding principles, along with input from resource specialists and the public, the planning team prepared strategies for achieving each goal.

Balancing the Goals

Individual resource goals compete to some degree with the goals for one or more of the other resources. Any such potential conflicts were resolved in the strategy development phase of the planning process, consistent with the CSFL mandate. The strategies have attempted to achieve an appropriate balance among various resource goals, with the understanding that not all goals carry equal weight (e.g., the Oregon Constitution and Attorney General's 1992 opinion required the State Land Board to use the lands for schools and the production of income for the CSF). It was also important that the strategies be designed so the forest could be managed to meet the federal ESA.

The planning team placed the highest priority on designing strategies to meet goals related to the constitutional mandate for CSFLs, specific laws or administrative rules, the DSL Asset Management Plan, and other specific policies, while meeting the federal ESA. Thus, the planning team focused on goals that were based on the following policies and agreements:

- CSFLs agreement between the State Land Board, ODF, and DSL
- State Land Board and BOF policies
- State Forester's policies
- Other state agency policies

The planning team focused next on meeting goals not mandated by law or policy. In the case of conflicts at this level, the core team resolved issues by developing strategies that provided the best balance among the goals.

Adaptive Forest Management

Monitoring and adaptive management are key elements of the FMP. A properly constructed monitoring program, combined with effective adaptive management, provides the necessary information to assess the effectiveness of the strategies in achieving the goals, and the flexibility to modify the strategies and management techniques as new information becomes available. The ODF views the integrated strategies and their associated standards as a reasonable starting point. The strategies will continue to change as more information is acquired. Over the long term, the strategies may result in a variety of possible outcomes as adaptive management occurs on the forest.

Public Involvement

Public involvement provided the planning team with a wider range of information and ideas, and was critical in gaining public understanding, acceptance, and support for planned actions. The planning team developed a comprehensive public involvement process at the beginning of the revision process in 2000, and adapted the process to meet changing needs for public involvement as planning proceeded.

The public involvement process had three important objectives:

- Seek appropriate insight, opinion, and data on planned management actions for the Elliott State Forest.
- Foster understanding, acceptance, and support for the management planning process and the management plan.
- Capitalize on important opportunities to inform the public about forest systems, forest stewardship, and management of state forests.

The public involvement process included public meetings, newsletters, field tours and contacts with local groups and individuals. The public involvement process is summarized in Appendix F.

Public Meetings and Tours

The ODF held public meetings at key points to obtain public input on the planning process. The initial meetings explored the issues of importance to the public in managing the Elliott State Forest. The ODF publicized the meetings—held at Coos Bay, Salem, and Roseburg—in newsletters, through press releases and media coverage, and by letters sent to those on the mailing list of the *Expectations* newsletter. Written comments were accepted after the meetings.

The planning team also sponsored tours that focused on the planning process and management of the state forest lands. These included tours for the BOF and the general public.

Expectations Newsletter

The ODF originally developed *Expectations* during the development of the 1994 FMP, to communicate information to interested parties about the planning process and related topics. *Expectations* was published at intervals throughout the current recent planning process.

Plan Approval

The provisions of this plan are intended to satisfy the legal and policy framework for managing CSFLs and BOFLs. Accordingly, this plan requires the approval of both the State Land Board and the BOF.

Introduction to Resources and Conditions

The following sections describe in detail the following Elliott State Forest resources:

- Agriculture and Grazing
- Air Quality
- Aquatic and Riparian Systems
- Carbon
- Climate
- Cultural Resources
- Ecology and Disturbance History
- Energy and Minerals
- Fish and Wildlife
- Forest Health
- Geology, Topography, Soils, and Geotechnical issues
- Land Base and Access
- Plants
- Recreation
- Scenic Resources
- Social and Economic Resources
- Special Forest Products
- Timber

Agriculture and Grazing

Current Status

The steep, broken terrain of the Elliott State Forest precludes the growing of agricultural crops. The Elliott State Forest has not been used for agriculture in the past. The forest's potential for special forest products is discussed later in this chapter. Possible future agricultural use of the Elliott State Forest could include Christmas tree farming or livestock grazing.

Growing high-quality Christmas trees in the Elliott State Forest does not seem to be economically feasible. The management of Christmas tree cultivation is intensive, and involves machine planting, weeding, spraying, and mechanical and cultural practices. Slopes must be less than 20 percent for these activities. Although the Elliott State Forest has approximately 5,000 acres of slopes that are less than 20 percent, they are not readily available for Christmas tree growing. The slopes are located in narrow corridors along rivers or are small, mid-slope benches and ridge tops. Of this acreage, three larger, grassy areas are managed under a cooperative agreement by the ODFW as winter habitat for elk; the remainder is located mainly in forested areas.

DSL leases approximately 90 acres of Big Creek bottom lands to a local rancher for grazing. In cooperation with ODFW and the Tenmile Lakes Basin Partnership (a watershed council), a number of stream enhancement activities have taken place along Big Creek, including fencing, a temporary habitat dam, and riparian plantings.

Domestic livestock grazing is of little importance in the Elliott State Forest. One acre of grassy area is being leased to an adjoining landowner near Palouse Creek. The site includes a small stream that is fenced off from the livestock, and abundant riparian vegetation grows on both sides of the creek. Because agriculture and domestic grazing are incidental uses of the Elliott State Forest, there are no goals or strategies for these resources in the FMP.

Air Quality

The State of Oregon is required to meet ambient air quality standards specified in the federal regulations adopted under the federal Clean Air Act. Failure to do so could result in the loss of funding for federal transportation programs in the state. State air quality standards must also be met.

Two types of events in the Elliott State Forest contribute to particulate air pollution: prescribed burning and wildfires. Currently, air quality in and near the Elliott State Forest meets state and federal standards. It is expected that this will continue because there is a trend toward less prescribed burning in the Elliott State Forest and on surrounding forest land. Because of the climate and location of the Elliott State Forest, lighter fuels and smaller materials decay naturally and break down within a short time.

Key Terms

Clean Air Act—Federal law passed in 1970, and amended several times since. The law's goal is "to protect and enhance the quality of the Nation's air resources"; it is implemented, in part, through a permit system.

Particulate—Particles are in the smoke produced by prescribed burning. State and/or federal air quality standards exist for particles in two size classes: PM_{10} (particles smaller than 10 microns in diameter) and $PM_{2.5}$ (particles smaller than 2.5 microns in diameter).

Prescribed Burning—Controlled fire burning under specified conditions to accomplish planned objectives; also called slash burning, as a frequent objective is to reduce the amount of slash left after logging.

Current Programs

The Oregon Smoke Management Plan regulates prescribed burning on all forest lands in Oregon, including federal, state, and privately owned lands. Some of its objectives are to protect public health, minimize smoke intrusions into designated population areas, reduce emissions from prescribed burning in western Oregon, and protect visibility in Class I areas during high-use periods. The Smoke Management Plan regulates forestry prescribed burning activities and ensures that they comply with the Clean Air Act. The regulations are set by the ODF and the Environmental Quality Commission, with assistance from the Oregon Department of Environmental Quality (DEQ).

The ODF regulates prescribed burning in the Elliott State Forest. District employees collect data on each site (or unit) proposed for burning, including the tons of fuels, location, elevation, tree species, and fuel moistures. They register the unit with the Coos Forest Protective Association and pay a per-acre registration and burn fee required by state law. The Association regulates the burning activities and issues burning permits.

ODF meteorologists in Salem evaluate weather and smoke dispersion conditions. The meteorologists then issue daily burning forecasts and instructions, which are designed to protect air quality. The instructions control the amount and location of prescribed burning on any particular day. Burning conducted in the Elliott State Forest must comply with these burning instructions or any exceptions allowed by the meteorologists. The district must also comply with any additional restrictions imposed by the Coos Forest Protective Association caused by local conditions. For prescribed burning on the Elliott State Forest, the goal is to protect the air quality of Coos Bay/North Bend, Roseburg, the Willamette Valley, Grants Pass, and the Rogue Valley.

The Coos Forest Protective Association is a private, nonprofit corporation that provides protection from fires to its corporate members and to other private, state, and federal lands. Its objectives are to minimize the cost of fire suppression and the damage caused by wildfire to forests and watersheds, and to respond to all fires with an effective, well-trained, equipped, and supervised fire control organization. As a result of aggressive efforts to suppress wildfires, effects on air quality are minimized and less particulate matter is released into the airshed.

Aquatic and Riparian Systems

Water affects virtually every other resource in Elliot State Forest—trees, plants, fish, wildlife, soils, and recreation. Aquatic and riparian resources include surface water (streams, lakes, and wetlands), groundwater and aquifers, riparian areas, water supply (for instream and out-of-stream uses), and water quality.

Other resource descriptions within this chapter also contain information related to aquatic and riparian resources. (In particular, see “Geology and Soils” for a discussion of slope stability, and “Fish and Wildlife” for a discussion of streams as fish habitat and a summary of stream survey information.)

History

Aquatic and riparian resources in the Elliott State Forest have been affected by a number of natural events and human caused activities. These include: forest fires, landslides, the Columbus Day storm of 1962, stream cleaning, and past harvest practices. Several fires have occurred in the Elliott State Forest. The largest known fire was the Coos Bay Fire of 1868, which burned 90 percent of the area now known as the Elliott State Forest. It has been difficult for large riparian conifers to become established after fire because of rapid establishment of alder and salmonberry. These fires often left riparian areas and uplands with little vegetation to hold soil in place and shade streams.

The Columbus Day storm blew down approximately 100 MMBF of timber in 1962. An additional 200 MMBF was cut to access the blowdown. In the past, fisheries biologists assumed that large wood in streams interfered with fish passage, and recommended that this large debris be removed. As a result of these recommendations, logging practices of the time routinely removed large wood (LW) from streams. However, more recent research has revealed that this LW contributes to essential fish habitat.

Riparian protection standards prior to the 1970s provided less protection than is currently implemented in Elliott State Forest. Riparian trees were usually harvested along with upland forests, and large logs providing valuable fish habitat were frequently removed from streams. As a result of historical logging and fires, many streams today have limited amounts of mature conifer forest in their riparian areas and few large logs. Streams often have riparian forests of alders and other hardwoods, or young conifers.

In 1909, the Oregon Legislature declared that all water in the state belonged to the public. In the years since then, many state agencies have been given the job of helping manage Oregon’s public waters. Currently, the Water Resources Commission has the primary responsibility for the development of an integrated, coordinated state program for managing Oregon’s public waters. Other state agencies and public corporations are directed to conform to statements of water resources policy.

Aquatic and riparian resources received greater attention in the 1970s, when new laws set water quality standards to be met in all bodies of water, including forest streams and rivers. The Forest Practices Act (FPA) was passed in 1971 to regulate forest operations.

The federal government passed the Clean Water Act (CWA) in 1972. This federal law set national water quality standards, and gave states the responsibility for carrying out the law.

The ODF addressed the effects of forestry activities on water quality through additional FPA rules, enacted at various times over the last 25 years. The new rules were designed to meet the water quality needs of fish and wildlife, and also to meet the requirements of the federal CWA. Water quality rules focus on retaining riparian vegetation and reducing the amount of sediment entering streams from forestry operations such as road building and logging. Wetlands are also protected by FPA rules and various state and federal laws.

Surface Water: Streams, Lakes, and Wetlands

Water bodies in Elliott State Forest drain into three major basins. The eastern and northern portions of the forest drain into the Umpqua River. The west side of the forest drains into the Tenmile Lake system. The West Fork Millicoma runs through the center of the forest towards the south and is part of the Coos River system. The Elliott State Forest contains parts of two lakes. Loon Lake, a popular recreation site has approximately 1 mile of shoreline in the Elliott State Forest. Elk Lake, also known as Gould's Lake is a small pond located within the Elliott State Forest on Elk Creek. Outside the Elliott State Forest, Tenmile Lake is influenced by waters draining from the forest.

Water moves continuously through a watershed, crossing property lines and other boundaries. Each landowner in a watershed affects water as it flows across or underneath that piece of land, and water resources downstream are influenced by the actions of upstream owners. Because the Elliott State Forest is mostly a contiguous block of land, restoration and protection measures can affect entire watersheds as well as downstream areas outside the forest.

The basic character of streams is shaped by hydrology, the steepness of the slope, channel morphology, and geology. An important factor is the nature of the stream’s substrate, which can be silt, sand, gravel, or bedrock. Riparian areas and streams influence and shape each other in many ways. In particular, riparian forests are the source of fallen trees, which are important structural components of streams. Large, fallen trees in streams create pools, modify the stream gradient, and retain organic material and sediments.

Healthy streams are naturally dynamic ecosystems. Occasional major disturbances (such as fires, wind, floods, and landslides) are normal processes that can add logs, boulders, and gravel, which are important building blocks of stream structure and aquatic habitats. In healthy streams, floodplains, wetlands, off-channel habitats, complex stream structures, beaver dams, and deep pools provide the resilience that enable streams to absorb these disturbances.

Key Terms

Riparian Area—Three-dimensional zone of direct influence and/or interaction between terrestrial and aquatic ecosystems. The boundaries of the riparian area extend outward from the stream bed or lakeshore.

Riparian Management Area (RMA)—A protected area with site-specific boundaries established by the ODF. The width varies according to the stream classification or special protection needs. The RMA protects the stream, aquatic resources, and riparian area. Aquatic resources include water quality, water temperature, fish, stream structure, and other resources.

Stream—To qualify as a stream, a water course must have a distinct channel that normally carries flowing surface water.

Perennial Stream—Year-round surface flow. In the FPA, it is defined as a stream that normally has summer surface flow after July 15.

Intermittent Stream—Surface flow only part of the year. In the FPA, it is defined as a stream that normally does not have summer surface flow after July 15. Ephemeral streams may run only during or shortly after periods of heavy rainfall or rapid snowmelt.

Stream-Associated Wetland—A wetland that is immediately adjacent to a stream. This includes wetlands adjacent to beaver ponds, side channels, or oxbows that are hydrologically connected to the stream channel by surface flow at any time of the year.

Wetland—As defined in the FPA Rules, wetlands are “those areas that are inundated or saturated by surface or ground water at 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.”

Stream Classification

Streams are grouped into the following categories based on their beneficial use (Oregon Department of Forestry 1994b):

- Type F—Fish-bearing streams
- Type N—Not a fish-bearing stream
  - Perennial streams
  - Intermittent streams
- Type D— Domestic use

Groundwater, Riparian Areas, and Uplands

Groundwater is subsurface water that accumulates in tiny open spaces in soil or loose rock, or in the crevices of hard rock formations. Groundwater and surface water are interconnected. Surface water percolates down through the tiny open spaces in soil and eventually reaches the groundwater. Groundwater moves from zones of high pressure to zones with lower pressure, and discharges into springs and streams. Streams often exchange water with the groundwater repeatedly along their course, with groundwater upwelling into the stream at various points, and surface water from the stream downwelling into the groundwater at other places.

Uplands are part of the hydrologic cycle. Rain or snow can evaporate, infiltrate into the soil, or flow overland until it reaches a stream or area where it can soak into the ground. The condition of the uplands can influence the retention of water, the rate of water runoff from rain or snow, and the frequency of landslides. These processes are influenced by the geology and soils, type of vegetative cover (whether forest or grass, for example), and the age of forest stands. The hydrologic processes on uplands affect the amount of stream flows and the timing of peak flows after rainstorms.

Riparian Habitat

The condition of the trees, other vegetation, and soils in the riparian area affects the morphology of streams, and the condition of fish habitat. Ecological functions of riparian areas include shade, bank stability, nutrients (as leaves and wood drop into the water), large wood, and complex margins to the stream. These functions are important for healthy fish habitat, and also for the many wildlife species that rely partially or completely on riparian habitats. Floods may occur rarely (only one or two days a year), but a healthy riparian area is especially important at these times and may influence whether the flood renews or degrades conditions within the stream.

Water Supply

Water that flows through state forest lands sustains ecosystems and also provides for out-of-stream uses such as irrigation, domestic use, and municipal use. The Coos District keeps records of all registered water users that use water from state forestlands. The Oregon Water Resources Department monitors stream flows, issues permits for water withdrawals from streams, and regulates water rights.

Holders of water right certificates are authorized to withdraw a specific amount of water from waterways in the State of Oregon. The point of diversion, amount of water allotted, place of use, and purpose of water diverted are indicated on each water right. Several adjacent landowners draw surface water from sources that are on or close to the Elliott State Forest. No municipal water systems are located within the plan area.

The ODFW operates the Millicoma Interpretive Center located on the West Fork Millicoma within the Elliott State Forest boundary. This educational facility produces coho, chinook, and steelhead with the assistance of many students and volunteers. The water source for this facility is a nearby spring.

The ODF occasionally draws water from the Elliott State Forest streams for firefighting, pesticide applications, road construction, and dust abatement. The ODF generally draws water from small pools behind culverts and artificial ponds.

Statewide water supply policy involves two issues. First, the demands on Oregon’s water resources are increasing while the supply of freshwater stays the same. Future water needs may be met through alternatives such as conservation, storage, and water right transfers.

Second, instream flows provide substantial public benefits, including support of fish and other aquatic life, recreational opportunities, and maintenance of water quality. The Oregon Water Resources Department is working to restore and enhance stream flow and lake levels by the establishment of instream water rights through new allocations, the transfer of existing out-of-stream rights to instream uses, and support for environmentally sound multi-purpose storage. These activities are designed to be consistent with the preservation of existing water rights. ODFW established instream water rights for many streams in the Elliott State Forest in the early 1990s. If newer water rights are granted, water from these streams may be used only to the extent that stream flows do not fall below that protected by the older instream water right.

Forest management activities influence water supply by affecting the age, species, and density of tree cover and other vegetation; the location and condition of roads; and the condition of the soil.

Water Quality

Water quality is measured by chemical, physical, and biological properties of water. Aquatic species such as salmon need high-quality water as well as suitable habitat. In forests, the water quality parameters of most concern are usually sediment and temperature. A biological parameter, bacterial contamination, can be of concern near recreational areas. Chemicals are not usually a water quality concern in forests, but could be if any chemical contamination occurred, such as a fuel spill or improper use of herbicides.

Both natural events and forest management activities can put sediment in streams. Sediment, soil, and debris are often delivered to streams in pulses, during major storms or floods. Road systems and poor timber harvest methods can generate and deliver considerable amounts of sediment to streams during storms. The episodic nature of these events can make it difficult to evaluate their effects on water quality. Water quality monitoring is further complicated by the natural variability within stream systems. Forest management activities can also influence water temperature. This effect can occur through the loss of streamside shade, or when stream channels become wider and shallower.

Road-related landslides tend to be larger than other types of landslides, causing more off-site impacts. In recent years, most road-related landslides in the Elliott State Forest have started from forest roads built before excavated material was hauled to a stable location.

Wetlands

Wetlands are often near streams or have trees, but they are ecologically distinct from streams and forests. The FPA identifies three major types of wetlands: significant wetlands, stream-associated wetlands, and other wetlands. Significant wetlands are defined as bogs, estuaries, and both forested and non-forested wetlands larger than eight acres. Stream-associated wetlands are those less than eight acres and classified according to the stream to which they are connected. Other wetlands include seeps and springs. Wetlands can be especially valuable in providing refuge for juvenile salmonids during high water events. Wetlands also provide habitat for wildlife, improve water quality, and contribute surface and groundwater. Although important, wetlands do not occupy a significant portion of the Elliott State Forest.

Carbon

Older forests, especially in the Pacific Northwest, store large amounts of carbon in live and dead trees, as well as the forest floor. Recent analyses of older forests illustrate that carbon storage in many unmanaged landscapes is not at equilibrium, but rather is increasing (Luyssaert et al., 2008). A recent study in the Pacific Northwest has shown that the potential to store additional carbon in Pacific Northwest forests is among the highest in the world because much of the area has forests that are long-lived and maintain relatively high productivity and biomass for decades to centuries (Hudiburg et al., 2009).

The recent study of carbon storage on the Elliott State Forest, conducted by Ecotrust, estimated the current (2010) carbon inventory to be about 24,500,450 metric tonnes of CO_2-equivalent (tCO_2e) (Davies, B. et al., 2011). Under this 2011 FMP this inventory is expected to increase over time. According to the Ecotrust study, if no harvests were to occur on the Elliott State Forest, the total amount of carbon stored would be approximately 46.6 million metric tonnes of CO_2e by 2050. Under this 2011 FMP, approximately 60 percent of the maximum carbon storage is expected in the forest by 2050, while also capturing some carbon in long-lived forest products. Carbon Storage is expected to increase over time under the 2011 FMP.

Climate

The Elliott State Forest has a strong maritime influence from the nearby Pacific Ocean. As a result, temperature fluctuations are relatively moderate and rainfall amounts are high. The mean minimum January temperature in the Elliott State Forest is approximately 32° F and the mean maximum July temperature is 76° F.

Recorded rainfall varies across the Elliott State Forest, averaging 65 inches per year at lower elevations on the western edge of the forest, and 115 inches per year on the high, interior ridges. Rainfall declines slightly on the eastern side of the Elliott State Forest, to 90 inches per year. Snowfall in the forest is normally light to moderate, both in amount and duration of the snow. There is no residual snowpack.

The west side of the Elliott State Forest is most strongly influenced by the proximity of the ocean. This influence is seen in the moderate temperatures and the frequency summertime fog on the west side. During the dry summer period, the fog contributes a significant amount of moisture to vegetation through condensation, and it reduces moisture stress on vegetation. Although much of the Elliott State Forest has steep slopes, sometimes with shallow soils, the south Oregon coast climate makes the forest a superior location for conifer tree growth.

Cultural Resources

Cultural resources are archaeological and historical resources. They may include objects, structures, or sites used by people in the past. Archaeological sites provide information about past cultures. Many sites also have religious, historic, or associational values for Native American communities. Historic sites have important interpretive, recreational, and heritage values, which are lost when artifacts and information are removed or destroyed. These resources are fragile and irreplaceable, especially objects still in their original locations. These undisturbed objects provide the most information about the culture that created them, the time frame in which they were created, and the character of the landscape at the time. Cultural resources provide a meaningful record of past cultures, events, and ecological conditions in Oregon.

Current Condition

The Elliott State Forest has not been fully surveyed for cultural resources. However, a cultural resource literature search for potential sites was completed in 1998. This report (Stepp Consulting 1998), identified 4 potential prehistoric sites and 50 historic site locations. Currently, only two of these sites have been field verified: two pioneer cemeteries that are currently protected as heritage sites.

The Elliott State Forest may contain some prehistoric cultural resources, but more information is needed before this can be verified. The Umpqua, Hunus, and Miluk Indian tribes were not awarded Indian reservations by the government; instead they received land allotments for their individual families, though some tribal members simply lived on the land. Native American legends, stories, hearsay, and other documented claims indicate that some of these land allotments may have been in the Elliott State Forest (Phillips 1996). It is possible that a burial ground was located along the Umpqua River within the Elliott State Forest boundary. A prehistoric foot trail may have been located along the ridge tops from Allegany northeast to Ash Valley, with some of the trail extending through the Elliott State Forest.

A few historic cultural resources from early Euro-American settlements remain in the Elliott State Forest. An historic wagon trail stretched from Allegany north along the East Fork Millicoma River, by Glenn Creek, east of Loon Lake, and continuing east to Scottsburg. Most of this old trail has been covered by modern roads. The Elliott State Forest also contains two homestead areas totaling 480 acres, two pioneer cemeteries (the heritage sites mentioned in the first paragraph of this section), and four fire lookout towers. In addition, the Cougar Pass lookout remains standing, and an old pioneer foot trail may still exist by the former Trail Butte lookout.

Key Terms

Archaeological and Historical Resources—Districts, sites, buildings, structures, and artifacts that possess material evidence of human life and culture of the prehistoric and historic past.

Archaeological Object—An object that is at least 75 years old; is part of the physical record of an indigenous or other culture found in the state or state waters; and is material remains of past human life or activity that are of archaeological significance, including, but not limited to, monuments, symbols, tools, facilities, technological by-products, and dietary by-products.

Archaeological Site—A geographic locality in Oregon, including but not limited to submerged and submersible lands and the bed of the sea within the state's jurisdiction that contains archaeological objects, and the contextual associations of the archaeological objects with each other or with biotic or geological remains or deposits.

Burial—Any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which, as a part of a death rite or death ceremony of a culture, human remains were deposited.

Historic Artifacts—Three-dimensional objects, including furnishings, art objects, and items of personal property that have historic significance. "Historic artifacts" does not include paper, electronic media, or other media that are classified as public records.

Ecology and Disturbance History

Environmental Setting

The interaction of geology, geomorphology, climate, and soils produced a varied and complex vegetation pattern across the Elliott State Forest. Various combinations of these factors provide habitat for diverse groups of plant species. Although there is seldom a discrete boundary along environmental gradients, categorizing discrete forest plant communities is a useful management tool. Vegetative zones are broad areas where a uniform macroclimate results in a plant association that is climax. The western hemlock zone is the most extensive vegetation zone in western Oregon, and includes most of the Elliott State Forest (Franklin and Dyrness 1973).

The western hemlock zone spans a wide range in precipitation and temperature, but the plant associations likely to occur in Elliott State Forest cluster at the warmer end of the temperature gradient and toward the midrange of precipitation (80 to 100 inches annually). Nearer to the coast, western hemlock plant associations are found mainly on ridges above the fog influence. Because of the disturbance history, much of this zone is dominated by Douglas-fir. Douglas-fir, western hemlock, and western redcedar are the predominant conifers in the western hemlock association. Bigleaf maple and red alder are the predominant hardwoods, providing up to 28 percent canopy cover (McCain and Diaz 2002).

Even though the Elliott State Forest is within the western hemlock zone, the forest is currently dominated by Douglas-fir. Douglas-fir represents the early stage in plant succession, having become established as the result of wildfires and timber harvesting. The Elliott State Forest’s natural and planted stands of Douglas-fir include a range of age classes, stand densities, and species composition. Western hemlock is the second most common conifer in the forest, followed by Western red cedar. No other conifers are found in significant amounts. Pacific yew (*Taxus brevifolia*) is rare, but does occur. Although Port-Orford-cedar grows in areas adjacent to Elliott State Forest, and occurs on some of the scattered tracts to the south, only a small plantation is found in the main block of the forest.

Several hardwoods of significance occur in Elliott State Forest. Red alder is the most abundant, and quickly inhabits any site with exposed soil. Bigleaf maple is common throughout the area, and Oregon myrtle (*Umbellularia californica*) is found in the western portion of the forest. Other tree species include willow, golden chinquapin (*Chrysolepis chrysophylla*), Pacific madrone (*Arbutus menziesii*), cascara (*Rhamnus purshiana*), and Pacific dogwood (*Cornus nuttalii*).

The scattered tracts encompass a wide range of vegetation types. Portions of these lands adjacent to the California border have some coast redwood (*Sequoia sempervirens*) and Douglas-fir mixtures. Much of one scattered tract near Brookings at Bosley Butte is predominantly knobcone pine (*Pinus attenuata*). A small tract on Crafton Creek near Port Orford includes a small acreage of native prairie and scattered oaks (*Quercus spp.*). ODF tracts adjacent to the South Slough Estuary of Coos Bay are composed of a mixture of Port-Orford-cedar, Douglas-fir, western hemlock, and Sitka spruce. Another tract adjacent to Winchester Bay is a stand of Sitka spruce with some western hemlock. Other scattered tracts, such as the one on Tom Folley Creek near Elkton, are very similar to the vegetation in the Elliott State Forest.

Disturbance History

Scale

Disturbance regimes vary at different scales and are relative to specific locations and time intervals. Some locales may be more subject to wind, landslides, and flooding, while others are affected more by fire, insects, and disease. However, both small- and large-scale disturbances by different causal agents can operate simultaneously in the same community or on the same landscape as a function of local climate, topography, and biota (Pickett and Thompson 1978).

Within a stand, small-scale disturbances primarily involve tree death or treefall and subsequent canopy gap formation. Such gaps occur when one to several large trees in the upper canopy die and/or fall over. The size and intensity of the local disturbance resulting from tree death or treefall are a function of the number and biomass of the tree(s) that fall.

Wildfire, wind, landslides, flooding, and certain other weather phenomena can be of great magnitude and act over large areas. Such catastrophic disturbances affect both healthy and weakened trees, and usually result in significant or complete mortality over wide areas. Large-scale disturbances such as wildfires generally return a stand to an earlier developmental state by killing many plants, thereby favoring the establishment of early seral species. On the other hand, windthrown forests may be accelerated toward a later developmental state if shade-tolerant advance regeneration forms the bulk of the next stand (Spies and Franklin 1988).

Wildfires range from approximating the size of a canopy gap to covering hundreds of thousands of acres. Wind damage covers a spatial range similar to that of wildfires, from small gaps to landscape scales. Variations in effects are caused by meteorological conditions, topographic characteristics, stand and tree characteristics, and soil characteristics.

Potential consequences of landslides and flooding include major changes to the structure of surface materials and drainage channel systems. In nearly all cases, a similar ecosystem eventually develops on the site. Interactions between the abiotic disturbances of wind and wildfire, and the biotic disturbances of disease and insects, occur on a large scale as well.

Distinctions between small- and large-scale disturbances are somewhat artificial considering that the development and cyclic renewal of terrestrial ecosystems are intimately linked to disturbances of both kinds at all temporal and spatial scales. The more difficult question is how to define what is normal in a particular system (Pickett and White 1985).

Disturbance in Oregon Coast Range Forests

Forests along the Oregon Coast, including the Elliott State Forest, result from a typical progression of stand structures following large, relatively infrequent disturbance events and subsequent smaller, more frequent disturbances. Relatively recent, large-scale events—such as the Coos Bay Fire (1868) and the Columbus Day Storm (1962)—influenced the distribution, composition, and structure of vegetation across the forest. Small-scale disturbances caused by subsequent small fires, windstorms, disease, insects, and harvesting also significantly affect the characteristics of the forest across the landscape.

Fire

Fire is the primary coarse-scale disturbance agent in the western hemlock zone of the Oregon Coast (Wimberly 2000). The frequency of fire occurrence is variable, and is determined by long-term climate changes (Long 1998). The average regional fire-return interval for the coastal zone is estimated at 230 years, but stands much older than this indicate the variability of a fire return interval (Long 1998; Agee 1993). The randomness of natural disturbances results in some stands burning repeatedly on short cycles while other stands escape for much longer periods (Hunter 1999). The lack of long-term fire records, variability, and climate changes do not allow inference of cyclic patterns of fire return (Agee 1993).

Large fires have been important historically to the development of forests in the hemlock zone. The historic Coos Bay fire of 1868 burned 90 percent of the area that is now the Elliott State Forest (Oregon Department of Forestry 1994a).

Fire size and severity increase as the fire return interval lengthens. However, large fires do not generally burn uniformly, and fire severity varies over the area. Topographic features had a greater influence on the probability of reburns after a major fire than on the occurrence of high-severity crown fires. Dry sites have a higher probability for reburning than moist sites (Wimberley and Spies 2001). The severity of a fire is a factor in determining the successional pathway of an area. The effect of fire size and severity on seed sources is a factor in determining the structure and composition of post-fire vegetation. Forests experiencing high severity fires may require 200 years before stands develop old-growth characteristics. Areas of moderate severity fire can develop many characteristics of old growth in a much shorter time (Wimberley et al. 2000).

The Biscuit fire of 2002, located at the southeast end of the hemlock zone, occurred in an area that historically has more frequent, less severe fires. It is an example of the variability of fire severity resulting from a large fire. The fire's perimeter encompassed 499,900 acres, with 15 percent burned at high severity, 24 percent burned at moderate severity, 44 percent burned at low severity, and 17 percent burned at very low severity or unburned (Siskiyou National Forest BAER Team 2002).

Insects and Disease

(For a more detailed description, see the “Forest Health” section in Chapter 2.)

Most insect damage on the Oregon Coast is caused by the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*), which tends to affect low vigor trees weakened by other factors. Beetle population buildup after significant disturbance events can cause damage to healthy trees. Increases in beetle populations tend to be short lived unless continued disturbance provides new habitat.

Laminated root rot (*Phellinus weirii*), is the most common and damaging disease in this area. In many forests with long intervals between stand-replacing disturbances, it is the most important disturbance agent affecting stand structure and composition (Hansen et al. 1998). This fungus is an efficient parasite that kills host trees of all ages and sizes. It is a relatively slow moving disease that can persist for up to 50 years in stumps of cut trees and roots of dead trees. It kills susceptible host trees, usually leaving younger, smaller trees standing, but increases the susceptibility of larger trees to windthrow. Laminated root rot results in scattered, various-sized patches of dead trees across the landscape. Because Douglas-fir is particularly susceptible to this disease, fire suppression and domination by Douglas-fir in planted or natural stands have contributed to its spread.

Stem decays, particularly those caused by heart rot fungi, are present in older forests and are important as disturbance agents by initiating and sustaining canopy gaps (Hennon 1995). They also provide important substrate for cavity-nesting birds and mammals.

Douglas-fir along much of the Oregon Coast is experiencing severe damage from Swiss needle cast. Though Swiss needle cast affects some stands in the Elliott State Forest, it has not become severe enough to cause serious decline in tree growth.

Landslides and Floods

Landslides are a dominant erosion factor on steep, forested slopes in western Oregon. Many factors affect landslide susceptibility. A landslide is the movement of a mass of soil, rock, and organic debris down slope. The typical landslide on steep forest lands begins as a relatively small failure, which may initiate debris flows. It is not possible to predict when any specific location will experience a landslide, but it is possible to recognize where landslides are more likely. The debris flow can scour soils along its path (Landslide and Public Safety Team 2001).

Floods are generally restricted to more predictable areas than fires or windstorms, and their magnitude and frequency of occurrence can be estimated for a given river (Oliver and Larson 1996). The effects of flooding are dependent on local weather and drainage basin conditions.

Wind

The continuum of disturbance by wind is difficult to characterize. Wind can cause coarse-scale disturbances, such as the Columbus Day Storm of 1962, or fine-scale disturbances that are more chronic in nature. Major wind events occur along the coast approximately every 20 years (Wilson 1998). Depending on the intensity, large-scale wind disturbances can create even-aged stands or increase the complexity of stand structures. The impact of wind on a forest depends on stand composition, canopy structure, size, age, and vigor. Wind direction and severity, soil and site properties, and the influence of mountains on wind flow and rainfall are also factors that affect the landscape (Nowacki and Kramer 1998). In a study conducted on the Oregon coast, approximately 25 percent of the sites showed evidence of wind disturbance, characterized by one or more uprooted trees, or trees with portions of their main stem snapped (Wimberley and Spies 2001).

Energy and Minerals

Current Status

The DSL leases oil, gas, and minerals on state-owned lands. It leases by auction for 40 acres or more of land, and through negotiation on less than 40 acres of land. DSL administers the leases on both CSFLs and BOFLs, but must obtain approval from the ODF for leases on BOFLs. DSL also issues prospecting permits and permits for surface disturbance, such as seismic lines.

The Oregon Department of Geology and Mineral Industries (DOGAMI) regulates gas, oil, and mineral exploration, development, and reclamation/abandonment throughout Oregon. DOGAMI routes applications for drilling permits to all state natural resource agencies, which have 21 days to respond. Additional statutes and regulations apply to exploration and development, and various permits and licenses are required. The various laws, regulations, and permits address issues such as air quality, water, threatened and endangered species, fish, explosives, and mines, and they are enforced by various state and county agencies.

Any mine plans prepared for DOGAMI will encourage mining and drilling by state-of-the-art, environmentally sound methods, to ensure that the CSF receives maximum revenues, and that other forest resources are protected. Exploration operations and leases can provide significant revenue. The actual mining operations, however, typically provide the highest per acre values of any natural resource.

The Elliott State Forest currently produces no oil, gas, or minerals. In the past, oil and gas drilling have occurred nearby, and leases were awarded on the forest. Currently, there are no leases on the Elliott State Forest. Likewise, several sandstone quarries in the Elliott State Forest have provided building stone and road rock in the past, but no extraction operations are currently active. Nearby mineral exploration and development have included coal prospects and quarries for volcanic road rock. The Elliott State Forest has a large quantity of poor-quality sandstone. Geologic conditions on the forest are thought to be more favorable for natural gas than for oil.

The southern Oregon Coast Range, which includes the Elliott State Forest, is believed to have some potential for oil, gas, and mineral resources. The Elliott State Forest is not considered a reliable area to prospect, however. This situation could quickly change as new geological models are developed for currently valuable commodities, or if prices rise dramatically for resources with a low value.

Fish and Wildlife

The Elliott State Forest provides habitats for most native species found in forests in the Oregon Coast Range (Johnson and O'Neil 2001). Appendix E contains lists of native fish and wildlife species, with scientific names. These species are currently known, or are likely, to exist on or adjacent to the Elliott State Forest. These lists include approximately 209 species: 58 mammals, 103 birds, 23 amphibians and reptiles, and 25 fish.

Summary of Listed Species

Table 2-1. indicates all federal and state fish and wildlife species listed as threatened or endangered that may occur on the Elliott State Forest.

Table 2-1. Fish and Wildlife Species Listed as Threatened or Endangered under the Endangered Species Act on or near the Elliott State Forest[1,2]

Category	Species
Federal threatened species	Marbled murrelet, northern spotted owl, coho salmon (Oregon Coast and Southern Oregon/Northern California Coast ESUs)
State threatened species	Bald eagle, marbled murrelet, northern spotted owl, coho salmon (Oregon Coast and Southern Oregon/Northern California Coast ESUs)
Federal candidate for listing	Fisher

[1]ESU = evolutionarily significant unit (a federal designation).
[2]As of 2010.

Threatened or Endangered Wildlife Species

Of the many wildlife species potentially found in the Elliott State Forest, four species are listed as threatened or endangered under either the federal or state ESA (or both) (Table 2-1.). Fish are discussed separately later in this section. Some species are classified in various special designations such as candidate or sensitive categories.

Bald Eagle (State Threatened)

The bald eagle (*Haliaeetus leucocephalus*) first gained federal protection in 1940 when Congress passed the Bald Eagle Protection Act. This Act was later amended to include golden eagles and renamed the Bald and Golden Eagle Protection Act (BGEPA). Bald eagles were listed as an endangered species in 1967 under the Endangered Species Preservation Act and later transferred to the list of threatened and endangered species under the 1973 Endangered Species Act (ESA). In 1978, this action was clarified to list the bald eagle as an endangered species in most of the lower 48 states, with the exception of five states, including Oregon, where it was listed as threatened. In 1975, it was listed by the state of Oregon as a state threatened species. The USFWS appointed a recovery team in 1979, and a *Pacific Bald Eagle Recovery Plan* for seven western states was approved in 1986 (USDI Fish and Wildlife Service 1986). The *Pacific Bald Eagle Recovery Plan* (USDI Fish and Wildlife Service 1986) listed criteria that needed to be met before bald eagles could be considered recovered, and then delisted as a federal threatened species. In 2007, the USFWS determined the bald eagle was no longer in danger of extinction, or likely to become endangered within the foreseeable future because the threats that led to its listing have been reduced or eliminated. As a result, on August 8, 2007 the bald eagle was removed from the list of threatened and endangered species. The bald eagle has not yet been removed from the state list of threatened species. Protections for the bald eagle remain under the BGEPA as well as the Migratory Bird Treaty Act of 1972 and Oregon Forest Practices Act. In addition, the USFWS has proposed a post-delisting monitoring plan.

Bald eagles are found on or near the Elliott State Forest year-round, and use the state forests and waters for nesting, foraging, and roosting. Because a pair of eagles often uses alternate nest sites, each nesting territory can include multiple nesting sites. As of 2010, there were three occupied bald eagle nesting territories in the Elliott State Forest.

Marbled Murrelet (Federal Threatened; State Threatened)

The marbled murrelet was listed as threatened in 1992 by the USFWS within Washington, Oregon, and California, because of loss of nesting habitat, potential threats from gill net fishing in Washington, and oil spills (USDI Fish and Wildlife Service 1992). A recovery plan was developed for the marbled murrelet in 1997 (USDI Fish and Wildlife Service 1997).

Key Terms

Federal and state agencies make formal classifications of wildlife, fish, and plant species, according to standards set by federal and state ESAs. The various classifications are defined below. Federal designations are made by the USFWS or NOAA Fisheries. State of Oregon designations are made by the Oregon Fish and Wildlife Commission (part of the ODFW) and the director of the Oregon Department of Agriculture (ODA).

Federal Classifications

Endangered Species—Any species (including subspecies or qualifying population) that is in danger of extinction throughout all or a significant portion of its range.

Threatened Species—Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Federally Listed Species—Species, including subspecies and distinct vertebrate populations, of fish, wildlife, or plants, listed as either endangered or threatened.

Proposed Threatened or Endangered Species—Species proposed by the USFWS or NOAA Fisheries for listing as threatened or endangered; not a final designation.

Candidate Species—Species for which the USFWS or NOAA Fisheries has sufficient information on hand to support proposals to list as threatened or endangered.

State Classifications

Endangered species—Any native wildlife, fish, or plant species determined by the Oregon Fish and Wildlife Commission or the director of the ODA to be in danger of extinction throughout any significant portion of its range within Oregon, or any native species listed as endangered under the federal ESA.

Threatened Species—Any native wildlife, fish, or plant species that the Oregon Fish and Wildlife Commission or the director of the ODA determines is likely to become endangered within the foreseeable future throughout any significant portion of its range within Oregon.

Candidate Species— A watchlist, of any native wildlife, fish, or plant species that the State Fish and Wildlife Commission or the director of the ODA determines is likely to become threatened or endangered throughout all or a significant portion of their range in Oregon. The watchlist is advisory only.

The marbled murrelet is a seabird that nests on natural platforms in trees in mature and old-growth coniferous forests within 50 miles of the ocean. Surveys for marbled murrelets have been conducted in the Elliott State Forest since 1992. In addition, research on the habitat characteristics of marbled murrelet nesting habitat on state forest lands, including the Elliott State Forest, was conducted between 1993 and 1998 (Hamer and Meekins 1996; Nelson and Wilson 2002). Through surveys and research, 11 nests were located and subcanopy behaviors were observed in many survey areas in the Elliott State Forest.

In 2002, potential marbled murrelet habitat on the Elliott State Forest was identified through an analysis of aerial photos and orthophotos of the forest. Through this exercise, 17,381 acres of potential murrelet habitat were identified. A study was designed and implemented to determine whether the marbled murrelet habitat layer resulting from the mapping exercise was an adequate representation of suitable murrelet nesting habitat on the Elliott State Forest. Through a comparison of vegetation characteristics collected at plots within mapped polygons, known occupied stands and within mature stands that were not mapped as habitat, the study found that the mapped habitat was similar to occupied habitat in characteristics associated with murrelet occupancy, including platform density and moss cover.

Northern Spotted Owl (Federal Threatened; State Threatened)

The northern spotted owl was listed as threatened by the USFWS in 1990. Surveys for northern spotted owls occurred in the Elliott State Forest and adjacent suitable habitat between 1990 and 1993. In addition, research on the demographics, habitat use, and habitat characteristics of northern spotted owls on state forest lands, including the Elliott State Forest, took place between 1993 and 1998 (Anthony et al. 2000a, 2000b; Tappeiner et al. 2000). Although there was an apparent loss of territories over the five years of the study, the rate of population change remained relatively steady, largely because of greater survival and fecundity. Density surveys of all suitable northern spotted owl habitat in the Elliott State Forest in 2003 and 2010 located a similar number of northern spotted owl sites as the last similar survey in 1996. A revision to the 2008 Northern Spotted Owl Recovery Plan is scheduled for completion in mid-2011 by the USFWS.

Key Terms

Activity Center—For northern spotted owls, the nest tree, or the location best describing the focal point of the activity of a northern spotted owl or pair of northern spotted owls when the nest location is not known.

Demographic Study—A study of population dynamics: the quantitative analysis of population structure and trends in size, growth rate, and distribution.

Subcanopy Behavior—Marbled murrelet behaviors that occur at or below the forest canopy, and that strongly indicate that the site has some importance for breeding (Mack et al. 2003).

Marbled Murrelet Management Area (MMMA)—Area designated for the protection of marbled murrelets, according to ODF policy.

Potential Habitat—For the purposes of surveys for marbled murrelets, any forested area with a residual tree component, small patches of residual trees, or one or more platforms (Mack et al. 2003).

Territory—The area that an animal defends, usually during breeding season, against intruders of its own species.

Fish

The streams, rivers, lakes, and other water bodies in the Elliott State Forest provide habitats for a variety of fish species. At least 30 species of fish use habitats in the plan area for part or all of their life history, or use habitats downstream from the state forest that may be influenced by state forest management.

Native salmonid species in the Elliott State Forest include fall Chinook salmon, coho salmon, chum salmon (*Oncorhynchus keta*), winter steelhead, resident populations of rainbow trout (*Oncorhynchus mykiss*), and both anadromous and resident races of cutthroat trout (*Oncorhynchus clarkii*). Native non-salmonid fishes include various species of lamprey, sculpin, dace, sucker, and others. Appendix E contains a complete list of native freshwater fish species currently known or likely to exist in the planning area. The ODFW collects information on fish habitat, distribution, and populations.

Salmonid Species (salmon and trout) — Anadromous salmonid populations have been generally depressed throughout western Oregon for a variety of reasons, including reduced survival in the ocean, reduced productivity of freshwater habitats due to logging, farming, and conversion of farm and forestland to other uses such as for dwellings and industrial use, and fishing levels. In recent years, numbers in the Elliott State Forest have improved. Listed fish species are discussed further below.

Cutthroat trout are widely distributed and abundance is thought to be relatively high. Populations appear to be resilient and able to respond to events that can reduce abundance (ODFW 2005). Special consideration is warranted for populations isolated above natural barriers

Non-salmonid Species — There is much less information about the status of non-salmonid species. Two species, the Pacific lamprey and Millicoma longnose dace, are of concern due to limited distribution, reduced abundance, and/or special habitat needs.

Key Terms

Anadromous Fish—Species of fish that mature in the ocean and migrate into freshwater rivers and streams to spawn (e.g., salmon and lamprey).

Resident Fish—Fish species that complete their entire life cycle in freshwater, or non-anadromous fish (e.g., a resident population of cutthroat trout).

Salmonid—Fish species belonging to the family *Salmonidae*, which includes trout, salmon, and whitefish species.

Listed Fish Species

One fish species listed under the federal ESA, coho salmon, inhabits the Elliott State Forest. Coho in the Southern Oregon/Northern California Coasts evolutionarily significant unit (ESU) were listed as threatened in 2005. After several listing, delisting, and review processes, Oregon Coast coho were finally listed as threatened in 2008.

The State of Oregon also lists both the Southern Oregon/Northern California Coasts and Oregon Coast coho ESUs as threatened.

Key Terms

Species—Any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature [Section 3(15) of the ESA].

Population—A group of fish spawning in a particular area at a particular time that do not interbreed to any substantial degree with any other group spawning in a different area, or in the same area at a different time [OAR, Division 7, 635-07-501(38)]. For example, "Millicoma River fall Chinook salmon" are a population.

Evolutionary Significant Unit—A group of populations that: 1) are substantially reproductively isolated from other population units of the same species, and 2) represent an important component in the evolutionary legacy of the species (National Marine Fisheries Service 1991). This term is used by NOAA Fisheries as guidance for determining what constitutes a distinct population segment for the purposes of listing Pacific salmon species under the ESA. For example, the "Oregon Coast coho ESU" is a delineation that encompasses all naturally spawned populations of coho salmon south of the Columbia River and north of Cape Blanco.

Habitat Status

The following is a summary of the in-depth habitat status discussed in the 2003 Elliott State Forest Watershed Analysis (Oregon Department of Forestry 2003). In 1993, the ODFW, in collaboration with the ODF, began inventorying stream habitats in the Elliott State Forest (Oregon Department of Forestry 2003). Since the start of the program, habitat inventories have been completed for much of the extent of anadromous salmon distribution within the forest. These surveys measure instream habitat characteristics (pool size and depth, active channel width, amount of wood in the channel, and other attributes), streamside vegetation, and valley attributes (valley width and other factors) for a desired reach of stream. Habitat benchmark values developed by ODFW can be useful in evaluating current conditions, but should be used with caution. The ecological potential for a specific stream can vary depending on the ecoregion, geology, natural disturbance history, size, and other individual features.

Pool habitat is a useful indicator of aquatic habitat quality. A pool area of at least 35 percent of the total stream area is considered desirable by ODFW. In addition to percent pool area, pool depth and complexity factor into habitat quality. Within the Elliott State Forest, the Tenmile Basin has the highest quality pool habitats and is the only region that meets ODFW habitat benchmark. Limited amounts of large wood in stream channels contributed to the low pool area and complexity outside the Tenmile Basin.

Gravel substrate in stream channels is important for providing spawning habitat and creating scour pools. The ODFW benchmark for desirable amount of gravel in riffle areas is 35 percent. Most of the surveyed low gradient stream reaches in the Elliott State Forest are near this habitat benchmark. The wide channels of the West Fork Millicoma, where limited large wood exists to capture material, have minimal gravel retention. Many streams with an active channel width of less than 40 feet also lack in-channel large wood and have limited riffle gravels.

Large wood within the stream channel is important in creating zones of lower velocity water, gravel deposits, and pool habitat. These features benefit both fish and aquatic amphibians. Wood jams help trap gravel and cobbles that would otherwise move downstream unimpeded during high flows. These deposits are a preferred substrate for fish spawning and for the production of aquatic insects on which fish feed. Wood in streams can create zones of slower water that provide refuge for young fish during high flows. Deep pools created by wood jams are also important for summer survival, when low flows reduce the cover available to fish.

Hardwood dominated stands are common along fish-bearing streams in the forest and are likely more widespread now than in the past. Hardwood trees provide shade and leaf litter to the aquatic environment, but their ability to create the volume of large wood desired in forest streams is very limited. The lack of large riparian conifers reduces the ability of natural recruitment of instream LW and the associated beneficial habitat features.

Forest Health

Fire, windstorms, people, insects, and diseases constantly disrupt forests, injuring and killing trees and other living things. These disturbances are natural and necessary processes of the forest ecosystem, and in fact provide many important components of wildlife habitat. (More detail on these disturbances is provided above under the section "Ecology and Disturbance History.") However, when disturbances are more severe, frequent, or widespread than considered normal or acceptable, the forest is often described as unhealthy (Campbell and Liegel 1996).

Most definitions of a healthy forest are based on the premise that management objectives can be achieved only within the limits of an ecologically viable and sustainable ecosystem. The following concepts are common to most current definitions of forest health: 1) a healthy forest can vigorously renew itself across the landscape and recover from a wide range of disturbances; 2) a healthy forest provides for the human needs of values, uses, products, and services; and 3) a healthy forest provides a diversity of stand structures that provide habitat for many native species and all essential ecosystem processes (Campbell and Liegel 1996; Kolb et al. 1994; Stolte 1997).

Although comprehensive assessment of ecosystem health is beyond the scope of this FMP, several key indicators of ecosystem health and vitality can be evaluated. Key indicators of forest health include damage from biotic agents such as insects, diseases, and animals, as well as damage from abiotic stressors such as fire, weather extremes, and air pollutants. These disturbance agents kill trees or parts of trees, reduce tree growth, and may predispose trees to damage by other agents. The effects of these various disturbance agents are usually described in terms of number of acres affected, number of trees killed, degree of damage, or reduction in tree growth rates, all of which can be measured through various survey techniques. Evaluations must determine what level of change indicates a significant forest health trend within the context of normal and historical variability.

Restoring or maintaining forest health usually is accomplished through silvicultural manipulation of the forest at the stand or landscape level. Such manipulations can help sustain healthy productive forests and keep damage from native pests to acceptable levels. Non-native or "invasive" species often require special measures such as eradication, quarantine, or direct suppression.

Current Condition

The current condition of the Elliott State Forest can be ascertained partially by examining long-term trends in damage from major disturbance agents. For example, the Elliott State Forest has not experienced the type of widespread deterioration that has occurred in eastern Oregon forests as a result of fire suppression and high-grade logging. However, substantial blowdown has occurred during periodic major winter storms.

Several diseases have reached noticeable levels of damage in recent decades. Swiss needle cast, the highly visible native foliage disease of Douglas-fir, is causing serious growth decline over a large area along the west slope of the Coast Range. In northwest Oregon, growth reduction is severe enough on some sites that the future of those stands is uncertain. In the Elliott State Forest, though Swiss needle cast affects some stands, it has not become severe enough to require major modification of silvicultural activities. Laminated root rot, a native disease of conifers, has damaged Douglas-fir on some sites, but current management practices will stabilize or reduce unwanted effects of this disease. Black stain root disease has reached epidemic proportions in some locations in southwest Oregon, but is found infrequently in Douglas-fir in the Elliott State Forest.

Aerial and ground surveys conducted during the past 60 years show little evidence of major pest outbreaks in the Elliott State Forest. Currently, few insect problems occur in the mid- to late-successional Douglas-fir stands. The most significant pest is the Douglas-fir beetle, whose outbreaks follow major windthrow events. The Sitka spruce weevil (*Pissodes strobi*) continues to limit Sitka spruce management. Continued monitoring through aerial and ground surveys will provide early warnings of new problems, and gradually improve our ability to maintain a healthy forest.

Armillaria Root Disease

Armillaria root disease is far less abundant and damaging than laminated root rot, but occasionally causes significant damage in young Douglas-fir plantations. Root disease surveys show that, in the Oregon state forests, armillaria is widely scattered and occurs in very small patches, usually affecting only a few trees. Scattered dead trees from armillaria have a positive value for wildlife habitat.

Damage appears most severe in even-aged plantations and on severely disturbed sites. Tree stress, which can result from poor planting, inappropriate seed source, soil compaction, or nutrient imbalance, generally predisposes trees to damage by armillaria (Shaw and Kile 1991, Hadfield et al. 1986), but vigorous, rapidly growing trees can also be attacked and killed (Rosso and Hansen 1998).

Black Stain Root Disease

Black stain root disease, caused by the fungus *Leptographium wageneri*, was largely unrecognized in the Pacific Northwest before 1969. Since then, the disease has become widespread in Douglas-fir plantations in southwest Oregon. In this area, 25 to 50 percent of 10- to 30-year-old Douglas-fir plantations contain diseased trees, with mortality as high as 50 percent in some stands (Hansen et al. 1988). The ODF Insect and Disease Section surveyed the Elliott State Forest for black stain root disease in 1986 and 1993, and found that it occurred with very low frequency (Kanaskie and Irwin 1993).

Black stain root disease is transmitted over long distances by spore-carrying bark beetles and weevils. The disease typically appears in small patches. These disease patches are encountered most frequently in areas with severe soil disturbance, in dense stands that have been pre-commercially thinned, along roads, and in stands with a history of tractor logging (Hansen 1978, Goheen and Hansen 1978). The high frequency of black stain root disease centers in disturbed areas likely reflects insect preference for stressed or injured host trees. Thinning in mid-summer, avoiding site and tree damage, and favoring species other than Douglas-fir reduces the impact of this disease.

Hemlock Dwarf Mistletoe

Hemlock dwarf mistletoe (*Arceuthobium tsugense*) is the only dwarf mistletoe that occurs in the Elliott State Forest. The principal host is western hemlock, but several true firs can also be damaged. Dwarf mistletoes are flowering seed plants that parasitize conifer trees by growing root-like structures directly into tree branches. They extract nutrients and water from host trees and cause mortality, growth loss, deformation of tree form and crown structure, and reduced seed production. Although birds and mammals can carry the sticky mistletoe seeds a long distance, most spread occurs when seeds are cast from infected overstory trees onto susceptible understory trees (Hawksworth and Wiens 1996).

In heavily infested stands, hemlock dwarf mistletoe can reduce wood volume to as little as sixty percent of normal. Infected trees are predisposed to damage from other stressors such as drought and bark beetles (Weir 1977). Hemlock dwarf mistletoe also provides food and habitat for certain wildlife species. For example, marbled murrelets are known to nest on hemlock branches deformed by dwarf mistletoe.

Because dwarf mistletoes are parasitic plants that require a living host to survive, clearcutting has been an effective control measure. Clearcutting, large fires, and short rotations have reduced occurrence of hemlock dwarf mistletoe on much of the Elliott State Forest. Long rotations and partial cutting may increase the abundance of hemlock dwarf mistletoe (Parmeter 1978).

Laminated Root Rot

Laminated root rot (*Phellinus weirii*) is a native fungal disease affecting many conifer species, and is the most widespread and destructive disease of Douglas-fir in the Coast Range of Oregon. On average, it affects approximately five percent of the Douglas-fir forest land, but the disease is distributed unevenly. Results from several surveys show that, in Southwest Oregon, including the Elliott State Forest, less than two percent of the Douglas-fir, or mixed conifer types, are affected by this disease (Kanaskie and Baer 1994).

Laminated root rot causes tree mortality and growth loss, and predisposes trees to windthrow. Because the disease spreads from root to root and affects groups of trees, it commonly creates canopy openings of various shapes and sizes. These openings allow light to reach the understory, stimulating growth of herbs, shrubs, and tree species resistant to the disease (Holah et al. 1993). Trees killed by the disease provide snags and downed logs that benefit certain wildlife species. The increased diversity and benefits to wildlife partially offset the huge volumes of timber lost to this disease annually. Because the disease destroys major structural roots, laminated root rot can contribute to extremely hazardous situations in developed recreation sites.

Laminated root rot intensifies on a site when Douglas-fir or other highly susceptible species are planted into an infested area, and the fungus (which survives for decades in buried roots) grows from infected roots onto the roots of the newly established tree. The most susceptible host species are Douglas-fir, grand fir (*Abies grandis*), and mountain hemlock (*Tsuga mertensiana*). Western hemlock and noble fir (*Abies procera*) have intermediate susceptibility, pines and cedars are resistant, and hardwoods are immune to the fungus (Thies and Sturrock 1995).

Current management emphasizes planting or retaining resistant or immune species, and carefully designing silvicultural systems to prevent blowdown after thinning. The ODF Insect and Disease Section in Salem conducts root disease surveys on specific areas when requested by the district.

Port-Orford-Cedar Root Disease

The Port-Orford-cedar root disease, caused by *Phytophthora lateralis*, threatens Port-Orford-cedar and, to some extent, Pacific yew in Southwest Oregon and northern California. Port-Orford-cedar occurs in some of the scattered tracts south of the Elliott State Forest's main block, but it has not been documented on the main block of the Elliott State Forest. The 1993 survey for black stain root disease did not reveal any Port-Orford-cedar in the areas surveyed. Pacific yew does occur as scattered individuals in the Elliott State Forest. As a result of the root disease, Port-Orford-cedar was once considered for candidate status under the state and federal ESAs, but was never listed.

Port-Orford-cedar root disease is caused by a non-native soil- and water-borne pathogen that can be transmitted in moving water and by logging machinery, vehicle traffic, and human and animal traffic. Its presence or absence can significantly affect forest management. Because its natural range reaches the southern boundary of the Elliott State Forest, Port-Orford-cedar can potentially be replanted in the Elliott State Forest in low risk areas away from infected drainages. Genetically resistant seedlings are available for deployment. Special management guidelines will be necessary if the district plans Port-Orford-cedar regeneration.

Sudden Oak Death

Sudden Oak Death (SOD), caused by the non-native pathogen *Phytophthora ramorum*, is a relatively new disease in Oregon. It was first discovered in July 2001 at five sites on the southwest coast near the town of Brookings. Aerial photos of the area indicate that the pathogen was present at one of the sites since 1997 or 1998. Outside of Oregon, *P. ramorum* is known to occur in forests only in California (14 counties) and in two European countries. The origin of the pathogen is unknown.

P. ramorum can kill highly susceptible tree species such as tanoak, coast live oak, and California black oak by causing lesions on the main stem. Tanoak is by far the most susceptible species in Oregon, and the disease seriously threatens the future of this species. *P. ramorum* also causes leaf blight or shoot dieback on a number of other hosts including rhododendron, evergreen huckleberry, Douglas-fir, and Oregon myrtle. If *P. ramorum* is allowed to spread unchecked in Oregon, it would seriously affect the ecology of southwest Oregon forests, and the resulting quarantine regulations would disrupt domestic and international trade of many forest and agricultural commodities. It poses a substantial threat to many forest ecosystems in North America and elsewhere around the world.

P. ramorum spreads during rainy periods when spores produced on infected leaves or twigs are released into the air and are either washed downward or transported in air currents. *P. ramorum* also has a tough resting spore stage, called a chlamydospore, which allows the pathogen to survive harsh conditions for months or years in soil or plant parts.

Since fall of 2001, state and federal agencies have been attempting to eradicate *P. ramorum* from infested sites in Oregon by cutting and burning all infected host plants and adjacent apparently uninfected plants. Between 2001 and the end of 2010 eradication treatments were completed on approximately 3,200 acres of forest at an estimated cost of $7 million. Despite this effort, the disease continues to expand slowly; from 2007 to 2010 approximately 60 new infested sites were found each year. Delays in completing treatments, latency of the pathogen, and consecutive years of unusually wet spring and early summer weather contributed to disease spread.

Despite the continuing new occurrences of *P. ramorum*, distribution of the pathogen in Oregon forests remains limited to a very small area near Brookings, suggesting that the eradication effort has at least slowed spread of the pathogen. Four aerial surveys per year, numerous ground-based surveys, and year-round stream baiting (62 drainages) have failed to detect the pathogen in forests beyond this general area of infestation.

Sudden oak death poses a significant but uncertain threat to Oregon's forest ecosystems. Continued research, monitoring, eradication, and regulation to prevent artificial spread on plant and wood products are essential to limiting disease impact. Currently a 162-square-mile quarantine area near Brookings is subject to state and federal regulations that restrict transport of host plants and plant products.

Swiss Needle Cast

Swiss needle cast (*Phaeocryptopus gaeumanni*) is a native fungal disease of Douglas-fir that occurs throughout the Coast Range and western Cascades. Until recently, the disease was of little consequence, causing premature shedding of three- and four-year-old needles. However, since the mid-1980s, several hundred thousand acres of Douglas-fir in the Coast Range have shown increasingly severe damage from this disease (Kanaskie and McWilliams, 2010).

Between 2001 and the end of 2010 eradication treatments were completed on approximately 3,200 acres of forest at an estimated cost of $7 million. Despite this effort, the disease continues to expand slowly; from 2007 to 2010 approximately 60 new infested sites were found each year. Several hypotheses have been suggested to explain why this normally benign pathogen is causing severe damage to Douglas-fir. The most likely explanation is that management practices, in combination with a climate conducive to the disease, have shifted the ecological balance in favor of the pathogen. Much of the

Sitka spruce and western hemlock zones have been planted to dense stands of Douglas-fir. Often, these plantations were established from seed collected farther inland and at higher elevations than native coastal stands. The combination of a favorable climate, an increase in the amount and density of Douglas-fir in coastal areas, and slightly off-site seed sources may have set the stage for rapid and efficient spread of the fungus. As a result, the pathogen population may have increased to levels that can overwhelm naturally occurring mechanisms of disease tolerance. Apparently, a delicate balance exists between the tree, the pathogen, and the environment.

Current management efforts to reduce the impact of Swiss needle cast are guided by a strategic plan developed by the ODF. Disease distribution and severity is monitored annually through aerial and ground surveys. ODF applies a range of silvicultural treatments, including planting species mixtures, thinning to encourage non-host tree species, pre-commercial thinning to maintain deep crowns, deploying genetically tolerant Douglas-fir, and harvesting severely infected stands and replanting with non-host species. Cooperative research efforts with OSU are underway to evaluate the effectiveness of a variety of silvicultural and chemical approaches to reducing impacts from the disease.

Other Forest Health Issues: The following disturbance agents also occur in the Elliott State Forest.

- **Animal Damage—There are many species of wildlife in the forest, but the number of animals causing important tree injuries is relatively small.** Mountain beavers, black bear, deer, elk, porcupines, gophers, and American beavers can cause damage to forest trees. Damage from these animals is sporadic and occurs in varying severity as to numbers of trees damaged.
- **Annosum Root Disease—**Western hemlock and grand fir are the principal hosts, with the most significant damage occurring on western hemlock. Most annosum decay is associated with tree wounds. Commercial thinning or partial cutting increases the potential for annosum root disease. The disease may increase as thinning intensifies and stand ages increase.
- **Douglas-fir Bark Beetle—**In western Oregon, the Douglas-fir bark beetle usually infests windthrown or diseased Douglas-fir trees. When a major windstorm occurs, the large supply of high-quality Douglas-fir breeding logs allows beetle populations to increase tremendously. Unless the large (more than 12 inches in diameter) windthrown Douglas-firs are salvaged rapidly or treated with the beetle-repellent methylcyclohexanone, a bark beetle outbreak can occur when the emerging brood attacks nearby standing green trees.
- **Noxious Weeds—**Noxious weeds are an emerging problem on forest lands. Invading non-native plants compete with native vegetation, and can significantly alter ecosystems. Spotted knapweed, gorse, and many other species are present in western Oregon forests (Campbell et al. 1997).
- **Spruce Aphid—**Spruce aphid infestations cause premature loss of older needles in Sitka spruce, and eventually kill branches or the entire tree. Much of

the spruce decline visible along the Oregon coast is attributable to the spruce aphid.

- **Spruce Weevil—**The Sitka spruce weevil is an important pest of Sitka spruce regeneration in coastal Oregon. It causes significant damage to young, open-grown Sitka spruce by killing the terminal shoot and deforming the tree. Research now suggests that a combination of stocking control, genetic resistance, and site selection may reduce the impact of weevil infestations.
- **Stem Decay—**In old-growth stands, decay organisms cause tree death or breakage, creating gaps in the canopy and providing rotten wood and hollow logs for wildlife. In areas with extensive young stands, the main concern may be the lack of decay and defect and its likely effect on wildlife and ecosystem processes.

Drought, Freezes, Windthrow, and Other Non-Biological Factors

Severe windstorms, droughts, and freezes can kill many trees. The ODF expects at least several of these events over the life of a stand. Isolated fragments of conifer stands, set aside for threatened and endangered species, will be particularly susceptible to windthrow. Windfall is minimized when sound trees, free of root disease, are left along cutting lines.

The historical record for the Elliott State Forest from the 1950s to the 1960s shows substantial amounts of blowdown following major winter storms. Because of the soil types and steep slopes in the Elliott State Forest, blowdown is likely to recur.

Periodic cold snaps have caused extensive browning of many conifers in the Coast Range, but the long-term effects have been generally minor. Low temperatures can also cause top-kill of conifers. Damage from abiotic stresses tends to be greatest when tree genotypes or species are poorly suited to their local environment.

Climate change resulting from increased concentrations of atmospheric carbon dioxide is expected to result in warmer temperatures and changed precipitation regimes during this century. Climate change will generally diminish tree health and improve conditions for some highly damaging pathogens (Kliejeunas et al. 2009). The effects of climate change also are generally expected to predispose forests to wildfires, insects and disease, reduce growth and survival, and ultimately change forest structure and composition at the landscape scale. Climate change will require trees and forests to adapt to new climatic and biotic environments.

Because of their ability to take up and store carbon dioxide, trees and forests may play a role in mitigating climate change. However, strategies to optimize carbon storage may compete with other objectives of forest management, such as conservation of biological diversity, maintenance of wildlife habitat, water, forest products, and recreation.

Geology, Topography, Soils, and Geotechnical Issues

Geology

The Elliott State Forest is located in the southern portion of the Oregon Coast Range physiographic province. Formation of the rocks which comprise this portion of the Coast Range began during the early Eocene period, approximately 50 million years ago. A deep marine basin was located at the position of the Elliott State Forest at that time. To the south was a shallow off-shore shelf which received large quantities of fine grained (sand to silt sized) sediment from the mouth of a large river system that drained the ancient Klamath Mountains located at the basin's southern end. The Tyee sandstone/siltstone formation, which underlies most of the Elliott State Forest, is believed to have formed from these massive sub-marine landslides that dislodged the shelf sediments. As these sediments settled to the ocean floor, the heavier sand particles were deposited first and then were covered by lighter finer silt and particles. Over the course of many cycles of this settling process, the layered siltstone over sandstone rock that is visible in many of the deeper road cuts in the Elliott State Forest were formed. Subsequent periods of, tectonic uplift, sea-level changes, and erosion have created the landforms visible in the Elliott State Forest today.

Sandstone beds may be more than 50 feet thick, alternating with siltstones and mudstones that vary from lenses (thin layers) to several feet thick. The Tyee formation in the Elliott State Forest generally has low primary porosity but is moderately jointed and fractured. It is this secondary porosity which provides the majority of rock-bound water in the Elliott State Forest although these sources are generally unreliable and insufficient for meaningful well water production.

Tyee Formation rocks tend to weather and decompose rapidly when exposed to air and water, and therefore have extremely limited utility as structural aggregate. . Igneous rocks, which when found in the Oregon Coast Range have origins as sub-marine seamounts that intruded the Tyee Formation, have great utility as structural aggregate but have not been found in the Elliott State Forest.

Topography

The topography in the Elliott State Forest is generally rugged and highly dissected with steep, narrow canyons, although the southeast part of the forest is less steep. The dissected landforms contain many ridges and swales. Across the forest, slopes face in all directions, with no dominant exposure. Elevations range from near sea level to 2,100 feet above sea level.

The major rivers and streams are in narrow valleys, bordered by steep side slopes. The gradients on the side slopes commonly exceed 65 percent. The valley bottoms were formed by alluvial deposits, and are gently sloping. Steep colluvial basins, sometimes called headwalls, are fairly common across the Elliott State Forest. The colluvial materials include soil and debris that have been moved downslope by gravity and biological activity. The many small stream channels in the forest generally begin some distance downslope from the headwalls.

The forest lies between six and twenty miles from the Pacific Ocean. The Umpqua River borders the northeast part, and the West Fork Millicoma River flows through the south and southeastern parts of the Elliott State Forest. Loon Lake is on the eastern border and Tenmile Lake is to the west of the Elliott State Forest.

Key Terms

Aggregate—Small rocks used in building forest roads.

Alluvial—Soil and similar materials that were transported and deposited by running water.

Colluvial—Soil, debris, and other materials that have been moved downslope by gravity and biological activity.

Debris Flow—A rapidly moving mass of rock fragments, soil, and water.

Debris Torrent—Rapid movement of a large quantity of materials, including wood and sediment, down a stream channel. This generally occurs in smaller streams during storms or floods, scouring the stream bed.

Dissected—A landscape that has been cut into hills and valleys by the process of erosion.

Geomorphoic—Land forms

Geotechnical—The study of soil stability in relation to engineering.

Leave Area—An area of standing timber retained among areas of logging activity to satisfy management objectives, such as seed source, wildlife habitat, or landscape management constraints.

Residual—Soil that has formed in its original place and has not been transported to its current location. **Site Class—**A measure of an area’s relative capacity for producing timber or other vegetation. (See the discussion under “Timber” later in this chapter for details on site classes.)

Site Index—A measure of forest productivity, expressed as the height of the tallest trees in a stand at an index age. In this document, an age of 50 years is used. (See the discussion under “Timber” later in this chapter for details.)

Tectonic—Changes in the earth’s crust.

Soils

Soil is a complex material made of decomposed and fragmented minerals and rock, water, chemicals such as plant nutrients, organic material and air and other gases in the spaces between grains. The organic material consists of living, dead, and decomposed plants and animals. Soil is formed by the combined influences of bedrock geology, water, time, climate, topography, and especially biologic activity. Forest site productivity is controlled the soil depth, soil porosity, soil biology, and availability of water and nutrients in the soil.

The soils in the Elliott State Forest are composed of several different types: approximately 83 percent of the forest soils are residual soils; approximately 16 percent are alluvial soils found in valley bottoms; the remaining 1 percent is comprised of agricultural land, rock outcroppings, lakes, ponds, and rivers. Most of the Elliott State Forest is Site Class II or III, indicating that trees reach heights of 95 to 134 feet at the age of 50 years (King 1966).

On steeper slopes, away from channels and colluvial basins, soil depth typically varies from one to three feet. These soils tend to be gravel and sand dominated, contain less silt and clay-sized particles than other locations, and are usually well drained. In colluvial pockets, soil depth typically varies from three to eight feet. These soils are poorly sorted, contain more silt and clay than other soils on steep slopes, and are often relatively poorly drained.

Benches have been created in several ways. They occur at old geomorphic weathering surfaces, called valley stages, or as a result of large-scale slope movement, or in areas where harder rocks resist erosion. Soils in benches may be deep with well-developed soil profiles, especially when the soils are well drained. Other benches have poorly drained soils with the water table near the surface.

Along streams, alluvial deposits are common. These deposits are typically well sorted sands, gravels, or coarse silts; drainage characteristics are highly variable. Clays are uncommon.

Three different organizations have produced soil maps that include the Elliott State Forest: the Soil Conservation Service, the Bureau of Land Management (BLM), and the Weyerhaeuser Company. The maps each use different soil names, which create difficulty in coordinating between the maps. A soil key of Coos County has been created, which helps in this coordination.

The ODF inventory and planning departments use the Soil Conservation Service Survey of the Elliott State Forest. The soil series and slope steepness were mapped into polygons to show the soil components, depth, and productivity. The Soil Conservation Service Survey Book is on file at ODF offices in Salem and Coos Bay.

Geotechnical Issues

Slope movements or landslides are the predominant landform-altering agent in the Oregon Coast Range. They “...constitute a major natural process of erosion and a source of downstream sedimentation from sloping terrain in the Pacific Northwest" (Swanson 1978). Generally, slope movements in the Elliott State Forest's steep terrain are classified as debris flows. Often these flows start in or enter steep V-shaped channels characteristic of the forest, and become debris torrents. For the remainder of this discussion, the term landslides will be used to include all types of slope movements.

Forest management activities such as road building and timber harvest potentially can trigger slope movements, although this potential can be minimized with good management practices. Slope movements can have negative effects on forest resources such as soil productivity, water quality, and fish habitat. The prevention of slope movements is a major geotechnical consideration in planning management activities.

The winters of 1995-1996 and1996-97 were the last winters with extremely heavy rains in the Coast Range. As a result of those storm events, the ODF published "Storm Impacts and Landslides of 1996" (Robison et al. 1999). Among other findings, the study revealed an increase in the rate of land sliding on very steep slopes in three of the four study areas in recently clearcut harvested units (interestingly, recently harvested stands in the Elk Creek area showed a lower landslide rate relative to the 100+ year age class). The study also revealed that forested areas in the 10 to 100-year age class experienced a lower landslide rate than that found in mature forest stands. Also, according to the study, the incidence of road-associated landslides was lower than in previous studies; this led to the conclusion that current road management practices are reducing the size as well as the number of landslides.

Research and monitoring, including the ODF landslide study, has documented that small Type N streams in steep terrain contribute significant amounts of large-diameter wood (greater than 24 inches) to fish-use streams. It has also been established that the lack of large wood in stream systems can be a contributing factor to the degradation of fish habitat.

Reeves et al. (2003) studied the sources of large wood in Cummins Creek, a fourth-order watershed in the Oregon Coast Range. They found that 65 percent of the number of pieces and 46 percent of the estimated volume of wood originated from upstream sources delivered by landslides or debris flows more than 300 feet from the channel. The remainder of the wood originated in streamside sources immediately adjacent to the channel. Wood from upstream areas constituted the majority of wood found between the bank-full channel width and below the surface level of water at bank-full flow. Reeves et al. (2003) also state that 25 percent of the wood was in aggregates (log-jams), which were formed mostly from wood originating in the upstream areas.

Landslide effects may be either on site or off site (downslope). On-site effects generally are limited to the landslide initiation site. Often, the soil has been completely removed at the initiation site, causing a loss of soil productivity. Off-site effects include changes to stream channel morphology, riparian vegetation, and redistribution of stream bed materials. Water quality may be temporarily degraded as suspended and bedload sediments increase. Landslides generally have short-term negative effects on fish habitat. Over the long term, inputs of LW and gravel are an important mechanism to sustain and improve fish habitat (Everest and Meehan 1981).

The goal of the geotechnical program in the Elliott State Forest is to minimize landslides induced by forest management practices. These can be divided into two categories: road related landslides and management-related landslides.

Road-Related Landslides

Many road design practices can substantially reduce the incidence of road-related landslides. These practices are always used in the Elliott State Forest. Roads are designed to fit the topography as much as possible, using ridge top locations, steep grades, and minimum widths. On extremely steep slopes, all material excavated from the road is hauled to a stable location. Road cross-drains are located judiciously. Sites unsuitable for road location are avoided.

Currently, most road-related landslides start from forest roads built before truck hauling of excavated material became a standard practice. One goal of the Elliott State Forest's aggressive road maintenance program is the prevention of sidecast failures from roads built with outdated construction practices.

Generally, road-related landslides tend to be larger than other types of landslides, and therefore produce the most off-site effects. Reducing the number of landslides caused by roads is an important goal in the Elliott State Forest. The district's program of road design, construction, and maintenance practices has proved successful in achieving this goal (Sessions et al. 1987).

Management-Related Landslides

Management practices that reduce soil disturbance are prescribed for harvest units with high landslide hazard locations. High landslide hazard locations are identified in the annual operations planning process, and the risk to downslope resources from land sliding is evaluated.

Foresters who work in the Elliott State Forest are trained in high landslide hazard location identification. Agency geotechnical specialists participate in the annual operations planning process, and are available to review operations where slope stability is a concern. Harvest practices in the Elliott State Forest are conducted with the intent of minimizing site disturbance, and providing a source of large wood in potential debris torrent tracks for aquatic habitat.

Various hypotheses explain the relationship between timber harvest and in-unit landslides. Root strength, site disturbance, and loss of tree canopy are mentioned in literature sources possible causes of landslides. On the nearby Mapleton District of the Siuslaw National Forest, "headwall leave areas" have been prescribed as a way of preventing in-unit landslides. A study by the Coastal Oregon Productivity Enhancement program (Skaugsett et al., 1992) inventoried 276 headwalls in the central Oregon Coast Range, including forested, clearcut, and leave areas. The study actually showed a higher rate of landslides from the leave areas. The authors speculate that headwall leave areas may be more susceptible to windthrow, or that the headwalls selected as leave areas may be inherently more unstable than headwalls where logging is allowed.

Land Base and Access

In this section, the Elliott State Forest lands are described in terms of land ownership, administrative organization, and access.

Land Ownership

State forest lands include CSFLs and BOFLs. The State of Oregon acquired the two types of land in different ways, and the two types are owned by different entities within state government. The CSFLs are owned by the State Land Board, and the BOFLs are owned by the BOF. Figure 2-1 shows the breakdown of land ownership in the Elliott State Forest. Each of these land ownerships has its own set of legal and policy mandates, which are discussed in Appendix D, “Legal and Policy Mandates.”

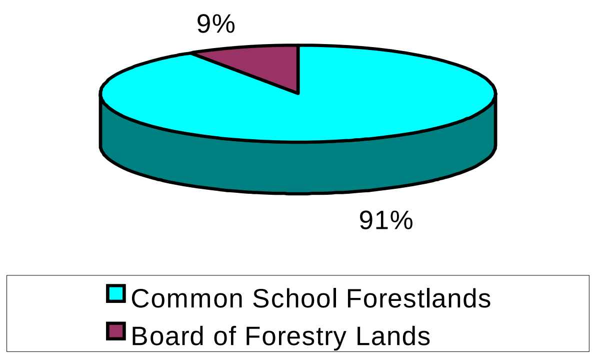


Figure 2-1. Elliott State Forest Land Ownership

The planning area includes 95,273 acres of state forest land as measured by GIS. Of this total, 86,367 acres (90.7 percent) are owned by the State Land Board, and 8,906 acres (9.3 percent) are owned by the BOF.

Administration

For administrative purposes, the ODF divides Oregon into districts. District foresters and their staffs carry out all field activities of the ODF in their respective section of the state. This FMP covers all state forest lands managed by the Coos District.

ODF districts are organized into regional areas. As shown in Figure 2-2, the Southern Oregon Area staff provides management oversight, long-range planning coordination, and professional resource specialist support to four districts and the Phipps Forest Nursery. Professional and technical support includes geotechnical engineering services, forest planning coordination, wildlife biology consultation, and radio system maintenance and repair.

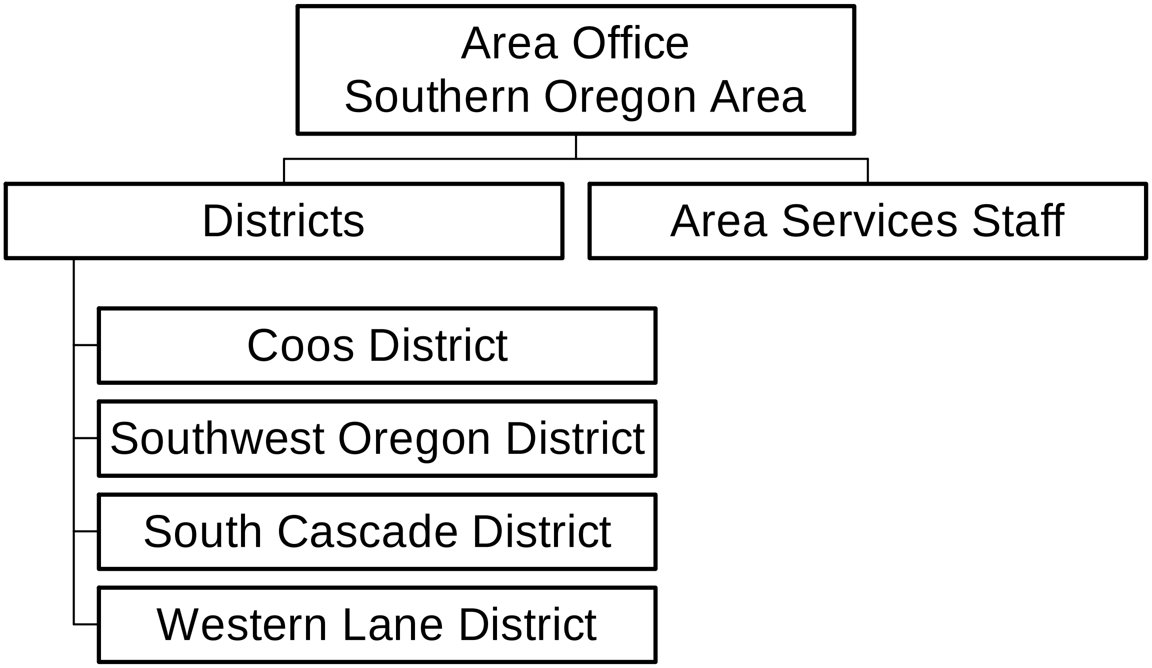


Figure 2-2. Management Organization

Management

In addition to the management provided by the district and area staff, state forest management is supported by the state forests program staff in Salem. Under the leadership of the state forests program director, the program staff provides overall program policy direction; liaison with other agencies and organizations; department-wide planning and program support; specialized expertise in biological, technical, and legal areas; business management; and fiscal accounting. The program staff carries out the forest management and business management functions that provide benefits through economies of scale and a consistent approach across all state forests.

The state forests program operates almost entirely on program-generated revenue, with minor amounts from cost-share grants, mostly in the recreation management program. The primary source of revenue is the sale of forest products, mainly timber. Because the program is almost wholly self-supporting, careful financial management is imperative. On BOFLs, 63.75 percent of the gross revenues are returned to the specific county in which the revenue was generated. The remainder goes to an account that is legally dedicated for the management of the forestlands.

On CSFLs, the net revenue (gross revenue minus management costs) is dedicated to the CSF. Historically, costs have averaged approximately one-third of the gross revenue.

Thus, all of the management activities for both BOFLs and CSFLs are accomplished on approximately one-third of the gross revenue produced.

Financial management of the program is accomplished in two primary ways:

- Revenue and expenditure planning, accomplished through revenue forecasting, and biennial and fiscal budgeting
- Revenue accounting and expenditure monitoring, accomplished on both a fiscal and biennial basis

The FMP and district IP are the primary mechanisms for financial management planning, because they identify the appropriate types and levels of management activities that accomplish the legal mandates for managing the lands. Through the biennial budgeting process, these specific activities are translated into resources required to implement the plan. Detailed annual operations are then reflected in the fiscal budgets. Biennial and fiscal budgets are prepared for the program staff in Salem, the Southern Oregon Area staff, and for the four districts. Revenue forecasting is conducted at the district and program staff levels on a periodic basis, to ensure that revenue flow is adequate to support planned activities. Expenditure and accomplishment monitoring is performed at the district, area, and program levels on a monthly and quarterly basis to ensure that actual expenditure levels are consistent with projected levels from fiscal and biennial budgets.

As part of the current planning process, all resources have been assessed for their revenue potential. For the foreseeable future, timber will remain the largest source of direct revenue generation. Alternative revenue sources will continue to be examined and analyzed. The state forests' high-quality water resources, fish and wildlife habitats, and diverse recreational opportunities will continue to produce important community and regionally based revenues and income.

Land Base Designation

By administrative rule (OAR 629-035-0040), all state forestland is designated either as silviculturally capable of growing forest tree species or not capable of such growth. A computer-generated map depicts the capability of the lands to grow trees. This map is merely descriptive, and does not propose a land use strategy.

Land Management Classification

A 1998 administrative rule (OAR 629-035-055) requires the State Forester to classify all forestlands according to the types of management that will be applied, the appropriate range of management activities, and the forest resources addressed. Land management classification describes the management emphasis for parcels of state forestlands, as determined by FMPs. The system identifies when a particular forest resource may need a more focused approach, or possibly an exclusive priority, in management. State forestlands will be classified into one of three classifications: General Stewardship, Focused Stewardship, or Special Stewardship.

General Stewardship—Lands where forest resources are managed using integrated management practices, and for which resource management goals are compatible over time and across the landscape. All resources addressed in the FMP will be managed. All resources may not be treated equally on every acre, but across the landscape, management will meet the goals identified in the plan.

Focused Stewardship—Lands are managed using integrated management practices, for a specific resource or resources, an FMP, or legal requirement that identifies the need for supplemental planning, modified management practices, or compliance with specific requirements. Management of specific forest resources may have minor effects on the management of other resources, but will not preclude integrated management. Focused Stewardship lands will be further classified into one or more of the following subclasses: Agriculture, Grazing, or Wildlife Forage; Aquatic and Riparian Habitat; Cultural Resources; Deeds; Domestic Water Use; Easements; Energy and Minerals; Plants; Recreation; Research/Monitoring; Transmission; Visual Resources; and Wildlife Habitat. An example of Focused Stewardship might be an area with scenic values, where visual activities are protected during and after forest management activities. This consideration could affect harvesting systems, the size and location of harvest units, or road locations.

S**pecial Stewardship—**Lands in which one or more forest resources require a level of protection that precludes integrated management of all resources; where a legal or contractual constraint dominates the management of the lands; or where lands are committed to a specific use, and management activities are limited to those compatible with that use. Special Stewardship lands are classified as one or more of the following subclasses: Administrative Sites; Agriculture, Grazing, or Wildlife Forage; Aquatic and Riparian Habitat; County or Local Comprehensive Plans; Cultural Resources; Deeds; Domestic Water Use; Easements; Energy and Minerals; Operationally Limited; Plants; Recreation; Research/Monitoring; Transmission; Visual Resources; and Wildlife Habitat. An example of Special Stewardship land might be the area surrounding a nest tree of a threatened or endangered species.

Land management classifications will be displayed on maps. For the purpose of protecting threatened and endangered species, as well as some cultural resource sites, some specific locations will not be displayed on classification maps. Instead, broader geographic areas within which the sites exist will be displayed. Exact locations of boundary lines will be determined on site and will depend on site conditions. More than one classification or subclass may be assigned to a parcel of land.

The goals and strategies in the FMP determine the management of key resources. The identification and mapping of land management classifications will be based on criteria in the plans. Information will be updated through watershed analysis and site-specific monitoring and field visits.

Public involvement is an important component of the land management classification process (described under the "Public Involvement" section of Chapter 6, in the subsection, "Public Involvement in District Implementation Plans and Annual Operations Plans").

Management Basins

The Elliott State Forest consists of 14 management basins that vary in size from 2,270 acres to 11,316 acres. The 13 management basins in the main block of the Elliott State Forest include the non-contiguous Sock Creek, Ash Valley, and School Land Bay tracts. Streams from these tracts drain into the watershed of the management basin to which they have been assigned. Approximately 2,270 acres of forest lands are scattered throughout Coos, Curry, and Douglas counties. These scattered tracts are collectively identified as the 14th basin. Table 2-2 lists the management basins and total acres in each. These management basins have varying resource considerations. The management basin boundaries (see Figure 2-3) were determined based on the following criteria:

Size Similarity—This criterion helps to ensure that habitat is well distributed throughout a basin and the forest.

Compatibility with Watershed Analysis—This criterion ensures that the basin organization, size, and boundaries are well-suited to conducting watershed analysis.

Consistency with HUC Boundaries—This allows the aggregation of basins as needed into sixth and fifth field Hydrologic Unit Codes (HUCs), which may be important for compatibility of monitoring, analysis, and research with other agencies or organizations.

The sixth field is the smallest watershed division of the recognized federal system for delineation of hydrologic unit boundaries. This system, originated in the 1970s by the USGS, is designed to result in a nationally consistent database of hydrologic units. Consistency with HUC boundaries allows the exchange and analysis of information with other organizations. For example, ODFW used sixth field HUCs to delineate priority watersheds for salmonids.

The seventh field HUCs were delineated by the Coastal Landscape Analysis and Modeling Study to model the economic, social, and environmental effects of forest management on coastal Oregon. This level of division is not described in the national system at this time, but it may be the next logical subdivision of the sixth field HUCs.

For the most part, the basins meet the HUC criteria. However, some very small tracts along the outer boundary of the Elliott State Forest are included in an adjacent management basin, although they are in a separate sixth or even fifth field HUC.

Table 2-2. Elliott State Forest Management Basins

Basin Number	Basin Name	Basin Acres
1	Mill Creek	5,349
2	Charlotte-Luder	6,322
3	Dean Johanneson	7,271
4	Scholfield Creek	4,974
5	Big Creek	7,786
6	Benson-Roberts	7,381
7	Johnson Creek	6,322
8	Palouse Larson	6,509
9	Henry’s Bend	8,256
10	Marlow-Glenn	6,512
11	Millicoma Elk	10,873
12	Trout Deer	11,316
13	Ash Valley	4,132
14	Scattered Tracts	2,270
	TOTAL	95,273

Alignment with Guiding Principles—The FMP is aligned with the guiding principles found in Chapter 3. For example, one guiding principle states that this is a goal-driven plan rather than an issue-driven plan. The management basins displayed in Figure 2-3 were selected on physical boundaries based on watersheds rather than organized for a particular issue. Watershed analysis uses the management basins to evaluate natural processes and human influences on those processes. This helps the managers focus on ways to achieve the goals in the plan, rather than on separate issues and concerns.

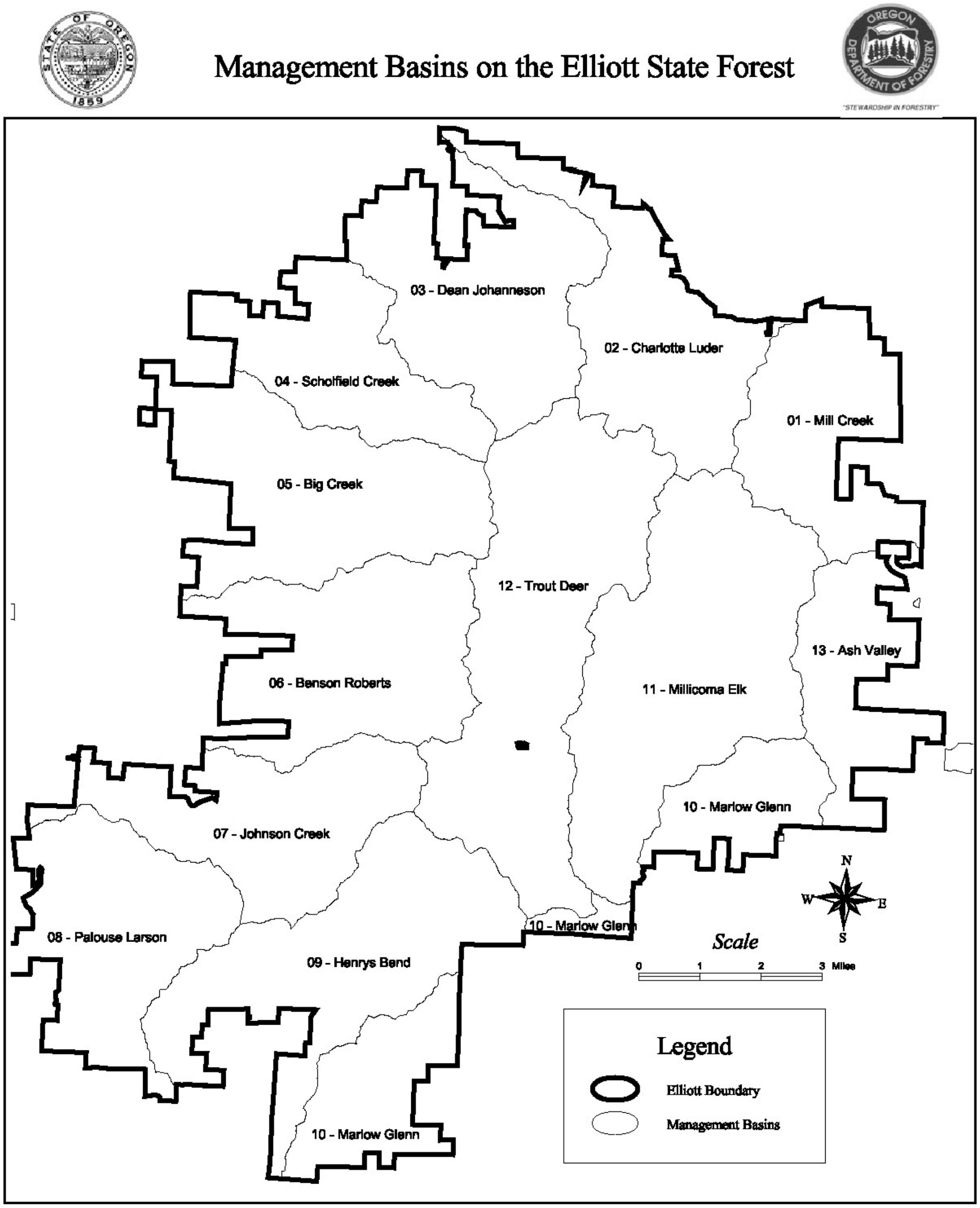


Figure 2-3. Management Basins in Elliott State Forest

Current Programs for Land Acquisitions and Exchanges

Oregon law gives the BOF the authority and means (through the ODF) to acquire forest land by "purchase, donation, devise or exchange." Any acquisition of forest land must be approved by the board of county commissioners in the county in which the lands are located. The BOF recently reaffirmed its policy that the ODF will actively pursue acquisitions and exchanges as a means of consolidating state forest lands for management efficiencies, economic values, or enhanced stewardship practices.

The purpose of acquiring and exchanging land is to increase the amount of state forestland and/or to consolidate state forestlands in contiguous blocks, rather than in scattered parcels. The consolidation of state forest lands will increase management efficiencies and long-term economic values, and will enhance stewardship practices and other forest resource values.

Access

The access system for state forestlands is composed of state highways, county roads, private and state forest roads, recreational trails, and navigable waterways. The state forestland access system is necessary to achieve forest protection and management goals. State forest roads are a resource, and represent large, long-term capital investments. They must be maintained in usable condition, with minimum impacts on other resources such as water quality, soil, and wildlife.

State Highways and County Roads

The public road system of state highways and county roads provides the initial access to state forestlands. When state highways cross significant stretches of state forestlands, the scenic qualities of views from the highways are protected in accordance with the FPA, appropriate land management classifications, and integrated resource management. County roads that cross large blocks of state forest land are considered an integral part of the forest road system in that area.

Roads on State Forestlands

Roads on state forestlands are used to access timber sales, special forest products, and forest management activity sites. They also provide access for fire suppression and recreation. For most Elliott State Forest lands, the main road system is essentially complete. However, additional spurs will still be needed to access future timber sale units.

Most roads identified as being suitable for decommissioning have been decommissioned. Most drainage structures identified as being impediments to fish passage have been removed or replaced.

Roads are built or improved as projects on timber sales. They are designed and constructed to standards that provide for good road maintenance and safe log transportation. Main access roads are surfaced with rock to provide for all-weather use and to minimize effects from rainfall and runoff. Secondary spur roads are built to the same maintenance standards, but may have lesser specifications for width and surfacing. In many instances, secondary spurs are blocked off after a timber sale or other forest management activity is completed, to minimize disturbance for elk and deer and for other management reasons. These roads are still subject to road maintenance requirements, unless they are legally closed or decommissioned by removing culverts and providing necessary long-term drainage.

There are approximately 550 miles of roads on state lands in the planning area.

Easements for Legal Access

A significant portion of state forestland is accessed by roads that extend through privately owned forest land. Legal easements are necessary to use these roads for the hauling of logs from timber sales or for other forest management activities. The ODF has acquired easements for many roads, and in some cases requires further acquisition of easements. Depending on the district's needs and the private owner's desires, easements can be temporary or permanent, and allow either public use or use only by the agency's employees and contractors.

Current Access Management Programs

The ODF's policy on forest roads states that roads will be developed and maintained to provide access for the sale of timber and other forest products, timber management activities, protection from fire. It also states that forest roads will be designed, constructed, and maintained to meet or exceed rules of the FPA. These rules set construction and maintenance standards intended to protect water quality, forest productivity, and fish and wildlife habitat. In addition to establishing the policy, the ODF's *Forest Roads Manual* sets road standards, gives design guidelines, sets an excavation and appraisal policy, and provides a wide variety of specifications and costs (Oregon Department of Forestry 2006).

The Elliott State Forest roads and private roads with easements are maintained under a road maintenance contract or by contractors as a requirement of a timber sale contract. District personnel monitor road use, determine maintenance needs, and develop maintenance plans. These plans include road surface maintenance (grading and rock application); ditch, waterbar, and culvert maintenance; roadside vegetation control; storm monitoring; and damage repair.

Plants

Elliott State Forest, Main Block

The main block of the Elliott State Forest is located within the Oregon Coast Range Ecoregion. The precipitation levels and geology of the Coast Range render it unique among its neighbors, the Klamath Mountain and Willamette Valley ecoregions. These unique qualities result in an unusual combination of plants within the forest ecosystem. These plants provide habitat and forage, add organic matter to forest soils, and influence the microclimate. In addition to their ecological functions, some plant species such as salal and sword fern are harvested commercially. Commercial uses of understory plants are discussed in this chapter's section entitled "Special Forest Products," below.

The resource description focuses on threatened or endangered plants, as listed under the state ESA. Also included are plants on the state candidate list and special concern plants designated by the ODF. All four of these categories are combined into the heading of "rare plants."

No comprehensive assessments or basic systematic surveys for rare plants have been conducted in the Elliott State Forest. In the late 1990s, individual harvest units were surveyed for rare plants. The ODF has developed a base list of state-listed plants, using the Oregon Natural Heritage Program (ONHP) list of May 2004, with the assistance of the botanist from the local BLM.

Of the 25 species found in Coos and Douglas counties, only three plant species have habitat and ranges that coincide with the forest (see Table 2-3). Most of the potential species were eliminated because they occur only on serpentine soils (a soil type not found in the main block of the Elliott State Forest), high elevations, coastal dunes, or boggy areas in the dunes. Other potential species appeared to have similar habitat requirements to that found in the Elliott State Forest, but there have been no discoveries within this range (i.e., north coast to south coast). None of the three listed species are confirmed to be present in the forest, although they have been discovered within reasonable proximity on other ownerships.

The three species that are likely present on the main block are Bensonia (Bensoniella oregona), tall bugbane (Cimicifuga elata), and Howell's montia (Montia howellii). Bensonia has been found above 2,500 feet at Signal Tree, above Camas Valley. Tall bugbane is found in lowland Douglas-fir forests with maple and sword fern. There are known populations on adjacent BLM lands. Howell's montia is found on moist lowland areas in vernally wet sites.

These three species are on the state candidate list. The remaining plants have a low likelihood of occurrence on the main block of the Elliott State Forest. The Oregon Biodiversity Information Center, previously known as ONHP, plant list is reviewed annually for updated information regarding changes in ranges, habitats and status.

The ODF is not aware of any other federally listed threatened or endangered plant species that are likely to occur on the main block of the Elliott State Forest.

Table 2-3. Rare Plants in Elliott State Forest Main Block

Scientific Name	Common Name
Candidates for T&E Status, But Not Currently Proposed	
Bensoniella oregona	Bensonia
Found in wet meadows and moist streamside sites in Pre-Cretaceous meta-sedimentary rock at elevations above 2,500 feet. Known at Signal Tree above Camas Valley, the northern-most location with lowest elevation confirmed.	
Cimicifuga elata	tall bugbane
Found in lowland Douglas-fir forests with maple and sword ferns.	
Montia howelia	Howell's montia
Found in moist lowland areas, vernally wet sites, often on compacted soil less than 400 meters in elevation.	

Elliott State Forest, Scattered Tracts

The scattered tracts of the Elliott State Forest are spread across Coos, Douglas, and Curry counties. The serpentine geology of Southern Oregon has a tremendous influence on the botanical biodiversity of the area. Thus, the number of potential listed species is greater on the scattered tracts than on the main block of the Elliott State Forest. There have been no comprehensive assessments or basic systematic surveys for rare plants on the scattered tracts. The following 30 plant species (Table 2-4) are on the state list of threatened, endangered, or candidate plants (Oregon Biodiversity Information Center and ODA), and have the potential to occur on the scattered tracts.

Table 2-4. Rare Plants in Elliott State Forest Scattered Tracts

Scientific Name	Common Name	Status
T&E Listed		
Abronia umbellate ssp. *Breviflora*	Pink sandverbena	Endangered
Arabis macdonaldiana[1]	Red Mt. rockcress	Endangered
Aster vialis	Wayside aster	Threatened
Calochortus coxii	Cox's mariposa-lily	Endangered
Calochortus howellii	Howell's mariposa-lily	Threatened
Calochortus umpquaensis	Umpqua mariposa-lily	Endangered
Cordylanthus maritimus spp. *palurtis*	Pt. Reyes bird's beak	Endangered
Lilium occidentale	Western lily	Endangered
Lupinus sulphureaus ssp. *Kincaidii*	Kincaid's lupine	Threatened
Microseris howellii	Howell's microseris	Threatened
Oenothera wolfii	Wolf's evening-primrose	Threatened
Phacelia argentea	Silvery phacelia	Threatened
Plagiobothrys hirtus	Rough popcorn flower	Endangered
Candidates for T&E Status, But Not Currently Proposed		
Arabis koehleri var. *koehleri*	Koehler's rockcress	
Bensoniella oregona	Bensoniella	
Cimicifuga elata	Tall bugbane	
Cypripedium fasciculatum	Clustered lady's slipper	
Draba howellii	Howell's whitlow-grass	
Frasera umpquaensis	Umpqua swertia	
Gentiana setigera	Waldo gentian	
Horkelia congesta ssp. *congesta*	Shaggy horkelia	
Lasthenia macrantha ssp. *prisca*	Large-flowered goldfields	

Table 2-4 continued. Rare Plants in ESF Scattered Tracts	
Scientific Name	**Common Name**
Candidates for T&E Status, But Not Currently Proposed	
Limnanthes gracilis var. *gracilis*	Slender meadow-foam
Meconella oregana	White meconella
Montia howellii	Howell's montia
Perideridia erythrorhiza	Red-root yampah
Sidalcea malviflora ssp. *patula*	Coast checker bloom
Strepthanthus howellii	Howells strepthanthus
Trieleia hendersonii	Leach's Brodiaea
Viola primulifolia	Western bog violet

1. Red Mt. rockcress is listed as an endangered species under the federal Endangered Species Act.

Current Management

The ODF protects listed plant species in accordance with the state and federal ESAs. Known sites are mapped, and listed species that occur or are suspected to occur on state forests are identified. The lists are continually updated in consultation with the Oregon Department of Agriculture (ODA and the Oregon Biodiversity Information Center).

During plan implementation, the ODF will determine if listed species occur or are likely to occur on lands where management activity is planned. If so, the district will determine if the proposed action is consistent with the conservation program for the listed species established by the ODA.

Recreation

General Patterns of Recreation Use

Recreation use within the Elliott State Forest is concentrated in several small areas of the forest; the remainder of the forest has little recreation use. The heaviest use occurs on long holiday weekends in the summer, and during deer and elk hunting seasons in the fall. Most forest visitors are local residents who enjoy undeveloped and relatively unregulated nature of the forest, with little competition for favorite sites. Future demand will be moderate for the recreation activities currently popular in the Elliott State Forest.

Camping

The Elliott State Forest provides numerous areas for dispersed camping along roads and streams. Popular areas include Elk Creek and the West Fork of the Millicoma River. Other sites are scattered throughout the forest, with widely varying use levels. The BLM operates and maintains the Loon Lake Recreation Area in the northeast corner of the Elliott State Forest on an 80 acre tract they own. This recreation area is one of the more popular destination sites in the Reedsport vicinity, with an average of 70,000 to 80,000 visitors each year.

Fishing

Winter steelhead fishing is popular in the Elliott State Forest in the West Fork Millicoma River. The ODFW, through its Salmon Trout Enhancement Program, created an increase in steelhead fishing opportunities at the Millicoma Interpretive Center and below.

Hunting, Shooting, and Trapping

Most recreational hunting in the Elliott State Forest occurs during the big game hunting season, which begins in late August and continues through January. Trapping takes place year round.

Motorized Use (Off-Highway)

Some visitors to the Elliott State Forest use old skid roads and trails for preseason scouting and hunting in off-highway and four-wheel drive vehicles. Most people use existing roads, many of which have been blocked off to regular vehicle activity. Summer use of motorcycles and all-terrain vehicles also occurs.

Non-Motorized Use

Horse riding, hiking, picnicking, and mountain biking activities occur across the forest, but in lower to moderate levels. Hiking and mountain biking trails have not been developed, as use is fairly infrequent.

Other Uses

A small number of people use the forest for other specialized activities. Kayakers use the West Fork Millicoma River, and sightseers use the Elliott State Forest's backcountry roads. School groups, universities, and forestry organizations also use the forest for various educational tours.

Current Condition

Outdoor recreation opportunities are among the major reasons people visit Oregon (Oregon Tourism Commission 1998). Between 1994 and 1997, an average of 1.85 million outdoor recreation trips was taken in Oregon each year.

Nationally, outdoor recreation has increased at a fast pace. The greatest increase has occurred in the number of bird watching participants. The National Survey on Recreation and the Environment also noted significant increases in the number of participants in hiking, dispersed camping, off-road driving, and sightseeing; these activities have increased at rates of 40 to 94 percent. The survey highlighted declines in two activities during the same period: fishing and hunting. The number of fishing participants declined almost 4 percent, while hunting participants declined by 12.3 percent. There is common speculation that cultural shifts and a lack of access to hunting areas are the reasons for the decline in hunting participants.

Table 2-5 presents trends in statewide recreation use, including the yearly increases in specific recreational activities.

Table 2-5. Statewide Recreation Use Trends

Activity	Percent Yearly Increase
Nature study/bird watching/food gathering	8.5 percent
Hiking/walking/climbing	8.9 percent
Camping	5.5 percent
Off-road driving	2.9 percent
Sightseeing/picnicking	12.2 percent
Fishing	4.9 percent
Hunting/shooting	2.1 percent

Source: Oregon Statewide Comprehensive Outdoor Recreation Plan, 2003.

SCORP reports that fishing, water activities, sightseeing, picnicking, and camping are the major outdoor recreation activities in the south coast region (Curry, Coos, and coastal Douglas counties). Six percent of all tourist trips in Oregon occurred in the south coast region (Oregon Tourism Commission 1998).

Other data from Oregon State Parks shows that camping is growing in popularity in the south coast region. Day use, however, has declined steadily since 1997. Recreation use, as reported by BLM's Coos District for Loon Lake and Dean Creek, has remained fairly consistent, with gradual increases in the number of visitors at the Dean Creek elk viewing area.

Implications

Regionally, the National Survey on Recreation and the Environment predicts that, with expected population growth (a 20.7 percent increase by 2010), increases will be seen in the number of participants in bird watching, hiking, dispersed camping, off-road driving, sightseeing, trapping, and fishing. Only hunting is expected to decrease, by 14 percent by 2010.

A narrower, statewide view of recreation use is presented in the Oregon Statewide Comprehensive Recreation Plan (SCORP) (Oregon Parks and Recreation Department 2003). SCORP notes bird watching, hiking, dispersed camping, off-road driving, sightseeing, fishing, trapping, and hunting as the top activities in the state. Similar to regional and national numbers, SCORP predicts significant growth in the demand for sightseeing, hiking, and nature study by 2010. SCORP further predicts that these activities will increase at a faster rate in Oregon than in the Pacific Coast region as a whole.

The national and regional trends indicate an overall decline in hunting activities. The trend toward less hunting must be considered in light of overall demographic changes. Because of increasing urbanization and general population growth, at both the national and regional levels, trends may be dominated by the activities of urban residents. The area surrounding the Elliott State Forest is largely rural, and it is likely that hunting will continue to be an important recreation use in the Elliott State Forest. However, hunting participation rates are not expected to grow at the same rate as other recreation activities.

Continued growth is expected in activities such as hiking, nature viewing, sightseeing, and dispersed camping. The Elliott State Forest could also support off-road driving, with careful management of other forest uses in potential conflict with that activity. Recreational use of the Elliott State Forest is expected to remain moderate because of the steep terrain, distance from major metropolitan areas, and relative lack of access.

Scenic Resources

In 1988, a SCORP survey revealed that sightseeing (i.e., driving for pleasure) was the most popular outdoor activity in Oregon; 69.3 percent of the households surveyed indicated participation in that activity (Oregon Parks and Recreation Department 1988). The SCORP survey also showed that sightseeing was the fastest growing recreational activity, increasing at a rate of 12.2 percent each year.

The Elliott State Forest is on the remote southern Oregon coast. The nearest major city to the Elliott State Forest is Eugene/Springfield, approximately 76 miles to the northeast. The Elliott State Forest is a major part of the view along the Tidewater portion of the Umpqua River on Highway 38 in the Coast Range from milepost 6 to milepost 13.

Current Condition

State Highway 38, adjacent to Elliott State Forest lands, is designated as scenic for the purpose of visual corridor management. The visually sensitive corridor is defined as the area within 150 feet of the outermost right-of-way boundary along both sides of the highway. Special rules apply to timber harvest in this corridor.

Two state forest land management classifications are used to designate areas for visual sensitivity. Where legal requirements or the management of visual resources dominates over the management of other resources, the lands are classified as Special Stewardship–Visual. Where management of visual resources allows for integrated management of other resources, but is subject to legal restrictions, supplemental planning, and/or modified management practices, the lands are classified as Focused Stewardship–Visual.

On private lands between the river and the Elliott State Forest, the lower Umpqua River along Highway 38 and its immediate visual foreground is protected either by Department of Transportation-owned scenic buffers or by scenic statutes and FPA rules. Some areas farther back from the highway, but still visible from the road, are considered mid-ground scenic areas and are designated as Special Stewardship–Visual. This means that harvesting is only allowed to enhance the visual characteristics of the forested landscape and/or viewshed. The background areas adjacent to these lands are classified as Focused Stewardship–Visual. Management activities for these areas are adjusted for visual considerations.

Social and Economic Resources

The economic analysis of forest management became much more complex after 1990. Historically, timber harvest levels alone drove the economic analysis, and timber harvesting from the Elliott State Forest still plays an important part in local economies. Purchasers of timber sales from the Elliott State Forest are from the Coos Bay, Bandon, Roseburg, Riddle, and Eugene-Springfield areas. These companies generally market the logs throughout southwest Oregon and the Willamette Valley. Currently, other resources, costs, and issues that focus on forest health, aesthetics, recreation, biodiversity, livability, climate change and other values play important roles in the calculus of social, environmental, and economic benefits provided by the Elliott.

State and local economies have changed dramatically the last two decades but the Elliott State Forest still significantly contributes to local economies. The forest sector accounts for about 6 percent of employment in Coos County and in southwest Oregon. A change of 1 million board feet in timber harvest from the Elliott State Forest is projected to add or subtract 11 total jobs in southwest Oregon, averaging an annual wage of $36,000.

The analysis of social and economic information is key to meeting the planning goals for the Elliott State Forest, and to presenting a comprehensive, integrated management approach that addresses the broad range of forest values. Management strategies for each commodity and amenity resource represented in the Elliott State Forest may have economic and social effects on local and statewide communities.

Oregon's Economy and Forest Sector

With a relatively strong economy, the state of Oregon has experienced significant population growth over the past 20 years. Starting from recession in the early 1990s, the economic boom of the 1990s is strongly correlated to population growth. During that time, high-tech industries led the state's strong economy, helping to attract a record number of people to Oregon. This is a distinct departure from the upswing in population in the 1970s, which was caused in large part by a thriving lumber and wood products industry. The prosperous Oregon economy, along with the perception of Oregon's unsurpassed livability attracted people from out-of-state. Even with the early 1990s recession and the major economic downturn beginning in 2007, Oregon's total population increased from 2,842,321 to 3,823,465, from 1990 through 2009, a 35 percent increase.

The 2007-2009 recession and slow economic recovery has severely impacted U.S., Oregon, and local economies. In addition to declining employment and personal incomes, the recession has impacted the health and vitality of local communities and families. Median household income in Oregon dropped from $50,393 in 2007 to $48,457 in 2009. Coincident with falling incomes, poverty rates, people without private health insurance, and the number of households on food assistance increased dramatically. (Dean Runyan Associated, Oregon Travel Impacts 1991-2009P).

Following the greatest economic downturn since the great depression, the recovery in U.S. economic growth recovery has been subdued by historical standards. According to the most recent IHS Global Insight forecast outlook for 2010, “The economy has lost momentum. Growth was just 1.6% in the second quarter ; we expect a 1.6% average in the second half also. . .We have reduced 2010 growth to 2.6% (from 2.8%) and 2011 growth to 2.2% (from 2.4%).” Oregon’s economic recovery has been slow, causing major budget deficits and a high unemployment rate lingering at 10.6 percent. Rural areas such as Coos County have been especially hard hit by the recent economic downturn.

Oregon’s forest sector has felt the brunt of the recent economic downturn. Logs from Oregon’s forests are processed predominantly into dimension lumber and plywood for the housing market and wood products used in commercial construction and remodeling. These markets are largely influenced by the amount of new home construction, nonresidential construction and home remodeling, the level of non-housing construction, mortgage interest rates, and competition from alternative suppliers of logs and sawtimber. Collapsing house prices and construction and a deep recession have soured markets for primary forest products and consequently timber marketed by the ODF. Market conditions improved in the spring of 2010 but the outlook has again darkened as U.S. economic growth slowed and expectations are that housing recovery will be slower than previously forecasted, and log prices likely weaker.

The lumber and wood products industry, although a declining force in the state’s overall economy, is still a major provider of jobs and income, and will continue to have a considerable effect on state and local economies. Periods of low product prices, mill mechanization, and decreased log availability all contributed to decreased employment and income in the manufacturing of primary wood products over the last two decades. Employment in Oregon’s forest sector was 50,464 in 2009 with a payroll of 2.03 billion dollars (Table 2-6.). With improvements projected for housing and nonresidential construction, forest sector employment is expected to increase over the next several years, although not to levels seen prior to the recent economic downturn.

Table 2-6. Forest Sector and Total Covered Employment and Wages for Coos County, Southwest Oregon, and Oregon, 2009

Area	Forest Sector Employment	Total Employment	Forest Sector Payroll	Total Payroll	Average Forest Sector Pay Per Job	Average Total Pay Per Job
Coos	1,333	21,448	$52,683,043	$653,980,695	$39,522	$30,491
Southwest Oregon*	16,338	296,907	$662,473,949	$10,067,024,542	$40,548	$33,906
All Oregon	50,464	1,608,669	$2,025,506,198	$65,541,013,025	$40,138	$40,742

*Southwest Oregon counties consist of Coos, Curry, Douglas, Lane, Jackson, and Josephine counties

Source: Oregon Employment Department, includes only covered employees and the numbers will not be consistent with economic impacts elsewhere cited.

Fishing has always been an important part of Oregon's economy. However, economic contributions to State and local economies have declined over recent decades. In 2009 economic impacts from fishing declined 7 percent from 2004. The near term outlook for fisheries is mixed with southcoast salmon harvests being severely depressed.

Tourism remains one of the state's top generators of jobs and revenue but experienced reductions in contributions to Oregon and local economies with the recent recession. Travel spending, industry employment and earnings, and tourism-related tax receipts have all declined since 2007. Transfer payments and investment income also continue to account for substantial portions of personal income among residents.

The Elliott State Forest and Local Economies

Timber has been the primary commodity sold from the Elliott State Forest. Changes in timber harvests have the largest effect on employment in the lumber and wood products industry, but also on schools and other local and state governments. Construction, retail and wholesale trade, health, and other services are among the sectors likely to experience changes in economic output as a result of a ripple effect.

With weak economic growth expected, economic contributions from the Elliott State Forest will be especially important to Coos, Curry, and Douglas Counties. These counties are expected to have the weakest employment growth in western Oregon (Table 2-7).

Table 2-7. Oregon Employment Forecasts by Region, 2008-2018

Workforce Region	Counties	2008	2018	Change	Percent Change
10	Crook, Deschutes, and Jefferson	81,280	92,340	11,060	14%
8	Jackson and Josephine	108,570	119,790	11,220	10%
11	Klamath and Lake	26,820	29,470	2,650	10%
5	Lane	154,400	169,400	15,000	10%
3	Marion, Polk, and Yamhill	197,300	216,400	19,100	10%
15	Clackamas	152,380	167,020	14,640	10%
2	Multnomah and Washington	712,300	780,500	68,200	10%
9	Gilliam, Hood River, Sherman, Wasco, and Wheeler	25,740	28,190	2,450	10%
1	Clatsop, Columbia, and Tillamook	37,740	41,130	3,390	9%
4	Benton, Lincoln, and Linn	103,390	111,540	8,150	8%
7	Coos and Curry	30,020	32,240	2,220	7%
14	Grant, Harney, and Malheur	18,390	19,740	1,350	7%
6	Douglas	38,130	40,560	2,430	6%
13	Baker, Union, and Wallowa	18,820	19,980	1,160	6%
12	Morrow and Umatilla	35,530	37,470	1,940	5%

Source: Oregon Employment Department

Because of fewer residents and because it contains most of the Elliott State Forest (66 percent, or approximately two-thirds of the Elliott State Forest) and employs county residents, Coos County will be more affected by changes in state forest management than the other counties. Coos County has recently had a weak economy.

Oregon's coastal economy took another downturn in 2009. In Coos County, the largest job declines were in construction (-240); trade, transportation, and utilities (-310); and leisure and hospitality (-220). The only major private-sector industry to gain jobs was educational and health services (+20). Total payroll employment fell by 5.6 percent in 2009. The severity of this past recession and subsequent "jobless recovery" is evident in Coos County. As of late summer, Coos County is in its fourth year of over-the-year job losses, although losses have moderated in the past year.

Over the past two decades, the economies and population growth rates in southwest Oregon and Coos County lagged behind those for the state as a whole. Coos County has a large percentage of older residents and a smaller percentage of young adults than most Oregon counties. Older adults are attracted to the area because of its striking beauty and the relatively low cost of retirement living, while young adults choose to leave the area because of lack of entry-level employment and higher educational opportunities. Despite the decline in younger residents, populations in southwest Oregon and Coos County will continue to grow, although at a slower rate than the rest of the state. The main source for the population growth will be retired in-migrants.

Local economies in southwest Oregon (Coos, Curry, Jackson, Josephine, Douglas, and Lane counties) will be affected differently by changes in state forest management strategies. The economies of Jackson and Josephine counties would be less affected by any changes in the management of state forestlands. Although natural resource-based industries have experienced declines, non-manufacturing jobs have increased, fueled by people moving into these two counties for quality of life and retirement reasons. And, although Douglas and Lane counties have experienced changes in their natural resource-based economies, they are becoming regional centers for wood processing and high-tech industries, respectively. Curry County has experienced similar trends in slowing employment and shifts in personal income.

Tourism, in terms of visitors to the Elliott State Forest, has little economic effect on Coos and other southwest Oregon counties. However, the effects of visitors are only a part of the total economic contribution of recreational activity. Other economic changes created by recreation include the indirect and induced economic activity generated by visitor expenditures. The industries most affected by tourist spending are lodging, amusement and recreation services, eating establishments, retail stores, and automobile services.

The availability of recreation resources is important to the local economies, but is difficult to measure quantitatively. Perceptions of quality of life and environmental quality considerations are credited for driving local economies. Again, the inherent beauty of southwest Oregon provides a strong attraction to the area and, in turn, benefits the economy.

Impact: Schools, Counties and Local Governments

The majority of the Elliott State Forest (90.7 percent) is composed of CSFLs. Revenues from CSFLs are distributed to the CSF, with the ODF reimbursed for management expenses. Revenues from BOFLs (9.3 percent of the Elliott State Forest) are distributed according to a formula, with approximately one-third distributed to the ODF for management and fire protection expenses. The remainder goes to the local taxing districts.

Almost all revenues generated from the Elliott State Forest come from timber harvesting. Over the past five years 88 percent of the timber harvest and stumpage receipts came from CSFLs. Changes in timber harvest levels will cause varying effects on revenues for schools and other governments. For CSFLs, most revenue effects to schools occur over the long term, with less noticeable effects in the short term.

Changing timber harvest levels on BOFLs will cause immediate effects on revenues to schools and other governments. However, because BOFLs constitute a small percentage of the total Elliott State Forest land base, the effect is relatively small.

Special Forest Products

Current Management

Special forest products include a variety of plant products, other than timber, that are collected or harvested for personal or commercial purposes. In the Elliott State Forest, the following special forest products have been sold, or permits issued for their collection: brush leases for sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), and huckleberry, and cedar sales for shakes. To date, these products have had little value to forest managers or landowners, so development and management has been minimal. For Elliott State Forest, the current program for special forest products involves responding to public inquiries and demands for these products.

The brush leases are the main special forest product in the Elliott State Forest. Total fees from these leases generate less than $1000 per year.

Forest managers have also issued contracts and special sales for cedar shakes. These sales are based on the amount of logs available, and have generally occurred as salvage of windthrown cedar trees. Very few cedar sales have occurred in recent years because of a lack of suitable logs and restrictions on harvest in riparian areas.

Most firewood is generated from timber harvest activities. Approximately 500 free use woodcutting permits are given to the public each year, which allows the cutting of firewood for personal use. However, because of the current practice of leaving downed wood across the harvest unit after logging, little wood is available for firewood use.

Timber

Trees define the character of the forest, and they serve many ecological functions. Live trees produce energy through photosynthesis, are the structural foundation of the forest, and provide habitat for wildlife. Standing dead trees, known as snags, are used by cavity-nesting birds and animals, and are food sources for many kinds of insects, which in turn, are food for woodpeckers and other birds. On the forest floor, the decay process for fallen trees occurs over centuries; during that time, the decaying trees provide a source of organic material and nutrients for young trees and plants, as well as habitat for insects, salamanders, and small rodents, which in turn are prey for larger wildlife.

This section discusses the timber resource in the Elliott State Forest. Other information relevant to trees and timber can be found in the sections entitled "Ecology and Disturbance History" and "Forest Health."

Timber Management

The timber program is based on general policies for managing state forests, which are based on the Oregon Constitution, the Oregon Admissions Act, and statutory direction. These legal and policy mandates are discussed in detail in Appendix D.

Common School Forest Lands are managed to provide the greatest benefit for the people of Oregon. The primary objective is the generation of the greatest amount of revenue for the CSF, consistent with sound techniques of land and timber management. Consideration is given to the need to protect soils, streams, wildlife habitat, recreational opportunities, and other forest values, as long as this need does not significantly detract from the generation of revenue over the long term (Oregon Admissions Act 1859; Oregon Constitution, Article VIII, Section 5; Crookham 1992; State Land Board's Asset Management Plan).

Board of Forestry Lands are managed to provide "the greatest permanent value of such lands to the state" (ORS 530.050), which the BOF has defined to include "sustainable and predictable production of forest products that generate revenues for the benefit of the state, counties, and local taxing districts; properly functioning aquatic habitats for salmonids, and other native fish and aquatic life; habitats for native wildlife; productive soil, clean air and water; protection against floods and erosion; and recreation" (OAR 629-035-0020).

Key Terms

Board foot—An amount of wood one foot square by one inch thick.

Stand Level Inventory—The ODF's Stand Level Inventory acquires and updates state forest vegetation information at the forest stand level. This information is used for tactical and operational decision-making. The Stand Level Inventory includes vegetation sampling protocols, forest stand data arranged in a database, computer programs for managing and using the information, and documentation of inventory elements.

Stocking—A measure of the adequacy of tree cover on an area. Unless otherwise specified, stocking includes trees of all ages.

As an asset to the counties, local taxing districts, and the CSF, prudent and careful management of the timber resource is an important theme in all planning and management of the forest. Administrative rules require that these lands be managed in an environmentally sound manner to provide sustainable timber harvest and revenues to these government entities.

The principle of sustained yield guides the timber program, and ensures that the CSF, counties, and local taxing districts will benefit from a perpetual source of revenue from a managed forest.

Past FMPs defined timber production as the predominant land use, with 95 percent of the Elliott State Forest in this classification. The remaining acres were allocated to uses such as roads, stream buffers, inoperable terrain, watershed use, recreation, service and transmission lines, scenic and protective conservancy, and non-commercial lands. Timber harvest was generally targeted to a sawlog market. Anticipated harvest ages for well-stocked stands ranged 30 to 45 years old for young commercial thinning, with most clearcutting being performed in stands from 90 to 130 years old.

During the six-year period from 1991 through 1996, the volume harvested in the Elliott State Forest was heavily influenced by the presence of the northern spotted owl, which was federally listed as threatened in 1990, and the marbled murrelet, also listed as threatened in 1992. The average annual volume harvested during this period was 17.74 MMBF. Because of the listing of the northern spotted owl, the State Land Board directed the ODF to prepare a new management plan for the Elliott State Forest not based on "moving northern spotted owl circles," but providing more certainty to the management of the Elliott State Forest and the production of income. In addition, the ODF decided to pursue an ITP for northern spotted owls and marbled murrelets through an HCP with the USFWS.

The HCP was approved in October 1995, and the new FMP was approved in 1994. The first annual plan implemented under the new FMP was for fiscal year 1995. The average annual harvest under this FMP was approximately 28 MMBF.

Management of the timber asset includes investment of time, dollars, and resources to realize the forest's ability to generate sustainable timber harvest and revenue over the long term. Investments include direct expenses for stand establishment; management activities such as site preparation, seeding and planting, and precommercial thinning; and forest infrastructure, such as roads and bridges. Long-term management includes indirect expenses, such as forest inventory and GIS systems, research projects, and monitoring projects.

Current Condition

Conifer forest covers most of the land in the Elliott State Forest. Before these lands became state forests, large fires killed or removed most of the older conifer forests. Approximately half of the conifer stands in the forest are more than 85 years old, as shown in Figure 2-4 and Table 2-8.

Other types of vegetation dominate the remaining acres, including grass, brush, and various species of hardwood trees such as alder and bigleaf maple. All resource information in this section is based on the Stand Level Inventory Program inventories as of December 2004.

Forests are naturally divided into stands—areas of five to several hundred acres occupied by trees or other vegetation similar in age, stocking, size, and species. Each stand is identified, mapped, and described in the ODF inventory. The inventory recognizes three main types of stands:

- **Conifer Stands—**These stands occupy most of the Elliott State Forest. The ODF classifies conifer stands as those in which conifer species compose 30 percent or more of the tree canopy. Although conifers are the principal species with economic value in these stands, the stands may also include substantial amounts of other vegetation types such as hardwoods, brush, grass, and ferns, which contribute to a diverse forest ecosystem. These types are either intermixed with the conifers or are in clumps too small to map and inventory separately.
- **Hardwood Stands—**These stands are found on a minority of Elliott State Forest lands. The ODF classifies hardwood stands as those in which hardwood species compose more than 70 percent of the tree canopy.
- **Unclassified Stands—**These stands are currently under contract for harvesting, or have already been harvested and will be planted soon.

In the 1950s, when forest management activities began in the Elliott State Forest, the forest predominantly consisted of Douglas-fir, with a minor component of other conifers (mainly hemlock and very small amounts of western redcedar and Sitka spruce). In most Elliott State Forest timber sales, these other conifers have usually constituted less than 5 percent of the volume. When forest management began in the Elliott State Forest, hardwoods constituted less than 10 percent of the acreage, much of this located in riparian areas. Most of the riparian hardwoods are red alder, with lesser amounts of bigleaf maple and myrtle. A greater amount of red alder is located in the Marlow Creek drainage, which was railroad logged in the 1920s to 1930s. Significant amounts of myrtle exist on south slopes in the western half of the Elliott State Forest. Other native hardwoods in the Elliott State Forest include very small amounts of bitter cherry (*Prunus emarginata*), cascara, madrone, chinquapin, and dogwood.

Figure 2-4. Conifer Age Classes in the Elliott State Forest and Scattered Tracts

Table 2-8. Summary of Conifer Age Classes

Summary of Conifer Age Classes							
Age Class (Years)	0–25	26–55	56–85	86–115	116–145	146+	Total
Acres	17,276	29,680	4,187	10,985	30,125	3,020	95,273

Chapter 3
Guiding Principles, Vision and Goals

This chapter discusses the guiding principles, forest vision, and resource management goals that set the direction for the *Elliott State Forest Management Plan*. The ODF uses the guiding principles, along with legal and policy mandates, to develop goals and strategies for long-range forest management. This chapter also presents the working hypotheses that support achievement of the vision and resource goals for the Elliott State Forest. The main headings in this chapter are:

Guiding Principles

1. **The FMP will recognize that the goal for CSFLs is the maximization of revenue to the CSF over the long term, consistent with sound techniques of land management. The goal for management of BOFLs is to secure the greatest permanent value to the citizens of Oregon by providing healthy, productive, and sustainable forest ecosystems, that over time and across the landscape provide a full range of social, economic, and environmental benefits to the people of Oregon.**

   The Oregon Constitution (Article VIII, Section 5) requires the State Land Board to manage CSFLs:

   > *…with the object of obtaining the greatest benefit for the people of this state, consistent with the conservation of this resource under sound techniques of land management.*

   According to a 1992 opinion of Oregon's Attorney General, the "greatest benefit for the people" standard requires the State Land Board to use the lands for schools and the production of income for the CSF. The resources of the lands are not limited to those such as timber, which are currently recognized as revenue generators for the CSF. The State Land Board should consider other resources, such as minerals, water, and plant materials, which may offer revenue for the fund. In addition, the State Land Board may take management actions that reduce present income if these actions are intended to maximize income over the long term.

   OARs 629-035-0000 through 629-035-0100 describe the BOF's guidance to the State Forester for managing BOFLs:

   > "To secure the greatest permanent value of these lands to the state, the State Forester shall maintain these lands as forestlands and actively manage them in a sound environmental manner to provide sustainable timber harvest and revenues to the state, counties, and local taxing districts. This management focus is not exclusive of other forest resources, but must be pursued within a broader management context that:
   > a) Results in a high probability of maintaining and restoring properly functioning aquatic habitats for salmonids, and other native fish and aquatic life;
   > b) Protects, maintains, and enhances native wildlife habitats;
   > c) Protects soils, air, and water; and
   > d) Provides outdoor recreation opportunities."

2. **The ODF will employ an adaptive management approach to ensure that the best available information is acquired and used efficiently and effectively in forest resource management programs.**

The FMP will consider a wide range of available natural resources data for the Elliott State Forest. However, new information will continue to become available after completion of the FMP. Some information may be the result of specific research activities. Other resource information will be collected through ongoing work conducted by state agency resource specialists.

New information will also become available through monitoring. The ODF is committed to an ongoing monitoring program.

As new information becomes available, the ODF will review and analyze its applicability to the management of the Elliott State Forest. Management of the Elliott State Forest will be adapted in light of the best available scientific knowledge.

3. **The FMP will be developed within the context of the Elliott State Forest as a managed forest.**

The majority of Elliott State Forest is composed of CSFLs. The ODF manages these lands under an agreement with the State Land Board to prepare and carry out programs for the management, control, and protection of the CSFLs. The management of the Elliott State Forest is implemented through the preparation and implementation of a comprehensive, integrated FMP.

BOFLs are owned by the BOF. The statutes governing this agreement are contained in Chapter 530 of the ORS. OARs Chapter 629, Division 35 directs that these lands will be actively managed. Active management means applying practices, over time and across the landscape, to achieve site-specific forest resource goals using an integrated and science-based approach that promotes the compatibility of most forest uses and resources.

4. **The FMP will recognize that the forest is intended to be an important contributor to timber supply for present and future generations.**

The Elliott State Forest (and scattered tracts in the plan area) encompasses 95,273 acres of forest land, and is an important contributor to the current and future timber supply for the local and regional area. Douglas-fir is the dominant species, with lesser amounts of western hemlock, western red cedar, red alder, and bigleaf maple.

5. **The FMP will be a comprehensive, integrated plan that takes into account a wide range of forest values.**

An integrated FMP provides for development and protection of forest resources across the landscape. For each resource or issue, the FMP includes a description of the current condition, a summary of key information, the management goals for development and/or protection of the resource, and the strategies that will be used to accomplish the management goals.

The FMP considers the following commodity and amenity resources:

- Agriculture and grazing
- Air quality
- Aquatic and riparian systems
- Carbon
- Cultural resources
- Energy and minerals
- Fish and wildlife
- Forest condition (health and ecology)
- Land base and access
- Plants
- Recreation and scenic resources
- Social and economic resources
- Soils
- Special forest products
- Timber

6. **Lands will be identified and managed for long-term revenue production while providing for a sustained contribution to biological capability and social values. The FMP will recognize that trade-offs will exist between revenue-producing activities and non-revenue-producing activities.**

An important aspect of Elliott State Forest management is long-term sustained yield. Short-term gain will not be sought at the expense of the long-term capability of the forest.

As part of the planning process, lands will be inventoried, and data will be collected on a number of resources. The planning process will also evaluate the economic and social effects of management decisions and the overall role of the Elliott State Forest in local economies. As dictated by its constitutional and statutory obligations, the Elliott State Forest will be managed to produce long-term revenue.

7. **The FMP will examine opportunities to achieve goals through cooperative efforts with other agencies, user groups, or organizations.**

Management goals can often be achieved more effectively and efficiently through collaboration with others. An important cooperative relationship is between the ODFW and the ODF. ODF intends to implement this FMP to both achieve the stated breadth of FMP goals as well as support shared conservation and restoration goals for native fish and wildlife as described in documents such as the Oregon Coast Coho

Conservation Plan, and Oregon Conservation Strategy. These agencies also work together to provide increased forage for big game through forage seeding and pasture land management, to reduce harassment of big game by closing roads, and to incorporate fish and wildlife considerations in timber sale plans by collaborating with local biologists.

8. The FMP will be developed through a collaborative and cooperative process involving the State Land Board, the BOF, the Department of State Lands, the public, local and tribal governments, and other resource management agencies.

The Elliott State Forest planning process is based on the concept that consideration of diverse viewpoints is useful in gaining understanding, acceptance, and support from the public, local governments, and resource management agencies.

The goals for involvement are to:

- Seek insight, opinions, and data on planned management actions on the Elliott State Forest.
- Build understanding, acceptance, and support for the forest resource management planning processes and decisions.
- Offer information about forest systems and forest stewardship.
- Provide opportunities for meaningful comment that can affect planning decisions at a time when involvement can contribute positively to the planning decisions under consideration.
- Provide and maintain a flow of communication with the State Land Board, the BOF, the public, local and tribal governments, and resource management agencies on processes and decisions related to the planning effort.
- Provide opportunities for the ODFW to participate in the development, implementation, and review of the FMP, IP, and AOP, including other joint agency meetings, such as review of T&E species surveys and relevant ODF policy documents.

9. The FMP will be goal driven.

A goal-driven FMP begins by defining overall management goals for the forest. By focusing on goals for land management, the FMP will avoid an issue-driven approach that deals with issues in a piecemeal fashion by analyzing and addressing specific concerns.

Examples of overall goals for the forest are found in these guiding principles. Once the overall goals have been established, resource-specific goals can be developed.

10. The FMP will present the Elliott State Forest in both a local and regional context.

Consistent with OARs and principles of good stewardship, planning will consider various geographic scales: the immediate physical area, the watershed level, and the overall landscape (including other public and private ownership).

In southwest Oregon (Coos, Curry, Lane, Douglas, Jackson, and Josephine counties), approximately 62 percent of forest land is in public ownership, mostly federal (58 percent). The Elliott State Forest constitutes approximately two percent of the total forest land in southwest Oregon (Lettman et al. 2001).

In the south Oregon coast region, approximately 49 percent of forestland is in public ownership. The Elliott State Forest constitutes 10 percent of that total (Sessions et al. 1991), and should be viewed in context with other ownership in the region. This FMP will define the role of the Elliott State Forest in timber production and other forest resources in conjunction with other public and private ownership in the south coast region.

11. The FMP will consider the overall biological diversity of state forestlands, including the variety of life and accompanying ecological processes.

OAR 629-035-0000 defines biological diversity as the "genetic variation and the abundance of microbial, plant, and animal life, the range of ecological functions, and the physical process at any local or landscape scale." This definition has been used throughout the planning process. It emphasizes process and the interactions that lead to landscape, ecosystem, species, and genetic diversity.

Managing for biological diversity requires management at various levels of biological organization: species, genetic variation within species, communities of organisms, and functional diversity. Functional diversity includes the many processes by which organisms transfer energy with each other and the physical environment.

Managing for biological diversity also requires the recognition that certain concepts and many details of managing ecosystems require further testing and refinement. To account for unknowns and new information, an adaptive management approach is required that integrates management, research, and monitoring to accomplish goals and objectives.

12. The Elliott State Forest will be managed to meet state and federal ESAs while fulfilling the State Land Board's responsibilities under the Oregon Constitution and the BOF's statutory responsibilities.

The FMP complies with all federal and state laws. Although many laws apply to the management of state forest lands, legal requirements for protection of threatened or endangered species are expected to have the most significant effects. Compliance with the state ESA will recognize the State Land Board's constitutional responsibility to maximize long-term revenues from CSFLs.

13. **The FMP will satisfy the constitutional mandate for CSFLs, and will recognize that ecosystem and watershed health are among the goals of this FMP.**

Most of the Elliott State Forest has resulted from natural seeding of Douglas-fir and other species after the Coos Bay Fire of 1868. For the past several decades, the Elliott State Forest has been carefully managed under the goals of the State Land Board. As in most watersheds, the Elliott State Forest experiences natural and human-caused conditions that promote restoration activities. For example, successful rehabilitation of under-productive acres has occurred over many years on the Elliott State Forest, and the Elliott State Forest has been involved in cooperative restoration and enhancement projects with local watershed associations.

The FMP will emphasize a continuing commitment to restoration activities and to the Elliott State Forest's vital contribution to the success of large-scale regional efforts such as the Oregon Plan for Salmon and Watersheds.

14. **The FMP will be designed to achieve a diverse range of stand types across the landscape, without a highly prescriptive approach.**

At any one time, the Elliott State Forest retains complex and interrelated resources and issues that constitute the forest landscape. The FMP will recognize a vision of the future, without the constraints of current conditions that will achieve the goals for all resources. The FMP will be designed to achieve a wide range of social, economic, and environmental values.

The FMP is designed to be flexible and incorporate new information as it becomes available through research and adaptive management.

Forest Vision

The vision for the Elliott State Forest is the preferred view of its future composition; The management strategies in Chapter 5 and in the district IP describe the manner in which the Elliott State Forest will evolve from its current condition to its future composition, while meeting the purpose of the lands. The forest vision is written in the present tense, as if the future is now.

Under the Oregon Constitution, the primary consideration for the future of the Elliott State Forest is to provide the greatest benefit for the people of Oregon, consistent with sound techniques of land management. Greatest benefit means that the lands are used for schools and revenue to the CSF is maximized over time. While achieving the greatest benefit standard, an appropriate balance of economic, social, and environmental values are maintained using adaptive management strategies and techniques.

The Elliott State Forest is a working forest that produces a sustainable timber harvest, generating jobs and revenue for the benefit of the state, counties, and local taxing districts. The management approach reduces economic risks by producing a diverse mix of stand structures and associated timber products, leading to increased asset value of the land over time.

The diversity of forest structures is maintained over time, providing for a broad range of social values important to Oregon citizens. The diverse forest structures contribute to the range of fish and wildlife habitats necessary for all native species, and to broad biological diversity. The forest provides a range of conditions to achieve the goals for all resources, and the strategies used to achieve these goals have substantial and broad scientific, stakeholder, and public support.

The Forest

The landscape of the Elliott State Forest contains a broad range of forest structures and native tree species. The forest stands are predominantly conifer, although hardwoods are intermixed in most stands. Some stands and drainages are dominated by hardwoods. Typical stand structures are listed below.

- **Early Structure—**Young stands with newly established trees, grasses, herbs, and shrubs.
- **Intermediate Structure—**This stage begins when trees fully occupy the site and form a single, main canopy layer. As the trees grow, they compete for light, nutrients, and moisture, and eventually less competitive trees die. Snags and downed wood begin to appear in the stand. The surviving trees grow bigger and have more variation in height and diameter. Near the end of the stage, a sufficient amount of trees have died and the living trees have enough variation that small gaps form and understory trees, shrubs, and herbs begin to reappear.
- **Advanced Structure—**This stage occurs later in stand development. Though advanced structure can be quite dense because several layers of trees exist, it is

generally characterized by a relatively open overstory, with significant understory development. Vigorous herbaceous and shrub communities combine with tree crowns to create multiple canopy layers. Tree crowns and shrubs create a complex vertical structure from the forest floor to the tops of the tallest trees. Some advanced structure stands have large trees; multiple, deep canopy layers; substantial amounts of coarse woody debris; large snags; and other structures typically associated with older forests.

Well-stocked, healthy, and vigorous forest stands are the rule. Insect and disease agents are present at low levels, and are considered a normal part of a healthy forest. Insects, disease, minor windthrow, other natural events, and active management create gaps throughout the forest. Gaps are relatively small openings within a stand, or small patches of a different vegetation type within a more general stand type. Stands vary in size from a few acres to hundreds of acres, and generally have irregular shapes.

Although management of the Elliott State Forest results in a range of structures over the landscape through time, individual stands are changing continuously. Some stands are harvested more often than others. This shifting mosaic of forest structures maintains vigorous timber-producing stands, contributes to the diversity of plant communities and wildlife habitats, and enhances overall biological diversity throughout the forest. The diverse mix of habitats includes habitat for species associated with older forest structures.

The Elliott State Forest contributes to the range of habitats needed by native fish and wildlife species, however the locations of specific types of habitat may change over time. Individual structural habitat elements, including hard and soft snags and down wood, are present across the landscape and are located in all stand types. These features provide for soil productivity as well as for habitat needs. Because of the forest’s diverse stand structures and provision of important habitat elements throughout the landscape, a range of habitat conditions will exist that will contribute to maintaining or enhancing native wildlife populations at self-sustaining levels within a regional context..

Many recreational uses are available in the managed forest, but dispersed, lightly managed recreation activities predominate. Recreation occurs across the whole landscape—in areas intensively managed for timber, as well as areas where fewer management activities are planned.

Thinnings, partial cuts, and regeneration harvests produce a predictable and dependable supply of timber and revenue. Smaller diameter wood is produced from thinnings in the early stages of stand development. High quality timber is produced through silvicultural techniques and harvested through partial cuts and regeneration harvests. Timber harvest and silvicultural activities contribute to employment in local communities, and to sustainable volumes of timber and diverse wood products flowing into local economies.

Riparian areas are a mixture of stands dominated by large conifers, and stands that are primarily composed of hardwoods for several decades before growth of shade tolerant conifers or disturbance changes their composition. Healthy herb and shrub communities are part of the riparian environment. Many snags and downed logs are found in and around streams. The riparian conditions support diverse tree, plant, and animal species, and contribute to healthy aquatic habitat elements. Although the specific locations of channels, deep pools, and other habitats shift over time, the mosaic of stream habitats has an overall stability. High quality fish habitat exists in most areas.

Management Perspective

The forest is actively managed to produce the various stand types in much shorter time frames than would occur in unmanaged stands. Management activities are scheduled to provide a sustainable flow of timber and revenue while maintaining the expected array of forest structural conditions over time. When natural events such as windstorms or fires affect forest structures, management activities are adjusted as needed.

Stewardship—The ODF practices good stewardship of the Elliott State Forest and its many resources. The ODF coordinates with other state and federal agencies, non-government organizations, neighboring landowners, and other interested individuals to achieve the management goals for the Elliott State Forest. The management program is adequately staffed to achieve forest management goals.

Monitoring—The Elliott State Forest continues to be an example of an adaptively managed forest. Monitoring is an integral part of forest management and provides feedback for adaptive management.

Resource Management Goals

Agriculture and Grazing

- Permit agriculture and grazing, to the extent that they are compatible with other resource goals.

Air Quality

- Contribute to meeting National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration standards established under the federal Clean Air Act (42 USC 7401 et seq.).
- Manage prescribed fire to comply with the Oregon Smoke Management Plan.
- Maintain compatibility with Oregon's Statewide Planning Goal 6 (Air, Water, and Land Resources Quality) to maintain and improve the air resource of the state.

Aquatic and Riparian Systems

Water Quality

- Maintain a level of water quality sufficient to support beneficial uses of the waters of the state, including propagation of fish and aquatic life, wildlife, domestic, agricultural, industrial, municipal, recreational, and other legitimate uses (ORS 468B.015 (2)).
- Maintain water quality that meets standards established by Oregon under the mandates of the federal CWA (33 USC et. Seq.).
- Maintain compatibility with Oregon's Statewide Planning Goal 6 (Air, Water, and Land Resource Quality).

Water Supply

- Maintain healthy watershed conditions to support the beneficial uses of the waters of the state.
- Maintain natural watershed storage capacity processes.
- Protect water-related functions of riparian lands.

Wetlands

- Maintain the natural functions and attributes of wetlands over time.
- Ensure that no net loss of wetlands occurs as a result of management activities.

- Maintain compatibility with Oregon's Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources).

Carbon

- Assess policy implications of management for carbon uptake and storage
- Maintain overtime a current accounting of carbon stored on the Elliott State Forest
- Explore carbon credit market opportunities
- Contribute to the statewide goals of the "Oregon Strategy for Greenhouse Gas Reductions"

Cultural Resources

- Preserve and protect archeological sites, or archeological objects in accordance with state law (ORS 97.740 to 97.760; 358.905 to 358.955; and 390.235).
- Conserve historic artifacts, and real property of historic significance in accordance with state law, in consultation with the Secretary of State and the State Historic Preservation Office (SHPO) (ORS 358.640 and 358.653).
- Protect additional cultural resource sites that are determined by the ODF to have special educational or interpretive value.
- Maintain compatibility with Oregon's Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources).

Energy and Minerals

- Manage gas, oil, and mineral resources on CSFLs to maximize long-term revenues to the CSF.
- Manage gas, oil, and mineral resources on BOFLs to provide revenues to counties and local taxing districts.
- Provide products useful to society, while minimizing impacts to surface resources (i.e., forests, fish, wildlife, etc.).
- Maintain compatibility with Oregon's Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources).

Fish and Wildlife

- In a regional context, provide habitats that contribute to maintaining or enhancing native wildlife populations at self-sustaining levels, and contribute to properly functioning aquatic habitats for salmonids, and other native fish and aquatic wildlife.
- Meet the requirements of federal and state ESAs.

- Contribute to maintaining fish and wildlife populations at levels that allow recreational and commercial opportunities, including fishing, hunting, trapping, and wildlife viewing.
- Consider management plans and overarching planning documents of other agencies when managing for fish and wildlife (e.g., Oregon Coast Coho Conservation Plan, Oregon Conservation Strategy, ESA recovery plans).
- Maintain compatibility with Oregon's Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources).

Forest Condition (Health and Ecology)

- Maintain or restore healthy forest conditions, thereby promoting sustainable, productive, and resilient ecosystems.
- Maintain biological diversity across the landscape.
- Maintain long-term forest soil productivity.
- Protect forest resources from unwanted fire and damaging pests.

Land Base and Access

Land Base

- Conserve the state forest land base to maintain resource values.
- Maintain compatibility with all Oregon Statewide Planning Goals and the Oregon Coastal Management Program.
- Maintain a land ownership pattern that can be efficiently managed.
- Identify and accomplish land exchanges and/or purchases that will enhance management efficiency.

Access System

- Develop and maintain a cost-efficient access system suitable for fire protection and management activities.
- Minimize potential adverse environmental and biological effects of roads and other components of the access system.
- Provide for public access where it is compatible with resource development protection and management activities.

Plants

- In a regional context, provide habitats that support the maintenance or enhancement of native plant populations at self-sustaining levels.

- Meet the requirements of federal and state ESAs.

Recreation and Scenic Resources

Recreation

- Provide diverse recreational opportunities that supplement, rather than duplicate, opportunities available in southwest Oregon, as defined in the SCORP (Oregon Parks and Recreation Department 2003).
- Provide opportunities for interpretation and outdoor education on state forest lands.
- Manage recreational use of the forest to minimize adverse effects to other resources and adjacent ownerships.
- Manage recreational use of the forest to accommodate a wide variety of existing uses while minimizing conflicts among user groups.
- Maintain compatibility with Oregon's Statewide Planning Goal 8 (Recreational Needs).
- Maximize efficiency and diversify funding of recreational management through development of partnerships with user groups, neighboring landowners, and other agencies.

Scenic

- Meet the scenic protection requirements of the Oregon FPA for visually sensitive corridors associated with designated scenic highways (ORS 527.755).
- Manage the forest to minimize visual effects in areas designated by the ODF as visually sensitive.
- Maintain compatibility with Oregon's Statewide Planning Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources).

Social and Economic Resources

- On CSFLs, maximize long-term revenues to the CSF.
- On BOFLs, provide sustainable timber harvests and revenues for the state, counties, and local taxing districts.
- Select sound forest management practices that promote sustainable state and local economies.
- Provide for a mix of resource outputs and amenity values that promote the long-term social health and economic viability of state and local communities.
- Enhance public understanding of forest resources and forest resource management.

- Maintain compatibility with Oregon's Statewide Planning Goal 9 (Economic Development).

Soils

- Maintain long-term forest soil productivity.

Special Forest Products

- Manage special forest product resources to allow sustainable harvests of special products on all lands suitable for such activities.

Timber

- Manage the timber resource to maximize long-term revenues to the CSF consistent with sound techniques of land management; to provide sustainable timber harvest and revenues to the state, counties, and local taxing districts; and to contribute to Oregon's timber supply.
- Produce a sustained yield of timber harvest from state forest lands.
- Promote the maintenance, growth, and development of forest trees and stands through the use of appropriate silvicultural techniques.

Working Hypotheses

The forest vision described earlier in this chapter provides an idealized view of the future. It describes a type of forest and an approach to forest management that the ODF believes will achieve the resource management goals. The forest management approach will thus satisfy the constitutional mandate for CSFLs to maximize revenue to the CSF over the long term, while remaining consistent with sound techniques of land management. The assumptions on which the forest vision is based are as follows.

Forest management is a complex endeavor—ecologically, socially, and economically. The ODF's understanding of forest systems is substantial, but incomplete. As more is learned through monitoring and research, a strong adaptive management framework is essential to successful implementation of this FMP. At the very heart of this FMP, and fundamental to the adaptive management program outlined in Chapter 7, is a set of working hypotheses. These working hypotheses relate to broader assumptions that, if validated over time, create the foundation for attainment of the forest's future composition, and thus the benefits that accrue from that composition.

These key working hypotheses are:

- The citizens of Oregon will continue to support integrated and active management of the Elliott State Forest to provide for multiple outputs and benefits.
- An active and integrated forest management approach will provide for greater levels of sustainable and predictable timber and revenue, while concurrently recognizing that ecosystem and watershed health are among the goals of this FMP.
- Identification and protection of key habitat areas for specific species will maintain existing populations as a source to colonize new habitat.
- A diverse array of stand structure, composition, age, patch size, and distribution will, at various times, provide for achievement of all of the resource goals outlined in the previous section of this chapter.
- The diverse array of stand structures will allow connectivity between habitat types within and across the forest for Oregon's native wildlife species.
- Ensuring biological diversity at the landscape level requires providing for an array of forest stand types through time and space.
- Providing for a diverse array of forest conditions through time can be accomplished in a managed context through the application of silvicultural principles.
- A diverse array of forest conditions will enhance overall forest health and reduce the risks of catastrophic loss from insects and disease.

- Active management resulting in a landscape of diverse stand types, combined with site-specific standards will result in the maintenance and restoration of properly functioning aquatic and riparian habitats.
- A balanced approach to forest management will achieve the goals of the FMP. Balance does not mean an equal allocation of resources; balanced forest management involves areas of little management (conservation areas), areas of moderate management where other resource values are emphasized along with timber production, and areas where timber production is the primary emphasis.
- A diverse array of conditions will provide diverse recreational opportunities on Elliott State Forest lands.
- Long-term management of natural resources can only succeed within a framework that provides for change.

Collectively, these working hypotheses form the basis for the set of integrated forest management strategies described in Chapter 5. They also provide the foundation for the key questions that must be explored through time, as this plan is implemented, to ensure that change occurs in an appropriate and timely manner.

Chapter 4

Resource Management Concepts

Chapter 4 presents the resource management concepts underlying the management strategies to be implemented in the Elliott State Forest. Resource management is designed to generate an appropriate balance of economic, environmental, and social values from this state forest within the context of maximizing revenues to the Common School Fund. The guiding principles listed in Chapter 3 embrace the concepts of "sustainable" and "integrated" that are fundamental to the management of the Elliott State Forest.

This chapter briefly explains the resource management concepts that were used to develop the strategies of the *Elliott State Forest Management Plan*. The concepts were derived from legal mandates and scientific research in the fields of geology, silviculture, forest ecology, fisheries and wildlife biology, and stream ecology. The full references for the scientific publications cited throughout the text are provided in Appendix B. Following the explanation of the conceptual foundation, the strategies of the FMP are presented in Chapter 5. The strategies provide the direction for achieving the goals and vision that were outlined in Chapter 3.

The main headings in this chapter are:

Introduction

Forest planning begins with overall policy (legal framework), guiding principles, vision, resource management goals, and landscape management strategies, and then proceeds through several steps to site-specific projects. Figure 4-1 shows the hierarchy of three planning levels, from strategic to operational.

The FMP provides the strategic framework for planning of the Elliott State Forest. The strategies are presented in Chapter 5. Using the strategic framework in the FMP, the district IP is developed to achieve the FMP management goals for a 10-year period, and move toward achieving the forest vision. AOPs describe site-specific projects and how those projects are designed to contribute to the goals of the FMP for a one-year period.

The three planning levels, shown on the next page and described in Chapter 1, provide a framework for adaptive management. Agency staff, through identified review and approval processes, can make changes as needed at the various levels, ranging from strategic landscape-wide changes to the FMP, to specific tactical changes at the district and project level.

STRATEGIC .... OPERATIONAL

FOREST MANAGEMENT PLAN

Oregon Constitution

Maximize Revenue to the Common School Fund Using Sound Techniques of Land Management

Harvest Objectives for Common School Forest Lands

Greatest Permanent Value (BOF Lands) (full range of benefits)

Resource Goals

Integrated Forest Management Strategies

Resource Management Strategies

Key Working Hypotheses

Land Base Designation

Land Management Classification System

Monitoring/Research Goals

10-YEAR IMPLEMENTATION PLAN

Current Condition

Expected Future Condition

Watershed/Basin Descriptions

Management Opportunities

Harvest Objectives for Board of Forestry Lands

Young Stand Management Objectives

Land Management Classification Maps

Recreation Plans

Road Plans

Monitoring/Research Plan

ANNUAL OPERATIONS PLAN

Timber Sale Plan

Young Stand Management Projects

Road Management Projects

Habitat Improvement Projects

Monitoring/Research Projects

Recreation Projects

Figure 4-1. State Forest Plans and Policies: Planning Hierarchy and Key Products

Basic Concepts for Managing the Elliott State Forest

The management approach for the Elliott State Forest synthesizes the knowledge from various disciplines, including forestry, fisheries, wildlife, geology, and hydrology. This approach to forest management seeks to meet the legal mandate for the land and achieve a broad range of resource goals that provide economic, social, and environmental benefits from the forest over time. In addition, this landscape approach manages forested ecosystems by utilizing silvicultural tools that emulate natural disturbances to provide forest products, maintain forest health, and retain significant social value.

The basic concepts for managing the Elliott State Forest in this FMP focus on:

- Sustainable economic and social benefit
- Sustainable forest ecosystem management
- Integrated resource management

Sustainable Economic and Social Benefit—Providing economic and social benefit is essential to sustainable management of the forest. The concept that economic, environmental, and social values of the forest are interdependent is basic to the design of the FMP. All three elements of sustainable forest management are woven throughout the FMP and within the strategies.

The basic concepts for sustainable economic and social benefit in this FMP focus on:

1. Legal mandates and trust obligations
2. Predictable and dependable products and revenues
3. Social benefit through forest management

Sustainable Forest Ecosystem Management—Sustainable forest ecosystem management is the application of silvicultural tools which will result in a range of stand structures and meet the resource management goals of the FMP. Specifically, it is designed to produce an array of forest stand structures and habitats across the landscape to provide for the economic, social, and environmental benefits called for in the management direction for these lands. These benefits include a high level of sustainable timber harvest and revenue, diverse habitats for native species, properly functioning aquatic systems, and a forest that provides for recreational opportunities.

The following five key concepts are the foundation for sustainable forest ecosystem management:

1. Recognize the importance of forest disturbance regimes and stand development processes.
2. Contribute to biological diversity at the landscape level.
3. Provide for biological diversity at the stand level.
4. Provide for a diverse and healthy forest ecosystem through the principles of integrated pest management.
5. Maintain properly functioning aquatic systems.

These management concepts are discussed in the following pages; additional information is provided in Appendix C.

Integrated Resource Management—Integrated resource management involves the design and implementation of management practices, taking into consideration the effects and benefits of all forest resources such that the goals of the FMP are achieved over time and across the landscape. It does not mean that all resources are treated equally or that management practices must provide for all resources on every acre at all times. The key integrated resource management concepts for management of the Elliott State Forest are discussed at the end of this chapter; they include active management resulting in a landscape of diverse stand types, combined with site-specific strategies for other resource values.

Implementation planning is discussed in more detail in Chapter 6. The concepts, framework, and processes for monitoring and adaptive management are described in Chapter 7.

Basic Concepts for Sustainable Economic and Social Benefit

The guiding principles outlined in Chapter 3 call for sustained economic and social benefit through active and integrated management of the Elliott State Forest over the long term. The terms “sustainable” and “integrated” recognize not only the complexity of forest management goals, but also the complexity of the systems and approaches necessary to meet them. Not all economic and social objectives can be maximized concurrently. Balancing goals through forest management practices presents a mix of opportunities, challenges and trade-offs. Environmental concepts are the third leg of sustainability and are addressed in other sections of the FMP.

The economic and social benefits of the Elliott State Forest will provide for both forest products and natural resource values.

The basic concepts for sustainable economic and social values in this plan focus on:

1. Legal mandates and trust obligations
2. Predictable and dependable products and revenues
3. Social benefit through forest management

Concept 1: Legal Mandates and Trust Obligations

A key planning principle for the Elliott State Forest involves the constitutional and statutory goals for the two types of forest land ownership.

The goal for Common School Forest Lands is the maximization of revenue to the Common School Fund in the long term, consistent with sound techniques of land management.

Approximately 90.7 percent of the Elliott State Forest and other lands managed by the Coos District are CSFLs. Revenue from these lands goes directly into the CSF, and a percentage of the investment income earned on the fund is distributed each year to support public schools.

The Oregon Constitution requires the State Land Board to manage CSFLs "with the object of obtaining the greatest benefit for the people of this state, consistent with the conservation of this resource under sound techniques of land management." According to a 1992 opinion of Oregon's Attorney General, the "greatest benefit for the people" standard requires the State Land Board to use the lands for schools and the production of income for the CSF. The State Land Board may take management actions that reduce present income if these actions are intended to maximize income over the long term. (See Appendix D for a summary of the 1992 Attorney General's opinion.)

The goal for management of Board of Forestry Lands is to secure the greatest permanent value to the citizens of Oregon by providing healthy, productive, and sustainable forest ecosystems that, over time and across the landscape, provide a full range of social, economic, and environmental benefits to the people of Oregon.

BOFLs constitute approximately 9.3 percent of the land managed by the Coos District. These lands were transferred to the state from the counties in return for a share of future revenue. Much of the counties' share of this revenue also is used to support public schools.

BOF guidance for managing BOFLs calls for maintaining them as forest lands and actively managing them in a sound environmental manner to provide sustainable timber harvest and revenues to the state, counties, and local taxing districts. This management focus is not exclusive of other forest resources, but must be pursued within a broader management context that includes other forest resource values such as fish and wildlife habitats, recreation, and protection of soil, air, and water. These concepts of sustainability are consistent with the goals for CSFLs.

Other legal mandates.

By agreement with the DSL for CSFLs, and by administrative rule for BOFLs, the ODF is directed to develop long-term management plans. The plans for CSFLs are to maximize return to the Common School Fund and produce a sustainable even flow harvest of timber using sound techniques of land management. The plans for BOFLs are to be based on the best available science and contain specific elements, including guiding principles, resource descriptions, resource management goals, management strategies, guidelines for asset management, and guidelines for implementation, monitoring, research, and adaptive management. In addition, management plans for CSFLs are to be consistent with the administrative rule for management plans for BOFLs unless the Land Board directs otherwise.

Management of the Elliott State Forest must also be consistent with a number of other state and federal laws, including federal and state ESAs and the Oregon Forest Practices Act (FPA).

The ODF will coordinate with the Oregon Department of Fish and Wildlife and Oregon Department of Agriculture (for plants) in developing plans to comply with the state ESA, as long as the plans do not conflict with the constitutional mandate for Common School Lands. For state threatened or endangered species listed after 1995, the Fish and Wildlife Commission may establish quantifiable and measurable guidelines considered necessary to ensure the survival of individual members of the species. These survival guidelines may include take avoidance and measures to protect resource sites, such as nest sites, spawning grounds, etc.

Under the federal ESA, the prohibition of take of listed fish and wildlife species applies equally to non-federal and federal lands. The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The definition of “harm” includes actual injury or death directly traceable to habitat modification. On non-federal lands, compliance with the federal ESA can be achieved through actions to avoid take or through an ITP issued through approval of an HCP. ODF has policies in place to avoid incidental take of spotted owls and marbled murrelets. These policies describe steps ODF takes to avoid take of T&E species. These include 1) requiring surveys for spotted owls and marbled murrelets prior to operations, 2) maintaining adequate habitat around known spotted owl activity centers and occupied marbled murrelet sites, and 3) applying appropriate seasonal restrictions for operations near known activity centers or occupied marbled murrelet sites.

Under the federal ESA, take does not apply to plant species. Instead, the ESA prohibits the removal, damage, or destruction of endangered plants on federal lands, and certain other activities on non-federal lands when in violation of state law.

Activities on lands managed by the ODF are subject to the FPA, which addresses specific site and resource protection. The FPA declares it public policy to encourage economically efficient forest practices that assure the continuous growing and harvesting of forest tree species consistent with sound management of soil, air, water, fish, and wildlife resources, as well as scenic resources within visually sensitive corridors, and to ensure the continuous benefits of those resources for future generations of Oregonians. The ODF, through the FPA, is the designated management agency by the DEQ to implement the water quality standards of the federal Clean Water Act on forest operations.

Concept 2: Predictable and Dependable Products and Revenues

Though the Elliott State Forest constitutes a relatively minor percentage of forest land and harvest volume in the state of Oregon as a whole, the cumulative impact of all forest lands in the state is important to Oregon’s forest economy. When examined in a local context, harvest volume from the Elliott State Forest is an important part of the economy. One MMBF of timber harvested from the Elliott State Forest generates 11 jobs in southwest Oregon, with an average wage of approximately$36,000 and generates additional proprietors’ and property owners’ income to owners of southwest Oregon businesses (Lettman 2010).

CSFLs are managed through an agreement with the DSL – the administrative arm of the State Land Board. The Elliott State Forest constitutes approximately two-thirds of the CSFLs in the state. The revenue from CSFLs accounts for, by far, the greatest amount of land-based revenue to the CSF (typically more than 75 percent of the fund’s land-based revenue).

The major emphasis in producing predictable and dependable wood products and revenues will be the continued harvest of high-quality, high-volume stands followed by prompt reforestation. This will promote vigorously growing younger stands that progress through the early and middle forest stages as quickly as possible. This emphasis will require using the full range of silvicultural methods to promote rapid tree and stand development. These activities will also produce significant volumes of lower quality timber from young stands.

Some existing advanced structure stands will serve as habitat for species that use late successional forest areas (see the discussion of stand structures in the “Concept 1: Recognize the Importance of Forest Disturbance Regimes and Stand Development Processes” section of this chapter, page 4-15). Over time, some of these stands will be regeneration harvested to provide products and revenue. The overall approach will produce a variety of stand structures across the landscape. Over time, this approach will provide consistent employment in silvicultural operations and in the processing of forest products. It will sustain a constant labor force and a consistent supply of forest products, rather than the historic boom and bust cycles of large regions harvested within a short time. Managing for a diversity of stand types will produce a variety of products. Diversified treatments will produce a range of qualities, sizes, and species of logs to match market conditions, as well as special forest products such as mushrooms, berries, and greenery (Oliver 1992, 1994).

Concept 3: Social Benefit through Forest Management

Social values realized from forest areas are wide-ranging, depending on the values of the individual. They include both commodity and non-commodity values. Most people value a number of social benefits that forests can provide.

Providing a regular source of employment for the local and regional economy, producing products used by businesses, and providing revenue to support education or other public programs are important social values to be derived from forests. These benefits can be provided through sustainable commercial harvest of timber and other forest products.

Environmental values are also considered important social benefits by many people. These values include ecosystems with abundant plant, fish, and wildlife populations for hunting, trapping, viewing, and collecting. Clean air, water, and productive soils are important aspects of biological diversity that are highly valued by many people. Aquatic and riparian strategies that provide biological diversity and properly functioning habitats for salmonids and other native fish and aquatic life will also enhance recreational and commercial fisheries.

Recreational opportunities are key benefits of managing the Elliott State Forest, especially for local communities. Though visitors to the Elliott State Forest have a modest direct economic effect on the local economy, these effects measure only a part of the total economic contribution of recreational activity. Other economic changes credited to recreation activity include the indirect and induced economic activity generated in other southwest Oregon counties, the economic activity received by the visitors themselves, and the contribution that these visits make to Oregon’s economy because they add to the perception of enhanced quality of life (Lettman et al. 2001).

Basic Concepts for Sustainable Forest Ecosystem Management

The goals identified in Chapter 3 depend on the functioning of key ecological or ecosystem processes. Maintaining these processes is a fundamental goal for sustainable forest ecosystem management. Salwasser et al. (1993) note that, to conserve ecosystems, regardless of the specific goals and objectives, management must be ecologically viable (environmentally sound), must meet fiduciary obligations (be affordable), and be socially desirable (politically acceptable). Failure to devote adequate attention to any one of these three criteria will result in a system that cannot be sustained. Thus, the closer ecological, social, and economic considerations are in agreement, the greater the likelihood that both ecosystems and society will benefit.

However, ecosystems function sustainably only when they remain within normal bounds of their physical and biological environment. Thus, management of the ecosystem will be successful only when management decisions reflect understanding and awareness of ecological principles related to sustainability. Sustainable management incorporates ecosystem conditions, natural processes, natural disturbance patterns, and productive capabilities into decision-making processes so that human needs are considered in relation to the sustainable capacity of the system. The most scientifically sound basis for ecosystem management is to ensure that the variation characterizing ecosystems includes the range of conditions that are expected at various scales in ecosystems apart from human activities or influences. This approach would generally preserve all components of natural ecosystems, but is not intended to return all lands to a natural state.

Maintaining viable populations of native plant and animal species is a central theme of ecosystem management. This approach also addresses conservation of soils, aquatic and riparian systems, and water resources. It is intended to allow normal fluctuations in populations that could have occurred naturally. It should promote biological diversity and provide for habitat complexity and functions necessary for diversity to prosper.

Individual stand management will vary greatly under this plan. Some stands will be managed along pathways that focus on timber production, incorporating habitat structures such as snags and downed wood. Stands in conservation areas will be managed to enhance habitat features, and in some cases stands in these areas will be harvested as protected species move.

In the long term, many stands will move through all of the stand development stages, and will return to the early structure condition through a regeneration harvest resulting in a dynamic mosaic of early, intermediate, and advanced stand structures (see the Key Terms box below). Embedded within the mosaic will be areas of advanced forest structure conditions that will persist in a relatively unmanaged state. These stands will likely exist in areas with known use by T&E species of wildlife, riparian management areas, or other areas where the focus is resource protection.

Key Terms

For this FMP, a series of three stand structures have been defined that depict the typical progression of stand development following a natural or human-caused disturbance. These structures are more fully described in the "Concept 1: Recognize the Importance of Forest Disturbance Regimes and Stand Development Processes" section of this chapter.

Early Structure—Young stands with newly established trees, grasses, herbs, and shrubs.

Intermediate Structure—This stage begins when trees fully occupy the site and form a single, main canopy layer. As the trees grow, they compete for light, nutrients, and moisture, and eventually less competitive trees die. Near the end of the stage, small gaps form in the stand where understory trees, shrubs, and herbs begin to reappear. These stands may include sapling stands, unthinned stands, or thinned stands where the overstory still occupies most of the stand.

Advanced Structure—This stage occurs later in stand development. This structure is generally characterized by a relatively open overstory and the establishment of significant understory vegetation. Vigorous herb and shrub communities combine with tree crowns to create multiple canopy layers. Tree crowns and shrubs create a complex vertical structure from the forest floor to the tops of the tallest trees. Some advanced structure stands have structure typically associated with older forests, including large trees; multiple, deep canopy layers; substantial amounts of coarse woody debris; and large snags.

Stand density will be actively managed to accelerate stand development; this will be performed through periodic thinning and partial cutting. These techniques can be used to produce a variety of results and a range of stand structures. A diversity of stand structures will provide for a broad range of ecosystems and wildlife habitats, which will contribute to biological diversity. The structural components associated with the range of stand structures will benefit long-term forest productivity by maintaining the key linkages for nutrient cycling and soil structure. The high level of diversity should result in a resilient forest that will not be prone to large-scale damage from environmental or human-caused stresses.

Many researchers agree that no single, ideal stand structure serves as a panacea to the wildlife and biological diversity issues we face today. Thus, a diversity of stand structures across the landscape in varying amounts and arrangements likely is the most effective way to provide habitats for the broad spectrum of birds, small mammals, or wildlife in general (Oliver 1992, Hunter 1990, Hansen et al. 1991, Carey et al. 1996, Carey and Johnson 1995).

The basic concepts for sustainable forest ecosystem management in this FMP are as follows:

1. Recognize the importance of forest disturbance regimes and stand development processes.
2. Contribute to biological diversity at the landscape level.
3. Provide for biological diversity at the stand level.

4. Provide for a diverse and healthy forest ecosystem through the principles of integrated pest management.
5. Maintain properly functioning aquatic systems.

Concept 1: Recognize Forest Disturbance Regimes and Stand Development Processes

The dynamic attributes of a forest ecosystem are composition, function, and structure. Composition describes the proportion of various species, while function refers to the processes taking place in the system. Structure includes types and distribution of stand components such as trees, snags, and logs of various sizes and shapes (Franklin et al. 2002).

Stand Composition

As described in Chapter 2, the Elliott State Forest is in the western hemlock zone as defined in Franklin and Dyrness (1973). The forest is dominated by Douglas-fir, and also contains western hemlock and western redcedar. Red alder, Oregon myrtle, golden chinquapin, and Pacific madrone are hardwood species also commonly found on the forest.

Hardwoods play an important role by providing species diversity at both the stand and the landscape level. Depending on stand history and species of the tree, the amount of hardwoods present may range from a few scattered trees to most of the trees in the stand. Red alder can be found in almost pure stands or as scattered trees or small groups in openings in mixed conifer/hardwood stands. Alder, a relatively short-lived and shade-intolerant species, will persist in mixed stands when the crowns are in the upper canopy.

Stand Function

Relationship between Disturbance and Stand Development

Ecologically sustainable forest management is based in part on understanding the relationship between forest disturbances and the subsequent processes of stand development. Natural disturbance regimes and their interaction with climate and terrain determine the size, shape, location, and types of patches that provide heterogeneity in unmanaged forest landscapes (Lindenmayer and Franklin 2002). Recent applications of the principles of ecosystem concepts to forest management recognize the importance of disturbances, both natural and human, in the development of forest planning and operations. Although human disturbance regimes cannot duplicate the spatial complexity of natural disturbances, they can be designed to emulate important attributes of natural disturbances to maintain biological diversity and sustain forest productivity. Such approaches use natural ecological processes to define specific resource management activities (Attiwill, 1994; Grumbine 1994; Norris et al. 1992).

Natural Disturbance

Disturbance regimes vary at different scales and are relative to specific locations and time intervals. Some locales may be more subject to wind, landslides, and flooding, while others are affected more by fire, insects, and diseases. However, both small- and large-scale disturbances caused by different agents can operate simultaneously in the same community or on the same landscape as a function of local climate, topography, and biota (Pickett and Thompson 1978).

Within a stand, small-scale disturbances primarily involve tree death or treefall and subsequent canopy gap formation. Such gaps occur when one to several large trees in the upper canopy die and/or fall over. The size and intensity of the local disturbance resulting from tree death or treefall are a function of the number and biomass of the tree(s) that fall.

Wildfire, wind, landslides, flooding, and certain other weather phenomena can act over large areas with varying magnitudes. Such catastrophic disturbances affect both healthy and weakened trees, and usually result in significant or complete mortality over wide areas. Large-scale disturbances such as wildfire generally return a stand to an earlier developmental state by killing many plants, thereby favoring the establishment of early seral species. Windthrown forests may be accelerated toward a later developmental state if shade-tolerant advance regeneration forms the bulk of the next stand (Spies and Franklin 1988).

Wildfires range from approximating the size of a canopy gap to covering hundreds of thousands of acres. Wind damage covers a spatial range similar to that of wildfire, from small gaps to landscape scales. Variations in impacts are due to meteorological conditions, topographic characteristics, stand and tree characteristics, and soil characteristics.

Potential consequences of landslides and flooding include major changes to the structure of surface materials and drainage channel systems. In nearly all cases, a similar ecosystem eventually develops on the site. Interactions between the abiotic disturbances of wind and wildfire and biotic disturbances of diseases and insects occur at a large scale as well.

Stand Structure Development

There are several models for stand structure development, but all have similarities (Oliver and Larson 1996; Peet and Christensen 1987; Franklin et al. 2002). Structural development in stands is continuous, rather than occurring in a series of discrete stages, with many of the processes occurring throughout the life of the stand. Specific processes may dominate or characterize stages of stand development, but are not necessarily unique to those stages. Individual stands may also skip developmental stages. Following a stand-replacing disturbance, the dominant developmental process generally operates uniformly over the entire stand. As stands develop, chronic disturbances create small gaps or openings where several stages of development are occurring in several areas within the same stand (Franklin et al. 2002).

Some models use several stages to further refine stand development, but four stages are common to all: stand initiation, stem exclusion, understory reinitiation, and old growth. Although the terminology varies and there is some overlap of developmental stages between models, the developmental processes are universal.

Early Stand Development, Legacies

Stand development after a disturbance is a result of conditions prior to the disturbance and the type and severity of the disturbance. The size, type, and severity of the disturbance; the amount, size, and species of live and dead material remaining; and the conditions immediately following the disturbance govern the starting point for stand development. The effects on stand initiation and pathway are striking when comparing the effects of disturbances. A stand experiencing a moderate severity fire may exhibit similar structural characteristics in 80 years to those found in a 200-year-old stand that experienced a high severity fire (Wimberly et al. 2000). Unlike fire, windstorms leave all of the organic material and may not destroy regeneration already present on site, resulting in much different conditions for stand initiation. The species and density of remnant legacy trees and other vegetation greatly influence the density and distribution of new seedlings. Large downed wood is one of the more persistent legacies, influencing the site for hundreds of years (Spies and Cline 1988). (See description of early structure in the text boxes contained within this section.)

Stand Initiation

A new generation of trees is established during this phase of stand development. The duration of establishment and ultimate pathway of the new generation varies widely. This period may range from five years to several decades (Oliver and Larson 1996). A number of factors that influence regeneration, survival, and growth may delay tree establishment and vary density. Grasses, forbs, and shrubs may dominate the site for 20 to 30 years, but dominance could last as long as 60 years (Spies and Cline 1988). Rapid stand establishment occurs when surviving advance regeneration is released from competition with the overstory after the disturbance (Franklin et al. 2002).

Stem Exclusion

Stands enter the stem exclusion stage when trees reoccupy all the growing space and exclude new plants from becoming established (Oliver and Larson 1996). Canopy closure caused by overlap among individual tree canopies increases inter-tree competition and causes major changes in understory vegetation. Reduced light levels, moderated temperatures, increases in relative humidity, and near-exclusion of wind affect the composition and function of the forest ecosystem. As conditions change, some species are suppressed or eliminated, while other species are favored. This stage is characterized by rapid tree growth and biomass accumulation, competitive exclusion of many organisms, density-dependent tree mortality or self thinning, natural pruning of the lower branches, and crown class differentiation (Franklin et al. 2002).

The time from stand establishment to canopy closure is dependent on the productivity of the site and tree density. Early in the stem exclusion stage, existing trees quickly reoccupy open growing space created by tree mortality or small disturbances. As the overstory trees mature, they cannot continue to fully utilize the growing space created by additional tree mortality or minor disturbances, causing changes in the understory environment. (See description of intermediate structure in the text boxes contained within this section.)

Understory Reinitiation

At this stage, the main cause of overstory tree mortality shifts from inter-tree competition to mortality from disturbance agents such as insects, diseases, wind, and other weather factors. The earlier density-induced mortality results in relatively uniform stands, while chronic disturbances tend to increase stand heterogeneity by creating a variety of patch sizes and gaps unevenly distributed throughout the stand. (See descriptions of intermediate and advanced structure in the text boxes contained within this section.)

Understory reinitiation may occur in Douglas-fir stands at 80 to 100 years, but may occur earlier with more shade-intolerant species or on poor sites (Oliver and Larson 1996). Depending on seed sources, site conditions, and the amount and type of competing vegetation, the time it takes for a shade-tolerant understory to develop can vary considerably.

This stage is characterized by minimum levels of downed wood; reestablishment or expansion of the understory plant community, including shade-tolerant species; shifting from density-dependent to density-independent causes of overstory tree mortality; and the development of defect and decay (Franklin et al. 2002).

Large, downed wood typically is minimal at this time. The large, downed wood resulting from the initial disturbance has decomposed, and most subsequent downed wood recruitment was from smaller trees. As the stand matures, larger size material is available for downed wood recruitment. Downed wood accumulates slowly for the first 100 years, increasing rapidly between 100 and 400 years (Spies and Cline 1988).

Old-Growth Stage

The old-growth stage of stand development is characterized by increasing structural complexity until the stand reaches a state where the trees that pioneered the site eventually die and are replaced by a diverse mosaic of younger trees, or the stand is replaced by a major disturbance. Under natural conditions, this stage of development can occur at approximately 200 to 350 years in Douglas-fir stands, and can proceed for several centuries.

The development of large overstory trees, increased decadence, accumulation of large downed wood, and the reestablishment of moss and lichen communities are characteristic of this stage (Franklin et al. 2002). Vertical and horizontal diversity develop as shade-tolerant trees grow into the overstory canopy, overstory crowns deepen, and gap formation increasingly affects the heterogeneity of the stand. Horizontal diversity is primarily a result of gaps in the tree canopy that are created or expanded. Small gaps are utilized by existing understory vegetation or regenerated by shade-tolerant species. Larger openings may be regenerated with shade-intolerant species. Within each gap, the process of establishment, thinning, and gap formation are repeated, but on a smaller scale (Peet and Christensen 1987). (See description of advanced structure in the text boxes contained within this section.)

Managing for a Diversity of Stand Structures and Complexities

Pacific Northwest forests follow the typical progression of stand establishment and development over time following a major stand-replacement disturbance. Historically, these large scale disturbances resulted from major windstorm events, large-scale insect and disease outbreaks, and wildfires.

For the purposes of this FMP, a series of three stand structures have been defined depicting the typical progression of stand development following a natural or human caused disturbance. This is a simplified model. In reality, a continuum of forest development stages exists, reached by a multitude of pathways. These stand structures apply to all stands regardless of species composition, including pure conifer, mixed conifer/hardwood, and pure hardwood stands.

The processes that develop stand structures are described below. The stand initiation process is represented by the early stand structure. The stem exclusion and early understory reinitiation processes are represented by the intermediate structure. Structural complexity and larger tree size inherent to the advanced understory reinitiation process are characteristic of the advanced stand structure. The term "old growth" is used to describe both a process and a structure. Old-growth stands are included in the advanced stand structure.

The stand structures correlate with at least four types of habitats. Open habitats occur during the early structural stage; closed canopy habitats are associated with intermediate structure stands. In the understory reinitiation stages, habitats have more horizontal and vertical diversity and a variety of habitat niches. Advanced structure stands provide habitats commonly associated with late successional forests.

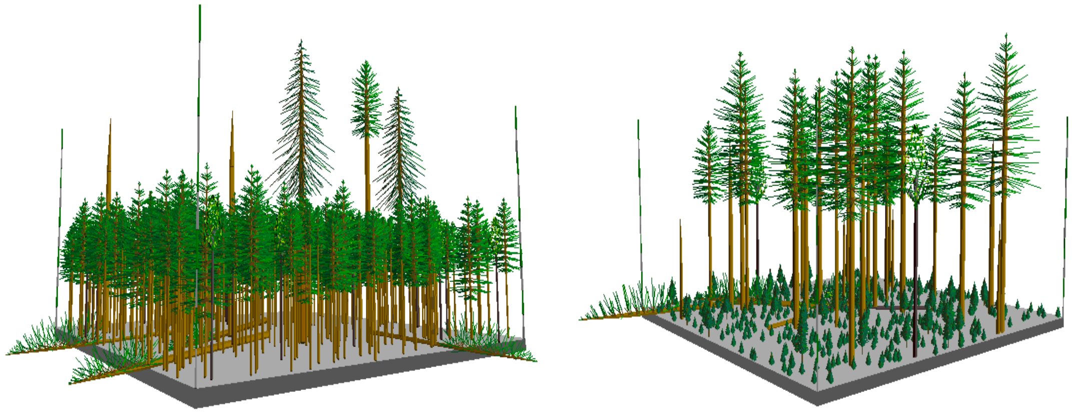
The figures below illustrate the possible appearance of these three representative stand structures following the typical stand disturbance, establishment, and development sequence. In addition, the figures describe stand characteristics, developmental stages, and the relative structural complexity.

Early Structure

Stand Development Process—Stand Initiation

Following a disturbance, an early structure stand develops through the stand initiation process. In the early years of this stage, new plants (trees, shrubs, and herbs) begin growing from seed, sprouts, artificial regeneration, or other means. The site is occupied primarily by tree seedlings or saplings, and herbs or shrubs. The trees can be conifers or hardwoods. Herbs, shrubs, and/or grasses are widespread and vigorous, covering 20 to 80 percent of the ground. This includes first-year regenerated stands, and continues to the stage when the trees approach crown closure. Snags, down wood, and residual live trees are carried over or recruited from the previous stand.

In the later years of this stage, increasing crown closure shades the ground, and herbs, shrubs, and grasses begin to die out or lose vigor. At this point in stand development, the stand transitions from an early stand initiation stage to an intermediate stem exclusion stage. Early structure stands also include stands that are thinned and/or pruned until the average stand diameter is six inches, and an understory exists which meets the definition of an intermediate structure stand.

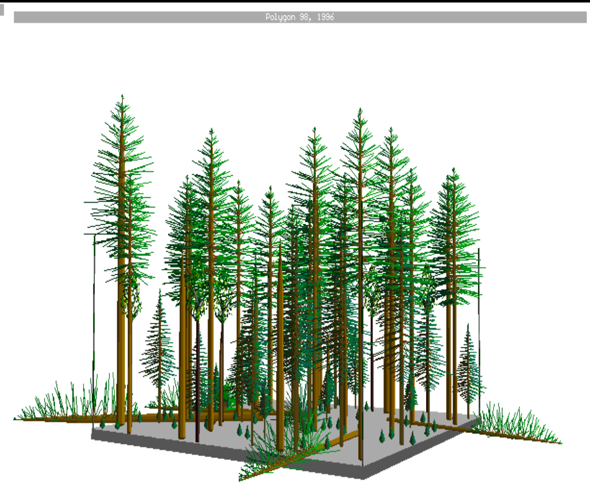


Intermediate Structure

Stand Development Processes—Stem Exclusion and Understory Reinitiation

As early structure stands develop and transition into the stem exclusion stage, trees fully occupy the site and form a single, main canopy layer. The stem exclusion process begins when new trees, shrubs, and herbs no longer appear and existing ones begin to die, due to competition for light, nutrients, and moisture. Later in the stage, shrubs and herbs may essentially die out of the stand altogether. The shrub and herb layers may be completely absent, or may be short and dominated by one or two shade-tolerant species, such as sword fern, Oregon grape (*Berberis aquifolium*), oxalis (*Oxalis oregana*), or salal. The trees begin to show decreasing diameter growth rate and crown length. Later, less competitive trees die. Root diseases may kill additional trees. As some trees die, snags and down wood begin to appear in the stand. The surviving trees grow bigger and have more variation in height and diameter. Near the end of the stage, enough trees have died and the living trees have enough variation that small gaps form and understory trees, shrubs, and herbs begin to reappear. These stands may include sapling stands, unthinned stands, or thinned stands where the overstory still occupies most of the stand.

The understory reinitiation process begins when enough light and nutrients become available to allow forest floor herbs, shrubs, and tree regeneration to again appear in the understory. The amount of brush and herbaceous species is minimal at the beginning, but increases to a substantial part of the stand by the end of the stage. In all understory reinitiation stands, the shrub and herb layers are likely to continue to diversify and maintain or improve their vigor. Adequate light reaches the ground to allow shade-tolerant and intolerant herb and shrub species (e.g., Oregon grape, sword fern, blackberry (*Rubus spp*.), huckleberry, twinflower (*Linnaea borealis*)) to flourish. Tree canopies may range from a single-species, single-layered, main canopy with associated dominant, codominant, and suppressed trees, to multiple species canopies. However, significant layering of tree crowns has not yet developed in the intermediate structure stands. The least developed stands in this category consist of a single-species, single-layered, main tree canopy with a limited understory of shrubs and herbs. Depending on the intensity and timing of density management activities, stands could shift back and forth between the stem exclusion and understory reinitiation stages over time.



Advanced Structure

Stand Development Process—Understory Reinitiation and Old-Growth Processes

The understory reinitiation process continues after enough light and nutrients become available to allow herbs, shrubs, and tree regeneration to grow and develop in the understory. The new understory may grow very slowly at higher stand densities. The vertical structure of advanced structure stands is more developed than that of intermediate structure stands in the understory reinitiation stage. Tree crowns show significant layering from the tallest trees to the forest floor. Shrub and herb layers are diverse, in terms of species and in vertical arrangement. More advanced structure stands have a mixture of shade-tolerant (e.g., western redcedar, western hemlock, bigleaf maple) and intolerant tree species (e.g., Douglas-fir); and shrub and herb species (vine maple (*Acer circinatum*), huckleberry, rhododendron, Oregon grape, prince's pine (*Chimaphila umbellata*), oxalis). The plant community provides a wide range of habitat niches from the forest floor through the canopy.

Advanced structure stands that are highly diverse may develop structural characteristics typically linked with older forests or old growth. These stands will not necessarily emulate all the processes and functions of very old forests. However, they provide habitat for species commonly associated with older forests.

Old Growth

Numerous definitions exist for old growth. The following definition is taken from the glossary of the FEMAT (Forest Ecosystem Management Assessment Team) Report (USDA Forest Service et al. 1993).

> "Old-growth conifer stand—Older forests occurring on western hemlock, mixed conifer, or mixed evergreen sites that differ significantly from younger forests in structure, ecological function, and species composition. Old-growth characteristics begin to appear in unmanaged forests at 175–250 years of age. These characteristics include (1) a patchy multi-layered canopy with trees of several age classes, (2) the presence of large living trees, (3) the presence of larger standing dead trees (snags) and down wood, and (4) the presence of species and functional processes that are representative of the potential natural community. Definitions are from the USFS's Pacific Northwest Experiment Station Research Note 447 and General Technical Report 285, and the 1986 interim definitions of the Old-Growth Definitions Task Force."

In the Elliott State Forest, large disturbances or timber harvest eliminated almost all old-growth stands. Currently only scattered old-growth trees and a few remnant patches of old growth are known to exist on the forest. Some residual old-growth trees remain following the Coos Bay Fire. Specific stands will be identified in this plan as old growth. In the future, old growth will likely occur on state forestlands in areas managed for special purposes, such as conservation areas or riparian areas.

Distribution of Stand Structures

The stand structures are not an end in themselves. To determine an appropriate range of stand structures, forest managers examined the diversity of stands historically associated with conifer forests in the Oregon Coast Range. Studies have been conducted on the historical distributions of older stand types (old growth) in the Oregon Coast Range (Teensma et al. 1991). At the province scale, research suggests that the percentage of older stands ranged from 30 to 70 percent of the landscape at any point in time. At smaller scales, the variability was even greater, ranging from 15 to 85 percent of the landscape at any point in time (Wimberly et al. 2000).

The range of stand structures will emulate the diversity of stands historically associated with conifer forests in the Oregon Coast Range, recognizing that the actual quantity and distribution of these early, intermediate, and advanced structure stands was highly variable through time. Some advanced structure stands will continue to persist, while others will be harvested and returned to an early structural condition.

Ranges of Stand Structures—ODF expects that applying the strategies in this FMP will result in ranges of early, intermediate, and advanced structure stands rather than exact percentages. First, the stand structures, as defined, do not always appear on the landscape as distinct types because structural development in stands is continuous. As structure in stands is classified they represent a continuum of characteristics within each classification.

Second, there is no single correct answer for the appropriate balance of the stand structures. Historically, the stand structures present in the Elliott State Forest have varied greatly. Large wildfires that resulted from Native American burning and subsequent European settlement (Coos Bay Fire and others) reduced the diversity of stand structures within specific watersheds or regions. Wildlife populations always fluctuated in accordance with the amount of available habitat, as well as from other natural factors.

There is currently no research that supports one specific, idealized array of stand complexity optimal for all species. However, because native species coevolved with historical disturbance regimes and the forest conditions that resulted, it is reasonable to conclude that providing meaningful contributions to the habitat needs of all native species will require producing all habitat types or surrogates.

For all these reasons, a precise percentage of expected stand structures is unnecessary for the differing stand complexities. The expected stand structure ranges are anticipated to provide the full array of habitats for native species while providing sustainable economic and social benefits (see Table 5-1 in Chapter 5).

Concept 2: Contribute to Biological Diversity at the Landscape Level

Managing for Biological Diversity

Forest management for biological diversity is implemented at two scales: a forest stand and the forested landscape. The stand may be defined as a patch of forest distinct in composition or structure or both from adjacent areas (Lindenmayer and Franklin 2002). Silvicultural treatments are applied at the stand level. The landscape may be defined as many sets of stands that cover an area ranging from many hundreds to tens of thousands of acres (Lindenmayer and Franklin 2002). This section discusses some of the concepts behind landscape level management for diversity. The next section discusses some of the concepts behind stand level management for diversity.

Managing for biological diversity requires managing at various levels of biological organization: species, genetic variation within species, communities of organisms, functional diversity, ecosystem diversity, and associated diversity of processes. Managing for diversity also requires recognition that certain concepts and many details of managing ecosystems require further testing and refinement. Thus, an adaptive management approach is required that integrates management, research, and monitoring.

There is no one size of landscape for all classes of wildlife because each organism scales the landscape differently. Planning for biological diversity at the landscape level requires consideration at a range of spatial scales. Landscape management for diversity is based on the following principles:

- Manage for a variety of seral stages, stand structures, and patch sizes across the landscape, emulating natural patterns (Concept 1).
- Maintain habitats of individual species or groups of species at particular risk of extinction, specifically the marbled murrelet and northern spotted owl.
- Maintain unique ecosystems, such as riparian areas, springs, wetlands, rock outcrops, and talus slopes.

Maintaining habitats for species at risk and maintaining unique ecosystems

Maintaining habitats of individual species or groups of species at particular risk of extinction involves identifying these habitats and ensuring they are maintained on the landscape. The most obvious way to ensure maintenance of specific habitats is through protection in conservation areas; another is through ensuring that the habitat type is maintained on the landscape over time through management. In this FMP, habitats used by particular species at risk are included in conservation areas (see Chapter 5). Conservation areas for threatened and endangered species may change in number, location or size over time as results of protocol surveys become available. Riparian areas are protected through the aquatic and riparian strategies, and unique ecosystems were identified and are included in conservation areas.

The combined strategies of maintaining conservation areas, unique ecosystems, riparian areas, managing for a range of stand types on the landscape, and providing legacy components (e.g., snags and logs) will contribute to maintaining biodiversity across the landscape. There are assumptions to this type of a landscape approach which can be tested through adaptive management. Some of the assumptions are,

- Areas retained in conservation areas for spotted owls and marbled murrelets will contribute to maintaining advanced structure on the landscape which will also provide benefits to other species that utilize mature forest conditions. Although conservation areas will range in size, most will be large enough to maintain interior habitat conditions.
- Connectivity of mature forest will occur across the landscape through space and time through the combined strategies that maintain conservation areas, unique ecosystems, and riparian areas on the landscape. Connectivity will be developed through un-interrupted habitat that connects patches of mature forest (e.g., riparian areas), scattered patches across the landscape, or by increasing permeability of younger age classes through retention of live trees, snags, and logs (concept 3). It is assumed that connectivity will occur at an adequate level such that terrestrial wildlife species can disperse across the forest.
- Habitat will also be provided for species which use forest conditions other than mature forests. Retention of legacy components including large and defective trees, snags, and downed wood will provide habitat for cavity-nesting wildlife, bats, terrestrial salamanders, and other species. Understory vegetation will provide forage for ungulates, habitat for neotropical songbirds, and cover for small mammals. The combined strategies described in this Forest Management Plan are expected to contribute to maintaining the suite of terrestrial wildlife species that occur on the Elliott State Forest.
- The range of forest structures will benefit aquatic and riparian processes and in turn aquatic species. This is particularly true for small non-fish bearing streams which may be more intimately connected to upland forest conditions than larger fish streams. The range of forest structure types are within an expected historic range of conditions. This suggests relationships between forest structure and aquatic functions would also be within the historic range. The resulting riparian functions (e.g. large wood recruitment, shade, sediment and nutrient routing, and hydrologic regimes) coupled with the aquatic and riparian strategies will contribute to habitat needs for amphibians and fish.

Management goals can often be achieved more effectively and efficiently through collaboration with others. An important cooperative relationship is between the ODFW and the ODF. ODF intends to implement this FMP to both achieve the stated breadth of FMP goals as well as support shared conservation and restoration goals for native fish and wildlife as described in documents such as the Oregon Coast Coho Conservation Plan, and Oregon Conservation Strategy. These agencies also work together to provide increased forage for big game through forage seeding and pasture land management, to reduce harassment of big game by closing roads, and to incorporate fish and wildlife considerations in timber sale plans by collaborating with local biologists.

Concept 3: Provide Biological Diversity at the Stand Level

Sustainable forest ecosystem management involves more than achieving a specific range of early, intermediate, and advanced structure stands. The stands must also have key structural components.

The landscape-level principles address this broad distribution of forest stands over the landscape and through time. Site-specific principles address managing stands to contain key structural components. Stand-level management deals with the structure and function of the individual stand, which differ with seral stage, ecosystem, and disturbance history. Within individual stands in all structure classes, important structural features for maintaining diversity include:

- Large and old trees
- Dead and dying wood (snags, wildlife trees, and downed wood)
- Understory vegetation

Legacy Components—Stand Level Management for Biological Diversity

Investigations of the effects of natural disturbances on forests underscore the importance of these events in ecosystem development. Results from these studies emphasize the importance of biological legacies (surviving organisms as well as stand structural components) to the rapid reestablishment of ecosystems that have high levels of structural, functional, and compositional diversity. Based on these results, the creation and maintenance of structurally complex managed stands is becoming the primary approach to managing forests for multiple, complex objectives, including commodity production (Franklin et al. 1997).

The most apparent changes caused by natural and human disturbances are in the type and distribution of structural components in the stands. Stands can be characterized as simple to complex based on the amount and distribution of the structural components. Active management to maintain structural complexity is vital to prevent the decline and eventual loss of key structural attributes (Lindenmayer and Franklin 2002).

Key structural attributes include the size of standing live and dead trees; the condition of those trees; and the size, amount, and condition of down wood on the forest floor. The canopies and boles of standing trees provide important habitats for a variety of wildlife. Down wood provides habitat and a long-term source of nutrients. It also fulfills many important roles in stream ecosystems by forming pools and backwaters, providing nutrients, dissipating the energy of flowing water, and trapping sediment. This structural complexity provides the basis for much of the variety and richness of species, habitats, and processes.

Approaches proposed to create structurally complex managed stands include silvicultural treatment of established stands to create specific structural conditions, and the retention of structural features at the time of harvest. Neither approach is mutually exclusive, although each has specific circumstances where it is particularly appropriate.

Active management may contribute to complexity on the landscape and habitat connectivity by retaining certain structures important to wildlife. Stand structures important for wildlife include large living trees and snags, large diameter logs, vertical heterogeneity—canopy layers, canopy gaps or antigaps—and thickets of understory vegetation (Lindenmayer and Franklin 2002; Bunnell et al. 1997). Providing these structural features in managed stands provides within-stand heterogeneity that allows some animals to persist in the managed areas and others to disperse across the managed area that otherwise would be prevented from doing so. In addition, these structures provide structural enrichment that allows a harvested stand to return more quickly to habitat suitability (Lindenmayer and Franklin 2002). These structures are described in more detail below.

Large Trees and Defective Trees—Large diameter trees are often characterized by large-diameter branches, complex branching systems, and bark habitats. These structures provide habitats for many organisms. When these large trees also contain defect and/or decay organisms (e.g., broken tops, heart-rot decay, mistletoe), they provide unique habitats and foraging opportunities for an even wider array of species. Often, these living trees with decay provide many of the same functions as snags, but remain on the landscape for a longer period of time. In addition, large trees and defective trees provide a potential source of future snag and downed wood structure.

A key structural component of advanced structure stands is the presence of large trees. One way to sustain this structural component within a managed forest is to retain enough residual live trees in regeneration harvest units to provide the required level of large trees when the stand develops the other characteristics associated with these stands.

Large trees and defective trees are preferred for retention in regeneration harvest units.

Snags—Snags help to meet the habitat needs of wildlife species, and also serve as a source of future down wood. Snags can be provided in all stand types, through a combination of existing snag retention, natural mortality in maturing stands, and artificial creation. Large snags are particularly important structures because their size allows them to be used by a wider range of species and because they tend to stay standing on the landscape for longer periods of time.

Standing dead trees are important to many species of wildlife, including woodpeckers, other cavity-nesting birds, raptors, bats, marten, bear, and many other birds and mammals. Snags provide nesting, roosting, foraging, perching, and denning habitat for various species of wildlife in the Elliott State Forest.

Downed Wood—Downed wood on the forest floor provides many important functions in forested ecosystems. Some of the identified functions are mineral cycling, nutrient mobilization, maintenance of site productivity, natural forest regeneration (nurse logs), substrates for mycorrhizal formation, and provision of diverse habitats for wildlife species. Downed wood is an integral component of advanced structure stands, and provides a biological legacy from old stands to young stands after catastrophic events.

This legacy can also be provided in managed stands if appropriate requirements are incorporated into timber harvest plans. Large diameter logs are important to wildlife because their size allows them to be used by a wider range of species, and because they remain on the landscape for long periods of time.

Understory vegetation –Understory vegetation contributes a variety of functions to the forest stand including providing shelter and food for many species of wildlife, substrate for other organisms such as bryophytes and macrolichens, nutrient cycling, and structure and compositional diversity. Shrubs provide food directly to insects which in turn are food for many species of birds and mammals. In addition, shrubs provide food for ungulates such as deer and elk, and berry or mast-producing shrubs provide food directly to birds and mammals. Understory vegetation also provides shelter and nesting sites for various species of birds and other wildlife (Muir et al. 2002).

Forest management can affect the structure of understory vegetation. Thinning dense forests can promote biodiversity and abundance of understory plants. Since some plants do better in relatively open conditions while others thrive in more closed-canopy forests, thinning prescriptions that incorporate variable density practices may maintain more diversity of understory vegetation than uniform prescriptions (Muir et al. 2002).

Concept 4: Provide for a Diverse and Healthy Forest Ecosystem through the Principles of Integrated Pest Management

A healthy forest condition is one in which biotic and abiotic influences do not threaten resource management objectives now or in the future. Biotic influences, such as insects, diseases, and vertebrates, are integral parts of the forest ecosystem. These disturbance agents, which can damage or kill trees, are for the most part native species that have been functional parts of the Elliott State Forest ecosystem for thousands of years. (A few agents, such as white pine blister rust, have been introduced and have become naturalized). Abiotic factors, such as weather extremes, drought, fire, climate change, and pollution, are often unpredictable or uncontrollable, and history shows that they too can cause severe damage.

When disturbance agents damage or kill trees, they affect the structure and composition of forests. These effects can be either positive or negative, depending on management objectives. Birds and other animals use dead and/or decayed trees for nesting, shelter, and foraging. Selective killing of certain tree species or individuals contributes to diversity by creating canopy gaps that provide space, light, and nutrients for a variety of plant and animal species. When forests experience large-scale insect outbreaks or disease epidemics, catastrophic and unwanted changes to the forest can occur.

A general principle of forest management is that greater biological diversity provides stability and resiliency to the forest, especially with regard to pests. A diversity of tree species provides some assurance that pest outbreaks will not kill all of the trees, because most native pests have some degree of host specificity. Structurally and compositionally diverse forests also will contain habitats and conditions suitable for the many natural factors that help keep pest populations and levels of damage within acceptable levels.

Strategies to reduce the undesirable impacts of insects, diseases, and other agents must consider the characteristics of individual stands, situations, management objectives, and the landscape or regional context. Management objectives for the Elliott State Forest vary over the landscape and often differ from one stand to the next. These various objectives help determine the expected future condition of the forest, which in turn drives stand management activities. Management actions must consider the effects of disturbance agents, which are a permanent part of the forest ecosystem. Integrating forest health strategies with management ensures the widest availability of options as forest management is adjusted and adapted in the future.

Prevention strategies involve establishing tree species and genotypes that are well-suited to the site, ensuring a diversity of species to avoid catastrophic losses, manipulating stand density to avoid stress that may predispose trees to pest injury, and manipulating stand structure and composition to create unfavorable conditions for pests.

Rather than elimination or eradication of pests on state forestlands (except in the event of an introduced exotic pest), the aim is on managing the forest such that pest effects are within acceptable ranges (which vary over time and space with changing objectives and constraints). The undesirable effects of these various influences can be mitigated through several prevention and suppression strategies. Many of these strategies involve applying existing silvicultural treatments and technologies. However, new approaches to management should be explored, and existing methods monitored to ensure that the best strategies are used. The forest health strategies apply to both upland and riparian areas.

In some cases, pest populations and associated damage can exceed the desired levels, and thus suppression might be appropriate. Any suppression activities on state forest lands must adhere to the principles of IPM. This approach uses the most appropriate of all reasonably available means, tactics, or strategies, blended together to minimize the impact of forest pests to meet site-specific management objectives. IPM techniques may include the use of natural predators and parasites, genetically resistant hosts, environmental modifications, and, when appropriate, chemical pesticides or herbicides.

Concept 5: Maintain and Enhance Properly Functioning Aquatic Systems

Riparian and aquatic habitats will be managed to maintain and enhance key functions and processes of aquatic and riparian systems. Because streams are tightly linked to the landscapes through which they flow, riparian and aquatic conditions depend on the interrelated components of the entire landscape. For this reason, this FMP uses a blended approach that applies the concepts of landscape ecology to manage riparian and aquatic habitats at the landscape level and through site-specific prescription. This type of two-tiered approach was cited by the Independent Multidisciplinary Science Team as necessary to achieve a high likelihood of providing properly functioning aquatic systems (Independent Multidisciplinary Science Team 1999).

The structural components in a landscape include the physical habitat occupied by salmonids and other organisms, along with the structures and processes that maintain the integrity of that habitat. Functional interactions include the flows of energy and materials within the ecosystem. Landscapes are dynamic: both structure and function change across time and space. Even with change, stability is ensured so long as ecosystem structure and function are maintained within certain bounds and all required components remain within the landscape (Independent Multidisciplinary Science Team 1999).

Management for Proper Functioning of Aquatic Systems

The functioning of natural riparian and aquatic areas depends on the interaction of three components: vegetation, landform and soils, and hydrology. Riparian-wetland areas function properly when adequate vegetation, landform, or large wood are present to: 1) dissipate stream energy associated with high waterflows, reducing erosion and improving water quality; 2) filter sediment, capture bedload, and aid floodplain development; 3) improve flood-water retention and ground-water recharge; 4) stabilize streambanks; 5) develop ponds and channels of sufficient depth and duration to provide fish habitat; and 6) support biological diversity (USDI Bureau of Land Management 1993, revised 1995). In determining what constitutes “properly functioning aquatic systems,” the overall approach in this FMP is based on the following key concepts:

- Native aquatic species have coevolved with the forest ecosystems in western Oregon.
- High quality aquatic habitats result from the interaction of many processes, some of which have been influenced by human activity.
- Aquatic habitats are dynamic and variable in quality for specific species, through time and across the landscape.
- No single habitat condition constitutes a “properly functioning” condition. Rather, providing diverse aquatic and riparian conditions over time and space would more closely emulate the natural disturbance regimes under which native species evolved.

The biological and ecological objectives of the strategies in this plan are to maintain and enhance the key ecological functions of aquatic, riparian, and upland areas that directly influence the freshwater habitat of aquatic species, within the context of the natural disturbance regimes that created habitat for these species.

Riparian Area Management

Properly functioning aquatic habitats must occur through two major approaches: 1) management towards a desired condition in specific riparian areas; and 2) management to support targeted functions and processes in specific riparian areas.

Understanding the role of riparian vegetation is fundamental to understanding the importance of riparian management. Natural disturbance regimes, including floods, debris flows, and beaver activity, historically determined the temporal and spatial distribution of the range of riparian characteristics (Teensma et al. 1991, Wimberly et al. 2000). Although significant areas of old growth are likely to have occurred along riparian areas, variability in the intensity, timing, and location of disturbance events created a diverse mosaic of riparian vegetation characteristics.

The complex interactions between aquatic plants (primary production of nutrients), salmon biological processes, and stream temperature result in a variable response to increased levels of sunlight to the stream. A riparian forest may reduce the amount of sunlight reaching the stream, thus helping maintain or reduce stream temperatures. Long-term management must provide the appropriate range of conditions to ensure appropriate water quality conditions in the riparian and aquatic systems so that they are biologically productive.

The massive network of roots growing from vegetation near the stream bank helps stabilize the soil and slow erosion. Large trees growing in the riparian area are the source of large wood that creates complex fish habitat. Leaves and other organic matter falling into the stream provide an energy source for this ecosystem (Forest Practices Advisory Committee Issue Paper on Riparian Function, November 1999).

A more detailed explanation of these approaches is presented in Chapter 5, under the heading, “Strategy 6: Management of Aquatic and Riparian Systems.”

Management strategies within riparian areas should be consistent with achieving or maintaining the desired conditions specified for the water body. For areas that do not meet the desired condition, management strategies should be designed to move the stand toward these conditions. Riparian areas that meet the desired conditions will be maintained in that state with limited or no management activity.

Desired Conditions

Fish-bearing Streams (Type F) and Large/Medium Non-fish-bearing Streams (Type N)—The goal of management along fish-bearing streams and larger non-fish-bearing streams is to grow and retain vegetation so that, over time, riparian and aquatic habitat conditions are maintained as, or become similar to, those associated with mature forest stands. Generally, the conditions associated with conifer stands of approximately 80 to 100 years of age or older are sites conducive to conifer production. Mature hardwood stands are the desired condition in sites where hardwoods are expected to be the natural plant community. This plant community is often more common on riparian sites because of the presence of saturated soils (high water table) or the effects of periodic floods. Mature forest conditions should support functions and processes associated with properly functioning aquatic habitats.

Small Non-fish-bearing Streams (Type N)—Along small non-fish-bearing streams, the overall goal of riparian vegetation management is to grow and retain vegetation sufficient to support important functions and processes within the various streams, and to contribute to achieving properly functioning conditions in downstream fish-bearing waters. The functions of these streams will be maintained by the influence and contributions of adjacent stands managed to achieve a sustainable harvest level, and by vegetation retained in riparian areas during harvest activities. Management strategies should be designed and implemented to maintain and enhance water quality, supplement wildlife habitat, and contribute to the overall supply of instream large wood within a watershed.

This FMP recognizes that a variety of small Type N streams exist across the forest landscape, and that these streams may differ in their physical characteristics, dominant functional processes, and contribution to watershed-level processes. As a result, the strategies for these Type N streams should vary according to which functions and processes are dominant within an individual stream. Riparian vegetation retention should be designed to maintain these dominant functions. The following section summarizes the key functions and processes that are considered important for different small Type N streams.

Perennial Streams—These streams are characterized in terms of function by their potential ability to influence water temperature in downstream reaches. Steeper gradient streams may also periodically transport large wood and coarse sediments to downstream reaches. Fine sediment and leaf litter (nutrient) storage processes are somewhat limited in the steeper streams primarily because past practices removed retention structures. The presence of large wood may enhance nutrient storage processes, and affects the morphology of steep channels primarily through the storage of coarse sediments. These streams are also often recognized as providing important habitats for certain sensitive amphibian species.

Lower gradient perennial streams generally lack the hydrologic force necessary to transport large wood or coarse sediments, but they possess the ability to transport fine sediments during normal storm events. These streams are often the sites where large wood and coarse sediments settle out and are stored during flood events. Fine sediment and leaf litter (nutrient) storage processes are dominant in these streams during most times of the year. The presence of large wood enhances these processes, and can directly influence channel morphology in non-confined reaches.

Riparian vegetation on these streams plays a key role in protecting stream bank stability, providing leaf litter input, and maintaining water temperature to provide cool water sources to downstream reaches. Water temperature protection should be focused in the downstream portions of these streams where the greatest influence on fish-bearing stream temperatures is most likely to occur. Vegetation retention should also be prioritized on reaches that may support amphibians. Management should be designed to provide a source of large durable wood for recruitment to these channels. In steeper streams, the wood will function as localized sites to sort and store coarse sediments, and as a potential supply of large wood for downstream reaches during periodic transport events. In all channel types, large wood enhances fine sediment and leaf litter (nutrient) storage and routing processes. Instream material to support these processes is provided by adjacent riparian stands, and may be delivered from steeper, upstream reaches.

Seasonal High energy Streams—The presence of a relatively wide active channel on these seasonally flowing streams indicates that periodic high flows can be a prevalent channel-forming feature. The relatively steep gradient, in combination with the potential for high flows, indicates a capacity for these streams to potentially transport coarse sediment and large wood. Where the influence of large wood is lacking, segments of these channels are often observed to have scoured to a bedrock-dominated form. With large wood, these channels commonly exhibit a stepped profile as a result of coarse sediment storage. The presence of large wood can change the morphology of these channels. Large wood transport events are assumed to be limited to infrequent high flow events and debris flows. The lack of perennial flow minimizes the influence of these streams on water temperature in downstream fish-bearing reaches.

Management along these streams should focus on providing a source of large, durable wood to maintain a stepped profile channel form, and to create habitat beneficial to aquatic species. The wood will function as sites that sort and store coarse sediments within the stream, and to provide a large wood supply for downstream reaches during periodic transport events. Large wood in these streams will also trap smaller materials, which will enhance the storage and processing of leaf litter (nutrients). Riparian vegetation should also be managed to protect stream bank stability, and provide leaf litter input. Because these streams do not flow perennially, management has little potential to affect water temperature in downstream reaches, or to moderate near-channel riparian micro-climate.

Seasonal Potential Debris Flow Track Reaches—The physical setting and characteristics of these streams indicates a high probability of large wood delivery to downstream fish-bearing waters in the event of slope failure. The morphology of these channels is conducive to transporting large wood during debris flows. The presence of high landslide hazard locations near these channels indicates a potential that debris flow events could occur. During these events, it is assumed that vegetation retained along the debris flow track will either reduce the energy of the event and cause the materials to become temporarily stored within the channel, or become entrained within the debris wedge for delivery to downstream reaches. Management should focus on maintaining vegetation that has a high probability of interacting with debris flows along this track. The emphasis should be on maintaining large trees that can provide the functional habitat-forming elements of these natural disturbance events.

The presence of vegetation along these channels supports stream functions and processes during the period when debris flow events do not occur. Riparian vegetation provides nutrient (leaf litter) input. Large wood recruited to these channels sorts and stores coarse sediments and influences channel morphology. This material also enhances nutrient storage and processing functions. The lack of perennial flow minimizes potential influences on summer water temperature in downstream fish-bearing reaches.

Other Seasonal Streams—Individually, these streams are assumed to have limited overall influence on watershed-level aquatic conditions due to their small size, flow pattern, and morphological characteristics. Their small size and seasonal flow pattern limits their individual potential to influence downstream water temperatures. The size, morphology, and physical setting of these streams also indicate a lower probability that large wood transport to downstream reaches is a significant function. The major functions of these waters are assumed to be the recruitment, routing, and processing of leaf litter, and transport, sorting, and storage of fine sediments.

The Blended Approach—A Landscape of Diverse Stand Structures Combined with Site-Specific Strategies

Aquatic ecosystems interact closely with the surrounding terrestrial systems, both at the landscape scale and at the scale of stream reaches and riparian zones. Therefore, the health of the aquatic system depends on forest management practices that recognize, maintain, and enhance the functions and processes that compose these terrestrial-aquatic interactions at a variety of scales.

Historical Conditions, Disturbance Regimes, and Riparian and Aquatic Habitats

Conditions over the landscape are dynamic. Aquatic and riparian habitats in western Oregon have always represented a continually shifting mosaic of disturbed and undisturbed habitats. At any particular point in time, some streams offer better habitat conditions for specific species than others (Independent Multidisciplinary Science Team 1999).

Historically, forest stands in the Elliott State Forest ranged from dense mature or old-growth conifer forests to sparsely forested open conditions created by fire, floods, wind, or other disturbance factors. It is estimated that, from 1850 to 1920, approximately 50 to 70 percent of forest stands in the Oregon Coast Range were in the mature or old-growth stages, defined as greater than 100 years of age (Teensma et al. 1991). More recent modeling efforts have estimated that historic levels of old growth ranged from 30 to 70 percent at the province scale. At smaller scales, the variability was even greater, ranging from 15 to 85 percent of the landscape at any point in time (Wimberly et al. 2000). Streamside forests likely had similar proportions of old and young forests, although there may have been more hardwood stands and young stands near large streams because of more frequent disturbances, including floods, debris flows, beaver activity, and related competition with shrub species. The riparian areas of smaller streams were more likely to be dominated by conifer stands.

Mature forest conditions likely dominated the landscape from 1850 to 1920. Instream habitat conditions varied in response to periodic catastrophic disturbances and variations in forest conditions across a watershed. In the Elliott State Forest, for example, a fire in 1868 burned more than 90 percent of the forest.

It is becoming increasingly evident that riparian and aquatic ecosystems are maintained over the long term by periodic upland and hydrologic disturbances. For example, wildfires left burned forests with structural elements such as snags and fallen trees, many of which were ultimately delivered to stream channels through landslides or other mechanisms. Natural disturbances such as wildfires, windstorms, and floods have affected and created Oregon's forests for millennia. Native flora and fauna evolved with these disturbance events. There is considerable debate about the frequency and magnitude of these events, and it appears that forest disturbance frequencies vary considerably throughout Oregon's forests based on location, climate, and ecosystem. The typical disturbance pattern in an area is known as the disturbance regime.

In the past, forest managers often did not recognize the structural needs of the streams and forests and the processes that created these structures. In the rehabilitation of the Columbus Day Storm, salvage logging was performed before new trees were planted. Historic timber harvesters did not attempt to maintain large conifers and fallen trees in riparian and aquatic habitats. Because of concerns about fish passage and floods, large wood was deliberately removed from stream channels. Thus, past management activities have contributed to the current low levels of large wood in most stream channels in the Elliott State Forest.

More specific analytical efforts are necessary to accurately describe the current conditions of riparian and aquatic habitats, including the levels of structural components such as large wood and large streamside conifers. This information will be the basis for site-specific prescriptions that use both active and passive management strategies to produce the desired conditions. Although active management can potentially produce the desired results several decades sooner than passive management, it also has some short-term risk. Prescriptions must balance the benefits and risks based on site-specific conditions.

Thus, in developing a set of strategies to support properly functioning aquatic systems, it is necessary to apply principles of landscape ecology to manage habitat at both the site-specific and landscape level. This type of a blended approach seeks to emulate disturbance patterns in both upslope and riparian areas (Independent Multidisciplinary Science Team 1999).

Slope Stability

Many watershed events can affect aquatic and riparian areas. Slope stability and landslides are a particular concern. The main issue is the potential effect of management activities on naturally occurring geologic processes.

Landslides are part of the natural geologic process in mountainous terrain, and are natural in western Oregon forests (Pierson 1977; Burroughs 1984; Burroughs 1985a; Burroughs 1985b; Benda 1988; Benda 1990; Benda 1994). This erosion process should be recognized as natural and geologically controlled over the long term. A "no-risk" option does not exist with landslides because of the very nature of the erosion process. Risk can be described as a function of both probability and consequence (Remboldt 1997). Management decisions related to this natural geologic process must be risk-based because of the uncertainty and complexity of geologic variation and the limits of scientific knowledge.

Landslides can substantially change habitat and stream environments in the short term, for years after the impact (Beschta 1981; Benda and Dunne 1987; Benda 1994). Channel-scouring landslides remove all gravel and structure that produce fish habitat. The deposition of debris (clay, silt, sand, gravel, and wood) from landslides buries fish habitat. Because of the devastating impacts to the immediate environment, landslides typically have been perceived as negative, and the prevention of landslides has been the goal of many engineering and land management efforts (Koler 1998).

Key Terms

Landslide—The dislodging and fall of a mass of earth and rock. There are many types of landslides, including debris slides, earthflows, rock block slides, slumps, slump blocks, and slump earthflows. The different types of landslides vary tremendously in how they occur, how far they move, the type of materials, etc.

Debris Torrent—Rapid movement of a large quantity of materials, including wood and sediment, down a stream channel. This generally occurs in smaller streams during storms or floods, and scours the stream bed.

Earthflow—Movement of material, both sediment and vegetation, down a slope. Earthflows are typically large, but move only a few centimeters each year.

Headwall—The steep slope or rocky cliffs at the head of a valley.

Rock Block Slide—Type of landslide in which the weakness and initial breaking is in the underlying rock rather than the soil.

Scour—The powerful and concentrated clearing and digging action of flowing air, water, or ice, especially the downward erosion by stream water in sweeping away mud and silt on the outside curve of a bend or during a flood.

Slump—Type of landslide in which a coherent mass of rock or unconsolidated material moves downslope along an upwardly curved surface, i.e., the slide tends to be spoon-shaped.

The latest scientific understanding is that landslides are the natural source for many key habitat structures (large wood and backwater) and as such, initiate hot spots of habitat and aquatic life. Over time, landslides are a major natural source of structure and habitat variation in mountain streams. Fish species are adept at occupying these locations, and it is a natural process for different fish species to inhabit the stream at different times, as the stream's structure and habitat change over decades and even centuries. In managed forests, the most damaging aspect of landslides may be the lack of wood in landslide deposits from timber harvest units. The management challenge then is to maintain near-natural landslide rates and composition of landslide deposits.

Landslides of many sizes and classifications occur on western Oregon forest lands. The landslide usually considered of most significance is the debris slide or debris torrent (Varnes 1977, Benda and Miller 1991) because of the common perception that forest management is most significant at altering rates and probability of failure for these smaller landslides (Pyles and Skaugset 1998). However, slumps, block slides, slump earthflows, and earthflows are also of concern in western Oregon forests, particularly in relation to forest road location and design (Beschta 1977).

Debris slides and debris torrents originate as shallow (typically three-foot depth), translational (slip surface parallel to the natural ground surface), steep slope landslides. They are small (typically less than 500 cubic yards), but often grow in volume through scour and undercutting until they cause major impacts in stream systems. They can travel great distances downstream as debris torrents, dam-burst floods, or migrating organic dams (Benda et al. 1997). The downstream effects of intense storm events and landslides are complex and difficult to predict. Prediction of initiation sites is only possible in the probability sense (Hammond et al. 1992). Prediction of run-out distance and deposition are possible (Benda and Cundy 1990), but predicting downstream impacts is difficult at best.

Forest management's effect on the rate of occurrence of these landslides is often divided into two categories; road-related landslides and in-unit landslides (Prellwitz and Koler 1994). Road-related landslides are somewhat more predictable and manageable. There are commonly accepted best management practices (BMPs) that can be associated with costs and levels of risk for managing this type of landslide (Koler and Neal 1989). There is even a relatively accepted track record of geotechnical input and environmental protection (e.g., Reilly 1989). This category of landslides contains no absolutes; however, there is reasonable agreement and theoretical rationale for existing design mitigation.

The second category of in-unit landslides is much less predictable and manageable. Numerous studies using aerial photography have attempted to quantify the rate of increase for specific areas due to harvesting (specifically clearcut harvesting). See *AEG Oregon Case Histories* (Skaugset and Pyles 1998) for a complete scientific review of the research. BMPs are much more limited and uncertain for in-unit slides than for road-related slides. For in-unit slides, it is appropriate to apply risk-based management that matches BMPs with the values at risk, and accepts the uncertainties and nature of the science (Michael 1997).

There are two basic conceptual concerns with timber harvest in relation to slope stability. The first and most commonly cited concern is root strength, defined as the ability of vegetation roots to reinforce the soil and add strength against slope failure (O'Loughlin 1974; Swanston 1974; Ziemer and Swanston 1977; Burroughs and Thomas 1977; Ziemer 1981; O'Loughlin and Ziemer 1982; Greenway 1987). Root strength is a difficult factor to evaluate, as it is complicated by the site-specific location of the root within the soil in relation to the potential slip surface. It is reasonably certain that rooting through the soil matrix into the underlying fractured rock or subsoil provides a buttressing effect, but this is difficult to quantify.

Another case is the lateral blanket effect of roots that do not penetrate the entire soil mass, or do not extend below a predicted potential slip surface. This lateral blanket effect is impossible to quantify by the usual analysis. The value of strength to be assigned is unclear even if the tensile strength of the individual root is known. The effect, however, is not less likely, but simply more complex.

The second theoretical concern for slope stability after vegetative removal is the effect of water. This factor is often termed interception and evapo-transpiration. Vegetation has a complicated role in relation to the groundwater pressures in the naturally marginal slope stability setting (steep slope and shallow landslide potential). The effect of vegetative removal on groundwater pressures has often been dismissed on a theoretical basis because the slope movements (debris slides) occur during intense storms in the winter. However, the most recent research (Dietrich 1997) and some conceptual thinking from forest geotechnical specialists leave the possibility of significance open for future research. If the mechanism for increased instability is misunderstood, the implication for environmental protection is significant. Leave areas that may stem to mitigate increased rates of landslides may actually have little or no real effect on those rates. Conversely, harvesting of some gentle ground that seems insignificant to slope stability might be exacerbating the natural risks.

The use of leave areas as a mitigation to slope stability risk must be studied in the context of the uncertainty that exists in the risk management decision. The ODF uses leave areas to mitigate the risk to public safety, in compliance with statute, and requires geotechnical professional design for all but the most basic leave area boundary decisions. This deferral or leave area approach is best understood as removing the potential (temporary) exacerbation of the probability of failure from the forest operation.

The USFS has attempted to use leave areas on a broad scale for habitat and stream protection purposes, on the Siuslaw National Forest in Oregon (Mapleton Headwall Leave Area). The OSU Engineering Department conducted a study of these leave areas, and found slightly higher rates of landslide occurrence in the leave areas than in apparently equivalent clearcut-harvested headwalls. This scientific perspective should not imply that managers “do nothing” (conduct business as usual), but it should be recognized in the management decision process. The applied science of vegetative management (leave areas) as a mitigation to slope stability risk should be seen as a work in progress or experimental.

Watershed Analysis

Watershed analysis must be a critical process in refining and planning management activities related to implementation of this FMP. With a greater understanding of the interrelated processes occurring in watersheds, plans and activities can be better structured, potential consequences better anticipated, and communication and resource understanding improved.

There is a need on state forestlands to employ a goal-driven process to characterize the watershed features of its management basins. These features include the riparian, aquatic, terrestrial, and cultural conditions, processes, and interactions that affect the overall watershed character and response to management activities. To assess these components so that they provide insight into management effects and resource potential, a relatively high-level assessment has been applied forest-wide.

Successful implementation of watershed analysis can provide qualitative and quantitative information useful to managers as they develop plans and set objectives for their management basins. Watershed analysis is a tool in guiding management and policy decisions to sustain use of a watershed's resources, and in ensuring that the broader goals of restoring and/or maintaining watershed health and providing for properly functioning aquatic systems are achieved.

To be successful, a watershed analysis must provide relevant, understandable, and logical information to managers and policy makers to improve actions and plans. Prioritization of analysis issues and data collection should be directed toward this goal. To be most effective, information and recommendations from watershed analyses should be processed through the adaptive management framework and processes developed for implementation of this plan, so that proposed changes are implemented in a timely manner, and review and approval take place at the appropriate levels.

Basic Concepts for Integrated Resource Management

Integrated resource management involves the design and implementation of management practices, taking into consideration the effects and benefits of all forest resources such that the goals of the FMP are achieved over time and across the landscape. It does not mean that all resources are treated equally or that management practices must provide for all resources on every acre at all times.

Coarse Filter – Fine Filter Planning

An operational approach to manage for biological diversity is the "coarse filter/fine filter" concept proposed by The Nature Conservancy (1982), and described in Hunter (1990). The coarse-filter component is based on the premise that maintaining a range of seral stages, stand structures, and sizes, across a variety of ecosystems and landscapes will meet the needs of most organisms. Sustainable forest ecosystem management provides the framework for the coarse-filter management of biological diversity. Individual species or habitats that require special consideration are managed under a fine-filter approach, such as species with unique or limited distributions (not addressed using the coarse filter). Fine-filter management superimposes specific management actions in addition to those required under the coarse-filter management. Collectively, coarse- and fine-filter management maintains and enhances biological diversity.

Coarse-filter/fine-filter planning for the Elliott State Forest will be accomplished through implementation planning. Planning at the implementation level can effectively integrate the two approaches to maximize compatibility between coarse- and fine-filter planning efforts.

Integrated resource management promotes the coarse-filter benefits of sustainable forest ecosystem management while providing the fine-filter provisions for special resource values. Integrated resource management will permit multiple resource objectives to be met concurrently while ensuring the protection of special resource values where necessary.

The basic concept of integrated resource management in this plan focuses on combining a landscape of diverse stand structures with site-specific strategies for other resource values.

Concept 1: A Landscape of Diverse Stand Structures with Site-Specific Strategies for Other Resource Values

Integrated resource management brings together knowledge of various natural resource disciplines to understand and promote land management actions that consider all forest values. Active management practices are applied over time in conjunction with conservation areas resulting in a landscape of diverse stand structures and achieving site-specific forest resource goals. Management practices are not applied to every acre every year. The approach promotes the compatibility of most forest uses and resources over time and across the landscape.

Integrated resource management provides the means for assessing resource values, compatibility of resource objectives, and necessity of additional planning or mitigation. It is best described as differing levels of management emphasis that adjust as the compatibility of resource values change.

The first level of integrated resource management occurs when all forest resources are integrally managed according to coarse-filter concepts.

The second level of integrated resource management occurs when the FMP specifies a higher level of management emphasis for a designated resource value. In these instances, the resource will be managed according to site-specific strategies. This management emphasis might mean supplemental planning before conducting management activities to assess effects, and design approaches that will maintain, protect, and enhance the specific resource. Management in these areas might also require management practices to be modified. In most cases, the FMP and/or legal requirements will list the site-specific management requirements for the resource.

The third and final level of integrated resource management occurs when the resource is managed exclusively according to site-specific strategies. Site-specific strategies may be applied because of: 1) legal requirements such as the FPA; 2) goals, strategies, and prescriptions in the FMP; or 3) dominant resource values that require protection, maintenance, or enhancement. . Goals, strategies, and prescriptions in the FMP, legal constraints or requirements, and the dominance of certain resource values will determine the level of management emphasis needed. One example of a site-specific resource value taking priority is the presence of a Native American village or burial site. In this example, preservation of the site would take precedence over other resource values.

Where more than one forest resource in a specific area requires site-specific emphasis, each of the resources will be managed according to the strategies for the specific resource. Where overlaps occur, the management approach will seek to achieve the goals for all of the identified resources to the maximum extent practicable. Where a forest resource in a specific area requires site-specific emphasis and another resource in the same area requires a higher level of consideration, the resource requiring the highest level of protection will determine the management approach. One example of overlapping resource values is the Native American site mentioned above being located adjacent to a fish-bearing stream. In this example, both the historic site and the fish-bearing stream require special emphasis; however, preservation of the site would still take precedence over other resource values. In addition, because of the possibility of stream channel migration, additional consultation with the State Historic Preservation Office might be necessary to prevent degradation of the site.

It is important to remember that integrated resource management activities should lead to achieving the goals of the FMP. Therefore, the values and needs of forest resources, as described in the FMP goals and strategies, are the determining factors in planning and conducting management activities.

Chapter 5

Resource Management Strategies

Chapter 5 presents the resource management strategies to be implemented in the Elliott State Forest. Resource management is designed to generate an appropriate balance of economic, environmental, and social values from this state forest. The land management goals listed in Chapter 3 embrace the concepts of “sustainable” and “integrated” that are fundamental to the management of the Elliott State Forest.

The concepts in Chapter 4 informed the development of resource management strategies. These concepts were derived from legal mandates and scientific research in the fields of silviculture, forest ecology, fisheries, and wildlife biology, and stream ecology. The strategies are the heart of the FMP and provide the direction for achieving the goals and vision outlined in Chapter 3.

The main headings in this chapter are:

Strategies for Managing the Elliott State Forest

The *Elliott State Forest Management Plan* presents a set of integrated strategies that are the basis for managing the forest. They are designed to be applied through a system of active management. The FMP includes strategies for sustainable economic and social benefit, strategies for sustainable forest ecosystem management, and strategies for integrated resource management that consider specific values in addition to a diverse range of forest stand types.

Together, this body of integrated strategies will be applied to provide both the coarse filter and the necessary fine filter emphasis for certain resource values. These integrated strategies will provide diverse forest habitats that are expected to accommodate most native wildlife species associated with forested habitats in the Oregon Coast Range.

The FMP strategies are expected to result in a range of stand types and stand complexity in the long term, in addition to regular, sustainable, timber harvest through silvicultural operations. It provides for the maximization of revenue to the CSF in the long term, consistent with sound techniques of land management.

It is essential that the strategies for sustainable forest ecosystem management be applied in an adaptive management context. Over time, monitoring will reveal if the strategies are accomplishing their intended purpose. As monitoring provides feedback, the FMP will be fine tuned and improved.

Strategies for Sustainable Economic and Social Benefit

The economic and social benefits of managing the Elliott State Forest are two important legs of sustainability; the third is environmental benefit. These three legs of sustainability are interdependent. To provide these benefits, it is essential to meet the legal mandates that include constitutional and statutory requirements related to the purpose of the lands, as well as other state and federal laws designed to protect environmental and biologic values.

The forest must be managed to produce products and revenue for the CSF to meet economic goals. The forest also provides social benefits such as jobs and recreational opportunities.

Managing a complex forest system for multiple goals presents a mix of opportunities and challenges. This plan recognizes there will be trade-offs in achieving these goals.

Strategy 1: Meet Legal Mandates and Trust Obligations

The Elliott State Forest will be actively managed with the intent of meeting legal mandates for these lands.

The most fundamental of these mandates is to maximize revenue for the CSF, and produce revenue for counties and local taxing districts. This mandate will be met primarily through regular timber harvest and marketing, along with the sale of special forest products. Managers will regularly review business processes and outcomes to ensure that an efficient and cost-effective approach is applied in carrying out the strategies in this FMP.

By agreement with the State Land Board and DSL (for CSFLs), and by OAR (for BOFLs), the ODF is directed to develop long-term management plans. The plans for CSFLs are to be prepared by ODF, to govern all management activities including the overriding objective of revenue production and, consistent with this primary objective, managing for other public values. The plans for BOFLs are to be based on the best available science and contain specific elements that must be addressed.

The FPA applies to state forest lands as well as to other ownerships. This act declares it public policy to encourage economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species consistent with sound management of soil, air, water, fish, and wildlife resources, as well as scenic resources within visually sensitive corridors, and to ensure the continuous benefits of those resources for future generations of Oregonians. Management of the Elliott State Forest will meet or exceed the requirements of the FPA.

ODF will coordinate with the ODFW and ODA in developing plans that comply with the state ESA and that are consistent with the constitutional mandate for CSFLs.

ODF will meet the federal ESA by applying policies and guidelines that will avoid take.

Strategy 2: Provide Predictable and Dependable Products and Revenues

This FMP is designed to produce predictable and dependable forest products and revenues generated primarily through timber harvest. However, other special forest products will be marketed as well. Land uses such as easements, rights-of-way, and recreation, are acceptable as long as they do not detract from the primary revenue-generating activity.

The economic outputs from this FMP were analyzed and identified during its development to provide reliable revenues to the beneficiaries and meet the constitutional mandate to maximize revenue to the CSF. The harvest level in the FMP will be designed to meet these obligations by taking a long-term view of maintaining the productivity of the resource. By SLB and DSL policy, the forest will be managed to produce a sustainable, even-flow harvest of timber, subject to economic, environmental, and regulatory considerations. Other revenue-generating opportunities such as ecosystem services will be evaluated as they become available.

It is expected that harvest levels will vary to some degree over time, but harvest generally will be a regular and predictable amount from year to year without large variations in quantity. Factors that may affect this regular output of products and revenue include changing market conditions and their effect on the demand for forest products. It is anticipated that the greatest amount of revenue will be generated through regeneration harvesting, with thinning of both young and older stands as they become silviculturally available. When practical, high value products for specialty markets will be identified and marketed.

Strategy 3: Provide Social Benefits and Values through Forest Management

Forests can be managed to provide many social benefits. Different social values are of particular importance to various individuals and groups. This FMP will produce a variety of social benefits that include economic benefits mentioned in the two previous strategies.

Social benefits from this FMP include the production of commodities that result in a regular source of employment for the local and regional economy, products used by forest industry businesses, and revenue to support education and other public programs. These benefits will be provided through commercial timber harvest and through harvest of special forest products. Other commodities include personal use firewood valued by local residents, both for its intrinsic value and for the experience and satisfaction of collecting a renewable resource to heat their homes.

Opportunities for recreation will be made available to the public. Recreational opportunities will mainly be dispersed and undeveloped. However, ODF will cooperate with user groups and other agencies in providing recreational opportunities where compatible with other forest management activities. These may include but are not limited to hunting, trapping, angling, kayaking, hiking, off-road vehicle use, and trail biking.

Forest management that produces diverse forest conditions is also valued by many people as a social benefit. This includes plants, fish, and wildlife for hunting, trapping, and viewing, and for the pleasure of knowing that these populations and habitats exist. Clean air, water, and productive soils are highly valued. Strategies that establish and maintain properly functioning aquatic and riparian habitats will enhance fish populations that sustain recreational and commercial fisheries.

Social benefits will be provided through the implementation of the integrated strategies in this FMP. The integrated strategies specifically address the social values mentioned above. The overall integrated management is anticipated to provide a diverse forest and a level of forest products that will provide jobs and business opportunities, and contribute to a prospering economy.

These social benefits are not mutually exclusive, but are intertwined and interdependent. Producing economic benefit also produces social values and enables investments in environmental benefits. Environmental benefits help maintain the productivity of the forest and provide social benefits as well. Sustainable forest management involves consideration for all values of the forest.

Strategies for Sustainable Forest Ecosystem Management

Current landscape design methodologies incorporate site history, natural disturbance regimes, and successional processes (Diaz and Bell 1997). Hunter and Calhoun (1996) suggest that the intensity of land use varies in a continuum from no human manipulations to management so intensive that natural ecosystems are replaced by artificial or cultivated ecosystems. In what they call the triad approach, three distinct land-use types can coexist at some level within a region without compromising the goal of sustaining biological diversity. The types are: 1) intensive commodity production areas; 2) areas with little or no resource use by people except low-intensity recreation; and 3) areas in which modest resource use is allowed (maintenance of diversity and ecosystem function takes precedence over commodity production). Using examples from forest, grassland, wetland, and aquatic ecosystems, they argue that all three types of land use have validity, and that in different situations a different balance among these uses could improve resource conservation. For example, in a region where multiple use forest management is dominant, timber production could be intensified in some areas, allowing other areas to be set aside as conservation areas with no net effect on production.

These three land-use types are generally represented in this FMP by: 1) stand structure types that are managed primarily for intensive commodity production and are in early and intermediate structure stages; 2) conservation areas with little or no resource use; and 3) areas that remain in advanced structure for a period of time as a result of a sustainable harvest level. The triad concept does not suggest an equal allocation of land use types. Exact values in each sector must come from case-specific analyses (Seymour and Hunter 1999). This approach reflects the fact that not every piece of ground must function as suitable habitat at all times to maintain viable populations. On the other hand, some ecological functions must be sustained on every piece of ground, especially those related to soils, nutrient cycling, and the interactions between land and water that regulate hydrologic flows and produce clean water (e.g., in riparian habitats along perennial streams).

Sustainable forest ecosystem management will result in a range of stand structures and landscape conditions including various types of conservation areas, as described in this chapter. Some of the stands in conservation areas currently are or may eventually become old growth as that condition is defined in Chapter 4. Through implementation of this FMP, the forest will provide a steady flow of timber volume and revenue, jobs, habitats, and recreational opportunities.

The approach is based on active management, with the main emphasis on the use of sound silvicultural approaches for producing diverse habitats, forest products, and social benefits. These silvicultural practices are designed to contribute to the range of habitat types or stand structures used by native wildlife species and to enhance biodiversity. The mixture and arrangement on the landscape is expected to provide connectivity between habitats within and across the forest.

Strategy 1: Actively Manage for a Diversity of Stand Structures

The planning area will be managed to achieve a sustainable harvest level that will result in a landscape of three different stand types: early structure, intermediate structure, and advanced structure. For the purposes of this FMP, these structure types will be defined as follows (see “Concept 1: Recognize the Importance of Forest Disturbance Regimes and Stand Development Processes” in Chapter 4 for more detailed qualitative descriptions of these types and the stand development processes they represent):

	Early Structure
Tree size:	Average diameter of the largest 40 trees per acre of the new cohort, is generally less than or equal to 6 inches DBH.
Description:	The trees are seedlings or saplings, usually less than 15 years old. Herbs and shrubs are widespread and vigorous, covering 20 to 80 percent of the ground.
	Intermediate Structure
Tree size:	Average diameter is generally between 6 and 18 inches DBH, but may be larger. Tree heights generally range from 40 to 100 feet.
Description:	Trees dominate the site and form a single, main canopy layer. There may be little or no understory development, or may include the development of understory trees. Shrub and herb layers may be absent altogether or present and diverse. Generally, herbs, shrubs, and grasses may cover up to 40 percent or more of the forest floor. The stand does not have significant vertical layering of tree crowns.
	Advanced Structure
Tree size:	Trees 18 inches DBH or greater are predominant in the overstory, and trees are 100 feet or taller. Advanced structure stands have at least 20 trees per acre of 18 inches or larger DBH and 100 feet or more in height, and at least 10 of these trees are at least 24 inches DBH. Understory trees average 30 feet in height.
Snags and downed wood:	Stands usually have some snags and downed wood; amount not defined.
Layering:	Vertical layering is usually present with tree canopies having two or more layers. Often the secondary layers are of shade-tolerant species of trees. Layering may be absent in some advanced structure stands where due to past management or local conditions, only a single tree layer is present. In addition to trees, shrubs and herbaceous species can contribute to layering.
Other Characteristics:	Highly diverse stands in this structure may develop the following additional components often associated with older forests: • 8 or more live trees per acre at least 32 inches in diameter • At least 6 snags per acre, 2 of which must be at least 24 inches in diameter; the remaining 4 must be at least 12 inches in diameter • A total of 3,000 to 4,500 cubic feet of downed logs in all decay classes 1 through 5; or 600 to 900 cubic feet per acre of sound downed logs in decay classes 1 or 2 • At least one large remnant tree per five acres • Multiple tree species, including shade-tolerant species; some trees with defects or decadence; and diverse understory vegetation

Note: DBH = diameter breast height

The expected outcome of each of the three stand structures are shown in Table 5-1.

Table 5-1. Percent of the Elliott State Forest Expected in Different Stand Structures

Advanced structure	30%-50%
Intermediate structure	30%-60%
Early structure	10%-20%

The forest will have varying percentages of advanced structure as a result of the sustainable harvest level identified for implementation planning purposes and fine-filter strategies for T&E wildlife, RMA's, and steep, unique, or visual lands (SUV's), with an expected result of 30 to 50 percent advanced structure across the forest. The following techniques, among others, are expected to result in the above percentage range of advanced structure:

- In some conservation areas, allow stands to maintain or develop into advanced structure with little management
- Partial cuts to maintain or enhance tree growth and diversity of vegetative communities
- Regeneration harvests in both intermediate and advanced structures to achieve a sustainable harvest level.

Over time, the configuration of stand structures will change across the landscape as early and intermediate structure stands mature and some advanced structure stands are harvested and regenerated. Specific decisions on the location and arrangement of stands will be made through the district implementation planning process.

In addition to the expected ranges of early, intermediate, and advanced stand structure types, the following elements of stand structure will be retained and/or promoted.

Remnant Old Growth

Consistent with the definition for old growth in Chapter 4, remnant old-growth stands are defined for this FMP as stands that are over 20 acres in size and are at least 175 years of age as of 2010. These stands have been identified on the forest and occur as small isolated patches. Because the occurrence is limited, the ODF will retain the identified remnant old-growth stands to provide this element of diversity for the length of this FMP.

Species Composition

Under this FMP, the strategy for hardwoods is to retain approximately the same amount and species composition as existed in the forest at first implementation of this FMP. Approximately 10 percent of the Elliott State Forest is in hardwood stands, defined as stands with at least a 70 percent hardwood canopy. A significant hardwood component will be located in riparian conservation areas and in other areas of the forest. In addition, hardwoods will be retained as an important component of live tree retention, with a particular emphasis on the less abundant myrtle and bigleaf maple, which are especially important to wildlife. In addition, a certain amount of red alder that exists in current plantations and that will seed into new regeneration harvests will be retained in these stands.

Multi-Layered Forest Canopies

Forest canopies that have multiple layers are associated with habitats for a variety of wildlife species. In this FMP, the definition for advanced structure includes criteria for multiple canopy layers of both trees and shrubs. Management of stands in some conservation areas will result in the development of multi-layered tree canopies.

Herbs and Shrubs

Herbs and shrubs are important components of forest habitats in all structural stages for many species of wildlife. Development of multiple layers of vegetation will increase the amount of vertical diversity in the stand, and provide additional habitat niches that can support increasing numbers of wildlife species. Management of forest stands in some conservation areas will result in the light and other characteristics needed for development of diverse layers of native herbs and shrubs.

Gaps

A within-stand gap is an interruption in the continuity of the vegetative community in a stand. In most cases, such gaps are considered to be small openings (one-half acre to two acres) where herbs, shrubs, and new trees are being established within larger stands where the dominant feature is an overstory tree canopy.

These within-stand gaps provide horizontal diversity to a stand, compared to the vertical diversity provided primarily by canopy layering. Forest stands in some conservation areas may develop the processes that lead to gap formation, such as windthrow, insects, and disease.

Strategy 2: Manage Conservation Areas to Protect Special Resources and Avoid Take of T&E Species

Conservation areas will be managed to provide protection to key forest resources, particularly riparian areas, SUV's, and to avoid take of threatened and endangered species - primarily northern spotted owls and marbled murrelets. In addition, conservation areas may fulfill other functions on the landscape, such as:

- Offering benefits to other species using these habitats, especially those using late successional habitats
- Providing stepping stones of advanced structure between late-successional reserves on adjacent federal forest lands
- Maintaining unique or special habitats not necessarily associated with federally listed species
- Contributing to diverse forest conditions on the landscape

Some active management will occur within conservation areas. Activities related to forest management that are expected to occur include harvest activities when northern spotted owl or marbled murrelet areas become historic or when northern spotted owl areas have sufficient habitat to allow harvest, vehicle traffic on forest roads, wildfire suppression and control, road maintenance, road construction, harvest unit guylines or tailholds, stream rehabilitation work, stream survey work, and animal survey work. Removal of trees or snags for safety reasons may also occur in some circumstances, such as when a dead tree is leaning over a forest road. In addition, management activities that further the purpose of the conservation area may be allowed in some areas, such as management to attain mature forest conditions along streams and to maintain forest health in steep, unique or visual areas.

When large-scale disturbance events occur, such as severe fire or insect and disease outbreaks, conservation areas will be evaluated through an adaptive management process to determine if they can still function for their intended purpose. Active management, including salvage, may be applied if the evaluation indicates that the conservation area is no longer serving its original purpose.

Types of Conservation Areas

Conservation areas serve different purposes, as described below.

Marbled Murrelet Management Areas (MMMAs), Northern Spotted Owl Circles

These conservation areas are designed to protect specific wildlife habitat to avoid "take" of T&E species associated with advanced structure conditions (i.e., northern spotted owl, marbled murrelet). In some cases, MMMAs and owl circles are part of, or next to, existing SUVs. Protocol surveys will be used to determine the location of MMMAs and owl circles. MMMAs and owl circles may change in number, location, or size over time as results of protocol surveys become available. MMMA’s and owl circles will be managed in accordance with State Forests Division take avoidance policies.

Steep, Unique, and Visual Lands —SUV conservation areas include lands where little management is expected for reasons that may not be associated directly with sites used by T&E species. These lands are termed steep, unique, or visual, and are described in more detail below. Although they are not specific to wildlife habitats, these lands can provide valuable wildlife habitats in addition to their primary function.

Steep, unique, and visual lands include:

- Areas almost exclusively associated with the steep, rocky slopes on either side of major rivers or streams, including the Umpqua River, Mill Creek, and the West Fork Millicoma River. These protected corridors vary from 1,000 to 4,000 feet in width. Slopes affected by public safety considerations fall within this category.
- Areas classified as non-silviculturally capable because they are rocky, boggy or covered by water, or for various other reasons have little to no commercial value for timber production. Currently, the Elliott State Forest has a few parcels of rocky or swampy lands scattered throughout the forest. Most parcels are less than five acres, though a few are as large as 20 acres.
- Areas where scenic values are the primary values to be maintained, including areas buffering recreational areas, highway corridors, river corridors, lakeshores, and other scenic attractions.
- Areas that ODF has determined to be uncommon or unique, such as;
    - **Old-growth stands—**This category includes stands over 175 years of age as of 2010. These old growth stands are rare in the Elliott State Forest because of its fire history. Some of these stands are located in MMMAs and owl circles; however, a few old-growth stands are not known to have resident northern spotted owls or marbled murrelets, and thus are classified as unique habitat.
    - **Unique forest types—**Two areas contain forest vegetation types that are uncommon on the Elliott State Forest, a pure stand of myrtle along Murphy Creek within the Big Creek Basin and a stand of bottomland hardwoods dominated by big-leaf maple in the Ash Valley Basin.

Timber harvest may take place if compatible with resource values in these areas; however, little active management is expected other than to ensure public safety.

In addition to their primary functions SUVs may fulfill other functions on the landscape. For example:

- Provide benefits to other species using these habitats, especially those using late-successional habitats
- Provide patches of advanced structure between late-successional reserves on adjacent federal forest lands (“stepping stones”)

- Maintain unique or special habitats not necessarily associated with federally listed species
- Contribute to diverse forest conditions on the landscape

Riparian Management Areas, Stream Bank and Inner Zones—RMAs function to protect streams and riparian areas from disturbance; filter sediment from uplands; and supply food, cover, shade, and large wood. Riparian corridors provide diverse habitats and connectivity throughout the stream network of a watershed. Within 25 feet of either side of fish-bearing and large and medium non-fish-bearing stream channels (stream bank zone), no management activities are allowed. Outside this area to 100 feet (inner zone), the forest will be managed to develop or maintain mature forest conditions. No harvest will occur within these inner zones, except as necessary to facilitate the establishment of mature forest conditions. Other activities expected to occur in the stream bank or inner zone include cable yarding corridors, traffic, and maintenance on existing roads, wildfire suppression and control, fish and wildlife enhancement projects, and fish and wildlife survey work.

See Strategy 5 under “Sustainable Forest Ecosystem Management” for more details on RMAs, including zone definitions and activities associated with non-fish bearing streams.

Strategy 3: Actively Manage to Provide Key Legacy Structural Components

This strategy presents approaches for managing the structural components listed below.

- Live trees
- Snags
- Downed wood

Although these approaches were developed specifically for retention in clearcut harvest units, retention of these structures in all stand structure types provides valuable wildlife habitat and other ecological values. Individual stands may exceed or fall below these standards; however, it is expected that harvested stands on average will meet these structural retention standards for a given AOP. Appendix C describes the concepts behind these strategies and provides a rationale for the targets and ranges in this FMP.

It is expected that structural components will be retained at the desired levels during any management activities, unless they create clear safety or fire hazards, or if their retention would result in unacceptable additional operational difficulties, environmental hazards, or threats to public improvements. The following guidelines will govern special circumstances affecting retention of the structural components:

Guidelines for Special Circumstances

- **Safety Concerns—**Where retention would constitute a significant safety hazard or result in a violation of state or federal law, individual trees or snags may be removed.
- **Pest Management Concerns—**Where retention would constitute a significant threat to surrounding stands because of the presence of insect or disease agents, individual trees or snags may be removed. The ODF forest entomologist or forest pathologist will be consulted in making the determination of significant threat.
- **Severe Operational Concerns—**Where retention would result in impacts on the ability of the ODF to protect other key resources identified in this FMP, individual trees or snags may be removed.
- **Salvage—**Salvage refers to the harvest of trees that have died, are dying, blown down, or are hazardous to public safety. The age and size of salvaged trees may vary. Trees may be salvaged individually or in larger parcels, depending on the cause and extent of the damaging agent. The economic return and the benefits of leaving all or a portion of the dead trees on an area are weighed when considering salvage operations. In the event of a major fire, windstorm, or other catastrophic disturbance, prompt salvage operations will be conducted to prevent build-up of epidemic insect populations, and to minimize economic loss. The same retention guidelines will be used as for other harvest operations. In the absence of a

catastrophic disturbance, it is unlikely that significant amounts of salvage will occur.

Structural Component Standards

Strategies 3a through 3c address standards for retention of structural components in clearcut units. These standards will be met outside of the streambank and inner zones of Type F and large or medium Type N streams in the harvest unit. Individual stands may exceed or fall below these standards; however, it is expected that harvested stands on average will meet these structural retention standards for a given AOP.

Strategy 3a. Live Tree Retention

- Retain 2 to 4 live trees per acre.
- Ensure that retained trees are larger trees, in general greater than or equal to the stand's average diameter breast height (DBH).
- Retain minor species (conifer or hardwood) of any diameter as part of or in addition to this target where operationally feasible and practical.
- To address the needs of a broader variety of wildlife species, retain at least 25 percent of the leave trees required to meet the standard in upslope areas or in RMAs that extend well into upslope areas.

Guidelines for Live Tree Retention

Live trees will be retained to meet the short-term habitat needs of species, to serve as a source of future snags and downed wood, and to provide legacy trees in future stands. Legacy trees are living trees that are carried forward into a new stand following disturbance, with the intent that most will persist through future rotations. In the long term, legacy structures will be present in all stand types.

- Consider a variety of types of live trees for retention, including:
    - Larger trees (trees that exceed the mean DBH of the stand)
    - Defective trees, such as broken or multiple topped, damaged, diseased, or other deformed live trees
    - Sound, healthy trees with good crowns
    - Hardwood or conifer species other than Douglas fir
- Trees may be retained in a variety of arrangements throughout each harvest unit, including uniform or random distributions as well as dispersed clumps.
- Trees may be retained at higher levels in some units, and lower levels in others, with the intent of achieving the average for all regeneration harvest units in a given AOP. Considerations include providing potential recruitment for snags or downed wood where these structural elements fall short. For example, if insufficient hard snags are available, more live trees should be left.

Strategy 3b. Retain Existing Snags of All Decay Classes Where Operationally Feasible During Harvest Activities

- Retain at least three hard snags per acre (decay class 1 or 2) at least 15 inches or larger DBH.
- If fewer than three hard snags per acre exist after harvest, create one snag per two acres, using live trees larger than 20 inches DBH.
- When the average DBH of the trees to be harvested is less than 20 inches, snag creation is not required.

Guidelines for Snag Management

Snags will be provided to meet the habitat needs of cavity-using species and to serve as a source of future downed wood. Management will be designed to provide snags within all stand types through time, through a combination of existing snag retention, natural mortality in maturing stands, and artificial creation.

- Snags should be retained in a variety of arrangements. Uniform or random distributions as well as dispersed clumping will be used to provide for a variety of habitat and predator/prey conditions. Some snags should be left on or near ridgetops when possible and practical.

Strategy 3c. Retain Existing Downed Wood of All Decay Classes Where Operationally Feasible During Harvest Activities

- Retain an average of 300 to 600 cubic feet per acre of hard logs (decay class 1 or 2), with the minimum volume of 20 cubic feet for any individual piece.
- When available, at least two logs per acre must meet or exceed 26-inch diameter at the large end.
- At least 50 percent of volume should be conifer logs.

The following exceptions to the standards above apply when the average DBH of the trees to be harvested is less than 20 inches:

- Retain an average of three to six logs per acre (decay class 1 or 2), with the minimum volume of 20 cubic feet for any individual piece.
- At least 50 percent of volume should be conifer logs.

Guidelines for Downed Wood Management

Downed wood will be provided to meet the habitat needs of wildlife species, provide for other key ecosystem functions, and provide the structural legacy necessary for advanced structure development. Achieving the downed wood component often requires a significant amount of time (many decades), especially in areas where existing stands are deficient in this material. Management will be designed to provide downed wood within all stand structures through time, through a combination of existing downed wood retention, natural mortality in maturing stands, and artificial creation. Large-diameter logs (greater than 26 inches) are an important component of advanced structure; because larger logs decompose more slowly, large logs placed during regeneration harvests will contribute to downed wood needs into the future.

- Retain downed wood in a variety of arrangements within individual harvest units. Uniform or random distributions as well as dispersed clumping should be used to provide for a variety of habitat conditions.
- Retain a portion of the downed wood when salvaging windthrow and other dead timber.
- Retain live trees and snags to provide for downed wood contributions through the course of forest development during the life of each stand.
- Retain and, where necessary, provide for the supply of downed wood at the time of partial cut harvests to supplement downed wood in more developed structure stands.

Strategy 4: Actively Manage for a Diverse and Healthy Ecosystem Applying the Principles of Integrated Pest Management

Strategy 4a. Actively Manage the Forest to Maintain or Improve Forest Health

The most effective way to maintain or improve forest health is through active management of stands. Generally, management activities are intended to promote tree vigor, keep pest populations and damage within desired levels, encourage biodiversity, and provide long-term productivity. Active management for forest health may include the following strategies:

- Maintain appropriate stocking levels through thinning.
- Favor appropriate tree species.
- Optimize the natural influences of pathogens and insects on trees and stands to create desired conditions.
- Maintain a diversity of tree species.
- Optimize genetic variation within tree species.
- Plant seedlings that are well-suited to the site and avoid unnecessary planting stress.
- Prevent buildups of pest populations through sanitation, salvage, and the use of repellents.
- Maintain healthy RMAs.
- Minimize injury to trees during stand management activities.
- Avoid damage to soils.
- Maintain and create snags to provide habitat for cavity-nesting species of birds which also serve as predators of many forest insect pests

Strategy 4b. Detect and Monitor Pest Populations, Damage Levels, and Trends

A critical step in forest health management is describing the extent, distribution, and severity of damage caused by major forest pests. Conducting monitoring activities over time allows for the description of changes in forest condition and helps evaluate the effectiveness of management. See the discussion of monitoring under “Adaptive Forest Resource Management” in Chapter 7. Several techniques applied in monitoring and detection of forest pests are listed below.

- Aerial surveys
- Ground surveys
- Stand exams/resource inventories
- Trapping for insect pests, including exotic pest introductions
- GIS for long-term tracking
- Participation and coordination with the national Forest Health Monitoring Program

Strategy 4c. Use the IPM Process to Implement Suppression or Prevention Actions when Pest Populations or Damage Exceed Acceptable Levels

The Insect and Disease Control Law (ORS 527.310 to 527.370) states that the State Forester shall implement the IPM process (described in ORS 634.122) on state forests. IPM is not a strategy per se, but a coordinated decision-making process that uses the most appropriate of all reasonably available means to minimize the effect of forest pests in an environmentally sound manner to meet site-specific management objectives. The steps in the process are listed below.

- Define the management unit.
- Define the site-specific management objectives.
- Establish detection and monitoring systems for pests or damage.
- Evaluate pest conditions in the management unit.
- Establish pest population or damage thresholds, and take action when exceeded or where historical documentation has verified a recurring problem.
- Develop potential strategies and evaluate them with the following criteria: effectiveness, operational feasibility, cost-effectiveness, ecological soundness, environmental impact, and management objectives for the site.
- Implement the selected strategy.
- Monitor and evaluate results of the activity.
- Maintain current and accurate records.
- Structure the program so it can be adjusted to accommodate changes or varying situations.

Strategy 4d. Assess and Manage Forest Genetic Resources

Many planted forest stands in Oregon pre-date current scientific understanding about the importance of seed source. Data from long-term genetic field trials demonstrate that poorly adapted Douglas-fir seed sources can yield poor survival, slow growth, and susceptibility to many pathogens (Silen 1996). Future climate conditions are a new and emerging source of interest in managing forest genetic resources. An assessment of older planted or seeded forest stands in state forests may be conducted, and will include an evaluation of forest health indicators to determine if stands are growing to expectations. Stands that are at high risk can be considered for earlier harvest.

Reforestation projects on the Elliott State Forest will take advantage of the highest quality seed to assure that forest trees and forest stands are well-adapted to planting locations and are capable of growing vigorously with resilience to forest health threats and the variety of possible future climate conditions. Subject to funding, the ODF is also involved in genetic improvement that includes testing and selecting for favorable characteristics that improve forest genetic resources.

Strategy 4e. Implement Strategic Plans to Address Insect and Disease Outbreaks

These strategic plans may include specific strategies developed to address diseases such as Swiss needle cast, sudden oak death, root rot or other diseases, or plans to address significant insect infestation problems.

Strategy 4f. Participate in Research and Cooperative Programs That Align with Elliott State Forest Management Objectives, to Improve Knowledge and Actively Enhance Forest Health and Biodiversity

Often, forest health problems are best investigated through a structured and credible research effort. By cooperating in research projects, the ODF can assure that results will be applicable to state forest lands. Some current examples include the Swiss Needle Cast Cooperative and the Regional Forest Gene Conservation Program. Participation in these types of programs is subject to available funding.

Strategy 4g. Cooperate with Other Agencies and Associations to Prevent the Introduction of Non-native Pests

There is increased potential for the introduction of exotic forest pests in western Oregon with the recent increase in international trade of wood and other products. The ODF supports regulatory and monitoring efforts coordinated by the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) and the ODA. If a new pest is introduced, the ODF will participate in interagency eradication efforts if necessary and subject to funding.

Strategy 5: Manage Aquatic and Riparian Systems

The landscape-level component of the aquatic and riparian strategies consists of the sustainable forest ecosystem management strategies described earlier in this chapter. Over time, the application of these strategies is intended to create forest conditions that will emulate historic conditions and processes relative to aquatic systems.

The second component of these strategies is a set of more site-specific or prescriptive strategies designed to protect key resource elements or provide for specific functional elements.

Finally, critical to the evaluation and refinement of management is watershed analysis. Watershed analysis is a strategy designed to collect and synthesize key watershed information that will be used to further evaluate the two components listed above.

In addition to the larger spatial-scale strategies, the strategies for aquatic and riparian systems are as follows:

- Use watershed analysis to inform management decisions.
- Apply management standards for aquatic and RMAs.
- Maintain or improve aquatic habitats.
- In special circumstances, apply alternative vegetation treatment to achieve habitat objectives in riparian areas.
- Apply specific strategies to other aquatic habitats: wetlands, lakes, ponds, bogs, seeps, and springs.
- Manage slope stability.
- Manage forest roads.

Strategy 5a. Use Watershed Analysis to Inform Management Decisions

A watershed analysis for the Elliott State Forest was completed in October 2003 (Oregon Department of Forestry 2003). The purpose of the watershed analysis is to measure current resources and improve the understanding of natural processes that influence fish habitat, wildlife habitat, and water resources throughout the Elliott State Forest. Consequences of human activities on these resources are also addressed through the analysis. Using current inventories of the forest, or those that could be extrapolated from studies conducted on similar areas, the analysis may be applied to, but not limited to:

- Developing a revised FMP;
- Implementation planning;
- Annual operational planning;

- Total maximum daily load studies;
- Restoration activities;
- Public education and outreach; and
- Long-term resource monitoring

The analysis is based on protocols suited to Elliott State Forest management needs, using the Oregon Watershed Enhancement Board manual and protocols as a foundation. The protocols were adjusted to include more rigorous information collection procedures for specific information "modules" based on forest management topics.

Information in the watershed analysis is being considered and, as appropriate, applied through IPs. This current watershed analysis will be supplemented with additional resource information as data on the watershed processes and interactions on the Elliott State Forest become available through future management activities and planning efforts.

Strategy 5b. Apply Management Strategies for Aquatic and Riparian Areas

Establish and maintain riparian management areas adjacent to all streams, in accordance with the standards and guidelines described below.

More site-specific prescriptive standards for aquatic and riparian areas constitute a key piece of the second tier of the balanced approach, and will guide forest management activities to achieve properly functioning aquatic and riparian habitat conditions over time. All management actions will be consistent with these standards.

The standards will be applied until the adaptive management process results in identification of alternative strategies or standards that better meet the objectives for aquatic and riparian habitats. As new information and a better understanding of the watershed functions and processes become available, this knowledge will be integrated into the management of riparian and aquatic habitat.

The management standards include specific provisions for establishing RMAs, and describe how management is to occur within these areas. Management will not occur within 100 feet of all Fish and Large and Medium Non-fish streams that already have mature forest conditions. Additional trees will be left beyond 100 feet to comply with all leave tree requirements for the full riparian management area. In general this will result in at least 100 foot no-harvest zones along all Fish and Large and Medium Non-fish streams when mature forest conditions exist. RMAs will be established immediately adjacent to waterways for the purpose of protecting aquatic and riparian systems, and maintaining the functions and ecological processes of the waterways. Within these areas, special management considerations and operational restrictions will be applied, and the protection of aquatic resources will be a high priority.

The width and leave-tree requirements of RMAs will vary by the type and classification of the water body. These widths were developed by considering the functions and processes to be achieved or maintained by management activities. The width of an RMA is measured horizontally, beginning at the average high water level of the water body, or the edge of stream-associated wetland, side channel, or channel migration zone (whichever is farthest from the waterway), and extending toward the uplands. The width of these areas will be expanded, if necessary, to fully encompass certain sensitive sites such as seeps, waterfalls, or other special sites noted in the management prescriptions.

RMA widths are intended to be averages applied over the length of a management site. The actual extent of a specific RMA can be varied to tailor vegetation retention to site-specific conditions, or to address special resource considerations. For example, an RMA boundary may be expanded where a potentially unstable slope adjacent to a stream could deliver materials to the stream. The intent of this action is to increase the potential for large wood delivery should a disturbance event occur. Variations in RMA design will always be completed in a manner consistent with the management objectives for the specific aquatic or riparian area.

See “Concept 5: Maintain and Enhance Properly Functioning Aquatic Systems” in Chapter 4 for related discussion and definitions of terms used in this strategy. See Tables 5-2 and 5-3 for the specific management standards that will be applied in these areas.

Guidelines: The Four Zones of a Stream Riparian Management Area

RMAs established along streams will contain four zones. The purposes of, and differences between, these four zones are explained below.

Aquatic Zone—The aquatic zone is the area that includes the stream channel(s) and associated aquatic habitat features. This zone includes beaver ponds, stream-associated wetlands, side channels, and the channel migration zone. The other zones of a RMA are established upslope from the outer edge of these features.

Stream Bank Zone—The stream bank zone is the land closest to the stream, including the stream banks. Most riparian functions are supported to some extent by vegetation in this zone, including providing aquatic shade, delivering downed wood and organic inputs (leaves and tree litter) to the stream and riparian area, stabilizing the stream bank, contributing to floodplain functions, and influencing sediment routing processes.

- The stream bank zone is the area within 25 feet of the outer edge of the aquatic zone for all streams. This zone exists on both sides of a stream.

Table 5-2. Management Standards for Type F Stream RMAs

	All Stream Sizes: Large, Medium, and Small
Stream bank zone 0 to 25 feet	• No harvest • Less than 10 percent vegetative disturbance • Full suspension required during cable yarding • No ground-based equipment operation • Leave any trees damaged or felled from yarding activities
Inner RMA zone 25 to 100 feet	• Manage for mature forest condition[1] • No management activity where mature forest condition exists, or where conditions are suitable for development of mature forest condition in a reasonable time frame without further treatment • Actively manage where necessary to achieve the desired condition in a timely manner • Minimum 15-year interval between harvest entries, and minimum number of entries necessary to achieve the desired condition • Partial cutting will maintain a conifer density of at least 25 relative density, and will retain at least 50 trees per acre • No more than 10 percent vegetative disturbance allowed from cable yarding • Full suspension wherever possible, or one-end suspension on all cable-yarded material • Ground-based equipment operation limited to area more than 50 feet from aquatic zone and slopes less than 35 percent, and allowed on no more than 10 percent of area • Leave any trees damaged or felled from yarding activities and additional felled, girdled, or topped trees to contribute toward downed wood targets[2] • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Retain at least 10 to 45[3] conifer trees and snags per acre (15 to 70 trees per 1,000 feet of RMA)[4] • Retain all snags as safety permits • Less than 10 percent ground disturbance from yarding activities • Retain all dead and downed material that was present prior to the operation

[1] Desired mature forest condition consists of a stand dominated by large conifer trees, or where hardwood-dominated conditions are expected to be the natural plant community (a mature hardwood/shrub community). For conifer stands, this equates to a basal area of 220 square feet or more per acre, inclusive of all conifers over 11 inches DBH. At a mature age (80 to 100 years or greater), this equals 40 to 45 conifer trees 32 inches in DBH per acre.

[2] Up to ten trees per acre will be retained as felled, girdled, or topped trees during partial cutting, to reach a target of 600 to 900 cubic feet per acre of hard downed wood.

[3] Outer zone tree retention target will be increased when less than the target number of conifers is present in the inner zone. The process for calculating the outer zone retention target is described in the section following the RMA prescription tables.

[4] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

Table 5-3. Management Standards for Type N Stream RMAs

Large and Medium Type N Streams	
Stream bank zone 0 to 25 feet	• No harvest • Less than 10 percent vegetative disturbance • Full suspension required • No ground-based equipment operation • Leave any trees damaged or felled from yarding activities
Inner RMA zone 25 to 100 feet	• Manage for mature forest condition[1] • No management activity where mature forest condition target already exists • Actively manage where beneficial to achieve mature forest condition • Minimum 15-year interval between harvest entries, and minimum number of entries necessary to achieve the desired condition • Partial cutting will maintain a conifer density of at least 25 relative density, and will retain at least 50 trees per acre • No more than 10 percent vegetative disturbance allowed from cable yarding • Full suspension wherever possible, or one-end suspension on all cable-yarded material • Ground-based equipment operation limited to area more than 50 feet from aquatic zone and slopes less than 35 percent, and allowed on no more than 10 percent of area • Leave any trees damaged or felled from yarding activities and additional felled, girdled, or topped trees to contribute to downed wood targets[2] • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Manage to retain at least 10 conifer trees and snags per acre (15 trees per 1,000 feet of RMA)[3] • Retain all snags as safety permits

[1] Desired mature forest condition consists of a stand dominated by large conifer trees, or where hardwood-dominated conditions are expected to be the natural plant community (a mature hardwood/shrub community). For conifer stands, this equates to a basal area of 220 square feet or more per acre, inclusive of all conifers over 11 inches DBH. At a mature age (80 to 100 years or greater), this equals 40 to 45 conifer trees 32 inches in DBH per acre.

[2] Up to ten trees per acre will be retained as felled, girdled, or topped trees during partial cutting, to reach a target of 600 to 900 cubic feet per acre of hard downed wood.

[3] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

Table 5-3 continued. Management Standards for Type N Stream RMAs

Small Perennial Type N Streams (applied to at least 75 percent of reach)[1]	
Stream bank zone 0 to 25 feet	• No harvest • No ground-based equipment operation
Inner RMA zone 25 to 100 feet	• Manage to retain at least 15 to 25 conifer trees and snags per acre (25 to 40 trees per 1,000 feet of RMA)[2,3] • Retain all other snags as safety permits • Within 500 feet of a confluence with a Type F stream, retain all hardwoods, non-merchantable trees, and other conifers as necessary, to achieve 80 percent shade over aquatic zone • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Manage to retain 0 to 10 conifer trees and snags per acre (0 to 15 trees per 1,000 feet of RMA)[2,3] • Retain all snags as safety permits
Small Seasonal Type N Streams: High Energy Reaches (applied to at least 75 percent of reach)[1]	
Stream bank zone 0 to 25 feet	• No harvest • No ground-based equipment operation
Inner RMA zone 25 to 100 feet	• Manage to retain at least 15 to 25 conifer trees and snags per acre (25 to 40 trees per 1,000 feet of RMA)[2,3] • Retain all other snags as safety permits • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Manage to retain 0 to 10 conifer trees and snags per acre (0 to 15 trees per 1,000 feet of RMA)[2,3] • Retain all snags as safety permits

[1] Prescription to be applied to at least 75 percent of perennial stream reach, including the first 500 feet above the confluence with a Type F, and areas that meet the definition of a Special Emphasis Area according to the definitions in the section following these tables.

[2] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

[3] In meeting the tree retention target for the inner and outer zones, preference will be given to retaining trees within the inner zone. Where there are sufficient trees within the inner zone to meet the combined target for the two zones (40 trees per 1,000 feet), no additional leave trees are required in the outer zone.

Table 5-3 continued. Management Standards for Type N Stream RMAs

Small Seasonal Type N Streams: Potential Debris Flow Track Reaches (applied to at least 75 percent of reach)[1]	
Stream bank zone 0 to 25 feet	• No harvest • No ground-based equipment operation
Inner RMA zone 25 to100 feet	• Manage to retain at least 10 conifer trees and snags per acre (15 trees per 1,000 feet. of RMA)[2,4] • Retain all other snags as safety permits • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to160 feet	• Retain trees and snags sufficient to meet legacy structure targets
Other Small Seasonal Type N Streams (applied to at least 75 percent of reach)	
Stream bank zone 0 to25 feet	• Maintain integrity of stream channel • No ground-based equipment operation
Inner RMA zone 25 to100 feet	• Manage to retain at least 10 conifer trees and snags per acre where operationally feasible (15 trees per 1,000 feet of RMA)[2] • Retain all other snags as safety permits • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to160 feet	• Retain trees and snags sufficient to meet legacy structure targets

[1] Prescription to be applied to at least 75 percent of stream reach, including the first 500 feet above the confluence with a Type F stream.

[2] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

[3] In meeting the tree retention target for the inner and outer zones, preference will be given to retaining trees within the inner zone. Where there are sufficient trees within the inner zone to meet the combined target for the two zones (40 trees per 1,000 feet), no additional leave trees are required in the outer zone.

[4] To maximize the influence of retained trees on debris flow processes, preference will be given to retaining these trees as close to the stream channel as operationally feasible, or on adjacent slope features that exhibit a high potential for failure and delivery to the stream.

Inner RMA Zone—The inner RMA zone is the next area away from the stream, adjacent to the stream bank zone. Vegetation within this zone contributes substantially to desired riparian functions, including providing aquatic shade, delivering a greater proportion of the potential large wood available, and contributing organic inputs to the stream. Vegetation within this area also provides some protection to certain aspects of riparian micro-climate. Because vegetation in this zone has a relatively greater role in supporting riparian functions and processes, a high priority is placed on management decisions in this area. If the inner zones of Type F and Large and Medium Type N streams have mature forest conditions then no management will take place in this zone.

- The inner RMA zone extends from 25 feet (the outer edge of the stream bank zone) to 100 feet from the stream. This zone exists on both sides of a stream.

Outer RMA Zone—The outer RMA zone is the portion of the RMA farthest from the stream. Vegetation within this zone may still contribute to certain riparian functions and processes, but to a lesser extent than the two zones closest to the stream. The primary functions provided by vegetation in this area include additional contributions of large wood to the riparian zone and stream channel, and the protection of riparian micro-climate. In some cases, the outer zone may also partially buffer the two inner zones from certain disturbance events such as windthrow.

- The outer RMA zone extends from the edge of the inner zone at 100 feet out to 160 feet from the stream. This zone exists on both sides of a stream.

Guidelines: Stream Classification

Determination of the applicable management standards for riparian areas is based on a stream classification system. Streams are grouped into two major categories based on the primary beneficial uses of the stream. Streams are further classified according to size, based on average annual flow. Flow pattern (perennial and seasonal) is also considered for small non-fish-bearing waters. This classification system is generally consistent with the method used for administration of the FPA, as described in the ODF's Forest Practice Technical Note 1—Stream Classification (Oregon Department of Forestry 1994b).

Beneficial Use Classifications

Streams and other aquatic habitats are classified into two major groups based on the presence or absence of certain fish species. The following definitions will be applied in classifying streams.

- **Fish-bearing (Type F)—**Waters that are inhabited at any time of the year by anadromous or game fish species, or by fish species that are listed as threatened or endangered under either federal or state ESAs.

- **Non-fish-bearing (Type N)—**Waters that are not fish-bearing (see previous definition).

Stream Size Classifications

Streams are further classified by size, based on estimated average annual flow. The following definitions apply to these size categories.

- **Small—**Average annual flow of two cubic feet per second (cfs) or less.
- **Medium—**Average annual flow greater than two cfs, but less than ten cfs.
- **Large—**Average annual flow of ten cfs or greater.

Flow Pattern Classifications

Small non-fish-bearing (Type N) streams are also classified according to the flow pattern exhibited in normal water years. For the purposes of this FMP, the following definitions will be used.

- **Perennial Type N Streams—**Streams that are expected to have summer surface flow after July 15.
- **Seasonal Type N Streams—**Streams that only flow during portions of the year; these streams are not expected to have summer surface flow after July 15.

Some seasonal non-fish-bearing streams are further classified as:

- **Seasonal High Energy Streams—**Seasonal streams with physical conditions that favor the periodic transport of coarse sediments and wood during high-flow events. For the purposes of this FMP, and in the absence of specific geomorphologic identification, stream reaches with an average gradient exceeding 15 percent, and an active channel width of five feet or more will be defined as seasonal high energy streams.
- **Potential Debris Flow Track Reaches—**Potential channelized debris flow track reaches are reaches on seasonal Type N streams that have been determined to have a high likelihood of delivering wood to a Type F stream.

The ODF field staff will make the determination of the likelihood that a reach will deliver wood to a Type F stream via a channelized debris flow, using the following criteria:

- The high landslide hazard location must be capable, due to topographic characteristics, of delivering to the seasonal stream reach. High landslide hazard locations include:
    - Active landslides (slopes with tension cracks, unvegetated soil scarps, or jackstrawed trees caused by slope movement)
    - Slopes steeper than 75 percent, excluding competent rock outcrops
    - Headwalls or draws steeper than 65 percent
    - Any other site determined to be of marginal stability by an ODF geotechnical specialist

- The path of a potential channelized debris flow and the likelihood that a debris flow will reach a Type F stream. If any one of the following conditions is present along the path from the high-risk site to the Type F stream, a debris flow is likely to stop and the stream reach would be determined to have a low probability of wood delivery to the Type F stream (Benda and Cundy 1990):
    - The presence of a channel junction that is 70 degrees horizontal or more, provided the channel downstream of the junction is less than 35 percent gradient
    - The presence of a stream reach that is less than six percent gradient for at least 300 feet
    - The stream channel is unconfined
    - Other characteristics that, in the judgment of the geotechnical specialist, are likely to cause debris flow deposition

Management Standards for Riparian Management Areas

If the inner zones of Type F and Large and Medium Type N have mature forest conditions then no management will take place within Inner Zones. If mature forest conditions do not exist and forest management would expedite the development of mature forest conditions, then the following standards will guide management activities so that properly functioning riparian and aquatic conditions will be created over time. These standards will apply until alternative standards are identified through the adaptive management process. As new information and a better understanding of the watershed functions and processes become available, this knowledge will be integrated into the management of riparian and aquatic habitat through the adaptive management process. The management standards are presented in Tables 5-2 and 5-3.

Increasing Outer Zone Conifer Retention on Type F Streams

On Type F streams, in situations where the number of conifers available for retention within the inner zone is not adequate to achieve the large wood delivery potential of a mature forest condition, additional conifers will be retained in the outer zone to provide additional large wood recruitment potential.

This additional outer zone target will apply when the number of conifers of suitable size (11 inches or greater DBH) in the inner zone is less than the mature forest condition target of 45 trees per acre (100 trees per 1,000 lineal feet of stream for a 100-foot inner zone).

The number of additional conifers to be retained in the outer zone will be equal to the deficit from the inner zone target, adjusted to account for the different widths of the zones. For example, if the inner zone has an average of 70 suitable conifers per 1,000 feet of stream, then the additional retention level for the outer zone would equal 30 times 0.7, or an additional 21 conifers per 1,000 feet of outer zone.

In no case shall the number of conifers required to be retained in the outer zone exceed the inner zone target for mature forest condition. This means that no more than 70 conifers per 1,000 feet of outer zone, or 45 trees per acre, are required. In addition, no trees shall be required to be retained in the outer zone in locations where, because of topography, they would have no opportunity to reach the area within the channel migration zone and thus potentially function as large wood in the stream channel. All conifers retained under this strategy shall meet the conifer retention criteria as described in footnotes to Tables 5-2 and 5-3: dominant or co-dominant trees, with preference given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

Perennial Type N Stream Special Emphasis Areas

On small Type N streams, the required RMAs will be located to provide protection to the following special emphasis areas. These special emphasis areas may be especially important to certain species (such as amphibians), or to the functions and processes within a watershed.

Seeps and Springs in Inner Riparian Management Area Zone, Connected to Aquatic Zone

The 25-foot stream bank zone of the stream, which is the no-harvest zone, will be extended around the outer perimeter of side slope seeps and springs that are within 100 feet of the aquatic zone and connected to the channel via overland flow. The inner zone will follow that boundary.

Source Areas of Perennial Streams

The 25-foot stream bank zone, which is the no-harvest zone, will be extended for a distance of 100 feet above the initiation point of perennial flow.

Stream-Associated Wetlands

The 25-foot stream bank zone, which is the no-harvest zone, will be extended around the outer perimeter of the wetland area.

Stream Junctions

The 25-foot stream bank zone (no harvest) will be extended for a minimum of 100 feet upstream and downstream, on each stream, where two or more small Type N perennial streams intersect.

Significant Waterfalls

A significant waterfall is one that has an identifiable splash zone. The splash zone is the area immediately adjacent to the stream channel that is occupied by vegetation commonly associated with wet areas, i.e., mosses, maidenhair (*Adiantum pedatum*) or licorice fern (*Polypodium glycyrrhiza*), and other hydric species. For these sites, the stream bank zone (no harvest) will be extended around the outer perimeter of the splash zone of the waterfall.

Key Terms

Active Channel Width—The average width of the stream channel at the normal high water level. The normal high water level is the stage reached during average annual high flow. This high water level mark often corresponds with the edge of streamside terraces; a change in vegetation, soil, or litter characteristics; or the uppermost scour limit (bankfull stage) of a channel.

Average High Water Level—The stage reached during the average annual high flow period. This level often corresponds with the edge of streamside terraces, marked changes in vegetation, or changes in soil or litter characteristics.

Bog—A wetland that is characterized by the formation of peat soils and that supports specialized plant communities. A bog is a hydrologically closed system without flowing water. It is usually saturated, relatively acidic, and is dominated by ground mosses, especially sphagnum. Bogs are distinguished from other wetlands by the dominance of mosses and the presence of extensive peat deposits.

Channel Migration Zone—An area adjacent to an unconfined stream channel where channel migration is likely to occur during high flow events. The presence of side channels or oxbows, stream-associated wetlands, and low terraces are indicators of these zones. The extent of these areas will be determined through site inspections using professional judgment.

Stream-Associated Wetland—A wetland that is immediately adjacent to a stream. This includes wetlands that are adjacent to beaver ponds, side channels, or oxbows that are hydrologically connected to the stream channel by surface flow at any time of the year.

Wetland—An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Strategy 5c. Maintain or Improve Aquatic Habitats

The aquatic habitat maintenance or improvement strategies are intended to correct human-induced conditions on the forest that may contribute to aquatic habitat deficiencies, or that may limit desired aquatic habitat conditions. The maintenance or improvement strategies will promote aquatic habitat conditions that will support the short-term survival needs of aquatic organisms. Also, these strategies will make it more likely that properly functioning aquatic habitat conditions will be attained in a timely manner. Finally, these strategies will encourage forest conditions that will support the ecological processes necessary to naturally create and maintain complex aquatic habitats on a self-sustaining basis.

This approach addresses aquatic habitat maintenance or improvement on a comprehensive basis, and uses both short-term and long-term management actions. These strategies will improve levels of aquatic function in the short term (to meet the immediate habitat needs of aquatic species and place aquatic habitats on a pathway toward desired conditions), while establishing and maintaining self-sustaining habitats over the long term. The following strategies and actions will be implemented as part of the aquatic habitat maintenance or improvement strategy.

Use information obtained from the Elliott State Forest watershed analysis to identify potential factors that could be contributing to undesirable aquatic habitat conditions.

This strategy will be implemented primarily through the watershed analysis strategies described earlier. Road inventories and risk assessments, aquatic habitat inventories, and riparian vegetation surveys are key sources of information used in the analysis.

Identify, design, and implement projects to correct identified problems in a timely manner.

- Aquatic habitat improvement projects will be designed with the intent of mimicking natural processes. The use of “engineered” or “constructed habitat” approaches to stream enhancement will be minimized.
- Projects will be designed and implemented using a multidisciplinary approach, and with direct consultation with the ODFW and in cooperation with local watershed councils.
- Project planning and design will consider habitat conditions, stream processes, and the disturbance regime at both the watershed and site-specific scale.
- Projects will be designed and implemented consistent with the natural dynamics and geomorphology of the site, and with the recognition that introduction of materials will cause changes to the stream channel.
- A priority will be placed on projects that supplement natural “legacy” elements (large wood) that are lacking because of previous disturbance events, and/or management activities.
- Projects will be designed to create conditions and introduce materials sufficient to enhance or re-establish natural physical and biological processes. An emphasis will be placed on projects that re-introduce large “key” pieces of large wood to stream channels in natural configurations.
- Wood placement activities will utilize materials that are expected to be relatively stable yet functional in these dynamic stream systems. The intent is to maximize the functional attributes of large wood, and minimize potential conflicts with public safety in downstream reaches. Reliance on artificial anchoring methods (such as cables) will be minimized, and will only be used in cases of significant concern for public safety.
- Projects will be implemented in a manner that minimizes the potential for negative effects to riparian areas.
- Constructed habitat projects will only be used where these efforts are deemed necessary to support the continued survival of aquatic species. These projects

(when deemed necessary) will only be placed in areas where the created habitat type would be expected to occur naturally.

Strategy 5d. Apply Alternative Vegetation Treatment to Achieve Habitat Objectives in Riparian Areas

The term “alternative vegetation treatment” refers to the application of silvicultural tools and management techniques in RMAs, using standards that differ from general riparian management standards, for the purpose of changing the vegetative community to better achieve the FMP’s aquatic and riparian habitat objectives.

Potential projects include silvicultural treatments such as the conversion of hardwood stands to conifer species, selective removal of hardwoods from mixed-species stands, the establishment of shade-tolerant conifer seedlings, the creation of gaps in hardwood stands to establish conifer seedlings (shade-intolerant and shade-tolerant), or other similar practices not specifically described in the management standards for riparian areas.

The alternative vegetation treatment strategies will apply alternative silvicultural approaches in riparian areas where basin-level stand conditions are inconsistent with the attainment of properly functioning aquatic habitat conditions in a timely manner. These strategies will be implemented in a way that maintains diverse riparian plant communities (heterogeneity) and that minimizes the potential for adverse effects to aquatic resources.

Use basin-level assessments to evaluate whether alternative vegetation treatments are needed to achieve properly functioning aquatic habitat conditions in a timely manner. Where appropriate, use the information from the assessments to plan alternative vegetation treatments.

This strategy will be implemented primarily through the watershed analysis strategies described earlier, applied at the basin level.

Alternative vegetation treatment projects will be planned using a multi-disciplinary approach involving a variety of resource specialists.

These projects will be designed with the involvement of resource specialists from the ODF and the ODFW. The specialists involved in a given project will vary according to the resources and physical conditions present at the site.

Alternative vegetation treatment projects will be monitored and evaluated over time to ensure that the objectives are being achieved, and that undesirable effects are being minimized. The results of these evaluations will be incorporated into the management activities in an adaptive management context.

The FMP recognizes that these treatments are experimental actions, and that over time managers will gain additional knowledge and experience through monitoring and research. This knowledge will be applied in an adaptive management context, to more successfully meet the multiple resource objectives for riparian and aquatic habitats.

Strategy 5e. Apply Specific Strategies to Other Aquatic Habitats

The Elliott State Forest contains other numerous aquatic habitats including, wetlands, lakes, ponds, bogs, seeps, and springs. The management objectives for these waters are generally similar to the objectives for streams, but the specific prescriptions are sometimes different. The following strategies apply to these other aquatic habitats.

Establish and maintain RMAs adjacent to other aquatic habitat areas in accordance with the standards described in this FMP.

These waters support diverse plant and animal communities, are connected to other waters in a basin, and play a significant role in the hydrologic patterns and functions of watersheds. Some species have adapted to, or are dependent on, the conditions found in and near these other aquatic habitats. These areas can also be sensitive to land management activities.

The strategies for other aquatic habitats will maintain the productivity of these habitats, protect the integrity of these sites and maintain hydrologic functions, provide suitable habitats for fish and wildlife dependent on these unique habitats, and contribute to habitat conditions needed for maintaining other native wildlife species of concern.

Prescriptions

The prescriptions for other aquatic habitats are presented in Tables 5-4 and 5-5.

Table 5-4. Management Prescriptions for Lakes, Ponds, and Wetlands

Greater Than 1 Acre
• Establish a 25-foot no harvest zone, starting from the high water line, or wetland boundary (whichever is greater). • Establish a RMA of 100 feet from the high water line, or wetland boundary (whichever is greater). • Manage vegetation to achieve and maintain mature forest conditions. • The site-specific prescription will classify the wetland.
From ¼ Acre to 1 Acre
• Establish a 25-foot no harvest zone, starting from the high water line, or wetland boundary (whichever is greater). • Establish a RMA of 50 feet from the high water line, or wetland boundary (whichever is greater). • Within the RMA, harvest activities will retain at least 50 percent of the existing live tree basal area, or 110 square feet of basal area per acre (whichever is greater). Retained trees generally will be representative of the existing diameter classes and species distribution, with a preference for retaining trees greater than 20 inches DBH. • If the waterway is inhabited by fish, or is identified as an important area for temperature-sensitive amphibian species, at least 80 percent shade will be maintained over the aquatic area. • The site-specific prescription will classify the wetland.
Less Than ¼ Acre
• Establish an RMA of 50 feet for waters containing fish (Type F), or 25 feet for non-fish-bearing (Type N) waters. These areas will be measured from the high water line, or wetland boundary (whichever is greater). • For Type F waters, harvest within the RMA will retain at least 50 percent of the existing live tree basal area, or 110 square feet of basal area per acre (whichever is greater). Retained trees will generally be representative of the existing diameter classes and species distribution, with a preference for retaining trees greater than 20 inches DBH. • For Type N waters, hardwood trees and brush will be retained to protect the hydrologic functions and wildlife habitat values of the site. • If the waterway is inhabited by fish, or is identified as an important area for temperature-sensitive amphibian species, at least 80 percent shade will be maintained over the aquatic area.
Stream-Associated Wetlands
• Stream-associated wetlands are considered to be components of the aquatic habitat of streams, and will be managed according to the objectives and prescriptions specified for the associated stream.

Table 5-5. Management Prescriptions for Bogs, Seeps, and Springs

Bogs
• Establish a 25-foot no harvest zone, starting from the high water line or wetland boundary (whichever is greater). • Establish an RMA of 100 feet from the high water line or wetland boundary (whichever is greater). • Manage vegetation within the RMA to achieve and maintain mature forest conditions.
Seeps and Springs
• Where possible, these aquatic areas should be incorporated into the RMAs of adjacent streams, and vegetation retention provided according to the stream prescription. In practice, this may simply require adjusting the boundary of a stream's RMA to fully encompass the spring or seep. • Other management considerations for some of these areas were described earlier in the section titled "Perennial Type N Stream Special Emphasis Areas."

Strategy 5f. Manage Slope Stability

Landslides and other geologic processes can have dramatic effects on watersheds, including aquatic and riparian areas. The following strategies address concerns about landslides and slope stability.

The objective in relation to landslides and slope stability management is to minimize the occurrence of management-induced slope failures and mitigate potential negative impacts on aquatic and riparian habitats. This will be accomplished through application of risk-based management principles and BMPs. Minimizing road-related landslides and chronic erosion (sedimentation to streams) is fundamental to this objective. Hazard assessment and risk-based management for in-unit slides, and ensuring that large wood is available in the track of potential debris slides and torrents, will promote properly functioning conditions for future aquatic habitat inputs. Monitoring and hazard assessment, combined with adaptive management, will ensure that this objective is realized.

Enhance current understanding of the processes that influence slope stability in the Elliott State Forest through watershed analysis and other information.

Such processes include, but are not limited to, soil type mapping, slope mapping, geologic history and processes, root strength influences, influences of road construction on slope stability, influences of stand age, influences affecting sediment delivery to fish bearing streams, and review of historic slope failures and relevant case studies.

Information gained through watershed analysis (Oregon Department of Forestry 2003) and other documents will be used to inform management decisions on the Elliott State Forest, including slope stability strategies. Relevant information will be incorporated into IPs and AOPs.

Evaluate alternatives that can minimize, mitigate for, or avoid risk in high and moderate hazard areas during District implementation planning and annual operations planning.

High hazard level areas are those that are likely to contain sites with relatively high probability of failure. Moderate hazard level areas may contain sites with moderate probability of failure. Low hazard level areas have a low chance of containing sites with a high or moderate probability of failure.

Design operations that will minimize, mitigate for, or avoid identified risks during project planning and design.

Geotechnical specialist input will be used as appropriate when alternatives are being considered for proposed operations. The district will coordinate geotechnical specialist review, and will be responsible for subsequent evaluation of alternatives and selection of the course of action.

Use site-specific geotechnical evaluation.

Road alternatives will receive site-specific geotechnical evaluation when the forest engineer needs to compare risk of road location, design, or construction alternatives.

Annual Operations Plans—A geotechnical specialist will provide initial hazard and risk assessment for timber harvesting and road construction operations in the AOP, early enough in the process to allow for proper consideration of alternatives (boundary changes, leave tree placement, etc.). Risk management may include ensuring that large wood is available in the track of potential debris slides and torrents, to promote proper conditions for future aquatic habitat inputs. The district is responsible for requesting review from the geotechnical specialist. For timber harvesting and road construction operations, the following process will be used:

- Operations in high hazard level areas will be evaluated by the geotechnical specialist during the AOP review for assessment of risk (likelihood of delivery to aquatic system).
- Operations in moderate hazard level areas will be investigated by district personnel to ensure that no high landslide hazard sites exist. If high landslide hazard sites are identified by field personnel, the geotechnical specialist will assess the risk of delivery to the aquatic system.
- Operations in low hazard level areas will not be expected to have any further geotechnical review. However, if high landslide hazard locations are identified during fieldwork, the geotechnical specialist will be consulted and the site evaluated in the same manner as high hazard level areas.

The effect of the forest operation on the landslide potential (potential increase in the probability of failure or landslide rate) will be judged based on slope, landform, underlying rock material, type of operation (road building, regeneration harvest, partial cut, thinning, etc), or other geomorphic or management characteristics.

Managing Risk

If the risk is low (minimal or no likelihood of delivery to aquatic system), no management modification will be recommended.

If the risk is moderate or high, management modifications to improve the likelihood of beneficial results may be recommended.

If the risk is moderate (potential to deliver but likelihood is low), the condition and significance of the aquatic resource will be further assessed. If the aquatic resource is already significantly degraded, the geotechnical specialist will develop recommendations for mitigating the harvest operation. Otherwise, no modifications to the operation will be made.

If the risk is high (likely to deliver to the aquatic system), the geotechnical specialist will develop recommendations for avoiding, mitigating, or minimizing the risk. This will include an evaluation of the potential debris chute or run-out channel, consistent with the criteria provided for identification of debris flow track reaches in the RMA strategies.

Strategy 5g. Manage Forest Roads

The *Forest Roads Manual* (Oregon Department of Forestry 2006) contains specific processes, procedures, and standards for road system management. It also describes the roles and responsibilities of the various resource specialists and land managers involved in road system management.

The road system will be managed to prevent water quality problems and associated impacts on aquatic and riparian systems, minimize disruption of natural drainage patterns, provide for adequate fish passage where roads cross fish-bearing streams, and minimize acceleration of natural mass-wasting processes.

The construction and use of forest roads are an integral part of actively managing state forest lands. Roads provide essential access for forest management activities, fire protection, and a variety of recreational uses. However, poorly maintained roads can be a major source of erosion and sedimentation. Proper road system planning, design, construction, and maintenance will prevent or minimize water quality problems and associated effects on aquatic resources, and significantly extend the useful life of a forest road. Quality information on the status and condition of existing roads is also essential to an effective maintenance or improvement program designed to meet the objectives stated above.

The vision of the ODF transportation system is a road network that will provide effective access for all necessary activities taking place in the forest. The transportation system will be actively managed to protect forest resources. The road network will be minimized to achieve forest management objectives. Barriers to fish passage created by road crossings will be corrected. Roads will be constructed in the most appropriate locations for carrying out anticipated activities, and the standard for forest roads will be a suitable match for the terrain and type of access needed. The roads will be effectively maintained to prevent degradation to other forest resources. Where appropriate, roads will be closed or vacated, and the land they occupied may be returned to active forest management. Adaptive resource management processes will be used to modify future practices as managers gain additional knowledge of resource needs and protection and learn more appropriate methods for meeting the objectives of this FMP.

The four primary areas of road system management are listed below and addressed in detail in the ODF's *Forest Roads Manual* (Oregon Department of Forestry 2006).

- Transportation planning
- Road design, construction, and improvement (including drainage systems)
- Road maintenance
- Road closure

Utilize the watershed analysis process developed under Aquatic and Riparian Strategy 1, to supplement the existing inventory of roads in the Elliott State Forest.

The district has already conducted a comprehensive road hazard inventory to a common standard specified through Oregon Plan protocols. The information from this inventory is being used to identify priority restoration and improvement projects related to the forest roads system.

Information obtained through the October 2003 watershed analysis for the Elliott State Forest, as described in Aquatic and Riparian strategy 1a, has identified additional information needs relevant to ongoing improvement of the Elliott State Forest road network. Additional information needs will be addressed through the implementation planning process.

Through development and updating of the district IP, apply the processes and standards for transportation planning described in the *Forest Roads Manual*.

The initial district IP will contain applicable portions of the transportation planning elements described in the *Forest Roads Manual*.

Forest road design, construction, improvement, and maintenance will be carried out in accordance with the processes and standards described in the *Forest Roads Manual*.

Identify and prioritize roads for closure and/or vacation using information gained from the comprehensive forest roads inventory, and in accordance with the standards described in the *Forest Roads Manual*.

Strategies to Integrate Resource Management

Thus far, this chapter has presented the strategies for sustainable forest ecosystem management, which are the basis for coarse filter management or managing the forest as a whole. The remainder of this chapter presents the management strategies for additional individual resources in the Elliott State Forest, as described in the Guiding Principles and Resource Management Goals presented in Chapter 3. The strategies to integrate resource management represent the fine filter or site-specific management strategies for resource values that the sustainable forest ecosystem management strategies alone may not achieve.

Agricultural and Grazing Resources

Agriculture

Agricultural uses will be considered on a case-by-case basis. Permits will be issued when these activities are compatible with other forest resources and activities.

Agricultural activities on state forestlands in the district have occurred on a limited basis in recent years, and are not expected to increase in the future. If the demand for agricultural use should increase, the ODF will consider these activities to the extent that they are compatible with the other resource goals.

BOF policies allow for non-exclusive permits to be granted for special uses. Agriculture is considered a special use. Agricultural activities are allowed only within the scope of a special use permit. These permits allow ODF to control the activity and protect other resources by the provisions used in the permit.

Grazing

Grazing leases on CSFLs will be considered on a case-by-case basis. Leases will be issued by the DSL when they are compatible with other resources.

The ODF and the DSL have overlapping land management responsibilities on CSFLs with regard to grazing. The ODF will actively review grazing plans, but will rely on the DSL to administer grazing leases on CSFLs. DSL management of grazing must comply with the current OARs for rangeland management on CSFLs.

Grazing leases on BOFLs will be considered on a case-by-case basis and issued when they are compatible with managing for greatest permanent value of the lands and do not conflict with other resources.

Grazing activity has been minimal in the district. Anyone requesting a grazing lease must prepare a grazing management plan that addresses the following items:

- Suitability and carrying capacity of the land for grazing.
- How livestock will be kept out of areas where land use designations preclude grazing.
- How grazing will be managed to protect or be compatible with timber production, cultural resources, fish and wildlife, soils, special forest products, and water resources.
- How livestock will be prevented from trespassing onto adjacent lands.

Before the grazing management plan is approved, the ODF must determine that the plan adequately addresses all concerns and that the department's share of revenues generated under the plan will cover all costs of administering the plan.

Air Quality

Limit prescribed burning to specific areas where any of the following occurs:

- Slash loads or competing vegetation are barriers to establishing a new stand after harvest.
- Slash loads constitute an unacceptable risk of wildfire.
- Slash loads may increase the risk of debris flows.
- Slash loads or competing vegetation are barriers to forage vegetation for ungulates.

Burn slash only under weather and fuel moisture conditions that will minimize the risk of significant fire escape.

Continue to protect the forest from wildfire through fire prevention and suppression activities.

Comply with the Oregon Smoke Management Plan and burn only after obtaining permits required under the Plan.

The current conditions described in Section 2 outlines the objectives of the Smoke Management Plan and lists procedures for conducting prescribed burning in Oregon. Because it is an element of DEQ's State IP, the Smoke Management Plan contributes to meeting NAAQS. As a whole, it reduces emissions from prescribed burning in western Oregon and minimizes smoke intrusions into designated population areas.

Implement alternatives to prescribed burning, and use burning techniques that reduce smoke emissions.

Prescribed burning will remain a necessary tool to reduce fuel loads, prepare sites for reforestation, and provide certain types of wildlife habitat. Because circumstances vary in different locations, smoke-reduction techniques must be prescribed on a site-specific basis. Some techniques, such as small wood utilization, may be driven by market conditions.

Carbon

Support recommendations of the Oregon Global Warming Commission's "Interim Roadmap to 2020"

- Establish a carbon inventory for the Elliott State Forest
- Establish baselines and calculate both long-term and intermediate outcomes for carbon storage based forest management strategies.

Determine net effect of management activities on carbon stocks

Cultural Resources

The cultural resource strategies recognize that historic sites, relics, and structures are public resources and provide important clues to the historic use of state forest lands. Forest management activities such as timber harvest, road construction, and recreation site development can irreversibly destroy the integrity of historic sites.

Update and maintain an inventory and assessment of cultural resource sites.

An inventory of sites is available to district staff to effectively manage cultural resources. Cultural resource sites may range from sites with legally mandated protection to sites with little or no significance. Each identified site will be assessed and rated for its legal or nonlegal protection status. The database will be updated as new sites are discovered or new information is gathered on existing sites. The ODF will rate sites for significance using the following categories:

- Mandated Protection (Class I)
- Internal Protection (Class II)
- No Protection (Class III)

Table 5-6 describes the categories of site significance, criteria used to designate sites, and relative management objectives for each site category. The tools and guidelines needed by managers will be developed as funding is available.

A prehistoric and historic cultural overview is a professional-level review, including extrapolation and interpretation of existing literature and information specific to the Elliott State Forest. Such an overview was completed in 1998 by Stepp Consulting of Corvallis, Oregon. This document provides the understanding and context for making cultural resource and other resource management decisions.

Maintain a cultural resource database for tracking and planning purposes, including a system of recording, filing, and retrieving cultural resource site data from GIS overlays and basin level inventories.

Existing cultural resource databases have been incorporated into the district GIS to assist in the planning of long- and short-term management actions. This database will be used to help protect cultural sites and meet long-range plan goals. Review and refinement of this work will be required as new information becomes available.

Develop a procedure for integrating site protection into forest activity plans by providing practical guidelines for recognizing, assessing, recording, and protecting sites.

New or known sites will likely be encountered by ODF field staff in carrying out management plans and activities. A system will be developed to provide guidance in recognizing, recording, and protecting sites in the short term, as well as after the resource inventory has been completed. This system will identify procedures best carried out at the intermediate planning level (management basin) and at the annual planning level (activity area or site).

Table 5-6. Cultural Resource Classes and Objectives

ODF Class	Site Protection Categories	Site Criteria and SHPO Site Examples	Management Objectives
I **Mandated** **Protection**	**A. Pre-Historic Archaeological Site:** Created/used before Euro-American inhabitancy	• The site has a record of creation/use by an indigenous culture (OAR 736-51). • Sites may include lithic quarries, lithic scatters, camps, villages, burials, and sites of objects such as symbols, tools, and facilities.	• Management activity excluded to protect sites from any excavation, alteration, disturbance or removal of remains. • If disturbance is necessary and detrimental to structure/site integrity, and SHPO Archaeological Permit is required to excavate, alter, disturb or remove remains in the immediate area. Permits are to be reviewed by qualified archaeologist. • Extend Level 1 objectives and consideration to sites that are soon to qualify for higher levels of significance (sites within 5 years of age minimum).
	B. Historic Archaeological Site: Created/used by humans after Euro-American inhabitancy	• The site has a record of creation/use by recent post-European culture (proof of existence, not remains). • The site is at least 75 years old; consider 45-year-old sites in planning horizon. • Sites may include shipwrecks, homesteads, camps, towns, monuments, tools, facilities, grave sites and cemeteries.	• Same as above.
	C. Historic Sites: Created/used by humans after Euro-American inhabitancy	• The site has aboveground structural remains or work of a master. • The site is at least 50 years old; consider 45-year-old sites in planning horizon. • Sites include bridges, tunnels, trestles, rockwork, roads, and trails that usually have structural or marked remains.	• Same as above, except that: SHPO Archaeological Permit is not required (may be exempt).

Table 5-6 continued. Cultural Resource Classes and Objectives

ODF Class	Site Protection Categories	Site Criteria and SHPO Site Examples	Management Objectives
II **Internal** **Protection**	**B. Historic Archaeological Sites:** --------------------- **C. Historic Sites:**	• Less than 75 years old • Valuable for public use and education -- • Less than 50 years old • Valuable for public use and education Examples: railroad grades, camp sites, lookout remains, sites related to ODF history (tree genetic trials, guard stations).	• Give highest protection to sites close in age to Level 1 significance. • Protect the site from disturbance where possible. Survey, remove, and catalog site/relics if destruction is unavoidable. • No legal requirements, except complete protection of grave sites and any work of a master.
III **No Protection**	**B. Historic Archaeological Sites:** **C. Historic Sites:**	• Less than 75 years old • Not valuable for public use value	• No special management action is required. • Before disturbance, gather information on site, record in inventory, and map. • Remove relics, label, and store for Interp/Ed programs or archival use.

Energy and Minerals

Maximize long-term revenues to the CSF, counties, and local taxing districts while minimizing effects to natural resources (forests, fish, wildlife, etc.).

If lands are identified where development of one or more subsurface resources is expected to generate the highest long-term revenue flow, such lands will be managed accordingly, with the following exceptions:

- Lands designated in the forest inventory and approved by the State Land Board (CSFL) and the State Forester (BOFL) as having a land use that precludes gas, oil, or mineral development.
- Lands that will produce another commodity with a higher contribution than gas, oil, or minerals to the long-term production of revenue. If production of the other commodity is compatible with gas, oil, or mineral development, both will occur.
- Lands where such development would conflict with legal requirements for the protection of other resources.
- Lands that are temporarily withdrawn from the production land base in order to preserve future management options or help prevent future listings of species as threatened or endangered.

Review and update DSL and ODF roles, responsibilities, and procedures dealing with mineral and energy resource assessment and prospecting and mining permit applications involving state forest land.

It will be necessary to review and update joint DSL/ODF roles, responsibilities, and procedures to ensure that they are fully aligned with all of the resource goals and strategies addressed in this FMP. The review should cover a broad array of issues, including:

- CSFL and BOFL management mandates and guidelines.
- Procedures and responsibilities for reviewing permit requests, setting royalty rates, resolving resource conflicts, and developing reclamation strategies.
- Administration of issued permits.
- Energy and mineral resource assessment and data sharing opportunities with the DSL and DOGAMI.
- Update of the existing DSL/ODF Rock and Mineral Sales Interagency Agreement.

Fish and Wildlife

The sustainable forest ecosystem management strategies described in this chapter are intended to result in functional habitat conditions for native species using forested habitats in the central Oregon Coast Range. The following components of the sustainable forest ecosystem management strategies are expected to address the habitat needs of fish and wildlife species in the Elliott State Forest:

- Maintain a diversity of stand types, representing early, intermediate, and advanced structure stages of development, through a combination of active management and conservation areas as described in the sustainable forest ecosystem management strategies.
- Maintain riparian habitats and protect streams and other aquatic systems through application of standards to maintain RMAs as described in the sustainable forest ecosystem management strategies.
- Maintain key structural components in managed stands by retaining snags, logs, and live trees as described in the sustainable forest ecosystem management strategies.

Monitoring and adaptive management, as described in Chapter 7, will be used to test these assumptions.

In addition, the following strategy applies.

Protect endangered, threatened, and candidate species by following procedures for complying with the state and federal ESAs.

ODF will follow State Forest Division policies and procedures for complying with the state and federal ESAs.

Land Base and Access

Land Base

Minimize the amount of forest land used for roads, road corridor clearings, landings, and mineral extractions by ensuring that construction and development specifications are designed to efficiently meet management activity objectives.

This strategy addresses Land Base Goal 1 by minimizing the amount of forest land used for management infrastructures and other resource developments. Roads, landings, rock quarries, or other developments are necessary to manage forests effectively. However, planners must ensure that each proposed development is designed to appropriate specifications. Planners should develop and analyze an array of alternatives, and choose specifications that accurately reflect management objectives and site-specific constraints.

Follow the procedures in ORS 197.180 and OAR 660-30, 660-31, and the ODF's State Agency Coordination Program, OAR 629-20, to ensure that land use programs and activities are consistent with Statewide Land Use Planning Goals and compatible with acknowledged county comprehensive plans and land use regulations.

All state agencies must comply with the Statewide Planning Goals by ensuring that land uses are compatible with acknowledged local government comprehensive plans and land use regulations. The ODF's State Agency Coordination Program and OAR 629-20 describe the procedures to be followed. Counties with state forestland within their boundaries review and comment on the compatibility of the FMP with their comprehensive land use plans.

The procedures in OAR 629-20 will also be followed to ensure that other levels of forest planning are compatible with acknowledged county plans and land use regulations. Other levels of forest planning include the district IP, transportation plan, AOPs, and land acquisitions through sale or exchange.

Continue with an active land exchange and acquisition program when favorable consolidation opportunities occur.

The ODF will actively pursue beneficial land acquisition and exchange opportunities as a means of increasing management efficiency and economic values, and to enhance forest resource values. This will be carried out in accordance with State Land Board and BOF policies and OARs.

The Coos District will develop a land acquisition and exchange plan that identifies potential consolidation and divestment opportunities. In carrying out this strategy, the district will review and update acquisition and exchange opportunities, establish priorities, and implement specific transactions by following procedures and reviews as outlined in State Land Board and BOF policies and rules.

Develop and implement land survey plans to establish and/or reestablish state forest boundaries necessary to meet management activity needs.

Established property corners and posted property lines are an essential part of the forest infrastructure. They help to identify land ownership and confirm locations of management activities, which in turn help to achieve efficient conservation of state forest land (Land Base Goal 1). Many property corners and lines for state forestland have already been established as part of the required work for past timber sales and other stand management activities. However, a significant number of property corners and lines must still be established and posted to meet broader resource management and public access needs, as well as future timber harvest needs. The establishment of property corners and lines will also aid in the development of accurate GIS land ownership overlays.

To work toward completing land surveys, the Coos District will determine the total survey workload remaining, set survey priorities in relation to planned forest management activities, and develop survey project proposals. The survey proposals may use a combination of ODF personnel, cooperative agreements with adjacent landowners, and service contracts.

Access

Develop a database and GIS overlay of the road network to use for planning and tracking purposes.

Many management activity plans are dependent on or affected by roads, including timber and special forest product sales, road improvement and maintenance plans, fire suppression access, fish and wildlife habitat issues, and recreation management. It is important to have accurate information about existing and planned road networks in order to meet access system and resource management needs. The conversion of this information into a GIS overlay will help planners use it most efficiently.

Construct, improve, and maintain road systems using engineering design, construction techniques, and maintenance programs consistent with the type and level of use, level of difficulty and hazard, amount of resource risk, and the minimum standards set by the FPA.

It is essential to provide forest access for fire protection and management activities. To minimize potential effects from forest roads, the district will use a variety of techniques to match specific access needs.

Road system management will be accomplished in accordance with the processes and standards described in the ODF's *Forest Roads Manual.* Consult and coordinate with adjacent landowners concerning possible road sharing opportunities to avoid unnecessary duplication of road systems.

Avoiding duplication of road systems will help to achieve Access Goal 2. The Coos District will continue to consider using adjacent landowner roads that provide better access for management activities. The district will reciprocate road use with other landowners on equal terms, where this exchange is appropriate and would reduce the overall road density on the landscape.

Plants

The sustainable forest ecosystem management strategies will provide the foundation for protecting biodiversity, and will meet the habitat needs of most plant species native to the Elliott State Forest. The following components of the sustainable forest ecosystem management strategies are expected to address the habitat needs of fish and wildlife species on the Elliott State Forest:

- Maintain a variety of seral stages, stand structures, and stand sizes by implementing the sustainable forest ecosystem management strategies. The goal of “providing habitats that contribute to maintaining or enhancing native plant populations at self-sustaining levels” is achieved through the general biodiversity approach that is implemented through the sustainable forest ecosystem management strategies. The overall result of these strategies will be a diversity of native plant communities.

- Protect riparian vegetation during forest operations by applying aquatic and riparian strategies. Plants that grow in riparian areas have important roles in wildlife habitat, hydrology, and nutrient cycling. Riparian features such as trees and understory vegetation are protected to maintain the biological and hydrologic functions of these areas.

In addition, the following strategies apply:

Protect endangered, threatened and candidate plants by following procedures for complying with state and federal ESAs for plants.

State Forests Division procedures were developed to manage individual species and habitats whose needs are not adequately addressed through the general strategies for plants. These procedures specifically address plants that are classified as endangered, threatened, and candidate. Detailed information about these plants is provided in Chapter 2 under the heading "Plants."

Contribute to statewide efforts to reduce the quantity and range of invasive, non-native plant species.

The ODF will apply IPM principles to address incidences of noxious weeds on state forest land, and will cooperate with other agencies and landowners in cooperative efforts to address such problems. The ODF will take steps to avoid contributing to existing or new invasions of these plant species.

Recreation

Provide recreational opportunities that are consistent with the current activities on the forest.

- Provide dispersed and undeveloped recreation opportunities such as hunting, trapping, fishing, camping, viewing, and other activities that are compatible with active forest management.
- Minimize potential adverse recreational effects on other resources, such as water quality.

Provide interpretation and education opportunities on the forest as staffing permits.

- Assist schools and other organizations in providing resource management education for children by the use of tours, field trips, and classroom discussions.
- Provide tours for the public and other groups.

Maximize efficiency and diversify funding of recreation management through development of partnerships with user groups, neighboring landowners, and other agencies.

- Consider proposals by user groups or other partnerships and participate as funding and workload allows to plan and develop trails in the Elliott State Forest.
- Cooperate with the BLM in hiking trail construction on state land adjacent to the Loon Lake Recreation Area.
- Supplement available recreation opportunities within the region, rather than duplicating existing services.

Scenic Resources

The scenic resource strategies recognize that landscape aesthetics are a public resource, and forest management activities such as timber harvest and road construction can affect the visual quality of the landscape.

The visual management strategy for the Elliott State Forest will be applied at both the landscape and stand level, and will be compatible with other resource goals and values. A full range of silvicultural activities will be considered in managing areas where visual quality is important.

Manage identified areas for visual sensitivity in accordance with ODF's Land Management Classification System described in Oregon administrative rule. Conduct management activities consistent with the requirements of the administrative rule and purpose for CSFLs.

Areas have been identified that are sensitive to visual effects from management activities. These are areas adjacent to, or seen from major highway corridors designated as visually sensitive by the FPA or areas with established, high public use vistas.

A full array of silvicultural treatments, harvest methods, and logging systems will be considered for use when planning operations in these areas. These methods include various degrees, combinations, and shapes of regeneration harvesting, patch cuts, commercial thinnings, and partial cuts.

Some visually sensitive areas, in which timber harvest would significantly impact visual quality, will be managed so that the growing and harvesting of trees and other incompatible resource uses will be secondary to the visual values.

Soils

The sustainable forest ecosystem management strategies provide an overall framework for maintaining long-term soil productivity, as well as other resource values. The additional strategies below describe some specific practices by which soils will be protected during forest management activities.

Comply with FPA requirements for soil protection.

Specific actions that implement this strategy are detailed in AOPs. Timber sale operators must comply with the OARs and sale contract provisions that address the protection of soils during harvesting operations.

Minimize management-induced slope movements by obtaining geotechnical assistance.

Timber sale planners will obtain assistance from geotechnical specialists in designing roads and harvest units. This input is based on interpretive geology and the use of soil and rock mechanics principles. It provides the rationale for hazard and risk assessment and mitigation in forest land management decisions. Geotechnical hazard and risk assessment is the best available tool for predicting the likelihood of inducing slope movements through land management activities. The use of geotechnical analysis in management decisions makes it possible to minimize the number or magnitude of management-induced soil movements, and to protect other resources.

This strategy will be achieved through application of the processes and standards for hazard and risk assessment, and geotechnical specialist review as described in Aquatic and Riparian Strategy 5f—Manage Slope Stability.

Maintain quantities of organic material in the soil (duff and litter).

- Limit the number and acres of broadcast slash disposal burns. When broadcast burning is necessary, it will be conducted under conditions that minimize effects to soil and organic materials. Factors to consider include, but are not limited to, amount, spatial distribution, flammability of fuels, weather conditions, and topography.

- During timber harvest, apply harvesting practices that minimize disturbance to the duff, litter, and soil layers, except where it is desired to scarify the soil for efficient tree regeneration. To the extent possible, retain harvesting residue (limbs, tops, and cull logs) while avoiding the creation of unacceptable fire hazards.

This strategy recognizes the importance of maintaining duff and litter as components of the soil. Organic matter increases soil fertility, retains moisture, retards rainfall runoff and erosion, and adds to long-term soil productivity. Limbs, cull logs, and duff also contribute to biodiversity by providing habitat for many species of animals.

Special Forest Products

Special forest products include a variety of plant products other than timber that are collected or harvested for personal or commercial purposes. In the Elliott State Forest, permits have been issued for the collection of sword fern, salal, huckleberry, firewood, burls, and cascara bark. These products produce little commercial value, and program development and management will be minimal. The following strategies will be used to manage special forest products in the Elliott State Forest:

Manage the commercial demand for special forest products through a permitting and fee system.

Brush leases are the primary commercial special forest product in the Elliott State Forest. Total fees from these leases generate less than $1000 per year. Fees are charged for commercial woodcutting permits; however, only a few commercial permits have been issued when large amounts of firewood were available. There has been little commercial interest in the collection of mushrooms and cones.

Manage the public demand for non-commercial special forest products through a free use permit system.

Firewood generated from timber sales is the main special forest product that generates public interest in the Elliott State Forest. Approximately 500 free use woodcutting permits, which allow firewood to be cut for personal use, are granted to the public each year. Little interest exists for the collection of mushrooms or other products, primarily because steep slopes make collection of these products difficult.

Chapter 6
Implementation

Chapter 6 discusses the standards and guidance for implementation of the *Elliott State Forest Management Plan*. Included in this chapter are guidelines for implementation planning and asset management, and opportunities for ongoing public involvement in FMP implementation.

The main headings in Chapter 6 are:

Implementation Guidelines

Responsibilities

The district forester is responsible for implementing all aspects of this FMP. The key areas of responsibility are the management strategies for all resources, district monitoring projects, and district public involvement.

The assistant district forester is responsible for coordination within the district. Key areas of responsibility include coordinating the development of the IP, AOPs, monitoring priorities and projects, periodic operational reviews, and information exchange.

The geotechnical specialist, wildlife biologist, silviculturist, monitoring coordinator, and public use coordinator are responsible for providing technical assistance to district personnel in the development of the IP, AOPs, and monitoring plans. They are also responsible for providing technical assistance to district personnel for field reviews, and for both landscape-wide and site-specific recommendations on specific management activities. They may also have specific responsibilities for monitoring and research projects.

Administrators and technical specialists are responsible for providing guidance and direction on state-wide program issues. They also may have specific responsibilities as identified in the FMP.

Plan Scope and Duration

The FMP provides management direction for all CSFLs and BOFLs managed by the Coos District. This includes the Elliott State Forest proper, as well as tracts of state forestlands, totaling 95,273 acres, scattered throughout Coos, Curry, and Douglas counties. This FMP supersedes and replaces the 1994 *Elliott State Forest Management Plan* (Oregon Department of Forestry 1994a).

For several reasons, the FMP is anticipated to endure for a decade or longer. First, the FMP is a goal-driven plan. The plan strategies will be most effective if applied over the long term, and in an adaptive management context. Second, the strategies give field managers substantial flexibility in using existing or new approaches to meet the goals. Monitoring and adaptive management information will be used to incorporate changes necessary to successfully implement the strategies. Third, the State Land Board, BOF, and the public will have access to periodic updates through monitoring reports and IPs that will describe how the FMP is being applied and provide insight into how well the goals are being met. These updates will be key to the State Land Board's determination as to whether portions of the plan should be amended or if a new FMP should be developed.

Implementation Priorities

Funding level for FMP implementation will vary based on cyclical economic trends and approval of budget level by the State Land Board. Over the long term, it is likely that funding levels will support the management activities necessary to meet the FMP goals. However, funding may be limited at times. For this reason, activities are prioritized as follows:

- Activities necessary to achieve the constitutional mandate for CSFLs
- Legally or contractually required activities
- Full implementation of all strategies and monitoring plans

The IP and AOPs will identify the activities that will be pursued within given time periods based on the anticipated funding levels.

District Implementation Plan

A district IP will be developed that contains more detailed information on implementation of the FMP strategies. The IP will describe:

- The implementation of the forest management plan on the landscape, including maps that show how the various strategies combine into a forest that has the anticipated mixture of forest types, areas where harvest will not occur, and areas where harvests may occur.
- The current stand structure amounts and distribution on the district.
- The proposed management activities for the given time period.
- The land management classifications that have been applied to lands in the district to reflect the management approaches and strategies adopted in the FMP and described in the IP.
- The specific management activities, harvest levels, outputs, and achievements anticipated for the next 10-year period. This will include:
    - Annual activity ranges for specific silvicultural operations during the 10-year period (e.g., acres of regeneration harvest and partial cut per year).
    - Estimates of the acres of stand structures that will increase or decrease in stand complexity through the identified management activities.
    - Estimates of the amounts of each structural habitat component that the ODF expects to be created through the identified management activities.

Implementation planning is an ongoing process in which ODF personnel will organize resource information, identify and coordinate management activities, and assess progress toward meeting the goals identified in the FMP. District personnel apply the goals and strategies provided by the FMP to stand and forest conditions within the identified management basins. Stand management activities are then identified for the foreseeable future (a variable amount of time, but approximately 10 years) based on the specific opportunities and constraints inherent to each management basin.

Information from each management basin is then used to develop the district IP. The IP integrates district operations, and is used in the development of AOPs and budgets.

Information derived from watershed analysis is prioritized for implementation, and will be incorporated into the district IP as appropriate.

Land Management Classification System

Concurrent with the development of the IP, the district will apply the Land Management Classification System in a manner that is consistent with the goals of this FMP. The Land Management Classification System is described in Chapter 2, under “Land Base and Access.”

Public Involvement and Revision Process

The initial district IP and the associated land management classifications were made available for public review and comment for a 90-day period prior to consideration for approval by the State Forester.

An IP that undergoes major revisions will be available for public review and comment for a 30-day period prior to consideration for approval of the revision by the State Forester.

Major revisions are proposed changes to the annual harvest level ranges of more than 25 percent based on combined acreage of regeneration and partial harvests. Minor revisions are include updates to number and location of T&E species, addition of new information (such as results research projects) and other revisions to the IP that do not meet the definition of a major revision. Minor revisions may be approved by the District Forester.

Additional details on the public involvement process can be found later in this chapter.

Annual Operations Plans

AOPs will describe the actual projects the district will pursue to implement the FMP for a fiscal year. Management activities may include harvest operations; road construction, improvement, or vacating; reforestation and young growth management; and aquatic habitat restoration. AOPs are developed by the district and must be consistent with the longer term district IP. Resource specialists from both the ODF and the ODFW will have an opportunity to provide input to the AOPs.

The AOPs will be submitted to the district forester for approval. The district forester will consider any written comments from resource specialists and the public before approving or denying approval of an AOP. Once the AOP is approved, the ODF has the authority to implement the AOP.

Asset Management Guidelines

The Elliott State Forest is a tangible asset of the people of Oregon. The revenues derived from the forest are paid to the CSF and the counties and local taxing districts where the forest is located. The forest and its rich resources provide both an ecological and economic foundation for local communities and the southwestern Oregon region.

“Assets,” as they are discussed in this section, are confined to the tangible resources and infrastructure (forest roads and related improvements) on state forestlands. This section provides a brief description of forest assets, explains the guidelines for efficient and effective management of the assets, and discusses the anticipated outcomes in terms of the value of the assets if the guidelines are implemented through time.

Description of Key Forest Assets

Lands

The plan area contains approximately 95,273 acres of CSFLs and BOFLs. Approximately 90.6 percent of these lands are CSFLs. These lands have the potential to produce resource values from timber, fish and wildlife, recreation, and a variety of other forest uses. Maintenance of this land base as productive and sustainable forests is essential to maintaining and enhancing the overall asset value of these lands.

Various analyses have estimated the value of these lands (Department of State Lands and State Land Board 1995, Department of State Lands and Oregon Department of Forestry 2005). The most recent is a cost/benefit analysis completed in 2005 by Mason, Bruce & Girard, Inc., a forest management consulting company. This analysis estimated the market value of the CSFLs of the main block of the Elliott State Forest—some 84,000 acres. Several types of prospective purchasers or investors were identified, each with certain requirements for investment return. The potential market price for the 84,000 acres of CSFLs identified in the analysis ranged from $265 million to $489 million. Assuming a similar inventory and land allocation for the 93,000 acres in the main block of the Elliott State Forest, the value can be estimated at $293 million to $541 million. Applying the same assumptions for the full 95,273 acres of the Elliott State Forest, including the scattered tracts, the potential market value for the planning area would be $300 million to $554 million.

Forest Products

The timber stands in the Elliott State Forest are an asset to the CSF, and the state, counties, and local taxing districts. Management of the timber asset includes an investment of time, dollars, and resources to realize the forest’s ability to generate sustainable timber harvest and revenue over the long term. Investments include direct expenses in young stand management activities such as precommercial thinning and fertilization, and direct expenses in forest infrastructure such as roads and bridges. Overall planning and long-term management also involves indirect expenses, such as forest inventory and GIS systems, research projects, and monitoring projects.

The timber resources are renewable and sustainable, and the forest's revenue-generating potential therefore is viewed in a long-term context.

Carbon

Carbon offsets[1] are gaining popularity as a tool to compensate for greenhouse gas emissions. By paying someone else to absorb or avoid the release of CO_2 elsewhere, the purchaser of a carbon offset can compensate for, or "offset", their own emissions. This is possible because climate change is a non-localized problem and greenhouse gases spread throughout the atmosphere. Reducing them anywhere contributes to overall climate protection.

In 2010, ODF conducted a careful investigation of the feasibility of carbon storage on the Elliott State Forest as a means to improve overall revenues realized from this asset. Results of this analysis indicated that, as a consequence of a number of protocol requirements for determining credits, we would not be able to meet our mandate to "maximize revenue to the Common School Fund over the long term, consistent with sound techniques of land management" through the sale of carbon offset credits.

Carbon policy and market issues are constantly evolving. We will continue to monitor these issues as well as evaluate the legal obligations associated with any decision to enter into the carbon offset market. Management of the Elliott State Forest post-HCP may open market opportunities in the future.

Fish and Wildlife

The Elliott State Forest provides habitat for many species of native wildlife. In this role, it has both direct and indirect social, cultural, and economic benefits for local communities and for the citizens of Oregon. Populations of several big-game species (deer, elk, cougar, and bear) and upland game birds (grouse and quail) support a recreational hunting and trapping industry with significant local and regional economic benefits. To manage this asset, it is important to maintain forest conditions that provide habitats to support harvestable levels of game species.

Populations of trout, salmon, and steelhead are another key asset, and support a large recreational fishing industry with significant economic and social benefits. To maintain this asset, it is critical to make investments that will maintain or restore properly functioning aquatic habitats. Investments in this area also contribute to improved availability of these same species to support commercial fishing interests offshore.

A variety of other wildlife species have value for non-consumptive uses such as wildlife viewing. As such, there is a tangible asset value in maintaining diverse habitats that contribute to sustainable population levels for these species.

[1] The term *offset* describes a reduction in emissions or increase in sequestration of greenhouse gases produced by one entity that is used to compensate for emissions produced by another entity. Carbon offsets are created by reducing emissions or by increasing the carbon stored in trees and soils and harvested wood products. Offset credits are issued to persons or organizations who perform offset activities by a regulatory agency or by an organization in charge of managing GHG registries. Credits can then be sold to individuals or organizations that want to mitigate their own GHG emissions.

Recreation

State forestlands have significant tangible and intangible value as a source of recreational opportunities. In addition to the recreational value of the fish and wildlife resources, these forests support other recreational activities that provide social and economic benefits.

Hunting is the main recreation use on the Elliott State Forest. Activities such as hiking, nature viewing, sightseeing, trapping, and dispersed camping are expected to become more popular in the future. The Elliott State Forest has limited off-road driving opportunities, but those activities must be managed to avoid potential conflict with other forest uses. Even with continued growth of recreational activities on the forest, use is expected to be moderate because of the steep terrain, distance from major metropolitan areas, and relative lack of access.

Water Resources

The waters that flow from the state forestlands are another major asset to local communities. These streams and rivers support key populations of fish and provide recreational opportunities.

To maintain the asset value of the water resources, it is important to protect and maintain high levels of water quality.

Forest Roads and Related Infrastructure

Integrated forest management to achieve the goals of this FMP requires a high quality, well-maintained system of forest roads and associated infrastructure. The Elliott State Forest currently contains approximately 550 miles of active forest roads, ranging from mainline access roads serving large areas for a variety of uses to short spur roads that may only receive intermittent use for specific purposes. Related infrastructure includes 18 bridges and 1,800 culverts. In aggregate, these forest roads and their related infrastructure represent a significant investment in state forestlands that has occurred over time, and has accrued significant asset value. Cost effective design, construction, and maintenance of forest roads is essential to protecting this investment and to achieving the resource goals of the FMP.

Guidelines for Asset Management

Maintaining and/or enhancing the value of the assets described in this FMP is fundamental to maintaining the ability of the forestlands to provide for sustainable timber and revenue, and to produce the other resource values. The asset management guidelines below are derived from language in the Oregon State Constitution, statutes and rules, DSL Asset Management Plan, BOF policy, and ODF policy.

Implementation of the FMP will be consistent with these guidelines to ensure that the asset value of the forest is maintained or enhanced through implementation of the FMP. The guidelines are as follows:

- Conduct active management, in a sound environmental manner, to provide a sustainable, even-flow of timber harvest and revenues to the CSF, counties, and local taxing districts.
- Conserve forestlands by maintaining the state forestland base.
- Maintain a land exchange and acquisition program that actively pursues acquisitions and exchanges as a means of consolidating state forestlands for management efficiencies, economic values, or enhanced stewardship practices.
- Maintain a budgeting and financial management system that ensures that revenues derived from these state forestlands are sufficient to cover the ODF's costs of implementing this FMP.
- Prioritize and undertake investments in stand management activities, such as precommercial thinning and fertilization, which are designed to increase timber quality and/or quantity and enhance wildlife habitat values.
- Maintain key investments in the development and protection of forest infrastructure, such as roads, bridges, and recreational trails and facilities.
- Maintain key investments in information systems such as forest inventory and GIS systems, to support overall FMP implementation and contribute to assessing the value of assets over time.
- Prioritize and undertake investments in research and monitoring projects, to ensure the success of adaptive forest resource management.
- Develop strategic plans for addressing identified critical forest health issues to minimize the effect of insect and disease on the timber asset.
- Implement marketing strategies designed to maximize the value received for products sold from state forestlands.
- Implement timber accountability strategies and systems to ensure that the state and other beneficiaries receive anticipated revenue from the sale of timber and other products.
- Grow and harvest trees to produce timber, revenues, jobs, and habitat for fish and wildlife.

Summary of Anticipated Outcomes from Implementing the Asset Management Guidelines

In addition to generating the annual revenues, which are detailed in the district IP, the base asset value of the land and timber is expected to increase as a result of implementing this FMP.

This increase in asset value is expected to result from several factors:

- Increasing bare land values in the southwest Oregon region.
- Increasing standing timber volume and average stand value in these forests as average stand age and size increase through time. This will be accomplished

through active density management (precommercial thinning and partial cutting) and investments in other cost-effective silvicultural treatments.

- Increasing value of facilities and infrastructure (e.g., roads, bridges, and other infrastructure investments) on state forestlands.
- Increasing ability of these lands to provide direct and indirect economic benefits associated with diverse wildlife habitats, properly functioning aquatic systems, broad recreational opportunities, and high levels of water quality.

Implementation of the FMP’s strategies is expected to result in significant revenue to the CSF, and the state, counties, and local taxing districts. The district IP provides details on anticipated revenues, associated expenses, and the resulting net income expected.

Public Involvement in Implementation

The ODF is committed to public participation in land management decisions (OAR 629-035-0080 and Guiding Principle 7). The guidelines in the Public Involvement Directive 0-5-1-210 (07/01, P.N. 941) describe the ODF's public involvement policies and procedures. Public participation in the development of this FMP is discussed in Chapters 1 and 2.

An effective public involvement program ensures that decisions are made with a full understanding of public concerns, and that those decisions are better understood and trusted by the people affected.

Early and Continuous Involvement

The benefits of public involvement cannot be achieved by means of a simple public notice and comment period once plans or projects are completed. The ODF prefers to involve the public early, so that concerns can be addressed as part of the planning process, rather than after the fact in a review or mediation. Early public participation is particularly important in the case of large-scale, complex projects or plans such as this FMP.

Appropriate Scale and Flexibility

The public involvement program should be appropriate for the scale and complexity of the project. A long-term, extensive public participation program is required for large-scale, complex projects that call for comprehensive evaluations.

Public involvement must be a flexible process, adapting to different sets of environmental issues and public concerns. The ODF will design and implement public involvement programs that match the needs of the project, and reflect the needs and preferences of people involved. Because public involvement is a dynamic process, the ODF may need to revise public participation plans when necessary.

Accountability and Timeliness

Participants in a public involvement process must be accountable for their actions. The ODF will ensure that the participation process is directly linked to the decision-making process. Participants should report back to their constituents in a fair and accurate manner, and follow through on any negotiated commitments. The ODF must ensure that members of the public have adequate time in which to review information and provide meaningful input. Stakeholders and other people involved should recognize that the decision-makers remain accountable for making the decision. Decision-makers should explain their decisions; clearly demonstrating how the public's input has been used, or explain why the results have not been incorporated in the decision.

Shared Process and Mutual Respect

Public involvement programs often bring together people representing a wide range of perspectives, opinions, and values. Participation in the process should be conducted in an atmosphere of mutual respect.

Public Involvement Techniques

Techniques should match needs. There is no single best public involvement technique. There are many techniques, and each may be effective in a particular set of circumstances or in response to the preferences of a particular public group. Specific techniques are presented in the *Public Involvement Directive*.

Public Involvement in the District Implementation Plan and Annual Operations Plans

Public involvement can provide local forest managers with additional information and ideas as they develop IPs and AOPs to achieve the goals of this FMP. Ongoing public involvement during implementation of this FMP is also critical to gaining public understanding, acceptance and support for local plans and operations.

Public involvement opportunities will be provided as district IPs, land management classifications, and AOPs are reviewed and approved. These opportunities will be designed to meet the following goals:

- To seek insight, opinion and data on planned management actions.
- To build understanding, acceptance and support for the forest management planning process and decisions.
- To offer information to the public about forest systems and forest stewardship.
- To provide the public with meaningful opportunities to comment and affect planning decisions at a time when public involvement can contribute positively to the planning decisions under consideration.

The district forester will be responsible for developing and implementing public involvement opportunities that will meet these objectives. At a minimum, the following opportunities will be provided:

District Implementation Plans—Prior to submitting the initial IP and the associated land management classification maps to the State Forester for approval, a 90-day public comment period was conducted to gather public input. All public comments submitted in writing were forwarded to the State Forester, along with the district forester's recommended IP and land management classifications.

The State Forester shall approve, modify, or reject the recommended IP. If the recommended plan is modified, the modifications will be incorporated into the original IP and appropriate revisions made to land management classifications. If the recommended IP is denied, the district forester shall prepare a revised or new IP and/or revised or new land management classifications as appropriate.

Prior to submitting a revised or new IP and/or revised or new land management classifications, after a previous denial, a 30-day public comment period will be in effect to gather public input. All public comments submitted in writing will be forwarded to the State Forester, along with the revised or new IP. The State Forester shall approve, modify, or deny this IP. The process described in this paragraph will be followed until approval of an IP is obtained.

Annual Operations Plans—The district forester must consult with the DSL as specified by contract, and consider any written comments from resource specialists and the public before approving or denying approval of an AOP.

Chapter 7
Adaptive Management

Chapter 7 discusses the concepts for adaptive management, what is involved in adaptive management, the four planning levels where change might occur through adaptive management, and the State Forests monitoring program.

The main headings in Chapter 7 are:

Adaptive Forest Resource Management

In the OARs that govern state forest management, adaptive management is defined as a scientifically-based, systematically structured approach that tests and monitors management plan assumptions, predictions, and actions, and then uses the resulting information to improve management plans or practices (OAR 629-035-0000 to 0110). It is the goal of the ODF, through the application of adaptive management techniques, to continually improve management policies and practices by learning from the outcomes of operational programs. Adaptive management requires managers and decision-makers who are willing to learn by doing, and who acknowledge that making mistakes is part of learning.

Adaptive management involves:

- Explicitly recognizing that there is uncertainty about the outcome of management activities.
- Explicitly recognizing that goals and objectives change over time.
- Deliberately designing management policies or plans to increase understanding about the system and to reveal the best way of meeting objectives.
- Carefully implementing the policy or plan.
- Monitoring key response indicators.
- Analyzing the outcomes, considering the objectives and predictions.
- Incorporating results into future planning decisions.

The following key concepts provide the foundation for adaptive forest resource management as it is described in this FMP:

- Adaptive management is a system of decision-making that recognizes that ecosystems and society are always changing.
- Adaptive management is not a replacement for decision-making at any level, but a system for making better decisions.
- Successful adaptive management requires a well-designed process that includes a strong information management program.
- Adaptive management requires a well-defined framework for dealing with change.

The FMP must be implemented using a scientifically-based, systematically structured approach that tests and monitors management plan assumptions, predictions, and actions, and then uses the information to improve management plans or practices. Technical specialists and field managers must evaluate results and make recommendations for change to the appropriate decision-makers. Proposed changes may involve minor adjustments in management practices, or they may require significant changes at policy and planning levels.

There are four planning levels at which change may be proposed, considered, and initiated:

1. FMP level
2. District IP level
3. AOP level
4. Management activity level

The FMP level demands the broadest review and most rigid approaches before change is allowed, whereas the management activity level requires the least review and provides the simplest avenue to change.

Implementing Adaptive Management

Following adoption of this Forest Management Plan, a 10 year Implementation Plan for Research and Monitoring will be developed. The purpose of this strategic plan is to guide research and monitoring activities in the planning area, based on the strategies of the FMP. This Implementation Plan for research and monitoring will be developed collaboratively with interested parties and will include opportunities for public input. This plan will:

- Describe the general monitoring issues that are anticipated to be addressed during the ten-year period.
- Provide the framework to aid prioritizing and developing specific monitoring projects to assess the effectiveness of the management strategies
- Guide development of annual operations plans to support monitoring projects
- Describe funding mechanisms and how available funding will be priorized between projects.

When ODF managers and staff receive new information, they recommend changes to the appropriate official for each of the four planning levels, as shown in Table 7-1. This official makes the final decision. At all four levels, various sources of information can trigger change: public input, monitoring information, research information, and operational experience.

Evaluating Change through Planning Processes

The FMP's success will depend on timely changes in strategies, approaches, and prescriptions in accordance with new knowledge. As new information is available, it must be evaluated in the context of the guiding principles, goals, and strategies of the FMP.

Table 7-1. Decision-Makers for the Four Planning Levels

Planning Level		Who Decides
1. FMP	→	State Land Board/BOF
2. District IP	→	State Forester
3. AOPs	→	District Forester
4. Management Activities	→	Management Unit Forester

1. Forest Management Plan

At this level, planning is typically at broad spatial and long temporal scales, and identifies general goals and strategies.

Information, decisions, and management in the FMP encompass landscape scales, policy concepts, and social, cultural, and environmental influences that may extend beyond state forestlands. These plans make forecasts for at least 10 years, and generally for 30 to 100 years or more. These plans are reviewed periodically and, at a minimum, at least every 10 years. Ten years or more is required to develop relevant monitoring information for these long-term forecasts.

What types of changes might occur at the FMP level?

Changes could occur in the FMP fundamental goals, concepts, and strategies. The FMP Strategies of Sustainable Forest Ecosystem Management that would require this level of evaluation address:

- Stand characteristics
- Structural habitat components
- Aquatic and riparian conservation strategies
- Upland management activities

Who makes the decision to change the FMP?

The State Land Board, BOF, Director of the DSL, and the State Forester will weigh the scientific, operational, and public information in a formal public process to determine changes to the FMP.

What will be the basis for recommending changes?

Changes in goals or incorrect assumptions about expected FMP outputs can be the basis for recommending changes in the FMP. Monitoring will focus on the overall outcomes from forest management, effectiveness of the management strategies, and assumptions in the FMP. This work will generally be long term and at broad landscape scales that include many specific monitoring and research projects. This information will help guide changes in the strategies, objectives, and potentially even the goals of the FMP.

What are the opportunities for public involvement in FMP changes?

Many opportunities will be offered for public involvement. Formal processes will include State Land Board and BOF meetings, FMP OAR hearings, public meetings and workshops, and public input or special interest committees. Less formal opportunities will exist for comments on periodic monitoring reports.

2. District Implementation Plan

Changes at this level will occur over the whole planning area (district), and over time frames longer than one year, but no more than 10 years. The district IP determines how the FMP strategies will be implemented. These IPs include the management activities scheduled for the next 10 years and estimates of the district's progress toward the FMP goals. These IPs are reassessed periodically (at least every 10 years), or if some significant event occurs, or information is received that would significantly change the planned activities or approaches.

What types of changes might occur at the IP level?

Changes could be made to the anticipated sequence of stand treatments, the management opportunities that will be pursued over the next 10 years, and other elements. Changes to the actual strategies themselves will not be made at this level.

Who makes the decision to change the district IP?

The State Forester, in consultation with appropriate other federal or state agencies, will weigh the economic, scientific, operational, and public information, when considering the initial approval and subsequent changes to the district IP.

What will be the basis for recommending changes?

Limited monitoring will focus on issues covered by the IP and issues relevant on the district. Areas of interest will include silvicultural pathways, and approaches used to develop structural components such as snags, remnant old growth trees, and other live trees.

What are the opportunities for public involvement in IP changes?

Many opportunities will be offered for public involvement. Formal processes may include public meetings and workshops and technical specialist or citizen input committees. Less formal opportunities will exist for volunteer involvement in actual monitoring projects and comments on periodic monitoring reports.

An IP that undergoes major revisions will be available for public review and comment for a 30-day period prior to consideration for approval of the revision by the State Forester.

3. Annual Operations Plans

AOPs identify all major forest management activities that are proposed for the next year, including silvicultural prescriptions, recreation projects, road construction and maintenance, stream restoration projects, and any other major projects. Monitoring information will be gathered about the short-term effects, implementation, and contribution of these activities toward FMP goals. This information will be used to effect change from year to year, at scales ranging from site-specific to district wide.

What types of changes might occur at the annual operations planning level?

AOPs are specific action plans that describe specific projects. Silvicultural prescriptions, recreation projects, stream enhancement approaches, and other projects could be changed to improve outcomes. In the case of silvicultural prescriptions, examples might include thinning to lower densities or changing the mix of species being planted.

Who makes the decision to change AOPs?

The district forester will weigh the scientific, operational, and public information through the annual operations planning process, and then make changes and approve the AOPs. The operations planning process includes review by ODF staff and a variety of technical specialists.

What will be the basis for recommending changes?

Limited monitoring will focus on issues covered by AOPs. Areas of interest will include the assessment of silvicultural prescriptions, methods used in stream restoration projects, effectiveness of operational approaches, and techniques to develop or retain structural components such as snags, remnant old growth trees, and other live trees.

What are the opportunities for public involvement in AOP changes?

AOPs are prepared by the district and will be made available for public comment prior to consideration for approval by the district forester. Other opportunities may exist for comments on periodic monitoring reports.

4. Management Activities

Agency personnel learn and make changes on a daily basis in the forest. To achieve the best possible results, it is critical to adapt practices to new information and changing conditions. Frequently, professionals on the ground can identify improved techniques that can be used immediately to achieve better results. In addition, some changes can be incorporated into an ongoing project based on new information from monitoring and research, or from larger-scale information sources offering applicable and appropriate information.

What types of changes might occur at the management activity level?

At this level, change will generally involve adjusting specific techniques. Reasons might include learning a technique that will produce better results, or a more cost-effective way may be found to complete a particular job.

An example is the creation of snags from live trees. In this case, removing tree tops may have been the preferred method, but based on research or operational concerns, the decision may be made to girdle or inoculate trees instead. This decision does not affect the basic principle of developing snags, but merely changes the method.

Who decides to make changes at the management activity level?

Field supervisors will be responsible for weighing the scientific and operational advantages and disadvantages of changes and determining whether change is appropriate.

What will be the basis for recommending changes?

Change at the management activity level may occur without any formal process constraints.

What are the opportunities for public involvement at the management activity level?

These decisions are typical of the daily field work of natural resource professionals and are made within a tight time frame. Opportunities may exist for commenting on periodic monitoring reports.

State Forests Monitoring Program

The Forest Management Plans for State Forests emphasize the need for adaptive approaches to management, in which the results of management actions are measured and compared to pre-determined objectives, and changes are made where necessary. This approach requires a commitment to long-term information gathering and the incorporation of that information into the decision-making process. The state forests research and monitoring program was developed to ensure that the levels of research, monitoring, and technology transfer are adequate to meet the information needs required by these long-range management plans. In fiscal year 2009, the State Forests Monitoring Program supported approximately 20 research and monitoring projects and forestry research cooperatives. Starting in fiscal year 2010, which began July 1, 2009, support for research and monitoring projects was greatly reduced. Currently, the program continues to support some research cooperatives, such as the Hardwood Silviculture Cooperative, Vegetation Management Cooperative, etc., as well as provide limited support to the Trask Watershed Study and to RipStream. Clearly, learning from forest science and experience will be constrained for some time. But, as the budget situation improves ODF will re-establish the research and monitoring program, concentrating on priority issues, as funding and personnel allow.

Following adoption of the FMP, a 10-year research and monitoring plan will be developed as a separate document, linked to the FMP and Implementation Plan. The plan will describe the general monitoring issues that are anticipated to be addressed; provide a framework to aid prioritizing and developing specific monitoring projects to assess the effectiveness of the management strategies; guide development of annual operations plans to support monitoring projects; and describe funding mechanisms and how available funding will be prioritized among projects.

Appendix A
Glossary

The following references are among those used in developing the glossary:

USDA Forest Service et al. 1994. Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Also known as the Clinton Forest Plan or the Final SEIS. USDA Forest Service, Pacific Northwest Region, Portland, OR. February 1994.

Dunster, Julian and Katherine Dunster. 1996. Dictionary of Natural Resource Management. UBC Press, University of British Columbia, Vancouver, Canada.

abiotic	The non-living components of the planet not currently part of living organisms, such as soils, rocks, water, air, light, and nutrients.
active channel width	The average width of the stream channel at the normal high water level. The normal high water level is the stage reached during average annual high flow. This high water level mark often corresponds with the edge of streamside terraces; a change in vegetation, soil, or litter characteristics; or the uppermost scour limit (bankfull stage) of a channel.
activity center	For northern spotted owls, the nest tree, or the location best describing the focal point of the activity of a northern spotted owl or pair of owls when the nest location is not known.
adaptive management	Adaptive management is a system of making, implementing, and evaluating decisions, which recognizes that ecosystems and society are always changing. It is a systematic and rigorous approach to learning from our actions, improving management, and accommodating change.
advanced structure stand	Stands with advanced structure are more developed than intermediate structure stands in the understory reinitiation stage. Tree crowns show significant layering from the tallest trees to the forest floor. Advanced structure stands that are highly diverse may develop structural characteristics typically linked with older forests or old growth.
aggregate	Sand and pebbles added to cement to make concrete, or that are used in road construction.
alluvial	Soil, debris, and other materials that have been deposited by currents of water.
ambient	Surrounding.
anadromous fish	Those species of fish (e.g., salmon) that hatch and rear for a portion of their life history in fresh water rivers and streams, then mature in the ocean, and then migrate back into freshwater rivers and streams to spawn.
aquatic	In or on the water; aquatic habitats are in streams or other bodies of water, as contrasted with riparian habitats, which are near water.
aquifer	A sand, gravel, or rock formation that is capable of storing or transporting water below the surface of the ground.
archaeological and historical resources	Districts, sites, buildings, structures, and artifacts that possess material evidence of human life and culture of the prehistoric and historic past.

archaeological object	An object that is at least 75 years old; is part of the physical record of an indigenous or other culture found in the state or waters of the state; and is material remains of past human life or activity that are of archaeological significance, including, but not limited to, monuments, symbols, tools, facilities, technological by-products, and dietary by-products (ORS 358.905).
archaeological site	A geographic locality in Oregon, including but not limited to, submerged and submersible lands and the bed of the sea within the state's jurisdiction, that contains archaeological objects and the contextual associations of the archaeological objects with each other, or with biotic or geological remains or deposits (ORS 358.905). Specific types of sites, as defined in Oregon law, are: **pre-historic archaeological site—**Created and/or used by humans indigenous to the area before Euro-American inhabitance. **historic archaeological site**—Created and/or used by humans since the time of Euro-American inhabitance; usually belowground and/or aboveground diminishing remains. **historic site—**Created and/or used by humans since the time of Euro-American inhabitance; usually aboveground structurally intact remains. **site of archaeological significance—**Any archaeological site on, or eligible for inclusion on, the National Register of Historic Places as determined in writing by the State Historic Preservation Officer, or any archaeological site that has been determined significant in writing by an Indian tribe (ORS 358.905).
average annual high flow period	High flows generally occur between November and March, with some variability in timing year to year. Average high flows are typically represented with a 2.5-year return interval.
average high water level	The stage reached during the average annual high flow period. This level often corresponds with the edge of streamside terraces, marked changes in vegetation, changes in soil or litter characteristics, or the bankfull stage of a channel.
basal area	The area of the cross-section of a tree stem near the base, generally at breast height (4.5 feet aboveground) and including the bark. The basal area per acre is the total basal area of all trees on that acre.
biodiversity *or* biological diversity	The genetic variation and the variety of microbial, plant, and animal life.

biotic	Any living aspect of the planet.
board foot	The amount of wood equivalent to a piece of wood one foot wide by one foot high by one inch thick.
Board of Forestry	The Oregon Board of Forestry is a seven-member board appointed by the Governor and confirmed by the state Senate. At least one member must reside in each of the state's three administrative regions (east, south, and northwest). No more than three members may receive any significant portion of their income from the forest products industry. The Board of Forestry supervises all matters of forest policy within Oregon; appoints the State Forester; adopts rules regulating forest practices; and provides general supervision of the State Forester's management of the Oregon Department of Forestry.
Board of Forestry Lands	Board of Forestry Lands were acquired by the Board of Forestry under ORS 530.010 to 530.040. Most were transferred from counties to the Board of Forestry in exchange for a portion of future revenue from the lands. Some lands were acquired by direct purchase.
bog	A wetland that is characterized by the formation of peat soils and that supports specialized plant communities. A bog is a hydrologically closed system without flowing water. It is usually saturated, relatively acidic, and is dominated by ground mosses, especially sphagnum. Bogs are distinguished from other wetlands by the dominance of mosses and the presence of extensive peat deposits.
burial	Any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which, as a part of a death rite or death ceremony of a culture, human remains were deposited (ORS 358.905).
channel migration zone	An area adjacent to an unconfined stream channel where channel course changes are likely to occur during high flow events. The presence of side channels or oxbows, stream-associated wetlands, and low terraces are indicators of these zones. The extent of these areas will be determined through site inspections using professional judgment.
chlorosis	Yellowing of normally green plant tissue due to destruction or limited production of chlorophyll; often a symptom of mineral deficiencies, disease (such as Swiss needle cast), feeding by sucking insects, root or stem girdling, or serious light deficiencies.
Clean Air Act	Federal law passed in 1970, and amended several times since. The authority to implement the act is delegated to the states. The act is implemented, in part, through a permit system.

clearcut	Traditionally, a silvicultural system in which the entire stand of trees is cleared from an area at one time. Clearcutting and planting (if needed) results in the establishment of a new even-aged stand of trees. In the Elliott State Forest, a modified clearcutting system is used, in which live trees, snags, and down wood remain on the unit after harvest.
coarse filter – fine filter	For the Elliott State Forest, an operational approach to managing for biological diversity is the "coarse filter – fine filter" concept proposed by The Nature Conservancy (1982), and described in Hunter (1990). The coarse-filter component is based on the premise that maintaining a range of seral stages, stand structures, and sizes, across a variety of ecosystems and landscapes, will meet the needs of most organisms. Fine-filter management superimposes specific management actions for individual species or habitats that require special consideration, such as species with unique or limited distributions.
colluvial	Soil, debris, and other materials that have been moved downslope by gravity and biological activity.
Common School Forest Lands	A subset of the Common School Trust Lands that have been listed by the State Land Board for the primary use of timber production.
Common School Fund	A permanent fund or account managed to provide revenues to the common schools. The State Land Board (Governor, Secretary of State and Treasurer) is the trustee of the Common School Fund.
Common School Trust Lands	State lands owned by the State Land Board. In Oregon, the lands originally granted by Congress under the Oregon Admission Act included approximately six percent of the new state's land for the use of schools. The primary goal in managing Common School Trust Lands is the generation of the greatest amount of income for the Common School Fund over the long-term, consistent with sound techniques of land management.
composition	The different species of plants and animals that live in an ecosystem. The dynamic attributes of a forest ecosystem are composition, function, and structure. Composition is the proportion of various species. Function is the processes taking place in the system. Structure includes kinds and distribution of stand components such as trees, snags, and logs of various sizes and shapes.
concept	An abstract or generic idea generalized from particular instances.

connectivity	A measure of how well different areas (patches) of a landscape are connected by linkages, such as habitat patches or corridors. At a landscape level, the connectivity of ecosystem functions and processes is of equal importance to the connectivity of habitats.
conservation areas	Designated land where conservation strategies are applied for the purpose of attaining specific conservation objectives; this may include cultural or biological aspects. In the Elliott State Forest, conservation areas include habitats utilized by northern spotted owls and marbled murrelets, riparian management areas, and steep, unique and visual lands. Management within conservation areas is aimed at maintaining desired conditions.
corridor	Areas of habitat that connect separate but similar habitat patches, within the landscape mosaic. For example, an area of mature timber, such as a riparian buffer, may connect larger patches of mature timber.
culmination of mean annual increment	Mean annual increment is the total increment of growth of a stand divided by the age of the stand. The culmination age is the age at which the mean annual increment reaches its maximum. If maximization of wood volume is the objective for the stand, this age is generally used as the rotation age. Periodic thinning enhances growth and extends the culmination age.
debris flow	A rapidly moving mass of rock fragments, soil, and water.
debris torrent	Rapid movement of a large quantity of materials, including wood and sediment, down a stream channel. This generally occurs in smaller streams during storms or floods, and scours the stream bed.
demographic study	A study of population dynamics; the quantitative analysis of population structure and trends in size, growth rate, and distribution.
density	The number or size of a population (trees, species, etc.) in relation to a unit of space. In silviculture, stand density is measured as the amount of tree biomass per unit area of land. This can be measured as the number of trees, basal area, wood volume, or foliage cover. Also see “Stand density” and “Stand density index.”
dissected	A landscape that has been cut into hills and valleys by the process of erosion.

disturbance	A force that causes significant change in an ecosystem's structure and/or composition. Disturbance can be caused by natural events such as fire, flood, wind, earthquake, and insect or disease outbreak, or by human activities.
early structure stand	Following a disturbance, an early structure stand develops through the stand initiation process. In the early years of this stage, the site is occupied primarily by tree seedlings or saplings, herbs, grass, or shrubs. In later years, increasing crown closure shades the ground, and herbs, shrubs, and grasses begin to die out or lose vigor. At this point, the stand transitions from an early stand initiation stage to an intermediate stem exclusion stage, leading to an intermediate structure stand.
earthflow	Movement of material, both sediment and vegetation, down a slope. Earthflows are typically large, but move only a few centimeters each year. (See also "landslide.")
ecosystem	A complex system comprising populations of organisms considered together with their physical environment and the interacting processes between them (e.g., marsh, watershed, lake ecosystem). Ecosystems do not have boundaries fixed in time or space because the form and function of ecosystems change at various rates, depending on prevailing environmental factors.
ecosystem functions	The many and varied biotic and abiotic processes that make an ecosystem functional, changing, and interactive (e.g., biogeochemical processes, nutrient cycling, decomposition, regeneration, and succession).
ecosystem management	A management practice and philosophy aimed at selecting, maintaining, and/or enhancing the ecological integrity of an ecosystem to ensure continued ecosystem health while providing resources, products, or non-consumptive values for humans. The actions taken reflect the management goals, and range from protection from human influence through to an increasing intensity of interventions to serve human needs.
edge	The point where two different plant communities (different vegetation types, successional stages, or conditions) meet. Edges may be created by a soil or topographical feature of the site, or where short-term effects are created by natural or human-caused disturbances.
ephemeral stream	Ephemeral streams occur in direct response to precipitation, running only during or shortly after periods of heavy rainfall or rapid snowmelt.

evolutionarily significant unit	A group of stocks or populations that: 1) are substantially reproductively isolated from other population units of the same species; and 2) represent an important component in the evolutionary legacy of the species (National Marine Fisheries Service 1991). This term is used by NOAA Fisheries (formerly the National Marine Fisheries Service) as guidance for determining what constitutes a "distinct population segment" for the purposes of listing Pacific salmon species under the Endangered Species Act. For example, the "Oregon Coast chinook ESU" is a delineation that encompasses all populations of chinook salmon from the Necanicum River on the northern Oregon coast, to Cape Blanco on the south coast.
extensive management	Extensive forest management is a term used for protection of the forest from fire and insects, and the reliance on natural regeneration for provision of the next forest.
fine filter	For the Elliott State Forest, an operational approach to manage for biological diversity is the "coarse filter–fine filter" concept proposed by Hunter (1990). The coarse-filter component is based on the premise that maintaining a range of seral stages, stand structures, and sizes, across a variety of ecosystems and landscapes, will meet the needs of most organisms. Fine-filter management superimposes specific management actions for individual species or habitats that require special consideration, such as species with unique or limited distributions.
Land Management Classification System	Under OAR 629-035-055, state forest lands are classified according to the management that will be applied. The classification describes the management emphasis for the land as determined by Forest Management Plans and any applicable Habitat Conservation Plan. State forest lands are classified as General Stewardship, Focused Stewardship, or Special Stewardship. Focused and Special Stewardship classifications are used when a particular forest resource may need a more focused approach or priority in management compared to other resources.
formation	A group of strata, or layers, of the same sort of rock or mineral, or rock having common characteristics.
fractal	Irregular shapes and surfaces that cannot be represented by classical geometry. Fractal dimension is an index of the complexity of spatial patterns.

fragmentation	The relationship of the landscape matrix to other types of patches; as fragmentation increases, the matrix becomes geometrically more complex. Maximum landscape fragmentation occurs when no dominant patch exists. Fragmentation is also the spatial arrangement of successional stages across the landscape as the result of disturbance, and is often used to refer specifically to the process of reducing the size and connectivity of late successional or old growth forests.
function	An activity or process that occurs in an ecosystem; some typical functions are plant growth, animal reproduction, and decay of dead plants.
geographic information system	A system for management analysis and display of geographic knowledge that is represented using a series of information sets such as maps and globes, geographic data sets, processing and workflow models, data models, and meta data.
geomorphoic	Land forms.
geotechnical	The study of soil stability in relation to engineering.
geothermal	Of or relating to the internal heat of the earth.
goals	A concise, broad statement of an organization's end or process that programs are designed to achieve. A goal is normally expressed as a broad, general statement of purpose, is usually not quantifiable, and is timeless in that it usually has no specific date by which it is to be completed.
groundwater	The subsurface water supply (below the water table) that saturates the pores and fractures of sand, gravel, and rock formations.
guidelines	A set of recommended or suggested methods or actions that should be followed in most circumstances to assist administrative and planning decisions, and their implementation in the field. They are provided as a broad framework of recommended actions to be taken, and thus provide some flexibility for decision-making.
guiding principles	The overall rules, goals, and responsibilities that guide the planning process for the Elliott State Forest.
Habitat Conservation Plan	A comprehensive planning document that is a mandatory component of an Incidental Take Permit application pursuant to section 10(a)(2)(A) of the ESA.
headwall	The steep slope or rocky cliffs at the head of a valley.

high water line	The stage reached during the average annual high flow period. This level often corresponds with the edge of streamside terraces, marked changes in vegetation, or changes in soil or litter characteristics.
historic artifacts	Three-dimensional objects including furnishings, art objects, and items of personal property that have historic significance. "Historic artifacts" does not include paper, electronic media, or other media that are classified as public records (ORS 358.635).
historic property	Real property that is currently listed in the National Register of Historic Places, established and maintained under the National Historic Preservation Act of 1966, or approved for listing on an Oregon register of historic places.
home range	The area that an animal traverses in the scope of normal activities, such as feeding; not to be confused with territory.
hydrology	The study of the properties, distribution, and effects of water on the landscape, under the surface, in the rocks, and in the atmosphere.
Implementation Plan	An Oregon Department of Forestry plan that describes in more detail than the long-range Forest Management Plan how the management strategies will be applied. These plans are designed to describe forest management activities for a ten-year period, and are revised at least every ten years.
incidental take	Under the federal Endangered Species Act, the taking of a federally listed fish, wildlife, and plant species, if the taking is incidental to, and not the purpose of, carrying out otherwise lawful activities.
Incidental Take Permit	Permit issued by the U.S. Fish and Wildlife Service or NOAA Fisheries that allows incidental take of a threatened or endangered species. The permit requires specified actions that minimize and mitigate the incidental take.
integrated pest management	A systematic approach that uses a variety of techniques to reduce pest damage or unwanted vegetation to economically and socially tolerable levels. IPM techniques may include the use of natural predators and parasites, genetically resistant hosts, environmental modifications, mechanical methods, and, when necessary and appropriate, chemical pesticides or herbicides.

integrated resource management	The management of two or more resources in the same general area and period of time (e.g., water, soil, timber, grazing, fish, wildlife, and forests). For the Elliott State Forest, integrated resource management means that the design and application of management practices must consider the effects and benefits of all of the forest resources in such a way that those effects and benefits lead to achieving the goals in the Forest Management Plan over time and across the landscape.
intensive management	Intensive forest management: A management concept promoting basic forest management in combination with juvenile-stand improvement and/or the use of artificial regeneration to ensure reasonably uniform stand establishment and stocking. Intensive silviculture: Any silvicultural practices designed to accelerate stand development and improve the stand value and final yields in stands that are well established.
interior habitat area	That portion of the older forest patch that remains effective when the negative effects of high contrast edge are removed.
intermediate structure stand	As early structure stands develop and transition into the stem exclusion stage, trees fully occupy the site and form a single, main canopy layer. The stem exclusion process begins when new trees, shrubs, and herbs no longer appear and existing ones begin to die, due to competition for light, nutrients, and moisture. Later, as more of the trees die, the understory reinitiation process begins, when enough light and nutrients become available so that herbs, shrubs, and young trees again appear in the understory.
intermittent stream	A stream with surface flow only part of the year. In the Forest Practices Act, defined as a stream that normally does not have summer surface flow after July 15.
landscape	Many sets of stands that cover an area ranging from many hundreds to tens of thousands of acres.
landslide	The dislodging and fall of a mass of earth and rock. There are many types of landslides, including debris slides, earthflows, rock block slides, slumps, slump blocks, and slump earthflows. The different types of landslides vary tremendously in how they occur, how far they move, what type of materials move, etc.
late successional habitat	A forest stand whose typical characteristics are a multi-layered, multi-species canopy dominated by large overstory trees; numerous large snags; and abundant large woody debris (such as fallen trees) on the ground. Other characteristics such as canopy closure may vary by the forest zone (lodgepole, ponderosa, mixed conifer, etc.).

leave area	An area of standing timber retained among areas of logging activity to satisfy management objectives, such as seed source, wildlife habitat, or landscape management constraints.
lieu lands	"Lieu lands" were offered by the federal government to the state to compensate for original land grants that had conflicting claims. The Elliott State Forest includes approximately 7,700 acres of lieu lands.
lithic scatter	A location where prehistoric stone tools were made, usually from obsidian. The tools and weapons were used locally or traded.
loading	The quantity of a substance entering a body of water.
management basin	An area used for forest planning. Management basins range from 4,100 to 11,300 acres. Their boundaries are based primarily on drainage and topographic patterns within the major drainage basins and watersheds.
management prescription	The management practices and intensity selected and scheduled for application on a specific area to attain predefined goals and objectives.
Marbled Murrelet Management Area	The area designated for the protection of marbled murrelets, according to Oregon Department of Forestry policy. (The acronym for Marbled Murrelet Management Area—MMMA—is sometimes pronounced "trima.")
mature forest condition	Desired mature forest condition consists of a stand dominated by large conifer trees, or where hardwood-dominated conditions are expected to be the natural plant community, a mature hardwood/shrub community. For conifer stands, this equates to a basal area of 220 square feet or more per acre, inclusive of all conifers over 11 inches diameter breast height. At a mature age (80 to 100 years or greater), this equals 40 to 45 conifer trees 32 inches in diameter breast height per acre.
minor tree species	For a given stand, tree species that occur as a relatively small component of the stand, such as western redcedar or alder in a stand consisting mostly of Douglas-fir trees.

monitoring	The measurement of environmental characteristics and conditions over an extended period of time to determine status or trends in some aspect of environmental quality. **Implementation Monitoring—**Asks the question, "Did we do what we said we would do?" **Effectiveness Monitoring—**Asks the question, "Are the management practices producing the desired results?" **Validation Monitoring—**Asks the question, "Are the planning assumptions valid, or are there better ways to meet planning goals and objectives?"
morphology	Form and structure.
National Environmental Policy Act	Commonly known as NEPA and signed into law in 1969., The Act requires all federal agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agency's decision-making process; and to consider the environmental impacts in the agency's decision-making process.
native	Indigenous to Oregon and not introduced.
natural ecosystem	An ecosystem that is minimally influenced by humans and that is, in the larger sense, diverse, resilient, and sustainable.
nonpoint source	Entry of a pollutant into a body of water from widespread or diffuse sources, with no identifiable point of entry. The source is not a distinct, identifiable source such as a discharge pipe. Erosion is one example of a nonpoint source.
non-salmonid fish	Any fish species outside the family *Salmonidae*. A salmonid may be resident or anadromous; examples are Pacific lamprey and sculpins.
non-silviculturally capable	Areas that are rocky, swampy, covered by water, or for various other reasons have little to no commercial value for timber production. The Elliott State Forest has a few parcels of rocky or swampy lands scattered throughout the forest. Most are less than 5 acres, though a few are as large as 20 acres.
nutrient cycling	Circulation or exchange of elements, such as nitrogen and carbon dioxide, between living and nonliving portions of the environment.
objective	A clear and specific statement of results to be achieved within a stated time period. An objective is measurable and implies precise time-phased steps to be taken and resources to be used, which, together, represent the basis for defining and controlling the work to be done.

old growth	A forest stand whose typical characteristics are a patchy, multi-layered, multi-species canopy dominated by large overstory trees, some with broken tops and decaying wood; numerous large snags; and abundant large woody debris (such as fallen trees) on the ground. In western Oregon, old-growth characteristics begin to appear in unmanaged forests at 175 to 250 years of age. (See "late successional habitat.")
orographic	A process in which air masses are lifted up by mountains or similar obstructions, leading to higher amounts of precipitation on the windward side of the mountain.
owl circle	The area defined for the purpose of identifying the home range of a northern spotted owl pair or resident single owl; the circle size varies by physiographic province. In the Oregon Coast Range, the radius of an owl circle is 1.5 miles, encompassing the area of 4,766 acres. Guidelines established by the U.S. Fish and Wildlife Service (later rescinded) required protecting 70 acres of owl habitat immediately around an owl activity center, 500 acres within 0.7 miles, and 1,906 acres within 1.5 miles.
particulate	Small particles in smoke produced by burning wood and other forest debris. Two kinds of particulate are controlled under federal and/or state requirements: total suspended particulates and PM_{10} (particulate matter less than 10 microns in diameter).
patch	The landscape patch is an environmental unit between which "quality" differs, such as a habitat patch.
perennial stream	A stream with year-round surface flow. In the Oregon Forest Practices Act, a perennial stream is defined as a stream that normally has summer surface flow after July 15.
planning area	The Elliott State Forests includes a main block and scattered tracts of state forest lands in Coos, Curry, and Douglas Counties and are managed by the Coos District of the Oregon Department of Forestry.
point source	The release of a pollutant from a pipe or other distinct, identifiable point, directly into a body of water or into a water course leading to a body of water.
policy	A definite, stated method or course of action adopted and pursued by an entity that guides and determines present and future decisions and actions. A policy establishes a commitment by which an entity is held accountable.

pollutant	A substance of such character and existing in such quantities as to degrade an environmental resource (i.e., water, air, or soil) by impairing its usefulness (including its ability to support living organisms).
population	The organisms that constitute a particular group of a species, or that live in a particular habitat or area. A group of fish (e.g., Nehalem River fall chinook salmon) that spawn in a particular area at a particular time and that do not interbreed to any substantial degree with any other group spawning in a different area, or in the same area at a different time are considered a population (OAR, Division 7, 635-07-501(38)).
potential murrelet habitat	For the purposes of surveys for marbled murrelets, any forested area with a residual tree component, small patches of residual trees, or one or more platforms (Mack et al. 2003).
prescribed burning	Controlled fire burning under specified conditions to accomplish planned objectives; also called slash burning, as a frequent objective is to reduce the amount of slash left after logging. Objectives may include site preparation for planting and reduction of fire hazards or pest problems.
properly functioning aquatic systems	The range of diverse aquatic and riparian conditions over time and space that emulate the habitat conditions that resulted from natural disturbance regimes under which native species evolved. There is no one condition that is properly functioning.
refugia	Locations and habitats that support population of organisms that are limited to small fragments of their previous geographic range, and areas that remain unchanged while surrounding areas change markedly (the areas serve as a refuge for those species requiring specific habitats). The changes could be short term, such as wildfires or human activity, or much longer term, such as periods of glaciation.
regeneration	Regeneration refers to the process of renewal of a forest or stand of trees, or to the young trees in a stand.
regeneration harvest	The removal of trees to make regeneration possible or to assist in the development of the established regeneration (young trees). The most common type of regeneration harvest in the Elliott State Forest is a modified clearcut, leaving specified amounts of live trees, snags, and down wood.
reserve	An area of land set aside to maintain it in a desired condition, e.g., as functional habitat for wildlife.

resident fish	Fish species that complete their entire life cycle in freshwater; non-anadromous fish. One example is a resident population of cutthroat trout.
residual soil	Soil that has formed in its original place and has not been transported to its current location.
riparian area	Three-dimensional zone of direct influence and/or interaction between terrestrial and aquatic ecosystems. The boundaries of the riparian area extend outward from the stream bed or lakeshore.
Riparian Management Area	A protected area with site-specific boundaries established by the Department of Forestry; the width varies according to the stream classification or special protection needs. The purpose of the RMA is to protect the stream, aquatic resources, and riparian area. Aquatic resources include water quality, water temperature, fish, stream structure, and other resources.
rock block slide	Type of landslide in which the weakness and initial breaking is in the underlying rock, not the soil. See also “Landslide.”
rotation	Also called tree age rotation. The time needed from regeneration of a crop of trees through to harvestable timber, or the time period to reach other stand criteria (e.g., complex habitat function).
salmonid	Fish species belonging to the family *Salmonidae*; includes trout, salmon, and whitefish species.
salvage	Salvage cutting is the utilization of standing or down trees that are dead, dying, or deteriorating, for whatever reason, before the timber values are lost.
seasonal stream	A stream with surface flow only part of the year. In the Forest Practices Act, defined as a stream that normally does not have summer surface flow after July 15.
seral stages	Developmental stages that succeed each other as an ecosystem changes over time; specifically, the stages of ecological succession as a forest develops.
silviculture	The art, science, and practice of controlling the establishment, composition, health, quality, and growth of the vegetation of forest stands. Silviculture involves the manipulation, at the stand and landscape levels, of forest and woodland vegetation, and the control or production of stand structures such as snags and down logs to meet the needs and values of society and landowners.

site class	Site class is a measure of an area’s relative capacity for producing timber or other vegetation. It is an index of the rate of tree height growth, with lower values indicating faster growing trees. The site index is expressed as the height of the tallest trees in a stand at an index age (King 1966). In this document, an age of 50 years is used. The five site classes are defined below. Most of the Elliott State Forest is site class II or III. Site class I ....135 feet and up Site class II..........115 to 134 feet Site class III.........95 to 114 feet Site class IV ....75 to 94 feet Site class V..........below 75 feet
site index	A measure of forest productivity, expressed as the height of the tallest trees in a stand at an index age. In this document, an age of 50 years is used. (See “site class.”)
slope stability	The degree to which a slope resists the downward pull of gravity. The more resistant, the more stable.
slump	A type of landslide; involves a failure in the soil, tends to be spoon-shaped, and the base often oozes out. (See also “landslide.”)
slump blocks, slump earthflows	Types of landslides. (See “landslide,” “slump,” and “earthflow.”)
spatial forest modeling	Spatial forest modeling is the assignment of harvest activities to specific forest parcels, thereby controlling the size and juxtaposition of treatment areas. Examples of spatial control include the size of regeneration harvests, the shape and size of older forest patches, establishing and maintaining connectivity, scheduling of transportation, and coordination of upslope and riparian activities. Spatial forest modeling is contrasted with strata-based forest modeling where parcels with common characteristics are merged together into strata with harvest activities assigned to percentages of the strata. However, with strata-based modeling, it is not known which parcels in the strata are scheduled, and it is not possible to control the size and juxtaposition of treatments.
species	When referring to the federal ESA, species also means: “…any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature” [Section 3(15) of the Endangered Species Act].
stand	A patch of forest distinct in composition or structure or both from adjacent areas.

stand density	In silviculture, stand density is measured as the amount of tree biomass per unit area of land. This can be measured as the number of trees, basal area, wood volume, or foliage cover.
stand density index	A relative measure of stand density; converting a stand's current density into a density at a reference size. It is usually expressed in the equivalent number of trees that are 10 inches in diameter, e.g., 65 trees per acre that average 26 inches in diameter have the same stand density index as 300 trees per acre that average 10 inches in diameter.
stand initiation	This stand development process begins when a disturbance such as timber harvest, fire, or wind has killed or removed most or all of the larger trees, or when brush fields are cleared for planting.
Stand Level Inventory	The Oregon Department of Forestry's Stand Level Inventory acquires and updates state forest vegetation information at the specific site level (forest stand). This information is used for tactical and operational decision-making. The Stand Level Inventory includes vegetation sampling protocols, forest stand data arranged in a database, computer programs for managing and using the information, and documentation of inventory elements.
stand structure	For the purposes of this Forest Management Plan, a series of three stand structures have been defined depicting the typical progression of stand development following a natural or human-caused disturbance. The stand initiation process is represented by the **early stand structure**. The stem exclusion and early understory reinitiation processes are represented by the **intermediate structure**. Structural complexity and larger tree size inherent to the advanced understory reinitiation process are characteristic of the **advanced stand structure**. Old growth stands are included in the advanced stand structure.
standard	A working principle that establishes the measure of performance extent, values, quantity, or quality for a given activity or item.
State Agency Coordination Program	Required under law for each state agency, to establish procedures to assure compliance with statewide land use goals and acknowledged city and county comprehensive plans and land use regulations.
state forests	In this Forest Management Plan, "state forests" or "state forest lands" refers to Common School Forest Lands owned by the State Land Board, and to lands owned by the Board of Forestry, and managed by the Oregon Department of Forestry.

State Historic Preservation Office	Oregon's State Historic Preservation Office was created in 1966 by federal statute. It administers the Statewide Plan for Historic Preservation and submits Oregon's nominations for the National Register of Historic Places.
State Land Board	The Oregon State Land Board is composed of the Governor, Secretary of State and State Treasurer. It was established under the Oregon Constitution to manage Common School Trust Lands and serve as trustee of the Common School Fund.
Statewide Planning Goals	Statewide Planning Goals are adopted by the Land Conservation and Development Commission to set standards for local land use planning. They have the force of law.
steep, unique and visual lands	Lands that include areas of steep, rocky slopes; areas classified as non-silviculturally for timber production; areas with scenic values; and/or areas determined by ODF that have uncommon or unique characteristics, such as old-growth stands and unique forest types. A key protected resource in conservation areas.
stem exclusion process	The stem exclusion process begins when new trees, shrubs, and herbs no longer appear and existing ones begin to die, due to competition for light, nutrients, and moisture.
stock	For the purposes of fisheries management, a stock is an aggregation of fish populations that typically share common characteristics such as life histories, migration patterns, or habitats (OAR, Division 7, 635-07-501(51)). For example, "north-mid coast fall chinook salmon" can be defined as a stock. This stock includes a number of fall chinook "populations" from basins in this area such as the Siuslaw, Yaquina, and Tillamook Bay watersheds.
stocking	A measure of the adequacy of tree cover on an area. Unless otherwise specified, stocking includes trees of all ages.
strategy	A carefully considered plan or method, more encompassing and larger scale than tactics, for achieving an objective.
stream	To qualify as a stream, a water course must have a distinct channel that carries flowing surface water during some portion of the year, including associated beaver ponds, oxbows, side channels, and stream-associated wetlands if these features are connected to the stream by surface flow during any portion of the year. Ephemeral overland flow is not a stream since this type of flow does not have a defined channel.
stream-associated wetland	A wetland that is immediately adjacent to a stream. This includes wetlands that are adjacent to beaver ponds, side channels, or oxbows that are hydrologically connected to the stream channel by surface flow at any time of the year.

stream classifications	Under the Department of Forestry's Forest Practices Act, streams are classified in two categories based on their beneficial use. Type F — Fish-bearing stream Type N — Not a fish-bearing stream Streams are also classified by size and amount of flow. Large streams have an average annual flow greater than ten cubic feet per second (cfs); medium streams have an average annual flow of two to ten cfs; and small streams have an average annual flow less than two cfs. **Perennial streams—**Year-round surface flow. In the Forest Practices Act, defined as a stream that normally has summer surface flow after July 15. **Intermittent streams**—Surface flow only part of the year. In the Forest Practices Act, defined as a stream that normally does not have summer surface flow after July 15. Ephemeral streams may run only during or shortly after periods of heavy rainfall or rapid snowmelt.
stream reach	A section of stream that is geomorphically distinct, and that can be delineated from other adjacent sections based on channel gradient, form, or other physical parameters.
structure	The physical parts of an ecosystem that can be seen and touched; typical structures in a forest are tree sizes, standing dead trees (snags), and fallen dead trees.
stumpage	The price charged for the right to harvest timber from publicly or privately owned forest land.
subcanopy behavior	For marbled murrelets, behaviors that occur at or below the forest canopy and that strongly indicate that the site has some importance for breeding (Mack et al. 2003).
succession	A series of changes by which one group of organisms succeeds another group; a series of developmental stages in a plant community.
sustainability	Sustainability is the ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time. Sustainable forest management describes forest management regimes that maintain the productive and renewal capacities, as well as the genetic, species, and ecological diversity of forest ecosystems.

sustainable economic and social benefit	Key strategies in this Forest Management Plan. These strategies focus on legal mandates and trust obligations, predictable and dependable products and revenues, and social benefit through forest management.
sustainable forest ecosystem management	Key strategies in this Forest Management Plan. A management approach that is based on the synthesis of knowledge from various disciplines, including forestry, fisheries, wildlife, and hydrology. It is an approach to forest management that seeks to achieve a broad range of resource goals and provide a balance of social, economic, and environmental benefits from the forest over time. In addition, Sustainable Forest Ecosystem Management is a landscape approach to the management of forested ecosystems utilizing silvicultural tools emulating natural disturbances to provide forest products, maintain forest health, and retain a high level of social value.
sustained yield	(1) An ideal forest management objective at which point the volume of wood removed is equal to growth within the total forest. Sustained-yield management implies continuous production planned to achieve at the earliest practical time a balance between increment to the mature forest and its cutting. (2) Achieving and maintaining in perpetuity a nearly equal annual or regular periodic output of the various renewable resources, without impairment of the productivity of the land.
tectonic	Resulting from changes in the Earth's crust.
territory	The area that an animal defends, usually during breeding season, against intruders of its own species.
take avoidance	Actions taken by ODF to prevent an incidental take of federally listed wildlife species during forest management activities. Management is consistent with State Forests Division Take-Avoidance policies.

threatened and endangered species

Federal and state agencies make formal classifications of fish, wildlife, and plant species, according to standards set by federal and state Endangered Species Acts. The various classifications are defined below. Federal designations are made by the U.S. Fish and Wildlife Service (USFWS) or NOAA Fisheries. State of Oregon designations are made by the Oregon Department of Fish and Wildlife (ODFW) or the director of the Oregon Department of Agriculture (ODA).

Federal Classifications

endangered species—A species determined to be in danger of extinction throughout all or a significant portion of its range.

threatened species—Species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future.

federally listed species—Species, including subspecies and distinct vertebrate populations, of fish, wildlife, or plants, listed at 50 CFR 17.11 and 17.12 as either endangered or threatened.

proposed threatened or endangered species—Species proposed by the USFWS or NOAA Fisheries for listing as threatened or endangered; not a final designation.

candidate species—Those species for which the USFWS or NOAA Fisheries has sufficient information on hand to support proposals to list as threatened or endangered.

State Classifications

endangered species — Any native wildlife, fish or plant species determined by the State Fish and Wildlife Commission or the director of the Oregon Department of Agriculture (ODA) to be in danger of extinction throughout any significant portion of its range within Oregon, or any native wildlife, fish, or plant species listed as endangered by the federal ESA.

threatened species — Any native wildlife, fish, or plant species that the State Fish and Wildlife Commission or the director of the ODA determines is likely to become endangered within the foreseeable future throughout any significant portion of its range within Oregon.

candidate species--- A watchlist, of any native wildlife, fish, or plant species that the State Fish and Wildlife Commission or the director of the ODA determines is likely to become threatened or endangered throughout all or a significant portion of their range in Oregon.

threshold phenomenon	Pattern or trend in population growth (climate, etc.) that exhibits relatively long periods of slow change followed by sudden increase or decrease in response to a gradually changing environment.
triad approach	An approach described by Hunter and Calhoun (1996) in which three land-use types are distinguished that can coexist without compromising the goal of sustaining biological diversity. The types are: 1) intensive commodity production areas; 2) areas with little or no resource use by people except low-intensity recreation; and 3) areas in which modest resource use is allowed while ecological values are protected (maintenance of diversity and ecosystem function takes precedence over commodity production).
understory reinitiation	The understory reinitiation process begins when enough light and nutrients become available to allow forest floor herbs, shrubs, and tree regeneration to again appear in the understory. The amount of brush and herbaceous species is minimal at the beginning, but increases to a substantial part of the stand by the end of the stage.
unsaturated zone	The layer of soil or rock between the aquifer and the surface of the ground. In this layer, some water is suspended in the spaces between soil or rocks, but the zone is not completely saturated.
watershed	In general, a watershed is defined as an area within which all water that falls as rain or snow drains to the same stream or river. There are different levels of watersheds, from the watershed of a small stream to the watershed of the Umpqua River.
watershed analysis	A process where data is evaluated and interpreted in order to understand causal linkages between watershed-scale processes. This process informs the design and execution of management plans and activities.
water table	The top of the groundwater. The water table is generally subsurface; marshes and lakes form where the water table meets the land surface.
wetland	As defined in Oregon’s Forest Practice Rules OAR 629-24-101 (77), wetlands are “those areas that are inundated or saturated by surface or ground water at 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.”
windthrow	Trees felled by high winds.

Appendix B
References

This appendix lists the books, reports, and other publications referred to in the Forest Management Plan. Listings are alphabetical. The following format is used.

Author's name in bold. Year published. Title of publication. Publisher, publisher's location.

The following abbreviations are used in this appendix. Standard two-letter postal abbreviations are used for the names of states.

BLM	Bureau of Land Management
DEQ	Oregon Department of Environmental Quality
GTR	General Technical Report
OBIC	Oregon Biodiveristy Information Center
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ONHP	Oregon Natural Heritage Program
PNW	Pacific Northwest Research Station (part of USDA Forest Service)
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior

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Appendix C

Sustainable Forest Ecosystem Management Strategy Information

Chapter 5 presented the strategies, and Chapter 4 presented the concepts behind those strategies. This appendix provides more detailed information underlying the implementation of the strategies.

The main headings in Appendix C are listed below. Important connections between these headings and Chapter 5 are summarized briefly below the headings.

The Array of Stand Structure Types

Sustainable Forest Ecosystem Management Strategy 1 states that the ODF will actively manage the Elliott State Forest for a diversity of stand structures. Table 5-1 in Chapter 5 displays the expected percentages for the three different stand types, across the state forest landscape.

The stand structures are not an end in themselves. The stand structures are designed to emulate the diversity of stand types historically associated with conifer forests in the Oregon Coast Range. Several studies have been conducted on the historical distributions of older stand types (old growth) in the Oregon Coast Range (Juday 1977; Teensma et al. 1991; Zybach 1993; Wimberly et al. 2000). These studies have produced a range of possible answers. At the province scale, research suggests that the percentage of older stand types ranged from 30 to 70 percent of the landscape at any point in time. At smaller scales, the variability was even greater, ranging from 15 to 85 percent of the landscape at any point in time.

Stands will vary in size and exist in a variety of arrangements (see “Sustainable Forest Ecosystem Management Strategy 1” in Chapter 5, and the other discussions in this appendix). Generally speaking, individual management basins will contain a mix of all stand types. However, some management basins may have only one or two of the stand types at any point in time. Interior forest habitats will be part of the mix. Decisions on the mix in any given basin will be made at the district level in Implementation Plans (IPs) (see Sustainable Forest Ecosystem Management Strategy 2).

Determining the Expected Landscape Percentages—Both objective and subjective processes were used to determine the FMP’s expected percentages of stand structure types. Foresters and biologists from the planning team considered the following factors.

- The amount of the forest landscape allocated to RMAs and SUVs.
- The projected amount of occupied marbled murrelet habitat.
- The projected number of occupied northern spotted owl sites over time.

The stand structure types correlate with at least four different types of habitats. Open habitats occur during the regeneration stage, and closed canopy habitats are associated with the early intermediate structure stage. In the late intermediate and early advanced structure stand types, habitats have more horizontal and vertical diversity and offer a variety of habitat niches. Advanced structure stands provide habitats commonly associated with older forests or old growth.

Precise Percentages vs. Ranges of Stand Types—There are several reasons for using percentage ranges for the expected array of stand structure types rather than setting an exact percentage. First, the stand structure types as defined do not always appear on the landscape as clearly defined, discrete types. Early structure stands blend into intermediate structure stands with the onset of crown closure. A newly developing understory may be short-lived or it may become established. The exact point at which an intermediate structure stand should be classified as advanced structure is open to individual interpretation.

Second, there is no single right answer for the appropriate balance of the stand structures. Historically, the stand structures present in the Elliott State Forest have varied greatly. Large wildfires such as the Coos Bay Fire have significantly reduced the diversity of stand structure types within specific watersheds or regions. Wildlife populations have always fluctuated in accordance with the amount of available habitat, as well as in response to other natural factors. There is currently no research that supports one specific, idealized array of stand structures optimal for all species. For all these reasons, precise numbers are unnecessary for the stand structure percentages, and the loss of flexibility could lead to poor long-term forest management. The planning team identified expected ranges that would provide diverse habitats for native species.

Silvicultural Practices

The application of silvicultural tools to achieve the long-term goals is based on identifying the current options for the management of existing stands, understanding the future options likely to result from current silvicultural manipulations, and effectively implementing the necessary silvicultural prescriptions to achieve the goals of the FMP. These are the everyday skills that foresters have used for decades.

No fixed treatments can be applied to all stands to achieve the FMP goals. Specific prescriptions must be developed for each stand and set of environmental conditions. The silvicultural tools will be applied in a variety of ways to meet the various goals in the FMP.

Over the long term, a diverse array of stand structures will be produced. However, most planning will focus on a shorter time frame—perhaps the next 10 years for planning and accomplishing specific management practices, and the next 20 years for projecting stand and landscape development and tentatively scheduling future activities. Adaptive management approaches and monitoring will provide the feedback and tools to make future prescriptions.

This shorter time frame is a more realistic planning period within which current stand and forest conditions can be assessed in light of the long-term goals, management scenarios can be analyzed, and future stand options considered. Stand conditions as they exist today are the basis for silvicultural manipulations to achieve the FMP goals.

In the short term, silvicultural treatments will aim to create diverse options for stand and forest management in the future, while providing timber and revenue, improving wildlife habitats, and maintaining biodiversity today.

In stands not planned for short-term regeneration harvest (primarily conservation areas), the basic approach is active management to maintain vigorous tree growth; produce forest products within practical economic timeframes; encourage shrub and herb development; and retain, maintain, or enhance the structural complexity of those stands. Where regeneration harvests occur, structural components will be retained to enhance the complexity of new stands.

The following silvicultural tools will be used (as discussed on the following pages).

- Regeneration harvests
    - Clearcuts (and modified clearcuts)
    - Retention Cuts
    - Selection Harvests: Single-tree and Group Selection
    - Modifications to Retain Structure and Snags
    - Rehabilitation Methods (replacement of brush fields and failed plantations)
    - Comparison of Regeneration Harvest Methods

- Reforestation
    - Site Preparation(fire, mechanical and chemical)
    - Planting (natural regeneration, species, selection, and appropriate stock)
    - Tree Improvement (selection and genetics)
    - Introduction of Additional Species (forage seeding)
    - Tree Protection (seedling animal damage control)
    - Vegetation Management(manual and chemical)
    - Cleaning (hand release)
    - Interplanting and Replanting
    - Control of Bear Foraging

- Density Management
    - Precommercial Thinning
    - Commercial Thinning

- Regeneration Harvests and Density Management Treatments Combined

- Pruning

- Fertilization

- Genetics

Silvicultural Tools and Forest Management

Silvicultural practices are the tools available to achieve the goals of this FMP. Many tools are available. Silvicultural results depend on the practice chosen, the way the treatment is applied, and the conditions in the treated stand. Silviculture works with stands (groups of trees that interact with each other over areas of several acres to several hundred acres).

Silviculture works with the ecological processes of stand development and stand recovery following disturbance. Disturbance is a part of nature. Forests are affected by windstorms, fire, drought, soil movements, insects, animals, and disease organisms. Forests are adapted to respond and recover from disturbances. Most silvicultural practices deliberately disturb stands and/or remove parts or all of the stands to encourage subsequent stand development along expected pathways. Some of these removals include the harvests from the forest.

Stand response to a treatment depends on the stand's condition before and after the treatment. Two key attributes of stand condition are the variation in tree size (especially diameter) and stand density (the number of trees, considering their diameter). Stand density is explained in the sidebar boxes below.

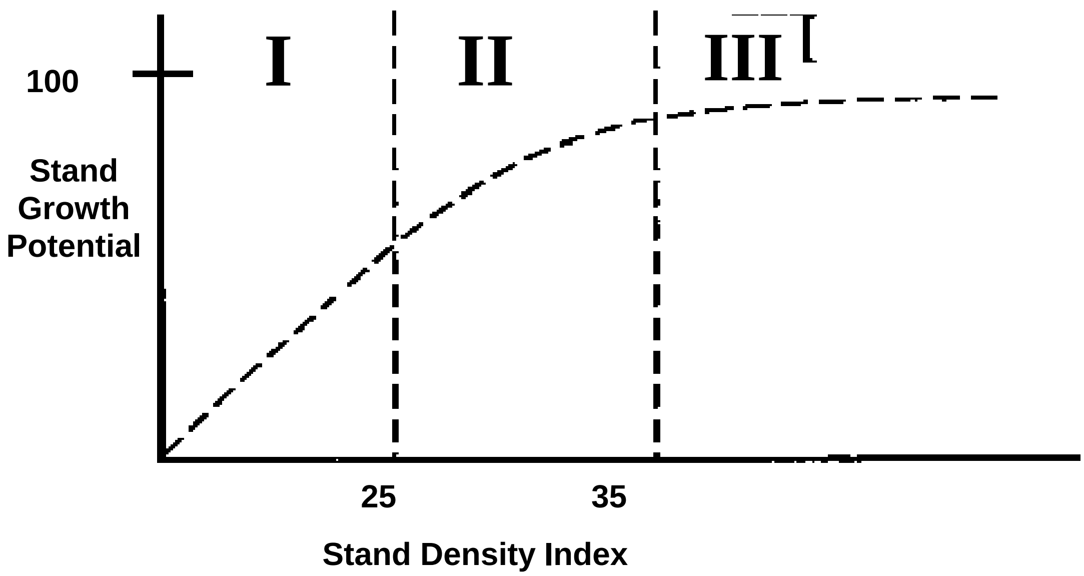
Stands with different structures develop differently after silvicultural treatments. Natural stands and plantations react differently. Existing plantations generally have less variability and less structure than natural stands. They are usually in more need of deliberate treatment to maintain stand vigor and development. Silvicultural practices may enhance or decrease stand structure.

Stand development is driven by density. Individual trees must grow larger or die. They cannot mark time unchanged. This means that any group of trees will eventually grow large enough to interact and interfere with each other. This process drives stand development. Active management adds nothing new, but may sharply increase the pace of stand development or forestall negative developments.

Stand Density

Foresters have found that the total production of cubic volume, by a stand of given age and species on a given site, is for all practical purposes constant and optimum for a wide range of stand density. This is the basis of all thinning. Foresters can grow the same volume in many small trees or fewer large trees.

From a density standpoint, there are three stages of stand growth:



I. Open Growth—Stand is in the early structure. There are no density-related light, water, or soil nutrition limitations. Non-tree vegetation is often lush. Trees grow at their full potential unless affected by competing vegetation other than trees (such as shrubs).

II. Onset of Competition—Stand enters the intermediate structure. Trees compete for light, water, and/or soil nutrients, and not all trees can grow at their optimum rate. Understory vegetation declines.

III. Maximum Stocking—Density-related mortality occurs. Understory vegetation is minimal or absent.

Stand Density

Department foresters measure stand density with Reineke's stand density index (SDI). SDI is a relative measure of stand density; converting a stand's current density into a density at a reference size. It is usually expressed in the equivalent number of trees that are 10 inches in diameter, e.g., 65 trees per acre that average 26 inches in diameter have the same SDI as 300 trees per acre that average 10 inches in diameter. This index is calculated from the stand's average diameter and the trees per acre:

$$\text{SDI} = \text{trees per acre x (diameter/10)}^{1.6}$$

The maximum SDI is 600 for Douglas-fir, 800 for the more tolerant western hemlock, and 440 for the more intolerant red alder. Stand density is often expressed as a percentage of these maximum values. For example, a Douglas-fir stand with 65 trees per acre and an average diameter of 26 inches has an SDI of 300 and a relative density of 50 percent.

The silvicultural significance of several key SDI values is explained below.

SDI (%)	Silvicultural Interpretation
25	Crown closure and onset of self-pruning, competition, and discouragement of understory.
35	Lowest limit of full site occupancy. Self-pruning, competition, and halt in understory development become significant.
55–70	Trees stressed. Self-thinning begins (earlier in stands with well-developed stand structure; later in stands without stand structure). Understories disappear.
100	Maximum stocking; rarely observed.

Density management prescriptions for wood growth are thus straightforward. To grow the most wood, help the stands reach 35 percent SDI as quickly as possible, use precommercial or commercial thinning to maintain them at 35 to 55 percent during their growing years, and allow them to reach 70 percent just before final harvest. However, foresters modify these prescriptions to achieve other management objectives besides wood growth. Examples of other objectives are the retention of understories, the development of larger trees, or the production of natural mortality. These stand characteristics produce diversified wildlife habitat, meeting the needs of wildlife species.

This theory applies to idealized, average stand conditions. Stands in the real world are rarely homogeneous. Understories may develop and persist in less stocked areas of otherwise well-stocked stands. Thinned stands are particularly variable due to variations in individual trees, skid road, cable corridor openings, etc.

Silvicultural practices can only be prescribed and evaluated when management has clearly described the goal. Silvicultural practices may be chosen to take stands along different paths depending on the management goal. For example, precommercial thinnings may be prescribed to produce a uniform stand of large-diameter evenly spaced trees or to produce a more varied stand of large and small trees with clumps and open areas. The former may be most appropriate to optimize certain values and the latter more appropriate for others.

Silvicultural accomplishment must be measured against the management goal. For example, 95 percent plus reforestation success may be an appropriate goal for optimal young stand management; it may or may not be necessary or desirable for wildlife goals. Economic considerations are an essential part of silvicultural practice. There are often several ways of achieving the same results. Rational choice of silvicultural methods requires explicit identification of objectives and calculation of costs and revenue, including the time value of investments.

Regeneration Harvests

Regeneration harvests are intended to replace an existing stand. The trees are removed and the stage is set for reforestation. Regeneration harvests are appropriate prescriptions where the existing stand is mature by the management objectives, contains defective or undesirable growing stock as defined by the management objectives, or has low vigor with a significant risk of loss.

To trigger reforestation and allow it to develop, stand density must be reduced below 25 percent SDI and maintained below 35 percent until the new trees are part of the stand. This density level differentiates regeneration harvest from thinnings. Regeneration harvests may be referred to as reinitiation harvests.

There are several types of regeneration harvest. For most stands in the Elliott State Forest, the most appropriate type to assure successful establishment of new trees is the clearcut or modified clearcut. A group selection harvest may be appropriate in some circumstances. The retention cut method may be appropriate for regeneration of western hemlock. Single tree selection may be appropriate for certain mixed western hemlock, Sitka spruce, or western redcedar stands.

Clearcuts—On almost all sites in the Elliott State Forest, clearcuts will provide the best conditions for successful plantation establishment. In this FMP, clearcuts are modified to leave residual live trees, snags, or trees destined to become snags specifically for their biological or environmental values. The intent of the modifications is not to help achieve regeneration, but rather to provide for the other values. In fact, these modifications may detract from reforestation. Trees left for biological or environmental values may be of significantly different species, condition, or location than trees left to help regeneration.

In other harvest methods, such as retention cuts and selection harvests, trees are left to help achieve regeneration, for example, as a seed source. However, in a modified clearcut, overstory trees, if alive and reasonably vigorous, will contribute to the overall stand stocking and may compete with the regeneration. Stand density may be approximated by calculating and summing the overstory and understory SDIs.

Retention Cuts—In this method, the original overstory is removed in two or three stages over several years. This method will work with most conifer species found in the Elliott State Forest, but is not necessary to regenerate any of them. Because of its logistical difficulty and careful timing requirements, it will rarely be appropriate. The exception may be western hemlock stands where western hemlock regeneration is desired but the overstory trees are not considered sufficiently windfirm for a modified clearcut.

Selection Harvests: Single-tree and Group Selection—Unlike the previous even-aged regeneration methods, selection harvests develop and maintain many-aged stands. Regeneration harvests, precommercial thinnings, and commercial thinnings are combined in this method. Trees are removed individually (single-tree selection) or in groups of half-acre to several acre patches. As the patch size increases, group selection tends toward clearcutting. The operative difference is whether the regeneration develops under the influence of the overstory.

Individual tree selection may be appropriate for mixtures of tolerant western hemlock, Sitka spruce and western redcedar where stand continuity of advanced structural characteristics is desired. With proper attention to vegetation management and reforestation, group selection methods should work with any tree species in the Elliott State Forest other than red alder, though growth of the new stand should not be expected to be as high as with clearcut methods.

Rehabilitation Methods—Where desired by management, the replacement of brush fields, grass areas, and/or failed plantations generally will be by methods similar to clearcuts. Only minor acreages of these remain in the Elliott State Forest.

Comparison of Regeneration Harvest Methods—Regeneration harvests will have obvious impacts on stand structure. Selection methods will retain the most structure. Modified clearcuts will retain some structure. Regular clearcuts have the least structure and provide more limited opportunities for structural development in the future. Retention cuts retain and promote a fair degree of stand structure, primarily through their less certain and more variable regeneration. Stand structure also influences selection of the regeneration harvest method. Dense stands, with skinny, crowded trees (often referred to as "doghair" stands), often are not windfirm enough to handle partial cutting; clearcutting may be the only practical method for these stands.

Reforestation

Reforestation to the standards and timeframes of the Oregon Forest Practices Act (FPA) is not easy or automatic in the conditions found in the Elliott State Forest. Reforestation requires various combinations of site preparation, planting, animal damage control, vegetation management, and occasionally interplanting or replanting.

These practices must be considered and prescribed for individual stands on a site-specific basis.

A range of silvicultural practices for reforestation are discussed briefly on the next page.

Site Preparation—In many circumstances, the harvest operation provides sufficient site preparation for planting. In other circumstances, slash, organic debris, and duff are physical barriers to planting, or the site is already occupied with existing or sprouting competing vegetation that will prevent or delay tree establishment. In these cases, site preparation by fire, mechanical means, or chemicals is appropriate.

Planting—In most circumstances, trees are hand planted. Natural regeneration, as a primary mechanism for reforestation, is usually restricted to western hemlock on moist sites or to fill in with additional trees. Appropriate species selection and use of the appropriate nursery stock are important. These procedures are well worked out with Douglas-fir and, to a large extent, with western hemlock, but it has been difficult to obtain appropriate planting stock for western redcedar, true firs, and hardwoods.

Tree Improvement—Trees are genetically adapted to certain sites. Selection and control of seed source is critical. Tree improvement programs are underway for Douglas-fir and western hemlock; most trees being planted today are from the tree improvement program. When improved seed is not available, seed is collected from local seed zones. These trees are expected to display better health and more vigorous growth.

Introduction of Additional Species—In some cases, wildlife forage crops may be seeded to benefit wildlife. Reforestation may be aided if the crop displaces what would otherwise be a more competitive species.

Tree Protection—Seedlings may be harmed or destroyed by animal browsing. Elk, deer, mountain beaver, rabbits, and rodents may all be problems. Some species, such as western redcedar, are particularly favored by animals and often eliminated. Thorough site preparation and large planting stock are the best indirect controls; these protection methods initiate tree growth in a positive manner and allow the trees to outgrow damage. In many other cases, direct control or prevention of animal damage is essential. Significant mountain beaver populations must be trapped. Seedling protection by bud caps, netting, or Vexar tubes is appropriate in many circumstances. Repellents have potential, but results have been erratic.

Vegetation Management—The Elliott State Forest is a highly productive tree-growing area. However, it also supports very competitive native and introduced herbs, shrubs, and hardwood trees. Vegetation management is usually needed to allow conifers to reach full stocking within FPA timeframe requirements. Chemical applications are usually the preferred method of vegetation management as they allow precise targeting with minimal site damage or side effects.

Cleaning (hand release)—A common practice in conifer stands is the removal of red alder stems, vine maple stems, and/or bigleaf maple sprouts that are overtopping conifers. This is usually done with hand-applied chemicals (“hack and squirt”). The current emphasis is to leave any individuals that are not overtopping conifers or any areas of only minor overtopping, so as to encourage biodiversity.

Interplanting and Replanting—These practices are now infrequent.

Control of Bear Foraging—Black bears may forage on conifer trees in the spring, damaging or killing individual trees or patches. Bears attack vigorous trees six inches in diameter and larger. Control methods include feeding bears and/or trapping individual problem bears. Pruning, removing the lower live limbs, reduces the carbohydrate-to-terpene ratio of the tree’s cambium, rendering the trees less palatable to bears.

Status of Reforestation in the Elliott State Forest—ODF foresters have worked out excellent methods of reforestation. Fully stocked Douglas-fir plantations occupy over 95 percent of most past sale areas. However, management objectives are changing for many stands, and foresters must adapt their reforestation methods to meet the new objectives. More work and adaptive management procedures will be required to achieve successful reforestation with different and multiple tree species, to incorporate modifications to clearcuts, and to meet the needs for a diversity of stand structures and wood quality.

Most young stand management practices in reforestation have produced plantations with reduced stand structure. Good planting stock is uniform. Site preparation, vegetation management, and control of animal damage all make growing conditions more uniform. Given this, subsequent silvicultural practices will be needed to introduce or encourage stand structure in managed plantations.

Density Management: Precommercial and Commercial Thinning

Thinning regulates stand density. In precommercial thinning, the cut trees are left unused and the operation is carried out at a cost. In commercial thinning, some or all of the cut trees are used and the operation produces revenues. Both practices have the same silvicultural impact. Thinning decreases natural mortality, maintains stand vigor, and develops healthier, larger, more windfirm, and generally more valuable trees. By removing trees that would otherwise die in the competition for light, nutrients, and water, commercial thinning increases net stand production over time. Thinning may also directly improve tree quality and tree size through selection of the better and larger trees for the residual stand. Potential drawbacks to thinning are the lower wood quality associated with larger branch diameters and increased stem defects in young stands thinned before crowns close and growth slows on lower branches; loss of snags for wildlife in thinned older stands; and decreased stand structure. Residual stand damage is minimal with proper contract administration.

Both precommercial and commercial thinning are optimally carried out before density-related competition reduces tree vigor, i.e., between SDI 25 and 55 percent. Precommercial thinning may be delayed to the higher end of this range to suppress branch growth. Commercial thinning is usually delayed to the upper end of the range to maximize harvest volumes, to improve sale revenues and reduce the number of stand entries. Thinning reduces the stand density to the point from which the stand will grow back to the desired stand density at the projected next entry, either another thinning or a regeneration harvest. This point may be anywhere from 25 to 45 percent. Some very vigorous young stands may be taken temporarily below 25 percent SDI, as these stands recover and quickly exceed 25 percent SDI. Thinning is marginal or inappropriate in overly dense stands with high height/diameter ratios.

Tree selection in precommercial thinnings is carried out by tree cutters, with species selection and the number of residual trees specified by foresters. Tree selection in most commercial thinnings is also performed by cutters, with foresters specifying the minimum average diameter of residual trees and acceptable residual stand basal area. These “auto-mark” thinnings have provided better results than thinnings where trees are individually marked. Fallers can consider all aspects, including tree selection, lead, and location of skid roads and cable corridors. Individual wildlife trees, trees of minor species desired in the residual stand, or any other exceptions to auto-mark specifications need to be individually marked or otherwise specified. In the future, more individual tree marking or alternate contract specifications may be necessary due to the increased stem defects in managed plantations and the need to carefully select against these.

In the short term, thinning may reduce the range of tree diameters through removal of smaller trees and forestalling future mortality. However, in the long term, thinning may increase future stand structures by developing larger, more windfirm trees that will respond to future treatments designed to enhance stand structures. Thinning also encourages the development of a more diverse group of shrubs and herbs. Modifications can be made to maintain and/or enhance stand structure. These modifications include maintenance of existing older or larger overstory trees and snags, deliberate creation of snags, creation of gaps, and retention of unthinned areas within stands.

Regeneration Harvests and Density Management Treatments Combined

In the Oregon Coast Range, many stands are a mix of clumps of mature or slow-growing red alder with scattered emergent conifers and generally over-stocked stands of conifers. The conifers are chiefly planted or seeded Douglas-fir, but include natural western hemlock and scattered western redcedar, Sitka spruce, and true firs. In the absence of management, these stands will quickly lose vigor through density-related competition. With management, stand structure can be maintained and greatly enhanced.

ODF foresters have developed sale prescriptions that simultaneously: 1) thin over-stocked but still vigorous conifer areas; 2) regeneration harvest mature hardwood areas and over-stocked and non-vigorous conifer areas; and 3) retain most emergent established conifers and many of the existing snags, as modifications to the regeneration harvests. Regeneration harvest areas included in these sales range from small clearcuts to group selection openings. Reforestation and management of competing vegetation is planned on the regeneration harvest areas; natural regeneration of minor species is also likely to occur in many areas.

Regenerated areas in these sales are not expected to produce as much timber volume as plantations on clearcut areas. However, the commercially thinned stands produced by these treatments will be much more productive than if they were regeneration harvested and converted at this time. Many future silvicultural options exist for these stands. They could be rethinned a number of times and carried to long rotations; they could be gradually converted to many-aged stands through group selection harvests; or they could be regeneration harvested through clearcuts and be replaced by plantations. In many cases, decisions on these options need not be made for many years, even decades.

Pruning

Production of structural grade wood generally requires that knots be maintained at 1.5-inch diameter or less. This standard can be achieved by maintaining Douglas-fir plantations at 250 to 300 trees per acre or more, until crowns close and are 30 to 40 feet above the ground. Larger knots may be tolerated in very large diameter trees. However, pruning is appropriate where such management is not desired; where stands have already been spaced to lower stocking; or where plantation losses to competing vegetation, bears, mountain beaver, deer, and elk have reduced stocking to lower levels. Pruning will also create clear wood wherever it is carried out. It is the only method of producing clear wood over rotations of less than 100 years.

Pruning is optimally performed when the trees are small enough to minimize the size of the knotty core in the center of the tree, and maximize the production of high grade, knot free wood at the time of anticipated harvest. Pruned trees must maintain a minimum of 50 percent of their live crowns. To maintain the live crown and minimize the core, pruning should be done in several lifts as the tree grows. The first log up from the ground is the most valuable part of the tree, and the most vulnerable to large branches in plantation culture. Pruning should be carried out to as high a point as is practical (at least 18 to 24 feet) where large valuable trees are expected.

Effective techniques for pruning with loppers and ladders have been developed based on New Zealand experience.

Pruning is not needed to grow structural wood in western hemlock stands. It would be needed to grow clear wood. Pruning, along with early trimming to one central stem, is also anticipated as a necessary practice in red alder plantations. However, this pruning need not reach as high up the tree.

Pruning should not alter stand structure. Pruning most trees in a stand, especially when combined with early precommercial thinning, will significantly increase light to the forest floor, thereby prolonging the early structure and herb and shrub forage values.

Fertilization

Many forest stands are deficient in nitrogen. Douglas-fir and true fir stands have been shown to respond to nitrogen fertilization by increasing volume growth for 4 to 12 years after fertilization. Average response is 1,000 or more board feet per acre to fertilization with 200 pounds nitrogen in urea. Response is better in thinned stands than in unthinned stands, and better on lower sites than on higher sites. Where intermixed red alder has added nitrogen to stands, conifer response to fertilization is less likely. The response of Douglas-fir is limited on site I soils. Fertilization of hemlock and western redcedar produce inconsistent responses. Response has been demonstrated for the period following stand closure up to approximately 80 years of age. Stand response past that age is unknown. Applications may be repeated, with similar responses, at four- to 8-year intervals. Application is usually by helicopter when enough moisture is present to quickly incorporate the fertilizer into the soil and minimize volatilization.

The optimum extent and frequency of fertilization are economic investment questions. Fertilization adds volume, and therefore value. However, the effects on overall stand development have not been well documented, and different situations will likely result in different outcomes. In some circumstances, fertilization may accelerate stand development, but it is unlikely to significantly change other forest attributes. Fertilization will not necessarily increase stand structural complexity. In other cases, it may slow the stand development progression by improving the diameter growth of smaller trees and delaying mortality.

Fertilization prescriptions may change in the future for plantations. In the Coast Range, many of these plantations are observed to be growing at significantly higher rates than previously expected. They may well respond differently or not at all to nitrogen fertilization. Foresters are considering trying balanced application of multiple nutrients with prescriptions tailored to individual sites after analysis of foliage. Response may be very significant, especially where response to nitrogen alone is not observed. Application of minor nutrients may also reduce the incidence of stem defects frequently observed in high site Douglas-fir plantations in the Oregon Coast Range. These stem defects are of serious concern for wood quality.

Genetics

Reforestation projects on state forest lands will take advantage of the highest quality seed to ensure that forest trees and forest stands are well-adapted to planting locations and are capable of growing vigorously with resilience to forest health threats.

The ODF has initiated genetic tree improvement efforts for several forest tree species like Douglas-fir, western hemlock, western redcedar, western white pine, Sitka spruce, and red alder. The principle objective of improvement efforts is to ensure that high-quality, well-adapted forest tree seed is available for reforestation programs. The breeding phase includes the selection and breeding of healthy, vigorous trees and field testing across a variety of environmental conditions. The production phase involves the propagation of the best selections into a seed orchard to enable the cost-efficient production of genetically improved seed.

The ODF's J.E. Schroeder Seed Orchard produces seed from a wide variety of forest tree species for general, specific, and forest structure silvicultural objectives. For species like Douglas-fir and western hemlock, seed orchard seed will be used for planting and seeding programs on state forests. Seed is mixed from a number of selected families to ensure that an adequate level of genetic diversity is maintained in planted forest stands. Seed from certain selected seed orchard trees may be used to achieve specific objectives such as improvement in wood quality characteristics and the value of timber at maturity.

The ODF is also involved in genetic improvement efforts to improve levels of pest resistance. Douglas-fir tree selections that demonstrate a tolerance to Swiss needle cast are being used in planting projects in cooperation with other landowners. The ODF is also working to develop tip weevil-resistant Sitka spruce. This pest has caused extensive damage to this conifer species. Field trials to test potential tip weevil-resistant spruce trees have been planted on two state districts, Astoria and Tillamook. In a cooperative project with the U.S. Forest Service, the ODF has access to western white pine seed that is genetically resistant to blister rust, a deadly pathogen that kills almost all natural white pine trees. All western white pine currently planted on state forest land comes from blister rust-resistant seed stocks.

The development and use of appropriate genetic stocks that survive well, are adapted to a variety of environmental conditions, and produce healthy, vigorous forest trees is a basic tool that helps provide forest stands that meet the FMP goals.

Management Pathways

Sustainable Forest Ecosystem Management Strategy 1 states that the ODF will use active management to provide a diversity of stand structures. The following sections describe in detail how management will proceed. The management pathways described here are examples, not prescriptions. Silvicultural practices mentioned in this section, such as modified clearcuts, retention cuts, and group selection, are explained earlier in this appendix (under the heading "Silvicultural Practices").

Management Pathways for Achieving Stand Structure Types

Stand Type: Early

Pathways—Regeneration harvests must occur to maintain or achieve open habitats and stand initiation on 10 to 20 percent of state forest lands on the district. Clearcuts, patch cuts, retention cuts, and group selection cuts are types of regeneration harvests that will create early structure stands. These harvests will maintain a sustainable flow of timber and revenue to local markets, economies, and governments, and will contribute to an expected amount of early structure on the landscape.

Stand Type: Intermediate

Pathways—Many of these stands originate from early structure stands that have reached crown closure. Some stands have been so densely stocked that virtually no understory exists; other stands consist of a single species, single-layered main tree canopy with an understory of shrubs and herbs that is more diversified than simply having one or two shade-tolerant species. They may persist for a long time unless density management activities are carried out to produce stands with understory trees and shrubs, or regeneration harvest returns the stands to the early stage.

Stands in the intermediate stage will be managed to meet the whole range of expected stand structure conditions and products. Each stand will be managed based upon its location and potential to meet the planning goals. Stands in conservation areas will generally be managed to produce advanced structure in accordance with ODF policy and guidance for the type of conservation area. For example, owl circles will be managed to meet ODF take avoidance standards. Stands outside conservation areas will be managed for high value timber production. The following text box provides an example of a decision process that could be used to develop silvicultural prescriptions for intermediate structure stands.

Example: Developing Prescriptions for Intermediate Structure Stands

1. The stand offers good silvicultural potential for future wood growth or development of desirable stand characteristics. Prescribe for:
    A. A pathway that does not head for advanced structure (retains biodiversity components such as snags, coarse downed wood, etc.); a pathway that heads for advanced structure (retains biodiversity components and develop multi-canopied structure – these stands will be primarily located in conservation areas); or general density management for vigorous growth that defers the decision on the ultimate stand structure for the given stand.

    B. Regeneration harvest. Prescribe regeneration harvest to meet early structure goals or to realize timber value.
2. The stand does not offer good silvicultural potential. Prescribe for regeneration harvest in near future, unless other management priorities exist.

Stand Types: Advanced

Pathways—A broad range of stand conditions exists in this stage. Stands are dominated by trees (rather than shrubs or herbs). Stands of trees may range from larger than sapling size to the very largest conifers. The following four conditions represent the range.

- The understory appears vigorous and is beginning to diversify. However, herbs, shrubs, and understory trees are not yet fully diversified. Some vertical layering occurs but is not extensive.

- The organization and structure of the living plant community is complex. Vertical layering of tree crowns, shrubs, and herbs is well developed.
- Plant communities are complex, layering is extensive, and snags, downed wood, tree litter, and soil organic matter are present.
- Further stand development features include large trees, canopy layering, snags, and substantial downed wood. Time has allowed functional processes to develop among a broad biotic community.

Over time most advanced structure stands will be located in conservation areas. The following text box presents some possible silvicultural prescriptions for advanced structure stands.

Example: General Prescriptions for Advanced Structure Stands

A. A pathway that does not lead to advanced structure (retains biodiversity components such as snags, downed wood, etc.).

B. A pathway that maintains current condition (retains biodiversity components and develops multi-canopied structure).

C. General density management for vigorous growth that will ultimately result in advanced structure.

D. Regeneration harvest for acres in this type that are not located in conservation areas.

Managing for Key Structural Attributes of Forest Stands

Multi-layered forest canopies, herbs and shrubs, and canopy gaps are structural components present in natural forest stands that are also desired in managed stands to provide biological diversity. Each of these attributes is described in more detail below.

Multi-layered Forest Canopies—Complex layering of forest canopies generally creates diverse habitat niches and benefits biodiversity. The more heterogeneous and complex the physical environment becomes, the more complex the plant and animal communities that can be supported, and the higher the species diversity (Krebs 1972). This is because structurally diverse habitats provide more available niches than do more homogeneous habitats.

Research has demonstrated that several closely related species with similar habitat requirements are able to live within the same area and avoid competitive exclusion by partitioning the available resources into several distinct subsets. For example, MacArthur (1958) observed that five species of similar-sized insect-eating warblers were able to co-exist within the same forest primarily because they fed at different positions in the canopy. Furthermore, MacArthur and MacArthur (1961) found that foliage-height diversity (a measure of stratification and evenness in the vertical distribution of vegetation) was even more valuable in predicting bird-species diversity than was plant-species diversity. This evidence indicates that a heterogeneous canopy structure provides more available niches that would allow the presence of a greater number of wildlife species.

The uniform, even-aged forest stands produced under traditional forest management cannot support the diversity of species found in most natural stands, or in managed stands that have a complex vertical structure. The species found in low-diversity plantations usually are habitat generalists or aggressive habitat specialists that exclude other species from the limited number of available niches. As increasing acreages are managed in low-diversity stands, the species that are excluded from low-diversity plantations may become scarcer, some even to the point of classification as threatened or endangered. For this reason, under this FMP, forest management will be used to develop complex stands with multi-layered forest canopies primarily in conservation areas.

Multiple Native Tree Species (conifers and hardwoods)—Increased tree species diversity within and among stands generally creates more diverse habitat niches and benefits biodiversity. Structurally diverse habitats provide more available habitat niches and can support a greater wildlife species diversity than do more homogeneous habitats (Krebs 1972). Hagar (1992) found that the presence of hardwoods within Douglas-fir stands was an important factor influencing the presence and abundance of several species.

Multiple tree species in a stand may lead to several wildlife habitat benefits:

- Different growth rates, tree forms, and shade tolerance result in increased vertical and horizontal within-stand diversity.
- Different tree species support different insect communities, which may lead to a greater diversity of foliage- and bark-gleaning wildlife species.
- Presence of short-lived species, such as red alder, may lead to an important source of within-stand decadence within younger stands as individuals begin to decline and die around age 40 to 65.

Herb/Shrub Considerations—Diverse herb and shrub vegetation layers provide important forage for wildlife, provide diverse habitat niches, and benefit biodiversity. Herbs and shrubs in recently harvested units provide an important source of forage for big game species. Other native plants, such as bitter cherry and elderberry, provide important forage for a large variety of non-game species. Large bigleaf maple trees are an important source of natural cavities and habitat structure in the forest. Unfortunately, these same plants compete with the planted and seeded trees that will grow to form the new forest stand. Plantation vegetation management is designed to control vegetation that is competing with commercial tree species. Overly aggressive vegetation management assures a successful plantation, yet greatly reduces the habitat value of the young plantation for wildlife. Aggressive vegetation management also truncates the herb-shrub (early) stage and accelerates the onset of the intermediate structure, which has a much lower wildlife habitat value.

Morrison and Meslow (1984) studied differences in habitat structure and bird communities between young plantations in the Oregon Coast Range that were sprayed with phenoxy herbicides (2,4-D and/or 2,4,5-T) and unsprayed controls. Four years after spraying, the main vegetative difference between the control units and treatment units was a reduction in vegetative complexity on treated sites. This simplification in vegetation was primarily due to reduced deciduous tree cover. Although rapid re-growth of shrubs was evident following treatment, deciduous trees remained suppressed at least four years after spraying. The researchers found that bird communities were similar between the control and treatment units. They speculated that this was because of a rapid recovery of the shrub component after phenoxy herbicide spraying. The greatest impact of spraying was on bird species that mainly used hardwoods for foraging, although some of these birds modified their behavior and foraged on shrubs in the treatment units.

The researchers concluded that, by maintaining a shrub component within the unit and maintaining small patches of deciduous trees, managers could maintain bird communities similar to those on untreated sites. In other words, as long as the vegetation control practices are designed to control, rather than to eliminate competing vegetation, the impact of vegetation management on bird communities is minimal.

Wildlife habitat can also be affected by changes that occur in the vegetation community as stands progress from the early to intermediate structure. Wildlife species that prefer the open habitats of the early structure will gradually become excluded as canopy closure progresses. As the overstory reaches full canopy closure, understory vegetation will be severely reduced or eliminated and the wildlife values provided by this vegetation will be lost. Specifically, the abundance of forage, cover, and the vertical diversity provided by tall shrubs becomes reduced. However, succession into the intermediate structure can create other important wildlife habitat elements. The intermediate structure stands can provide thermal, hiding, and escape cover, especially for big game mammals. For these reasons, it is important to have closed canopy stands as a part of the forest landscape.

As stand development progresses through the intermediate structure, the changes in the understory vegetation community cause changes in wildlife habitats and wildlife communities in the stand. As these stands become more open and the understory develops, wildlife habitat components such as forage and cover are provided, and some species that prefer more open habitats may begin to recolonize the site. Development of multiple layers of vegetation will increase the amount of vertical diversity in the stand, and provide additional habitat niches that can support increasing numbers of wildlife species. However, the response of wildlife to these vegetative changes will also be affected by the abundance of other important structural habitat components, such as snags and downed wood.

Gaps—Gaps increase the horizontal diversity within stands, provide important forage for wildlife, provide diverse habitat niches, and benefit biodiversity. A within-stand "gap" is an interruption in the continuity of the vegetative community in a stand. These gaps are generally small openings (one-half to two acres) where herbs, shrubs, and new trees are being established, within larger stands with a dominant overstory tree canopy. One example of a gap is an opening created by windthrow in a densely stocked stand of trees.

Much research has been done on the ecology and wildlife dynamics of large, between-stand gaps in forests, such as those created by wildfire or clearcutting (Dyrness 1973; Agee and Huff 1987; Hemstrom and Franklin 1982; Halpern 1987). However, relatively little information is available on the ecology of small canopy (within-stand) gaps. Spies et al. (1990) presented data supporting the concept that small-scale gap disturbances and vegetation response are important driving forces in the dynamics of Douglas-fir/western hemlock forests. They found that gap formation rates and vegetative responses were slower in these forests than in other forest types.

Understories in old-growth stands tend to be much patchier than in younger forest stands. This patchiness is partially a response to varied overstory conditions. Gaps are important structural features of old-growth stands and typically persist for long periods. Well-developed understories of herbs, shrubs, and small trees characterize such open habitats. Heavily shaded sites ("anti-gaps"), also characteristic of old-growth forests, produce areas from which green plants may be almost totally absent (Franklin and Spies 1991; Spies et al. 1990).

Managing for Key Legacy Structural Components

Sustainable Forest Ecosystem Management Strategy 3 presents approaches for managing the key habitat components listed below, followed by the reasons for providing these habitat components within the managed forest.

- Residual live trees
- Snags
- Downed wood

Stand-level management for diversity requires managing the structural components of stands. This challenge requires managers to weigh all factors important to the long-term sustainability of the forest ecosystem, and also to consider the short- and long-term productivity of the forest for human needs. Effective control of wildfires may be adversely affected by downed wood and tall snags. By careful planning of the spatial arrangement and temporal occurrence of stands and structural components on the landscape, managers can find reasonable approaches to develop diverse forest structural characteristics for wildlife and biodiversity, while still protecting the forest from unwanted wildfire. It is likely that trade-offs will be required in specific locations within the district. However, on a district-wide basis, both fire control and the expected array of stand structures can be accomplished.

The structural components will be retained during any management activities unless they create clear safety or fire hazards, or if their retention would result in unacceptable additional operational difficulties, environmental hazards, or threats to public improvements. Examples of unacceptable operational difficulties include situations in which the location of a tree might require the relocation of a road to a less stable place, or that a substantially longer road be built to avoid the tree. Examples of situations in which a decision might be made to remove a residual tree, snag, or patch of trees include windthrow or other natural causes of downed trees, likely damage to improvements such as bridges or buildings, or potential road washouts or other road damage. It is expected that the vast majority of structural components will be retained, and there will be few situations in which these components must be removed.

Remnant Old-growth Trees—Existing old growth in the district occurs as scattered individual trees, and occasionally as small isolated patches. Because the occurrence is limited, the ODF’s intent is to retain existing old growth, subject to operational and safety considerations, to provide this element of diversity in present and future stands. The discussion below regarding residual live trees also applies to remnant old-growth trees.

Residual Live Trees

Live retained trees provide important structure for several species of wildlife in different stages of stand development. Patches of live trees of various sizes, ages, and species promote species diversity and may act as refugia or centers of dispersal for many organisms, including plants, fungi, lichens, small vertebrates, and arthropods (USDA Forest Service et al. 1993). Several bird species are positively associated with the retention of large live trees within harvest units, including the olive-sided flycatcher. In addition to providing raptor perches and foraging substrate for animals living in young plantations, residual live trees in regeneration harvest units may allow development of structurally diverse stands and landscapes in later stages of forest development (Zenner 2000). Retention of large trees within harvest units increases structural heterogeneity within the developing stand, and provides a legacy of structure that may provide habitat (primarily foraging and dispersal) for some species associated with late-successional conditions. As the stand develops, these trees add vertical diversity to stands, providing more habitat niches for wildlife, and potential future nesting sites for species such as northern spotted owls and marbled murrelets. Legacy structure, including residual trees, snags, and downed wood, has been found to be an important component of spotted owl habitat, particularly in younger stands.

In addition, live trees retained at harvest are a source of future downed wood and snags in a stand. This is particularly important in the intermediate structure stage, when the new cohort consists of small diameter trees and there is little mortality. During this stage, retained trees are the only source of large dead wood structures.

Diversity of tree structure should be considered when selecting trees for retention. Complex canopy structure and especially leaning boles are beneficial for some lichens. Trees that are asymmetrical provide a diversity of habitat substrates and often have more lichen and moss epiphytes on large lateral limbs than symmetrical trees (USDA Forest Service et al. 1993). Trees with some level of defect are likely to die and become snags sooner than straight, healthy trees. Relatively sound trees with healthy crowns are more likely to survive and contribute to habitat structure throughout the next rotation.

Distribution—Live trees can be left in either a scattered or clumped distribution in final harvest units. Both distributions provide many of the same wildlife benefits, but each provides unique benefits not provided by the other distribution.

Providing leave trees in a scattered distribution over part of the landscape may substantially reduce the amount of the time necessary for the stand and the landscape to develop multi-storied canopies. However, in some situations, individual scattered trees are more susceptible to windthrow.

On the other hand, patches or clumps of trees may provide better protection for special micro sites such as seeps, wetlands, or rocky outcrops (USDA Forest Service et al. 1993) than scattered individual trees. Placement of clumps of leave trees in headwater drainages may protect important habitats for amphibians. Clumped leave trees often are more stable than individual scattered trees.

Providing a diversity of arrangements is the key to managing for a range of species. Managers must combine these habitat ideas with operational considerations to make decisions on a site-by-site basis.

Rationale for Number of Residual Live Trees in Regeneration Harvest— Sustainable Ecosystem Management Strategy 3 requires two to four live trees per acre to be retained in regeneration harvest units. These trees are to have a diameter greater than or equal to the stand average, ensuring that large trees are left in stands where they are available. When these larger trees are not available, four trees per acre would normally be retained. Minor species are retained as feasible and practical.

Having a range rather than a target allows flexibility while ensuring that a minimum are retained for any particular sale area. A range of two to four live trees per acre is consistent with the recommendation for providing habitat for the olive-sided flycatcher in open canopy stands developed by Partners in Flight (Altman 1999).

Modeling of the dynamics of snags and logs over time indicates that amounts of snags and downed wood recruited into a stand over time are enhanced by retention of live trees at initial harvest, particularly when minor species are retained (Kennedy et al. 2004). Minor species that are not of significant commercial value can provide a great deal of wildlife value throughout the rotation as well as contribute to stand complexity. Finally, larger trees are more likely to remain alive and standing for a longer period of time; and, if not, they at least will provide snags or logs of a large size to persist throughout the rotation (Kennedy et al. 2004).

Snags

Standing dead trees help to meet the habitat needs of cavity-using species and to serve as a source of future downed wood. Snags can be provided in all stand types, through a combination of existing snag retention, natural mortality in maturing stands, and artificial creation. For the purposes of this FMP, a snag is defined as a dead tree at least 15 inches in diameter and at least 20 feet tall. Neitro et al. (1985) reported that 10 of 11 species of cavity-nesting birds occurring in western Oregon and Washington used snags with diameters of 15 inches and greater. Data summarized by the USFS on its DecAID website indicate that 20 feet is the smallest mean tree height for nest trees measured by various studies of cavity-using species in the Oregon Coast Range http://www.fs.fed.us/r6/nr/wildlife/decaid/index.shtmlSnags are important components of wildlife habitat throughout stand development. In open canopy stands, snags provide habitat for species that require cavities in which to nest, such as purple martins, tree swallows, and western bluebirds. In mature and older stands, snags are used by species such as spotted owls, pileated woodpeckers, and Pacific fishers for nesting and denning. Pileated woodpeckers in particular, and other primary cavity excavators, create the cavities that other species (secondary cavity nesters) use for nesting. In fact, 55 species of wildlife require or frequently use snags for breeding, roosting, or denning in the Pacific Northwest (Weikel and Hayes 1999). Snags are also an important foraging resource, particularly for woodpeckers, throughout stand development.

In developing a strategy for providing snags in a managed landscape, taking into account how snags provide habitats through time is an important consideration. The following conclusions were derived from the results of a dead wood simulation model developed and summarized by Kennedy et al. (2004). The snags created or retained at the time of harvest provide most of the snag resource during the first ten years. There is little recruitment of new snags during this time. When these retained snags are large, they may persist on the landscape for decades. Many existing snags are felled during harvest operations for safety reasons. When live trees in addition to snags are retained at harvest, some of the live trees begin to recruit into snags between 10 and 60 years after harvest. In addition, some of the snags retained at harvest fall over and become downed wood, or become duff if they were initially soft snags. Both existing and recruited snags are important components of the snag resource during this time period. From 60 to 100 years, few of the snags retained at harvest remain standing. During this period, large snags are recruited from retained live trees (which by this time are probably quite large), as well as from large trees available in the new cohort.

Species that use snags in mature stands will also benefit from late successional habitats that have been retained on the landscape in conservation areas. In addition, snags occurring in riparian areas will contribute to habitat for mature forest species. **Rationale for the Number of Snags—**The snag management guidelines presented in this FMP are designed to provide nesting, roosting, foraging, perching, and denning habitat for the various species of wildlife that use snags in the Elliott State Forest. Sustainable Forest Ecosystem Management Strategy 3 requires a minimum of three hard snags per acre to be retained in regeneration harvests. When this target has not been achieved within one year after harvest, 0.5 snags per acre are created within the stand, using live trees larger than 20 inches diameter breast height.

Very little information exists on the size and abundance of snags required to maintain viable populations of species that use snags for part of their life history. Neitro et al. (1985) developed a model to determine the number of snags needed to maintain specific population levels of certain species of cavity-nesting birds. A critical assumption of this model is that, if sufficient snags exist to provide nesting habitat for the target species, sufficient foraging habitat will be available to provide for the desired population levels. Weikel and Hayes (1999) contend that consideration of nesting resources alone in managing for cavity-nesting birds is likely inadequate, and that foraging resources also need to be considered. An adequate prey base cannot necessarily be supported when providing only for nesting trees.

The DecAID Decayed Wood Advisor (Mellen et al. 2003) is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. The information presented on ranges of snag and downed wood amounts under natural and current conditions is based on forest inventories, research studies, and other sources. Information is presented on wildlife species use of snags and downed wood based entirely on scientific field research rather than on modeling the biological potential of wildlife populations. This tool can provide a perspective on the quantities of snags and logs present in plots measured for wildlife studies as well as in vegetative inventory plots in various forest types and regions. Although these quantities may not be appropriate for stand-level targets, they do provide a picture of how dead wood is distributed on the landscape.

The ODF's approach is to manage for snags at levels approaching known historical levels. Spies et al. (1988) characterized snags and downed logs in fire-originated stands in western Oregon and Washington, offering a view of the historical condition of snags in these areas. In the Oregon Coast Range, they found an average of two to four snags per acre greater than 20 inches diameter breast height and more than 16 feet tall. These researchers included snags in all decay classes, from old, soft snags, to recently created hard snags. Soft snags may take many years or even decades to develop. The ODF strategy is to retain all existing snags wherever possible and to provide hard snags across the landscape. Existing snags are very valuable for wildlife in that they may already have usable cavities; from an economic standpoint, they are of little or no value. The most critical issue with existing snags is safety. In practice in the Elliott State Forest, the majority of existing snags within harvest units are felled for safety reasons. Hard snags (decay class I–II) provide a unique foraging and nesting substrate; some species only forage on or nest in these recent snags. In addition, more recent snags will persist longer on the landscape than those that are already in a more advanced state of decay.

When the target of three snags per acre is achieved, and snags are distributed appropriately, this level of snag retention should provide habitat for western bluebirds in open canopy stands (Altman 1999). If the retained snags are large, they are likely to remain standing for long periods of time. Over time, additional snags will be recruited from retained live trees, and eventually from the new cohort as it develops. When few snags are retained at initial harvest, stands may undergo significant periods of time without any large snag habitat available until the new cohort develops trees large enough to provide functional snags (Kennedy et al. 2004). Large snags retained at harvest and maintained over time may provide habitat for other cavity-using species in intermediate and some advanced structure stands. Retained live trees also are an important source of large snags over time. However, the most likely source of snags in future advanced structure stands are trees from the new cohort (Kennedy et al. 2004).

Spies et al. (1988) found that old-growth stands had the greatest abundance of large snags, and younger stands had higher densities of small snags. Preference for large-diameter snags has been documented for several species of cavity-nesting birds (Mannan et al. 1980; Schreiber and deCalesta 1992; Zarnowitz and Manuwal 1985; Bull et al. 1997). Larger trees may be more likely to persist for a longer period of time, and for this reason receive more use over time. Some species require a minimum size snag for nesting, so a larger snag will provide opportunities for more species than a smaller one.

Rationale for Snag Distribution Requirements—The distribution of snags is an important consideration. Snags may be distributed in either a clumped or scattered distribution. Most cavity-nesting birds defend nesting and foraging territories and exclude all other individuals.

Cavity nesters in natural forest stands tend to nest within aggregations of snags, or snag patches (Nelson 1989). However, this tendency may occur simply because snags in natural stands tend to occur in clumps (Cline 1977; Hemstrom and Logan 1986; Spies et al. 1988). A given number of snags uniformly or randomly distributed over a stand may provide habitat for more individuals of a given species than the same number of snags in one clump within the stand. Such a scattered distribution may allow the "packing" of more territories within a stand. However, a scattered distribution also has the potential to create many perches for hawks and other predators.

The key to managing for a range of species is to provide a diversity of arrangements. Managers will combine habitat considerations with operational requirements to make decisions on a site-by-site basis to provide diverse habitat conditions on the forest.

Downed Wood

Downed wood on the forest floor provides many important functions in forested ecosystems. Some of the identified functions are mineral cycling, nutrient mobilization, moisture retention, maintenance of site productivity, natural forest regeneration (nurse logs), substrates for mycorrhizal formation, shade, cover, and nesting, denning, and foraging habitats for wildlife species in all stand structure types.

Wildlife use downed wood for a variety of habitat needs, including thermal and hiding cover, dispersal pathways, denning, feeding, food storage, reproduction (nesting), and resting (Franklin 1982; Bartels et al. 1985; Franklin et al. 1981; Maser et al. 1979). Logs may have a particular importance to some wildlife species when stands are in an early structure stage. At this stage, the absence of tree and shrub cover means that downed wood may be the only available source of shade and moisture retention. Studies have correlated or predicted that the abundance of small mammal and amphibian species in Douglas-fir forests is related to the abundance, size, and decay class of downed wood (Corn and Bury 1991; Bury and Corn 1988; Aubry et al. 1988; Corn et al. 1988). Carey and Johnson (1995) also found that species biomass and relative productivity of small mammals was greater in old-growth than managed forests, and suggested that the amount of downed wood and understory vegetation development appeared to play important roles in the observed differences.

Wildlife species have also shown preferences for different attributes of downed wood structure, including debris size and decay condition. For example, in a study in the Oregon Coast Range, Corn and Bury (1991) found that clouded salamanders preferred large Douglas-fir logs with attached bark, an early decay stage, but ensatinas were found more often in well-decayed logs. The study also found that clouded salamanders appeared to prefer larger logs, in both diameter and length. Another study of amphibian species in southwestern Oregon and northern California found that large, well-decayed logs were the most heavily used downed wood, though the use of particular size and decay classes of debris varied among salamander species (Welsh and Lind 1991).

Downed wood is an integral component of the structure of advanced structure stands and provides a biological legacy from old stands to young stands after catastrophic events. This legacy can also be provided in managed stands if appropriate requirements are incorporated into timber harvest plans.

Over the life of a stand, the abundance of downed wood tends to follow a U-shaped curve with high abundance in early stand ages (30 to 80 years), a low point during the mature stand phase (100 to 200 years), and increasing amounts and a peak as logs accumulate faster than they decompose during the old forest stage (Franklin et al. 1981; Spies and Cline 1988; Franklin and Spies 1991). After a catastrophic event in an older forest stand, such as a fire or windstorm, a biological legacy of downed wood and snags remains as the new stand develops. This material gradually decomposes and the abundance declines, reaching a low point during the mature stand phase. Once the stand reaches the old-growth stage, the recruitment of dead material begins to increase. In old-growth stands of western Oregon and Washington, the volume and biomass of woody debris (snags and logs combined) average more than twice the amount found in mature stands (Spies and Cline 1988).

In young managed stands growing after a clearcut harvest, the abundance of downed wood can be substantially less than in natural stands, due to the loss of downed logs from salvage during harvest and site preparation activities, and the lack of large trees left as a source of future downed wood (Spies and Cline 1988; Carey and Johnson 1995). Downed wood in managed stands also tends to be of smaller average diameter than found in natural stands (Spies and Cline 1988). This pattern may be caused by the removal of downed logs during timber harvest for utilization of the material, to clear sites for tree planting, and to reduce the risk of fire (Spies and Cline 1988). Periodic thinning and removal of trees in managed stands may also reduce the abundance of downed wood, as the self-thinning processes found in natural stands are reduced in the managed stand.

In developing a strategy for providing downed wood in a managed landscape, it is important to consider how logs provide habitats through time. The following conclusions were derived from the results of a dead wood simulation model developed and summarized by Kennedy et al. (2004). When very little downed wood is present after regeneration harvest, downed wood levels, while increasing over time, tend to remain at low levels. Large logs tend to persist for long periods of time, and when retained at harvest continue to provide large log volume over time. When high levels of live trees and snags are retained at harvest in addition to retained logs, there is a consistent increase in large log volume over time.

The size class distribution of fallen logs varies among young, mature, and old-growth stands. Old growth stands have the highest number of large fallen trees, defined as greater than 24 inches diameter breast height (Spies and Cline 1988). The size of downed logs can affect the functions of this material and its suitability as wildlife habitat. The size of the log affects its decomposition rate and, therefore, its longevity on the site. Because large logs decay more slowly than small logs, large logs will persist longer and will provide wildlife with habitat continuity over longer periods of time (Franklin et al. 1981). For this reason, this FMP contains strategies to replicate old forest conditions that include requirements for the size of downed logs.

Large logs typically persist in the forest environment for substantial time periods, often up to several centuries, due to slow decay rates (Franklin and Spies 1991). Because decomposition of this material is gradual, downed logs in natural stands are present in a variety of decay stages. These stages are classified as decay classes I through V. The distribution of total downed wood biomass in these decay classes has been shown to vary with stand age (Spies and Cline 1988).

In old-growth stands, the greatest proportion of downed wood occurs in decay class III (the intermediate class), with the remainder of the downed wood nearly equally distributed between heavily decayed and nearly new fallen logs (Spies and Cline 1988). Highly decayed material (decay classes IV and V) only accounts for 26 percent of the total biomass of snags and logs in these old-forest stands (Spies and Cline 1988). Young stands tend to be more dominated by heavily decayed downed wood (Spies and Cline 1988). To replicate old forest conditions, it may be necessary to maintain or create these decay class distributions.

Given the variety of habitat preferences of wildlife species using downed wood, a wide range of downed wood should be maintained, by retaining or creating logs in a diverse array of size classes and decay stages. Replicating old forest structural patterns of downed wood is a logical strategy for maintaining a diverse wildlife community.

Rationale for the Downed Wood Target—In regeneration harvest units, where the average diameter breast height of the trees to be harvested is 20 inches or more, an average of at least 300 to 600 cubic feet of hard downed wood per acre will be retained. At least 50 percent of this volume should be in conifer logs. There is also a requirement for two logs per acre to be a minimum of 26 inches diameter at the large end where these logs are available.

Currently, there is no scientific quantification of the exact amount of downed wood needed to maintain a diverse community of forest wildlife species. Scientific research has documented that this structural material is important to many species, but detailed information is lacking on the minimum amount necessary to support the habitat requirements of the many species that use it. For example, Carey and Johnson (1995) suggest that 15 to 20 percent ground cover of downed wood, well distributed over the forest floor, appears to be adequate to maintain small mammals, whereas a 5 to 10 percent cover would not allow the animals to reach their potential abundance. These authors also caution that this substrate is not only important for small mammals, but also provides critical habitat for birds and amphibians. Currently, there does not appear to be a definitive estimate of the amount of downed wood needed to maintain all these groups of wildlife.

The DecAid Decayed Wood Advisor (Mellen et al. 2003) presents information on ranges of snag and downed wood amounts under natural and current conditions based on forest inventories, research studies, and other sources. Information is presented on wildlife species use of snags and downed wood based entirely on scientific field research, rather than on modeling the biological potential of wildlife populations. This tool can provide a perspective on the quantities of snags and logs present in plots measured for wildlife studies as well as in vegetative inventory plots in various forest types and regions. Although these quantities may not be appropriate for stand-level targets, they do provide a picture of how dead wood is distributed on the landscape.

The ODF's approach is to manage for downed wood at levels approaching known historical levels. Spies et al. (1988) characterized snags and downed logs in fire-originated stands in western Oregon and Washington, offering a view of what the historical condition of downed wood in these areas may have been. In stands in the Oregon Coast Range, they found an average of 1,000 to 3,200 cubic feet of downed wood per acre, with an average of 1,700 cubic feet per acre in mature stands. In their inventories, Spies et al. (1988) included downed wood in all decay classes, from very decayed wood, to downed logs that showed little evidence of decay. Approximately 20 percent of the downed wood measured was in early stages of decay and considered hard downed wood (T.A. Spies, personal communication. 1996.). Twenty percent of 1,700 is 340 cubic feet per acre. It may take many years or even decades to develop downed wood that is very decayed. The ODF's strategy involves protecting existing downed logs wherever possible and supplementing existing downed wood by providing additional logs during harvest entries.

The range of 300 to 600 cubic feet per acre of hard logs approximates the percentage of hard logs available in mature stands in the Oregon Coast Range (Spies et al. 1988). The requirement for two logs per acre to be at least 26 inches diameter at the large end recognizes the need for providing large logs that will function as valuable wildlife habitat and persist over long periods of time. The requirement for half of these logs to be conifer recognizes that conifer logs will persist longer on the landscape, while also allowing hardwood logs to be left in areas where hardwoods are predominant in the harvested stand. Hardwood logs, while less persistent through time, still provide an important function in providing shade, moisture retention, cover, and a substrate for insects.

In some cases, regeneration harvests will occur in stands that contain smaller diameter trees, and providing 300 to 600 cubic feet of hard logs may not be operationally practical. Recognizing that downed wood is still an important component to have retained at regeneration harvest, logs are required to be retained, but at a level of three to six logs per acre, without an associated volume range. Live trees retained in these harvests will provide a larger wood contribution in these stands in the future.

Appendix D
Legal and Policy Mandates

This appendix describes legal and policy mandates that affect state land management.

Common School Forest Lands

History

The majority of the Elliott State Forest consists of Common School Forest Lands (CSFLs). The history of CSFLs can be traced to the Land Ordinance of 1785, the creation of the Territory of Oregon in 1848, and the Admission Act of 1859. The federal government's policy was to grant sections 16 and 36 of every township to the new state for the use of schools. Oregon's grant included 3.5 million acres of grazing and forest lands. Eventually, all but 130,000 acres of forest land was either sold for the benefit of schools or lost through fraudulent land deals.

Governor Oswald West and State Forester Francis Elliott conceived the idea of creating Oregon's first state forest by consolidating 70,000 acres of remaining grant lands that were located within national forests. The process of finding an equivalent tract of federal land lasted from 1912 until 1927. The federal government included 6,800 acres of public and revested Oregon and California Railroad lands to balance the exchange, and the final deeds for the exchange were acquired in 1930.

In the 1960s, another 7,700 acres of land owed to the state through school indemnity claims, otherwise known as "lieu lands," were added to the Elliott State Forest. The federal government offered lieu lands to compensate for grant lands with conflicting claims, such as those which were already settled or occupied by townsites. Lieu lands also compensated for grant lands inside federal ownerships with no likelihood of being surveyed.

Between 1970 and 1990, a series of land exchanges enlarged the forest by 7,000 acres. This addition brought the total CSFLs in the Elliott State Forest and scattered tracts up to the present 86,376 acres.

Federal law stipulated that the grant lands be managed for the use of schools and not for other public needs. Permanent investment trusts were established to protect the financial principal derived when grant lands were disposed. Lands that were retained were to be managed by the states in accordance with the beneficiary trust interest. These obligations are spelled out in the Oregon Constitution and the Admission Act of 1859.

Legal Mandates

The Oregon Constitution

The Oregon Constitution (Article VIII, Section 5) authorizes the State Land Board to manage CSFLs. The State Land Board is directed to "manage lands under its jurisdiction with the object of obtaining the greatest benefit for the people of this state, consistent with the conservation of this resource under sound techniques of land management." This responsibility has been clarified through the 1992 opinion of state Attorney General Charles S. Crookham (discussed below).

The Oregon Constitution provides for revenues derived from CSFLs and other specified sources to be deposited into the Common School Fund (CSF). It also authorizes the State Land Board to withdraw money from the CSF to carry out its powers and duties to manage the lands. The State Land Board has implemented its authority through a contract with the Oregon Department of Forestry (ODF) to manage CSFLs.

1992 Attorney General's Opinion

A description of the Oregon Constitution's mandates for managing CSFLs is found in a July 24, 1992 opinion of Oregon Attorney General Charles S. Crookham. (46 Op. Atty. Gen. 468 (1992), Opinion No. 8223, July 24, 1992) (Crookham 1992). This opinion addresses the lawful uses of Admission Act lands and the effect of federal or state regulations on such uses. The issue at hand was the State Land Board's compliance with the federal and state Endangered Species Acts (ESAs).

Admission Act lands are those lands offered by the federal government to the State of Oregon for the use of schools upon Oregon's admission to the United States in 1859. The Attorney General's opinion discussed the restrictions that Congress intended to impose on Oregon's use of these lands.

According to Crookham, a binding obligation was imposed on Oregon when it accepted the Admission Act lands "for the use of the schools." The Oregon Constitution dedicates the proceeds of Admission Act lands to the CSF and gives the State Land Board responsibility to manage these lands in trust for the benefit of the schools. The State Land Board has a further constitutional obligation to manage lands under its jurisdiction "with the object of obtaining the greatest benefit for the people of this state, consistent with the conservation of this resource under sound techniques of land management." Crookham noted that the "greatest benefit for the people" standard requires the State Land Board to use the lands for schools and the production of income for the CSF.

In Crookham's opinion, the resources of Admission Act lands are not limited to those, such as timber, that are currently recognized as revenue generators for the CSF, but include all of the features of the land that may be of use to schools. Other resources, such as minerals, water, and plant materials that may offer revenue for the fund should be considered.

The State Land Board may incur present expenses or take management actions that reduce present income if these actions are intended to maximize income over the long term. Lands may be temporarily set aside for the purpose of "banking" an asset while its economic value appreciates if the State Land Board has a rational, non-speculative basis for concluding that such action will maximize economic return to the CSF over the long term.

Neither the Oregon Admission Act, nor the Oregon Constitution exempts the State Land Board from complying with the federal and state ESAs, in the opinion of the Attorney General.

Crookham felt it is unlikely that the courts would exempt the State Land Board from complying with the federal ESA. Even if the grant of Admission Act lands were viewed as a contract or trust arrangement between the state and the federal government, Congress retains the authority to alter the terms of the arrangement by virtue of its sovereign power to legislate.

Because the state ESA does not explicitly require or prohibit any particular action with respect to the management of Admission Act lands, Crookham felt that the state ESA does not restrict the State Land Board's exercise of its constitutional powers over the disposition and management of Admission Act lands. The State Land Board must comply with the state ESA unless it unduly burdens the State Land Board's constitutional responsibility to manage the Admission Act lands. Only if the state ESA fundamentally impaired the State Land Board's ability to maximize revenue over the long term from the Admission Act lands would there be an undue burden on the State Land Board's management and powers.

Finally, the Attorney General said it is not possible to predict whether the application of the federal ESA to Admission Act lands could result in a claim against the federal government for a taking of property. However, the state ESA definitely could not result in a taking because the State Land Board would not be required to comply with a law that prevented it from its constitutional responsibility to maximize revenue from Admission Act lands over the long term.

Oregon Revised Statutes

Statutes concerning CSFLs are found in Oregon Revised Statutes (ORS) 530.450 through 530.520. ORS 530.450 gives the name "Elliott State Forest" to any lands in the national forests on February 25, 1913 that were patented to the State of Oregon for the purpose of establishing a state forest. Besides the Elliott State Forest, other lands under the jurisdiction of the Department of State Lands (DSL) are suitable for use as state forest lands. These include some lands in the western Oregon state forests plan area. ORS 530.460 and 530.470 describe the process by which the DSL and the State Board of Forestry (BOF) may "designate" these lands for the primary purpose of "growing timber and other forest products." Lands so designated are named "Common School Forest Lands." Through a similar process, these lands may be reverted to their original status.

Under ORS 530.490, the State Forester is directed to manage CSFLs so as to "secure the greatest permanent value of the lands to the whole people of the State of Oregon." Although the statutes again refer to timber production as the dedicated use of the land, much of the statutory language has been found to be inconsistent with constitutional mandates. Oregon's Attorney General has stated that the various other natural resources must also be considered as long-term sources of revenue.

The statutes call for "long-range management plans based on current resource descriptions and technical assumptions, including sustained yield calculations for the purpose of maintaining economic stability in each management region" (ORS 526.255).

Funding

Receipts from the CSFLs enter the CSF. The ODF is reimbursed on a quarterly basis for management expenses incurred on these lands. The ODF's biennial budget request is subject to the approval of the State Land Board and the Governor. Final authorization of the budget is determined by vote of the state legislature. The budgets of the CSFLs and Board of Forestry Lands (BOFLs) are considered as a whole, and are categorized as "other funds" that are separate from the state's general fund. They are accounted for separately within the ODF.

Board of Forestry Lands

History

The BOFLs were acquired by the BOF in two ways: 1) through direct purchase; and 2) through transfer of ownership from counties in exchange for a portion of the future revenue produced by these lands. The BOFLs in the Elliott State Forest total 8,906 acres.

Under the BOF's supervision, the DOF manages BOFLs to provide healthy, productive, and sustainable forest ecosystems that over time and across the landscape, provide a full range of social, economic, and environmental benefits to the people of Oregon.

Legal Mandates

Forest Management Planning

The Oregon Revised Statutes refer to forest management planning in ORS 526.255, which calls for "long-range management plans based on current resource descriptions and technical assumptions, including sustained yield calculations for the purpose of maintaining economic stability in each management region." Oregon Administrative Rule (OAR) 629-035-0030 provides more specific direction on what information these forest management plans must contain and the mechanisms for BOF approval.

Other Key Statutes and Rules

ORS 530.010 through 530.170 guide the acquisition, management, and development of state forests that are under the jurisdiction of the BOF. The statutes are discussed below and on the next page.

1. ORS 530.010 authorizes the BOF, in the name of the State of Oregon, to acquire lands that are chiefly valuable for forest crop production, watershed protection and development, erosion control, grazing, recreation, or forest administrative purposes. The lands may be acquired by purchase, donation, devise, or exchange from any public, quasi-public, or private landowner. All land acquisitions are subject to the prior approval of the county commissioners of the county in which the lands are located. The lands so acquired are designated as "state forests."

2. ORS 530.030 deals with the conveyance of county forestlands to the state. This statute recognizes that BOFLs are managed to produce income for the counties. Most of these lands were originally acquired by the counties through foreclosure of tax liens. Under county ownership, the lands provided revenue to the counties. The statute maintains this revenue source by allowing ownership to be conveyed to the state "in consideration of the payment to such county of the percentage of revenue

derived from such lands." The percentage distribution of revenue between counties and the state is addressed in ORS 530.110.

3. ORS 530.050 directs that BOFLs shall be managed so as "to secure the greatest permanent value of such lands to the state." To this end, the State Forester, under the authority and direction of the BOF, is given the latitude to:

    - Sell forest products
    - Reforest and protect the lands from fire
    - Execute mining leases and contracts
    - Sell rock, sand, gravel, pumice, etc.
    - Produce minor forest products
    - Grant easements, and charge fees for road use
    - Permit the lands to be used for other purposes (e.g., fish and wildlife environment, landscape effect, flood and erosion protection, recreation, domestic livestock, and water supplies), provided such uses are "not detrimental to the best interest of the state" in the opinion of the BOF
    - Do all things and make all rules necessary for the "management, protection, utilization, and conservation of the lands"

OAR 629-035-0000 through 629-035-0110 provide direction for state forest management policy and planning, and further define how the lands are to be managed to achieve "greatest permanent value" to the citizens of Oregon.

The rules provide the following direction:

- As provided in the statutes, "greatest permanent value" means healthy, productive, and sustainable forest ecosystems that over time and across the landscape provide a full range of social, economic, and environmental benefits to the people of Oregon.
- To secure the greatest permanent value, the lands are to be maintained as forestlands and actively managed in a sound environmental manner to provide sustainable timber harvest and revenues to the state, counties, and local taxing districts. This management focus is not exclusive of other forest resources, but must be pursued within a broader management context.
- Forest management plans are to be developed and implemented that will secure the greatest permanent value.

Analysis of Legal Mandates

The BOF's legal mandates for managing BOFLs include the dual obligations of sharing income with the counties (ORS 530.030) and conserving, protecting, and using a variety of natural resources (ORS 530.050). The administrative rules governing state forest management policy and planning provide direction on how to balance these dual obligations. The rules' primary findings and directions are summarized below.

- These lands must be managed to achieve the greatest permanent value to the state.
- The counties in which these forestlands are located have a protected and recognizable interest in receiving revenues from these forestlands; however, the BOF and the State Forester are not required to manage these forestlands to maximize revenues, exclude all non-revenue producing uses on these forestlands, or to produce revenue from every acre of these forestlands.
- Based on existing BOF principles and policies, and current scientific and silvicultural information, the uses set forth in the rules are compatible over time and across the landscape, when the lands are actively managed in an environmentally and silviculturally exemplary manner.
- Based on existing BOF principles and policies, and current scientific and silvicultural information, forestlands that are actively managed as provided for in the rules can produce economic value over the long term and promote healthy, sustainable forest ecosystems.
- Actively managing forestlands for the purposes described in the rules is in the best interest of the state.

Funding

Out of the revenues derived from BOFLs, 36.25 percent is used by the DOF to pay for the management and protection of the land. ORS 530.110 and 530.115 provide that counties receive 63.75 percent of the revenues (15 percent of the total revenues to the State Forests Protection Subaccount; 75 percent of the remaining revenues distributed to the counties—i.e., 75 percent of 85 percent, which is 63.75 percent).

The ODF's budget request is subject to the approval of the BOF and the Governor. Final approval of the budget is determined by vote of the state legislature. The budget for all state forest lands is categorized as "other funds" that are separate from the state's general fund. The budgets and expenditures for the BOFLs and CSLFs are accounted for separately within the DOF.

Other Legal Mandates

Federal Endangered Species Act

The federal ESA was enacted in 1973 to preserve species that are at risk of becoming extinct. The ESA has been modified several times since 1973. Administration of the ESA falls under the authority of the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) (jointly referred to as "the Services").

The ESA protects species that have been designated as "threatened" or "endangered" through a listing process. The ESA defines an "endangered" species as one which is in danger of extinction throughout all or a portion of its range. A "threatened" species is likely to become an endangered species within the foreseeable future.

Species may be proposed for listing as threatened or endangered, or may be termed "candidate species," for which the USFWS and NOAA Fisheries have sufficient information on hand to support proposals to list as threatened or endangered. Some species are "federal species of concern," an informal term that refers to species the Services believe might be in need of concentrated conservation actions. These species receive no legal protection, and will not necessarily be proposed for listing as threatened or endangered.

As explained below, various provisions of the ESA may distinguish between federal and non-federal lands, plant and animal species, and species listed as threatened or endangered.

The ESA directs federal agencies to carry out programs for the conservation of threatened and endangered species. Federal agencies are prohibited from jeopardizing the existence of any threatened and endangered species, and from destroying or adversely modifying "critical habitat." Neither of these provisions distinguishes between plant and animal species.

The designation of critical habitat occurs at the time a species is listed. Only federal lands are directly subject to the restrictions pertaining to critical habitat. However, critical habitat designations on non-federal lands could have indirect effects on management of those lands, if an Incidental Take Permit (ITP) is requested.

Critical habitat is defined in section 3(5)(A) of the federal ESA as "(i) the specific areas within the geographical area occupied by the species, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management or protection ..." Note that the actual presence of a listed species is not required for critical habitat designation, only presence of features that the species would use if it were present. Critical habitat designations are not necessarily limited to federal lands.

"Critical habitat receives consideration under Section 7 of the ESA with regard to actions carried out, authorized, or funded by a federal agency. Federal agencies must ensure that their actions do not result in destruction or adverse modification of critical habitat." (Federal Register, Vol. 59, No. 18, page 3816). Issuance of an ITP is a federal action. As such, USFWS is required to do a Section 7 consultation (within agency) prior to issuing the permit. This combination of legal requirements would likely lead to USFWS being unable to grant an ITP that would involve timber harvest on lands designated as critical habitat.

The ESA prohibition against "take" applies equally to non-federal and federal lands, and specifically to fish and wildlife species. "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The USFWS has further defined "harm" as an act which actually kills or injures wildlife. Such acts may include significant habitat modifications or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 CFR § 17.3).

A significant revision of the ESA occurred in 1982, when provisions allowing for "incidental take" were added. Such taking must be incidental to, and not the main purpose of, the carrying out of an otherwise lawful activity. To obtain an ITP, an applicant must submit a conservation plan, sometimes known as a Habitat Conservation Plan (HCP). An ITP may be granted if the following conditions are satisfied: 1) the taking will be incidental; 2) the applicant will minimize and mitigate the impacts of taking; 3) there will be adequate funding to implement the HCP; and 4) the likelihood of the survival and recovery of the species will not be reduced.

The ESA does not merely protect surviving populations; it directs the Secretaries of Commerce and the Interior to develop a recovery plan for each threatened and endangered species. The objective is to enable each species to recover to the point that protection under the ESA is no longer necessary and the species can be taken off the list.

State Endangered Species Act

The state ESA was passed in 1987 and included both plant and animals. Revisions that outline listed species protection requirements were added by 1995 legislation. The bald eagle, northern spotted owl, and marbled murrelet were listed as threatened species under the ESA in the following years: the bald eagle in 1987, the spotted owl in 1988, and murrelet in 1995.

For state threatened or endangered species listed after 1995, the Fish and Wildlife Commission may establish quantifiable and measurable guidelines considered necessary to ensure the survival of individual members of the species. These survival guidelines may include take avoidance and measures to protect resource sites, such as nest sites, spawning grounds, etc. Because the bald eagle, northern spotted owl, marbled murrelet were all listed in or prior to 1995, state survival guidelines were not developed for these species. In the absence of survival guidelines, ODF will rely on take avoidance strategies as the means of protecting state listed species. For Oregon Coast coho, ODF will coordinate with ODFW on management consistent with the Oregon Coast Coho Conservation Plan.

Oregon Forest Practices Act

Activities on lands managed by the ODF are subject to the Forest Practices Act (FPA), which is found in Chapter 527 of the Oregon Revised Statutes, and the Oregon Administrative Rules pursuant to these statutes.

The FPA declares it public policy to encourage economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species consistent with sound management of soil, air, water, fish, and wildlife resources, as well as scenic resources within visually sensitive corridors. The BOF is granted the exclusive authority to develop and enforce rules protecting forest resources and to coordinate with other agencies concerned with the forest environment.

The FPA has developed in an evolutionary manner since the original act was passed in 1971. The 1971 law established minimum standards for reforestation, road construction and maintenance, timber harvesting, application of chemicals, and disposal of slash. Subsequently, administrative rules were written to define the "waters of the state" and to protect streams and riparian areas. Rules were adopted to prevent soil damage resulting from logging and to prevent mass soil movement.

The FPA was strengthened in 1987 with the passage of House Bill 3396. The concept of sensitive resource sites was introduced, along with the requirement that written plans be approved prior to operating near those sites. Provisions were added that allow interested citizens to review and comment on notifications of operations and written plans.

The 1991 legislature added new standards for reforestation, wildlife habitat, and scenic considerations. The new requirements included timeframes and trees per acre standards for reforestation, limits on the size and proximity of clearcuts, visual standards for logging in visually sensitive highway corridors, and specifications for wildlife trees and downed woody debris retained after logging. The BOF was directed to reclassify and develop appropriate protection levels for the waters of the state. In 1994, revised waters of the state rules were adopted by the BOF and assigned to Division 57 of the Oregon Administrative Rules.

In 1996, the BOF adopted administrative rules governing chemical rule applications. In 2002, the BOF adopted changes to administrative rules governing forest roads and harvesting that implemented many of the road recommendations from the Forest Practices Advisory Committee convened by the BOF. Also in 2002, the BOF adopted new rules developed from Senate Bills 1211(1997) and 12 (1999), covering shallow, rapidly moving landslides and assigned them to Division 623 of the Oregon Administrative Rules.

In 2003, the legislature removed authority for the BOF to adopt or enforce a rule under ORS 527.610 to 527.770 that requires the BOF or the State Forester to approve written plans as a required precedent to conducting a forest practice or operation. The legislature required that rules pursuant to these changes be adopted by July 1, 2005.

Oregon Land Use Laws

Since 1973, with the passing of The Oregon Land Use Act, Oregon's land use has been guided by local comprehensive planning under a number of Statewide Planning Goals (ORS 195, 196 and 197; OAR Chapter 660). State forest land management complies with this law by following the ODF's current State Agency Coordination Program, described in OAR Chapter 629, Division 20.

To date, 19 Statewide Planning Goals have been adopted by the Land Conservation and Development Commission (LCDC). These include goals on citizen involvement, the planning process, farm lands, forest lands, natural resources, development, and coastal resources (Oregon Department of Land Conservation and Development 2005). These goals are quite detailed and have the force of law. As part of the 1973 law, the Department of Land Conservation and Development was established to implement the policies and goals of the LCDC. In 1979, the legislature created the Land Use Board of Appeals to rule on matters involving land use.

State law requires each city, county, and special district to have a comprehensive plan, as well as the zoning and ordinances needed to put the plan into effect (ORS 197.175). Locally adopted land use plans are reviewed by LCDC to ensure that they are consistent with the statewide goals. After LCDC has officially approved a local government's plan, the plan is said to be "acknowledged." An acknowledged local comprehensive plan is the controlling document for land use in the area covered by the plan. Thus, management of state lands must be compatible with local comprehensive plans and land use regulations (ORS 197.180).

In 1978, LCDC approved the ODF's State Agency Coordinating Agreement. This agreement, required of all state agencies, describes the ODF's rules and programs that affect land use, and spells out how the agency will coordinate its functions with local governments, other state and federal agencies.

In 1987, the Oregon Legislature passed House Bill 3396, which resolved issues between the FPA and the land use programs. Specifically, the statewide planning goals do not apply to programs, rules, procedures, decisions, determinations, or activities carried out under the FPA (ORS 197.180 and 197.277). The FPA prohibits local governments from regulating, prohibiting, or limiting forest practices in any way on forestlands outside an urban growth boundary unless an acknowledged exception has been taken to a forestland goal (ORS 527.722). In 1991 LCDC certified that the ODF's new State Agency Coordination Program (OAR 629-20) was compatible with the statewide planning goals.

Key Terms

Acknowledgment—Approval by the LCDC of a city or county's comprehensive plan; acknowledgment of compliance with the Statewide Planning Goals.

Certification—Approval by LCDC of a state agency program found to be consistent with the Statewide Planning Goals.

Department of Land Conservation and Development—State agency that administers Oregon's statewide planning program and provides professional support to the LCDC.

Land Conservation and Development Commission—A seven-person commission that sets the standards for Oregon's statewide planning program. Members are volunteers appointed by the Governor and confirmed by the State Senate.

Land Use Board of Appeals—Established in 1979 essentially as a state court that rules on matters involving land use. Appeals from the Land Use Board of Appeals go to the State Court of Appeals and finally to the Supreme Court.

State Agency Coordination Program—Required under law for each state agency to establish procedures to assure compliance with statewide land use goals and acknowledged city and county comprehensive plans and land use regulations.

Statewide Planning Goals—Statewide planning goals are adopted by the LCDC to set standards for local land use planning. They have the force of law.

Goal 4 of the statewide planning goals, "Forest Lands," is "to conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources, and to provide for recreational opportunities and agriculture" (Oregon Department of Land Conservation and Development 2005).

Goal 4 allows the following land uses on forest land: "(1) uses related to and in support of forest operations; (2) uses to conserve soil, water and air quality, and to provide for fish and wildlife resources, agriculture and recreational opportunities appropriate in a forest environment; (3) locationally dependent uses; (4) dwellings authorized by law." In addition, "Forest operations, practices and auxiliary uses shall be allowed on forest lands subject only to such regulation of uses as are found in ORS 527.722" [the Forest Practices Act] (Oregon Department of Land Conservation and Development 2005).

Two other statewide planning goals are of particular interest. Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources) is "to conserve open space and protect natural and scenic resources." Goal 6 (Air, Water and Land Resources Quality) is "to maintain and improve the quality of the air, water and land resources of the state."

The ODF has established procedures under OAR 629-20, its State Agency Coordination Program, to assure that land use programs comply with statewide land use planning goals, and are compatible with acknowledged city and county comprehensive plans and land use regulations. In the case of a state FMP, the District Forester will notify local governments when an FMP is being developed, and will request their review and comment on the compatibility of the draft FMP with the local governments' comprehensive plans. If a conflict is found between the ODF's statutory obligations and land use compatibility, OAR 629-20-050 describes the dispute resolution process to be followed. OAR-629-20 also describes procedures to be followed if land use classifications are updated; land is acquired, sold or exchanged; non-forest uses must be approved; or when block plans, Annual Operations Plans, and transportation plans are developed. OAR 629-20-000 states that "it is not the intent of these rules to prevent either the BOF or the Department of Forestry from carrying out their statutory responsibilities."

Mandates for Specific Resources

Legal and policy mandates apply specifically to forest resources. These resources are listed below in alphabetical order, with relevant information under each heading.

Agriculture and Grazing

Agricultural activities are permitted under ORS 530.050(4) and ORS 530.490(2). These laws authorize the State Forester to grant easements on BOFLs and CSFLs. BOF Policy No. 3-1-4-002 allows non-exclusive permits to be granted for special uses. Agriculture is considered a special use, and is allowed when it does not interfere with forest management activities. Any revenue from agriculture permits is shared with the county where the activity takes place.

Grazing on BOFLs is permitted by ORS 530.010, 530.030, and 530.050. These statutes allow the State Forester to permit domestic livestock grazing in order to secure the greatest permanent value to the state, as long as this use is not detrimental to the best interest of the state. There are no administrative rules to regulate livestock grazing on BOFLs. The ODF manages any grazing that occurs on BOFLs, and shares any income from grazing leases with the county where the land is located.

The ODF manages CSFLs under a contract with the State Land Board. The contract describes the roles of the ODF and the DSL for these lands. Under this contract, grazing and mineral leases on CSFLs are managed by the DSL.

Air Quality

The federal Clean Air Act, as amended in 1977 and 1990 (42 U.S.C. 7401, et seq.), is the main law regulating air quality. The goal of the law is “to protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare and the productive capacity of its population.” Under the law, the U.S. Environmental Protection Agency (EPA) sets air quality standards known as the National Ambient Air Quality Standards (NAAQS).

The authority to implement the law is delegated to the states. In Oregon, the Department of Environmental Quality (DEQ) develops and carries out programs to meet the NAAQS , through the State Implementation Plan. Sub-plans have been developed by other state agencies to address specific air quality concerns. Two air quality plans affect forest management directly: the Oregon Smoke Management Plan and the Oregon Visibility Protection Plan.

The Oregon Smoke Management Plan—ODF districts issue site-specific and time-specific burning permits under conditions adjusted daily to the weather. The conditions are designed to avoid smoke contamination of certain population centers (designated areas) and popular recreation areas (smoke-sensitive areas). These burning instructions specify geographic locations and fuel to be consumed. Permits may also specify fire protection and mop-up criteria. During burning, smoke behavior is monitored from the ground and at times from the air, and results are compiled on an annual basis by ODF smoke management staff. The Smoke Management Plan has established special protection zones for some cities.

The Oregon Visibility Protection Plan—Prescribed burning strategies to protect visibility are implemented under the Oregon Visibility Protection Plan. Visibility is a consideration for wilderness areas, such as the Mount Hood, Mount Jefferson, Mount Washington, and Three Sisters wilderness areas. Due to fire season restrictions and ODF policy, no prescribed burning takes place from May/June until approximately November when the rainy season begins.

Aquatic and Riparian Systems

In 1909, the Oregon Legislature declared that all water in the state belongs to the public. In the years since then, many state agencies have been given the job of helping manage the public's water.

The WRC is responsible for the development of an integrated, coordinated state program for managing Oregon's water (ORS 536.300). Other state agencies and public corporations are directed to conform to statements of water resources policy (ORS 536.360). Oregon Revised Statutes, Chapters 536 through 543 guide the WRC on water-management policies.

Oregon Administrative Rules, Chapter 690, contains rules developed by the WRC that address water management. In addition, the Water Resources Department is in the process of proposing new rules for the protection of instream flows for certain fish species.

Oregon Revised Statutes, Chapter 527, known as the FPA, regulates forest operations. For protecting water resources, the primary focus of the regulations is on controlling activities around all types of water bodies and stream channels.

Water Resources Department Programs

Streamflow Restoration Priorities — The state Water Resources Department and Department of Fish and Wildlife have jointly identified priority areas for streamflow restoration in basins throughout the state. These priority areas represent watersheds in which there is a combination of need and opportunity for flow restoration to support fish recovery efforts under the Oregon Plan for Salmon and Watersheds. The Water Resources Department is focusing its efforts to aid in recovery of salmonids on these priority areas. The South Coast, Umpqua, and Rogue are the three basins in the planning area (Oregon Water Resources Department 2005).

Water Quality

Water quality protection is mandated by both federal and state laws. The most important federal law for water resources is the Clean Water Act (CWA), first passed in 1972 and amended several times since then. The goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters to protect beneficial uses such as public water supply, recreation in and on water, and propagation of fish and wildlife. The states are responsible for implementing the law and meeting its water quality standards.

Oregon forest practices rules are approved as sufficient to implement water quality standards under the CWA. Section 303(d) of the CWA requires states to identify and list threatened and impaired bodies of water. Rules describing beneficial uses, policies, standards and treatment criteria (OAR Chapter 340, Division 4) are enforced by the DEQ.

The state's water quality is under the authority of the Environmental Quality Commission, and is regulated by the DEQ. ORS 468B contains the state laws pertaining to water pollution control. OAR Chapters 40 through 55 contain water quality regulations. DEQ's water quality program for forestlands is administered by the BOF through the administrative rules of the FPA. These rules specify best management practices for forest operations, which ensure that water quality will meet DEQ standards. Any forest operation that complies with the rules is deemed to comply with the state's water quality standards. ORS 527.710, 527.765, and 527.770 contain the FPA rules to achieve these water quality standards.

The WRC is responsible for the development of an integrated, coordinated state program for managing Oregon's water. Other state agencies and public corporations are directed to conform to statements of water resources policy. Oregon Revised Statutes, Chapters 536 through 543, guide the WRC on water-management policies. Oregon Administrative Rules, Chapter 690, contains rules developed by the WRC that address water management. The state's laws and administrative rules are designed to achieve the goals of the federal CWA, as well as to achieve state goals for water resources.

The Oregon Plan for Salmon and Watersheds is Oregon's cooperative effort to restore salmon runs, improve water quality, and achieve healthy watersheds and strong communities throughout the state. Many state agencies, including the ODF, are involved in carrying out the plan. The mission of the Oregon Plan is "Restoring our native fish populations and the aquatic systems that support them to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits."

Wetlands

Federal Laws and Policies—At the federal level, the U.S. Army Corps of Engineers regulates the discharge of materials into waters of the United States, which includes wetlands. This authority is derived from Section 404 of the CWA. Key exemptions exist under federal law for obtaining individual dredge and fill permits for: 1) normal farming, ranching, and forestry activities, such as plowing, minor draining, and harvesting; 2) constructing or maintaining stock ponds or irrigation ditches; and 3) constructing or maintaining farm, forest, or mining roads. Essentially, all normal silvicultural activities are exempt as long as they do not convert a wetland to an upland.

State Laws and Policies—The DSL administers several aspects of regulation and management of wetlands, that are relevant to state forestlands. These statutes include the state's Removal-Fill Law, Senate Bill 3, and the Mitigation Bank Act.

The Removal-Fill Law (ORS 196.800-196.990) requires permits from the DSL for removal, fill, or alteration involving 50 cubic yards or more of material in any water of the state, including wetlands.

Senate Bill 3, passed in 1989, is primarily intended to promote protection and conservation of wetlands, and is in many ways an adjunct to the Removal-Fill Law.

The Mitigation Bank Act of 1987 is a state statute that provides for the acquisition and protection of wetlands, and for the establishment of wetlands mitigation banks by the DSL.

The ODF, FPA, identifies three major types of wetlands: significant wetlands, stream-associated wetlands, and other wetlands. The FPA also regulates activities that affect these areas. The Water Protection Rules (ORS 629-645 and 629-655) in the Forest Protection Rules identify the protection measures required for riparian areas and wetlands.

Carbon

Currently, there are no legal requirements that direct the State Land Board to manage for carbon in addition to the other legal mandates. (See legal mandate section of this FMP) However, there are several initiatives that could eventually result in more specific direction from the State of Oregon to manage for carbon uptake and storage on forestlands across Oregon:

- <u>House Bill 2200</u> – Passed by the 2001 Oregon State Legislature and signed into law. House Bill 2200 establishes State Forester authority to sell forest carbon offsets from Oregon Department of Forestry managed forest lands. Requires the State Forester to develop an accounting system for measuring and reporting forest carbon offsets. Establishes an advisory committee to assist the Board in developing principles and standards for carbon accounting. This authority has been established in ORS 530.050.

- <u>Governor's Advisory Group on Global Warming</u> – The purpose of the 2004 advisory group was to recommend greenhouse gas emission reduction goals for Oregon and recommend specific actions Oregon can take to move toward meeting the emission reduction goals. The recommended actions fall in the following areas: 1) Integrating Actions, 2) Energy Efficiency, 3) Electrical Generation and Supply, 4) Transportation, 5) Biological Sequestration, 6) Materials Use, Recovery and Waste Disposal, and 6) State Government Operations. Recommendations were released in as the *Oregon Strategy for Greenhouse Gas Reductions*. These identify 3 significant actions for offsetting greenhouse gases through biological sequestration: 1) reduce wildfire severity and extent from forest fuel treatments, 2) maintain the forest land base, and 3) forestation.

- <u>Oregon Global Warming Commission</u> – House Bill 3543 (passed by the 2007 Oregon Legislature) formally established greenhouse gas emissions reduction goals for Oregon and created the Oregon Global Warming Commission and the

Oregon Climate Change Research Institute. The Global Warming Commission is charged to develop recommendations for the 2009 Oregon Legislature that further key elements of the Governor's 2009 Climate Change Initiative. The Commission will track and evaluate the carbon sequestration potential of Oregon's forests and assess management strategies that increase sequestration, reduce wildfire emissions and increase the production/utilization of wood products. The Commission will research adaptation strategies regarding changing species distributions as a result of climate change.

Results of the Commission's work to date have been published as the "Interim Roadmap to 2020." The recommendations for the forestry sector include:

- Establish a carbon inventory for all Oregon forests. This will require a collaborative effort to define and develop an agreed-upon approach for developing and maintaining a carbon inventory system. Based on these data, establish baselines and both long-term and intermediate goals for carbon storage that account for different forest types and ownerships, including overall storage gains in public forests.
- All timber management planning and public forest transactions (e.g. timber sales, offset sales) should include net impact on Oregon's carbon account.
- Oregon State forestlands should be managed to increase carbon stores over time, consistent with ecosystem values and yield of durable forest products.

Cultural Resources

Several federal and state laws, and one statewide land use planning goal regulate cultural resource management on state forestlands. Goal 5, Open Spaces, Scenic and Historic Areas, Natural Resources, and Cultural Resources, requires counties and local governments to inventory cultural resources, and manage them to preserve their original character if there are no conflicting uses or consequences. Administrative rules that apply to cultural resources on state forestlands are OAR 690-51-240 (1991) and OAR 736-51-070. Archaeological sites are defined as sites over 75 years old. Some sites over 50 years old qualify for limited protection. Oregon statutes do not mandate archaeological surveys, or mitigation of impacts by state agencies as part of conducting land management activities. However, artifacts and sites found on public lands must be protected from harm, alteration, or removal. If a sacred object is found, the State Historic Preservation Office and appropriate group or tribe must be notified. Anywhere in Oregon, state law protects Native American cairns and graves.

Information relating to the location of archaeological sites and objects is usually not released to the public unless the public interest requires the disclosure, or if the governing body of a Native American tribe requests the information.

The State Historic Preservation Office, which is part of the Oregon Parks and Recreation Department, administers the Statewide Plan for Historic Preservation and submits Oregon's nominations for the National Register of Historic Places.

Energy and Mineral Resources

Several state laws regulate energy and mineral resources on state forests, including ORS 273.551, 273.780, and 273.785. The DSL has jurisdiction for the leasing of oil, gas, and minerals on state-owned lands. Before a lease is issued, the law directs DSL to consult with the State Department of Geology and Mineral Industries and to obtain concurrence from the state agency responsible for the surface rights of the land involved. Leases are auctioned when more than 40 acres are involved. On less than 40 acres, leases are handled through negotiations. The DSL also administers a prospecting permit system that could eventually lead to applications for leases.

The ODF does have the right to use gravel, sand, stone, and soil from state forestlands to repair or construct roads or other state facilities without approval by the DSL.

Fish and Wildlife

The primary laws specific to fish and wildlife are the state and federal ESAs (discussed in an earlier section of this appendix).

Land Base and Access

Land Base

The following laws and rules provide direction for the acquisition, exchange, and management of state forestlands.

ORS 530.450 through ORS 530.520 Acquisition, Management and Development of the Elliott State Forest Common School Forest Lands. These statutes give the DSL and the BOF authority and means to designate, set aside and exchange CSFLs for the Elliott State Forest.

ORS 530.010 through ORS 530.040 Acquisition, Management and Development of State Forests. These statutes give the BOF authority and means through the ODF to acquire forest land by "purchase, donation, devise or exchange." Any acquisition of forest land must be approved by the board of county commissioners in the county where the lands are located.

OAR 629-033-0000 through OAR 629-033-0055 and OAR 629-035-0070 Forest Land Exchanges and Acquisitions. These administrative rules describe the procedures and public review required when lands are added to or removed from the state forest land base.

Access

The following laws and policies provide direction for access to roads on state forestlands.

Forest Practices Administrative Rules, Chapter 629, Division 24—State forest land is subject to all the Oregon Forest Practices Administrative Rules. Rules 629-24-520 through 629-24-524 specifically address road location, road design, road construction, and road maintenance. These rules recognize the necessity of roads for forest management and protection, and set minimum construction and maintenance standards intended to protect water quality, forest productivity, and fish and wildlife habitat.

Motorized Recreation Administrative Rules, Chapter 629, Division 26, 629-26-005 through 629-26-025—These rules govern the use of recreational off-road vehicles on state forestlands and give the State Forester the authority to designate off-road riding areas, to close riding areas, and to permit organized recreation events.

Oregon Vehicle Code, Off-Road Vehicles, ORS 821.010 through 821.320—These statutes govern the use of recreational off-road vehicles on all lands in Oregon, including state forestlands. They set standards for registration, equipment, and operation, and also set penalties for violations, including penalties for off-road vehicle-caused damage to trees, vegetation, or soil.

Oregon Department of Forestry, Forest Road Manual for State Forests, Forest Roads Policy—The Forest Roads Policy states that roads will be developed and maintained to provide access for the sale of timber and other forest products, for timber management activities, for protection from fire, and for public access. It further states that forest roads will be designed, constructed, and maintained to meet or exceed rules of the FPA. The road manual sets road standards, gives design guidelines, sets an excavation and appraisal policy, and provides a wide variety of specifications and costs (Oregon Department of Forestry 2006).

Plants

Federal Endangered Species Act

The federal ESA was enacted to preserve plant and animal species that are at risk of becoming extinct. The federal ESA is administered for plants by the USFWS. For endangered plants, the federal ESA prohibits the removal, damage, or destruction of plants on federal lands; and certain other activities on non-federal lands. Prohibited activities on non-federal lands include removing, cutting, digging up, damaging, or destroying any endangered plant species in known violation of any law or regulation of any state, or in the course of any violation of a state criminal trespass law. The activities prohibited for endangered plants are not automatically prohibited for threatened plants. However, according to the federal ESA, such prohibitions may be established for threatened plants through regulation, if they are found to be “necessary and advisable for the conservation of such species.”

State Endangered Species Act

The Oregon laws covering threatened and endangered plants are found in ORS 564.010 through 564.994. Further legal requirements are given in the Oregon Administrative Rules (OAR Chapter 603, Division 73).

The state ESA was first passed in 1987. Oregon’s threatened and endangered plant species are managed under the authority of the Director of Agriculture, with administrative responsibilities delegated to the Oregon Department of Agriculture (ODA). Protection and conservation programs are established through administrative rules. State agencies such as the ODF, are directed to cooperate in furthering conservation programs for threatened or endangered species.

In determining if listed species occur, or are likely to occur on lands where management activity is planned, the ODF consults with the Natural Heritage Program of Oregon as well as the ODA. If the determination should be positive, a process that is detailed in the administrative rules must be followed to conserve the species.

The term “action” has been defined by administrative rule to include activities that disturb the ground or vegetation or suppress plant growth. A sale or exchange of state-owned land, such that a listed species would be removed from state jurisdiction, would also be considered an action.

Recreation

Recreational Use of State Forest Land, Chapter 629, Division 25, establishes standards for recreational use of state forestlands by the public. The rules regulate off-road vehicle use, camping, firearm use, disposal of garbage and human waste, and other activities associated with recreational activity.

Scenic Resources

Generally, most state forest land adjacent to visually sensitive highway corridors is considered to be of high scenic quality. Along major highways, the immediate visual foreground is protected either by Department of Transportation-owned scenic buffers or by scenic statutes and FPA rules. For areas farther back from highways but still visible from the road, which are considered mid-ground and background scenic areas, some acres are designated as scenic, allowing management activities for these areas to be adjusted for visual considerations.

The highways in the vicinity of the Elliott State Forest are designated as scenic for the purpose of visual corridor management. The visually sensitive corridor is defined as the area within 150 feet of the outermost right-of-way boundary along both sides of the highway. Special rules apply to timber harvest in this corridor.

State Scenic Waterways Program

There are no state scenic waterways in the Elliott State Forest. The program is designed to protect and enhance the special attributes and natural values of designated scenic waterways. These values include recreation, fish, wildlife, water quality, geology, historical and botanical resources, aesthetics, and the freeflowing character of the rivers. Dams, reservoirs, impoundments, and placer mining are prohibited. The Oregon Department of Parks and Recreation has general administrative rules for scenic waterways, and has developed specific administrative rules for some individual scenic waterways. Administrative rules for the Nestucca Scenic Waterway were published in July 1994 (OAR 736-40).

A review and approval process for land uses may noticeably alter or modify property within the scenic waterway corridor. Land uses that require review and approval include timber harvest and road construction, among others. The Department of Parks and Recreation must be notified one year in advance of activities requiring review and approval. Approval is based on criteria established in the administrative rules.

Soils

The ODF manages state forestlands in accordance with the FPA rules, Division 24, for soil protection. These rules define best management practices for protecting soil and forest productivity when conducting timber harvest, prescribed burning, or road construction activities. The ODF uses the professional expertise of foresters, geotechnical specialists, soil scientists, and forest engineers to evaluate proposed activities.

Appendix E
Wildlife and Fish Species Lists

This appendix lists the amphibian, reptile, bird, and mammal wildlife species, as well as the fish species, likely to be present currently in the Elliott State Forest. Some species are known to be present. Others are considered likely to be present based on their known ranges and use of forested habitats. The matrix includes both common names and species names, and provides information on the status of each species. Abbreviations for status are defined following the list of species. Headings in this appendix are:

Sources

A number of sources were used in developing this appendix (references provided below). The list of species was compiled by Marnie Allbritten, wildlife biologist with the Oregon Department of Fish and Wildlife; Alan Ritchey, fish biologist with the Oregon Department of Fish and Wildlife; and Marcia Humes/Jennifer Weikel, staff wildlife biologist with the Oregon Department of Forestry.

The Oregon Species Information System database provided the data on species occurrence in the Coast Range province within the counties in the planning area (Oregon Department of Fish and Wildlife 1995). Important literature references include:

- Amphibians: Leonard et al. 1993
- Reptiles: Nussbaum, Brodie, and Storm 1983
- Mammals: Hall 1981; Burt and Grossenheider 1972; Christy and West 1993; Verts and Carraway 1998
- Birds: Puchy and Marshall 1993; Gilligan et al. 1994; Marshall et al. 2003

Status

Federal or State of Oregon Endangered or Threatened or Candidate Species

- **Endangered—**Species in danger of extinction throughout all or a significant portion of their range.
- **Threatened—**Species likely to become endangered in the foreseeable future.
- **Candidate—**Species for which the U.S. Fish and Wildlife Service (USFWS) or NOAA Fisheries have sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a listing regulation is precluded by other higher priority listing activities.

(Federal Endangered Species Act of 1973, as amended; Oregon Endangered Species Act of 1987, ORS 496.172; OAR 635-100-100 to 635-100-130.)

Federal Species of Concern

Federal "species of concern" is an informal term that refers to those species which the USFWS believes might be in need of concentrated conservation actions. Such conservation actions vary depending on the health of the populations and degree and types of threats. At one extreme, only periodic monitoring of populations and threats to the species and its habitat may be needed. At the other extreme, species listing as a federal threatened or endangered species may be required. "Species of concern" receive no legal protection, and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species.

State Sensitive Species

State sensitive species are those likely to become threatened or endangered throughout all or any significant portion of their range in Oregon. This list is updated biennially. Sensitive species are broken into the two categories listed below (ODFW 2008).

Critical—Species which are imperiled with extirpation from a specific geographic area of the state because of small population sizes, habitat loss or degradation, and/or immediate threats. Critical species may decline to a point of qualifying for listing as threatened or endangered if conservation actions are not taken. **Vulnerable—** Species facing one or more threats to their populations and/or habitats. Not currently imperiled with extirpation from a specific geographic region or the state but could become so with continued or increased threats to populations and/or habitats. (ORS 496.012 (1); OAR 635-100-040.)

State Strategy Species

The Oregon Conservation Strategy, developed by Oregon Department of Fish and Wildlife, describes species and habitats of greatest conservation need in Oregon. Species are identified by ecoregion, based on conservation need and opportunity in each ecoregion. Strategy species for the Coast Range ecoregion are identified below.

List of Species

Common Name	Species Name	Status
Mammals		
Virginia opossum	*Didelphis virginiana*	NON
Mountain lion	*Felis concolor*	SG
Bobcat	*Felis Rufus*	
Roosevelt elk	*Cervus elaphus roosevelti*	SG
Black-tailed mule deer	*Odocoileus hemionus columbianus*	SG
Coyote	*Canis latrans*	
Gray fox	*Urocyon cinereoargenteus*	
Black bear	*Ursus americanus*	SG
Fisher	*Martes pennanti pacifica*	FC, SSC
Raccoon	*Procyon lotor*	
River otter	*Lutra canadensis*	
American beaver	*Castor canadensis*	
Porcupine	*Erethizon dorsatum*	
Snowshoe hare	*Lepus americanus*	
Brush rabbit	*Sylvilagus bachmani*	
Mountain beaver	*Aplodontia rufa*	
American marten	*Martes americana*	SSV, OCS
Nutria	*Myocastor coypus*	NON
Ermine	*Mustela erminea*	
Long-tailed weasel	*Mustela frenata*	
Mink	*Mustela vison*	
Spotted skunk	*Spilogale gracilis*	
Striped skunk	*Mephitis mephitis*	
Trowbridge's shrew	*Sorex trowbridgii*	
Fog shrew	*Sorex sonomae*	
Vagrant shrew	*Sorex vagrans*	
Pacific shrew	*Sorex pacificus*	
Pacific marsh shrew	*Sorex bendirii*	
Shrew-mole	*Neurotrichus gibbsii*	
Townsend's mole	*Scapanus townsendii*	
Coast mole	*Scapanus orarius*	
California myotis	*Myotis californicus*	SSV, OCS

Common Name	Species Name	Status
Mammals (continued)		
Long-eared myotis	*Myotis evotis*	FSOC
Little brown myotis	*Myotis lucifugus*	
Yuma myotis	*Myotis yumanensis*	FSOC
Long-legged myotis	*Myotis volans*	SSV, FSOC, OCS
Fringed myotis	*Myotis thysanodes*	SSV, FSOC, , OCS
Big brown bat	*Eptesicus fuscus*	
Hoary bat	*Lasiurus cinereus*	SSV, OCS
Silver-haired bat	*Lasionycteris noctivagans*	SSV, FSOC, OCS
Townsend’s big-eared bat	*Corynhorinus townsendii*	SSC, FSOC, OCS
Townsend’s chipmunk	*Tamias townsendii*	
Western gray squirrel	*Sciurus griseus*	SG
Douglas’ squirrel	*Tamiasciurus douglasii*	
Northern flying squirrel	*Glaucomys sabrinus*	
California ground squirrel	*Spermophilus beecheyi*	
Dusky-footed woodrat	*Neotoma fuscipes*	
Bushy-tailed woodrat	*Neotoma cinerea*	
Ringtail	*Bassariscus astutus*	
Deer mouse	*Peromyscus maniculatus*	
White-footed vole	*Phenacomys albipes*	FSOC
Western red-backed vole	*Clethrionomys californicus*	
Red tree vole	*Phenacomys longicaudus*	SSV, FSOC, OCS
Long-tailed vole	*Microtus longicaudus*	
Creeping vole	*Microtus oregoni*	
Townsend’s vole	*Microtus townsendii*	
Muskrat	*Ondatra zibethicus*	
Pacific jumping mouse	*Zapus trinotatus*	
Birds		
Green heron	*Butorides virescens*	NTMB
Great blue heron	*Ardea herodias*	
Wood duck	*Aix sponsa*	SG, NTMB
Harlequin duck	*Histrionicus histrionicus*	SG, FSOC
Hooded merganser	*Lophodytes cucullatus*	SG, NTMB

Common Name	Species Name	Status
Birds (continued)		
Common merganser	*Mergus merganser*	SG
Turkey vulture	*Cathartes aura*	NTMB
Osprey	*Pandion haliaetus*	NTMB
Bald eagle	*Haliaeetus leucocephalus*	ST, OCS
Northern goshawk	*Accipiter gentiles*	SSV, FSOC
Sharp-shinned hawk	*Accipiter striatus*	NTMB
Cooper's hawk	*Accipiter cooperii*	NTMB
Red-tailed hawk	*Buteo jamaicensis*	NTMB
American kestrel	*Falco sparverius*	NTMB
Peregrine falcon	*Falco peregrinus*	NTMB, SSV, OCS
Mountain quail	*Oreortyx pictus*	SG, FSOC
Blue grouse	*Dendragapus obscurus*	SG
Ruffed grouse	*Bonasa umbellus*	SG
Killdeer	*Charadrius vociferus*	NTMB
American dipper	*Cinclus mexicanus*	
Marbled murrelet	*Brachyramphus marmoratus*	FT, ST, OCS
Rock dove	*Columba livia*	NON, SG
Mourning dove	*Zenaida macroura*	SG, NTMB
Band-tailed pigeon	*Columba fasciata*	SG, FSOC, NTMB, OCS
Western screech-owl	*Otus kennicottii*	
Great horned owl	*Bubo virginianus*	
Northern pygmy-owl	*Glaucidium gnoma*	
Barred owl	*Strix varia*	
Northern spotted owl	*Strix occidentalis*	FT, ST, OCS
Northern saw-whet owl	*Aegolius acadicus*	
Common nighthawk	*Chordeiles minor*	NTMB
Vaux's swift	*Chaetura vauxi*	NTMB
Anna's hummingbird	*Calypte anna*	NTMB
Rufous hummingbird	*Selasphorus rufus*	NTMB
Belted kingfisher	*Ceryle alcyon*	NTMB
Red-breasted sapsucker	*Sphyrapicus ruber*	NTMB
Downy woodpecker	*Picoides pubescens*	
Hairy woodpecker	*Picoides villosus*	
Northern flicker	*Colaptes auratus*	
Pileated woodpecker	*Dryocopus pileatus*	

Common Name	Species Name	Status
Birds (continued)		
Olive-sided flycatcher	*Contopus cooperi*	SSV, FSOC, NTMB, OCS
Hammond's flycatcher	*Empidonax hammondii*	NTMB
Little Willow flycatcher	*Empidonax trailii brewsteri*	SSV, FSOC, NTMB
Pacific-slope flycatcher	*Empidonax difficilis*	NTMB
Western wood-pewee	*Contopus sordidulus*	NTMB
Purple martin	*Progne subis*	SSC, FSOC, NTMB
Tree swallow	*Tachycineta bicolor*	NTMB
Violet-green swallow	*Tachycineta thalassina*	NTMB
Cliff swallow	*Petrochelidon pyrrhonota*	NTMB
Barn swallow	*Hirundo rustica*	NTMB
Gray jay	*Perisoreus canadensis*	
Western scrub jay	*Aphelocoma californica*	
Steller's jay	*Cyanocitta stelleri*	
American crow	*Corvus brachyrhychos*	
Common raven	*Corvus corax*	
Black-capped chickadee	*Poecile atricapillus*	
Chestnut-backed chickadee	*Poecile rufescens*	
Red-breasted nuthatch	*Sitta canadensis*	
White-breasted nuthatch	*Sitta carolinensis*	SSV
Brown creeper	*Certhia americana*	
House wren	*Troglodytes aedon*	NTMB
Winter wren	*Troglodytes troglodytes*	
Golden-crowned kinglet	*Regulus satrapa*	
Western bluebird	*Sialia mexicana*	SSV, NTMB
Townsend's solitaire	*Myadestes townsendi*	NTMB
Swainson's thrush	*Catharus ustulatus*	NTMB
Hermit thrush	*Catharus guttatus*	NTMB
Varied thrush	*Ixoreus naevius*	
American robin	*Turdus migratorius*	NTMB
Wrentit	*Chamaea fasciata*	
Cedar waxwing	*Bombycilla cedrorum*	NTMB
European starling	*Sturnus vulgaris*	NON
Warbling vireo	*Vireo gilvus*	NTMB
Cassin’ vireo	*Vireo cassinii*	NTMB

Common Name	Species Name	Status
Birds (continued)		
Hutton's vireo	*Vireo huttoni*	
Orange-crowned warbler	*Vermivora celata*	NTMB
Nashville warbler	*Vermivora ruficapilla*	NTMB
Yellow warbler	*Dendroica petechia*	NTMB
Yellow-rumped warbler	*Dendroica coronata*	NTMB
Black-throated gray warbler	*Dendroica nigrescens*	NTMB
Townsend's warbler	*Dendroica townsendi*	NTMB
Hermit warbler	*Dendroica occidentalis*	NTMB
MacGillivray's warbler	*Oporornis tolmiei*	NTMB
Wilson's warbler	*Wilsonia pusilla*	NTMB
Common yellowthroat	*Geothlypis trichas*	NTMB
Western tanager	*Piranga ludoviciana*	NTMB
Black-headed grosbeak	*Pheucticus melanocephalus*	NTMB
Evening grosbeak	*Coccothraustes vespertina*	
Lazuli bunting	*Passerina amoena*	NTMB
Spotted towhee	*Pipilo erythrophthalamus*	
Chipping sparrow	*Spizella passerina*	NTMB
Fox sparrow	*Passerella iliaca*	
Song sparrow	*Melospiza melodia*	
White-crowned sparrow	*Zonotrichia leucophrys*	NTMB
House sparrow	*Passer domesticus*	NON
Dark-eyed junco	*Junco hyemalis*	
Red-winged blackbird	*Agelaius phoeniceus*	NTMB
Brown-headed cowbird	*Molothrus ater*	NTMB
Northern oriole	*Icterus galbula*	NTMB
Purple finch	*Carpodacus purpureus*	
American goldfinch	*Carduelis tristis*	NTMB
Pine siskin	*Carduelis pinus*	
Red crossbill	*Loxia curvirostra*	
Amphibians & Reptiles		
Northwestern salamander	*Ambystoma gracile*	
Long-toed salamander	*Ambystoma macrodactylum*	
Pacific giant salamander	*Dicamptodon tenebrosus*	
Ensatina salamander	*Ensatina eschscholtzii*	
Dunn's salamander	*Plethodon dunni*	
Western redback salamander	*Plethodon vehiculum*	

Common Name	Species Name	Status
Amphibians & Reptiles (continued)		
Rough-skinned newt	*Taricha granulosa*	
Clouded salamander	*Aneides ferreus*	SSV, OCS
Southern torrent salamander	*Rhyacotriton variegatus*	SSV, FSOC, OCS
Western toad	*Bufo boreas*	SSV, OCS
Pacific tree frog	*Pseudacris regilla*	
Coastal Tailed frog	*Ascaphus truei*	SSV, FSOC, OCS
Red-legged frog	*Rana aurora*	FSOC
Foothill yellow-legged frog	*Rana boylii*	SSV, FSOC, OCS
Bullfrog	*Rana catesbeiana*	NON
Northwestern pond turtle	*Clemmys marmorata*	SSC, FSOC, OCS
Northern alligator lizard	*Gerrhontus coeruleus*	
Western skink	*Eumeces skiltonianus*	
Rubber boa	*Charina bottae*	
Northwestern garter snake	*Thamnophis ordinoides*	
Common garter snake	*Thamnophis sirtalis*	
Sharptail snake	*Contia tenuis*	
Common kingsnake	*Lampropeltis getula*	SSV, FSOC
Fish		
Chum salmon	*Oncorhynchus keta*	SSC, OCS
Coho salmon	*Oncorhynchus kisutch*	SSV, FT (SONC and Oregon Coast ESU) , OCS
Fall chinook salmon	*Oncorhynchus tshawytscha*	SSV, OCS
Winter steelhead	*Oncorhynchus mykiss*	FSOC, SSV, OCS
Coastal cutthroat trout	*Oncorhynchus clarki*	FSOC, OCS
Millicoma longnose dace	*Rhinichthys cataractae spp.*	FSOC, SSV, OCS
Umpqua dace	*Rhinichthys evermanni*	
Speckled dace	*Rhinichthys osculus*	
Largescale sucker	*Catastomus macrocheilus*	
Threespine stickleback	*Gasterosteus aculeatus*	
Redside shiner	*Richardsonius balteatus*	

Common Name	Species Name	Status
Fish (continued)		
Pacific lamprey	*Lampetra tridentata*	SSV, FSOC, OCS
River lamprey	*Lampetra ayresi*	FSOC
Western brook lamprey	*Lampetra richardsoni*	SSV, OCS
Coastrange sculpin	*Cottus aleuticus*	
Prickly sculpin	*Cottus asper*	
Reticulate sculpin	*Cottus perplexus*	
Riffle sculpin	*Cottus gulosus*	
Largemouth bass	*Micropterus salmoides*	NON
Smallmouth bass	*Micropterus dolomieui*	NON
Black crappie	*Pomoxis nigromaculatus*	NON?
Bluegill	*Lepomis macrochirus*	NON?
Rainbow trout	*Oncorhynchus mykiss*	
Brown bullhead	*Ictalurus nebulosus*	
Umpqua chub	*Oregonichthys kalawatseti*	FSOC, SSC, OCS

Key to Status

FC	Federal candidate species
FE	Federal endangered species
FSOC	Federal species of concern
FT	Federal threatened species
NON	Non-native species; introduced
NTMB	Neotropical migratory bird
OCS	Strategy Species identified in Oregon Conservation Strategy
SE	State endangered species
SG	State game species
SSC	State sensitive species: critical status
SSV	State sensitive species: vulnerable status
ST	State threatened species

Appendix F
Public Involvement

Public involvement is critical in developing the best possible Forest Management Plan (FMP) for the Elliott State Forest. The public involvement process helps to increase the public's understanding and support for forest management actions. In addition, the public contributes information, ideas, and values that are essential to FMP development.

The Oregon Department of Forestry (ODF) planning team carried out extensive public involvement, as detailed in this appendix. The planning team provided information and sought public input at each step of the planning process, and solicited comments on the draft strategies and proposed actions. The two federal agencies involved with the Incidental Take Permit (ITP)—the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries)—began participating in the public involvement process in 2001 as contributing members of the planning team.

The public involvement process was integrated with the overall planning process, and covered all parts of the planning process: the FMP, the proposed Habitat Conservation Plan (HCP) revision, and the National Environmental Policy Act (NEPA) analysis, which will be documented in an Environmental Impact Statement that will accompany the proposed HCP.

This appendix describes all public involvement for all documents related to the FMP for the Elliott State Forest.

History of Public Involvement

The public involvement process consisted of newsletters, public meetings and forest tours, information on the ODF website, an independent scientific review, and informal contacts with groups and individuals.

The text of this appendix describes in detail each aspect of the public involvement process.

Table F-1 presents a chronological history of public involvement activities, showing how the activities fit together and in what sequence they occurred. The history includes only activities related to state forest policy and planning. For example, the Board of Forestry (BOF) meets every six weeks and considers many issues related to Oregon forests, but the chronological history shows only meetings at which Elliott State Forest planning was discussed or a decision relevant to Elliott State Forest planning was made.

Newsletters included a number of articles; however, only a few main articles for each issue are mentioned.

Expectations Newsletter

The ODF published the first issue of the *Expectations* newsletter in May 2001, and continued to publish the newsletter throughout the planning process. The newsletter was dedicated to Elliott State Forest management planning news, and was published on an as-needed basis as work was accomplished and new steps taken. See the chronological history for the exact dates of publication.

Expectations was mailed to a list of interested individuals, organizations, and agencies. A broader audience was reached through press releases and articles in western Oregon newspapers. Interested persons and groups were invited to request one-on-one meetings or presentations.

In September 2005, a newspaper insert in The Coos Bay World (circulation 15,500) and the Roseburg News-Review (circulation 19,500) announced public meetings and a comment period for the final draft of the FMP. Letters also were sent out to the mailing list regarding the September 2005 meetings.

Table F-1. Chronological History of Public Involvement

Date	Event
2000	
January 2000	Planning process begins for revision of FMP and HCP
January 2000	Draft report (recommendations) received from Elliott Aquatic/Riparian Task Force, which began meeting in 1998 to review and recommend riparian and aquatic strategies for the Elliott State Forest
July 27, 2000	BOF tour (public invited)
July 28, 2000	BOF meeting
August 1, 2000	State Land Board meeting; State Land Board provides direction to ODF to develop multi-species HCP
August 2000	Public Involvement Plan developed and approved by Steering Committee
October 20, 2000	BOF meeting to provide update on early stages and direction of planning for FMP and HCP
December 6, 2000	Presentation at Coos County Commissioners meeting
2001	
January 2001	Letter sent to mailing list announcing public meetings and inviting participation
January 2001	News releases, public service announcements about meetings sent to media
January to February 2001	Newspaper advertising announcing public meetings purchased in *Coos Bay World, Eugene Register-Guard, Portland Oregonian, Roseburg News-Review, Salem Statesman-Journal*
January to February 2001	Public meetings held in Coos Bay, North Bend, Roseburg and Salem to provide background on reasons for revising FMP and HCP, and to seek public input on management of the Elliott State Forest
May 2001	First issue of *Expectations* newsletter published, containing background and purpose of forest, and reason for FMP revision

Table F-1 continued. Chronological History of Public Involvement

Date	Event
2002	
January 2002	Second issue of *Expectations* newsletter published; guiding principles unveiled, outcomes of wildlife and habitat studies, economic study, watershed assessment, and wildlife species study for inclusion in HCP
June 5, 2002	BOF update
September 2002	Third issue of *Expectations* newsletter published, containing proposed management concepts (conservation areas, structure to define forest characteristics and revised aquatic/riparian areas) introduced; computerized modeling evaluates various management approaches
September to October 2002	Open written comment period for public input on proposed management concepts of FMP
October 17, 2002	BOF meeting update on FMP planning
October 8, 2002	State Land Board meeting update on FMP planning
October 2002	Presentation to Tenmile Lakes Basin Partnership
December 18, 2002	Presentation to Coos Bay Optimist Club
December 19, 2002	Meeting with Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
2003	
January to March 2003	Public comments evaluated for applicability to revision process
February 10, 2003	Meeting with Coquille Indian Tribe
May 2003	Recommendations on public comments made to Core Planning Team for inclusion in planning process
July 25, 2003	BOF update
2004	
April 13, 2004	State Land Board meeting
April 22, 2004	BOF tour (public invited)
April 23, 2004	BOF meeting in Coos Bay
May 3, 2004	FMP draft strategies available to public
May 10, 2004	Expectations newsletter mailed
June 10, 16, 17, 2004	Three public meetings (Salem, Coos Bay, Roseburg) to discuss FMP strategies
June to August 2004	Open written comment period on draft FMP
October 12, 2004	State Land Board meeting
October 22, 2004	BOF meeting

Table F-1 continued. Chronological History of Public Involvement

Date	Event
2005	
January 21, 2005	Presentation to Douglas Timber Operators
February 8, 2005	State Land Board meeting (Elliott Cost/Benefit Study)
February 18, 2005	Presentation to Coos Chapter, Society of American Foresters
February 2005	Notice of public scoping meetings: Federal Register Notice that the ODF is developing an HCP; and that ODF (with USFWS and NOAA Fisheries) has scheduled public scoping meetings (on FMP, HCP, EIS)
February 8, 2005	State Land Board meeting (Elliott Cost/Benefit Study)
March 17, 2005	Presentation to Oregon Fish and Wildlife Commission
May 24, 25, 26, 2005	EIS scoping public meetings
June 2005	State Land Board meeting
June 2005	BOF meeting
September 2005	Newspaper insert inviting participation at public meetings on FMP
September 7, 2005	BOF meeting
September 20, 21, 2005	Public meetings to discuss final draft FMP – Coos Bay; Roseburg
October 11, 2005	State Land Board meeting
October 13, 2005	Presentation to Douglas Timber Operators meeting, Roseburg
October 20, 2005	Presentation to Governor’s Rural Policy Advisory Committee - Coos Bay
December 9, 2005	Presentation to Friends of New and Sustainable Industries - Coos Bay
December 13, 2005	State Land Board meeting
2006	
January 4, 2006	BOF direction to continue development of HCP consistent with January 2006 FMP
February 14, 2006	State Land Board direction to continue development of HCP consistent with January 2006 FMP
2008	
August 22, 2008	Draft Habitat Conservation Plan and Environmental Impact Statement released for 90-day public review ending on November 20, 2008

Table F-1 continued. Chronological History of Public Involvement

Date	Event
2009	
October 13, 2009	State Land Board meeting
December 8, 2009	State Land Board meeting - Twelve invited panelists, representing a wide variety of viewpoints, provided information to the Land Board. The panelists were from environmental organizations, logging interests, government agencies, the education community and the Coquille tribe.
2010	
January 6, 2010	BOF direction to complete revised HCP by end of 2011 if agreement can be reached with federal services. Or, if agreement cannot be reached, terminate the 1995 HCP and implement a take avoidance FMP using ODF policies
February 9, 2010	State Land Board direction to complete revised HCP by end of 2011 if agreement can be reached with federal services. Or, if agreement cannot be reached, terminate the 1995 HCP and implement a take avoidance FMP using ODF policies
October 12, 2010	State Land Board meeting
November 1 to December 30, 2010	60-day public comment period for revised 2010 FMP (take avoidance plan)
November 5, 2010	BOF meeting
December, 2010	State Land Board Meeting. Because a HCP agreement with federal service could not be reached, the ODF and the DSL plan to finish development of a new FMP that does not utilize a HCP to meet the ESA, leaving open the opportunity to revisit the option for a HCP in the future.
2011	
January 5, 2011	BOF meeting. Because a HCP agreement with federal service could not be reached, the ODF and the DSL plan to finish development of a new FMP that does not utilize a HCP to meet the ESA, leaving open the opportunity to revisit the option for a HCP in the future.
April 29, 2011	BOF meeting. Requested consideration and approval to begin rulemaking for the Elliott State Forest Management Plan revision.
May 5, to August 1, 2011	90-day public comment period for rulemaking for the Elliott Forest Management Plan revision.
June 1 to August 29, 2011	90-day public comment period for the 10-year Implementation Plan for the Elliott State Forests and Forest Land Management Classification maps.
June 14, 2011	State Land Board focus group meeting with nine panelists representing a broad range of interests.
July 19 and 20, 2011	Public hearings in North Bend and Roseburg for rulemaking on the Elliott State Forest Management Plan revision. Also received comments

	on the draft Coos District Implementation Plan and draft Forest Land Management Classification.
July 22, 2011	State Land Board meeting in North Bend - Public testimony on proposed Forest Management Plan.

Forest Log Newsletter

The ODF publishes a newsletter, the *Forest Log*, which covers all of the ODF's activities. Approximately 3,500 copies are mailed every two months to interested individuals, organizations, businesses, and agencies. Several articles covered the development of the FMP and HCP. The articles included contact information and explained how individuals could become more involved in the planning process. The main articles in the *Forest Log* are listed below.

- The January–February 2003 issue of the *Forest Log* contained an article explaining the forest management planning process for the Elliott State Forest, the concepts of structure-based management, and how to receive more information.
- The annual reports for the ODF appear in the March–April editions. In 2000, 2001, 2002, 2003, 2004 and 2008 each of these reports offered a section from the Coos District on current planning for revisions to the FMP and HCP.

Public Meetings and Tours

Public meetings were held at major steps of the planning process. Along with discussion of the FMPs, the meetings also included discussion of the need for the HCP, the planning process for the HCP, and the relationship between the FMP and the HCP.
Public meetings were publicized in the newsletters, through press releases and media coverage, and letters to the *Expectations* mailing list. The meeting locations were in Coos Bay, Roseburg, and Salem. Written comments were received after the meetings.

In addition, ODF planners met with interested individuals and groups over the course of the planning process. These contacts included informal meetings and tours, telephone conversations, distribution of informational materials, and outreach to local news media.

The State Land Board held focus group meetings on December 8, 2009 and June 14, 2011 to hear testimonies from panelists representing a broad range of interests. The panelists provided their perspectives on the Elliott State Forest and the draft 2011 Elliott Forest Management Plan.

World Wide Website

The ODF used its website to include information about Elliott State Forest planning, beginning in 2001. The web site address is
http://www.oregon.gov/ODF/STATE_FORESTS/elliott.shtml.

Notice of Intent

On May 9, 2005, the USFWS and NOAA Fisheries published a notice of intent in the Federal Register to prepare an EIS. The notice stated that the EIS would examine the proposed approval of the HCP and issuance of an ITP, to the ODF. The notice further stated that the USFWS, NOAA Fisheries, and ODF had jointly scheduled a series of public scoping meetings on the project. The notice also gave a brief overview of the project and listed the species and activities to be covered by the ITP (Federal Register, May 9, 2005, Volume 70, Number 88, pages 24450–24452).

Notice of Availability

On August 22, 2008, the USFWS and NOAA Fisheries published a notice of availability in the Federal Register that ODF had submitted applications to USFWS and NOAA Fisheries for incidental take permits. The notice stated that permit applications included a proposed HCP and draft Implementation Agreement, and that a draft Environmental Impact Statement (DEIS) for the proposed action was available. The notice also gave a brief background of the project and listed the species and activities to be covered by the ITP. The notice stated that a 90–day comment period was being provided and that all comments must be received no later than November 20, 2008. (Federal Register, August 22, 2008, Volume 73, Number 164, pages 49647-49648).

Steering Committee

The planning process for the Elliott State Forest was guided by a steering committee consisting of managers from the ODF, the Oregon Department of State Lands (DSL), the Oregon Department of Fish and Wildlife, the Oregon Department of Justice, a Coos County Commissioner, and the Superintendent of the South Coast Education Service District. This 11-person group was advisory to the State Forester and Director of the DSL on the Elliott State Forest planning process. It provided overall direction to the planning team and comment on key issues during the process. In addition, the steering committee members kept community leaders and others informed of planning issues and progress.

Steering Committee Members

Dan Shults and Dave Lorez, Southern Oregon Area Directors, (Chair)

Ray Craig/Steve Thomas/Nancy Hirsch, & Mike Bordelon, State Forests Division Chiefs

Mike Bordelon/Ross Holloway/Lisa Debruyckere/Mike Cafferata, State Forests Division Deputy Chiefs

Jim Young, Coos District Forester and Project Leader

Mike Schnee/Barbara Lee/Keith Baldwin/John Barnes, State Forests Policy and Planning Managers

Cary Greenwood/Dan Postrel, Oregon Department of Forestry Agency Affairs Directors

John Lilly/Steve Purchase/Jim Paul, Department of State Lands, Assistant Directors

Steve Denney/Larry Cooper, Oregon Department of Fish and Wildlife, Southwest Region Directors and Rod Krahmer, ODFW Forest Practices Program Coordinator

Ian Whitlock/Michele Logan, Department of Justice

John Griffith, Coos County Commissioner

Rick Howell/George Woodruff, South Coast Education Service District Superintendents

Gary Groth, Douglas County Lands Director

Core Planning Team for Elliott State Forest Management Plan

The ODF formed a Core Planning Team to be responsible for developing revisions to the FMP and HCP. The team developed resource goals and strategies for the management of the Elliott State Forest. Team members brought a wide range of disciplines to the revision process. The group met nearly monthly, beginning in October 2000 through 2005, then as needed to complete the planning process.

Core Planning Team Members

Jim Young, Coos District Forester and Project Leader
Greg Kreimeyer/Norma Kline, Coos Assistant District Foresters, District Representatives

Larry Sprouse/Robert Fields/Jennifer Wright, Coos District, Project Coordinators

Marcia Humes/Jennifer Weikel, Oregon Department of Forestry, State Forests Wildlife Biologists

Logan Jones, Oregon Department of Forestry, State Forests Planning Coordinator (2000–2003)

Mike Schnee/Barbara Lee/Keith Baldwin/John Barnes, Oregon Department of Forestry, State Forests Policy and Planning Managers

Jeff Brandt, Oregon Department of Forestry, State Forests Research and Monitoring Coordinator

Liz Dent, Oregon Department of Forestry, Riparian and Aquatic Specialist

Doug Robin, Oregon Department of Forestry, State Forests Silviculturalist

Jane Hope/Roger Welty, Oregon Department of Forestry, State Forests Planning Specialists

Jasen King, Oregon Department of Forestry Unit Forester, Southwest Oregon District, and Project Technical Writer

Jeff Foreman, Oregon Department of Forestry, Public Information Officer

Randy Smith, Oregon Department of Forestry, Southern Oregon Wildlife Biologist

Marnie Allbritten, Oregon Department of Fish and Wildlife, Wildlife Biologist

Howard Crombie/Tom Loynes/Alan Ritchey, Oregon Department of Fish and Wildlife, Fisheries Biologists

Members for other resources:

Jon Germond, Oregon Department of Fish and Wildlife (2003–2005)

Lee Folliard/Kevin Maurice/Brian Cox, U.S. Fish and Wildlife Service

Frank Bird/Chuck Wheeler, NOAA Fisheries

Additional Resource Issue Specialists:

Wildlife: Randy Smith/Mike Wilson/Matt Gostin Oregon Department of Forestry

Watershed Assessment: Dan Clough, Oregon Department of Forestry

Geotechnical: John Seward/Jason Hinkle, Oregon Department of Forestry

Social & Economic: Gary Lettman, Oregon Department of Forestry

Forest Modeling: Pam Overhulser/Norma Kline/Robert Fields/Tod Haren/Rob Nall Oregon Department of Forestry/Dr. John Sessions, Oregon State University

GIS: Chris Bradbury/Lisa Zwart/Ryan Miller, Oregon Department of Forestry

Mapping: Terry Lieschner, Oregon Department of Forestry

Stand Level Inventory: Mike DeLaune/Terry Leischner, Oregon Department of Forestry

Pathology: Alan Kanaskie, Oregon Department of Forestry

Entomology: Dave Overhulser, Oregon Department of Forestry

Technical Writer: Kate Lighthall

Writing Consultant: Linda Lamb

Technical Editor: Bonnie Dash, Envirocal