Western Oregon State Forests Management Plan

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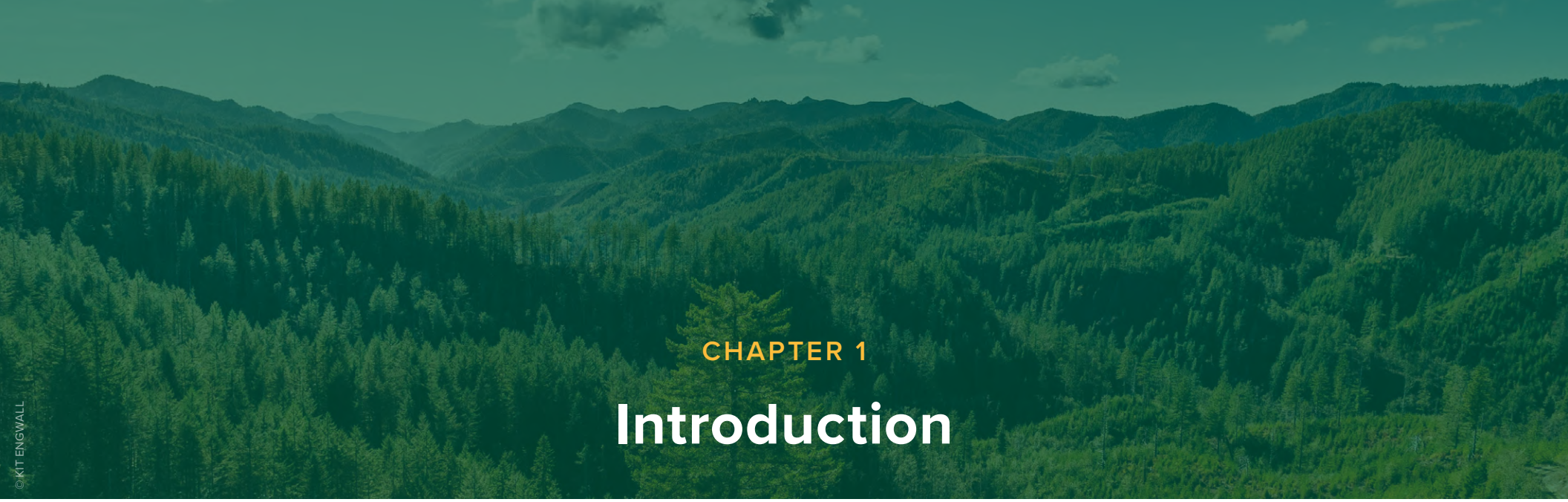
Land Acknowledgement

Indigenous tribes and bands have been with the lands that we inhabit today throughout Oregon and the Northwest since time immemorial and continue to be a vibrant part of Oregon today. We would like to express our respect to the First Peoples of this land, the nine federally recognized Tribes of Oregon: Burns Paiute Tribe, Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz Indians, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation, Coquille Indian Tribe, Cow Creek Band of the Umpqua Tribe of Indians, and The Klamath Tribes. It is important that we recognize and honor the ongoing legal and spiritual relationship between the land, plants, animals, and people indigenous to this place we now call Oregon. The interconnectedness of the people, the land, and the natural environment cannot be overstated; the health of one is necessary for the health of all. We recognize the pre-existing and continued sovereignty of the nine federally recognized Tribes who have ties to this place and thank them for continuing to share their traditional ecological knowledge and perspective on how we might care for one another and the land, so it can take care of us. We commit to engaging in a respectful and successful partnership as stewards of these lands, and as we are obliged by state law and policy, we will uphold government-to-government relations to advance strong governance outcomes supportive of Tribal self-determination and sovereignty.



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CHAPTER 1

Introduction

1.1

Purpose and Scope of the Forest Management Plan

The *Western Oregon State Forests Management Plan* (plan or FMP) provides management direction for all Board of Forestry Lands[1] (BOFL) and Common School Forest Lands (CSFL) managed by the Oregon Department of Forestry (ODF) west of the crest of the Cascade Range. This plan supersedes and replaces the *2010 Northwest Oregon State Forests Management Plan*, the *2011 Elliott State Forest Management Plan*, and the *2010 Southwest Oregon State Forest Management Plan*. The Board of Forestry (BOF) may review, modify, or terminate a plan at any time; however, the BOF will review the plan no less than every 10 years (Oregon Administrative Rule [OAR] 629-035-0030).

The public and various organizations were involved in developing the FMP. For more information, see Appendix A, *Engagement*.

This chapter describes or provides the following.

- Purpose and scope of the FMP, including guiding principles of the plan, ownership and location of the lands governed by the plan, and history of the FMP.
- Plan themes: greatest permanent value (GPV), diversity, equity, and inclusion (DEI), climate change, sustainability, and adaptive management.
- How the FMP relates to other plans and processes.
- An outline of the FMP chapters.

Definitions of underlined terms in this chapter and throughout the document are provided in the Glossary.

1.1.1

Guiding Principles

The Forest Management Planning rule (OAR 629-035-0030) identifies required elements for FMPs. Among these are “guiding principles that include legal mandates and Board of Forestry policies.” Taken together, and at the direction of the BOF, the guiding principles directed the development of this FMP.

[1] Terms underlined in this document are defined in the Glossary. Defined terms are underlined at the first instance in each chapter.

PRINCIPLE 1—GREATEST PERMANENT VALUE

The FMP will be grounded in the management mandates for BOFL as expressed in the GPV and Forest Management Planning OARs.

OAR Chapter 629, Division 35, Management of State Forest Lands, provides the foundation for the development of the FMP for the BOF. Division 35 includes definitions, findings, and principles associated with acquired lands, language defining GPV, and direction for the development of FMPs.

GPV benefits include but are not limited to:

- Sustainable and predictable timber harvest and revenues.
- Properly functioning aquatic habitats.
- Protection, maintenance, and enhancement of habitat for native wildlife.
- Protection of soil, air, and water.
- Provision of outdoor recreational activities.
- Consideration of landscape context.

Also mentioned in the OARs are protection against floods and erosion; protection of water supplies; grazing, foraging, and browsing for domestic livestock; forest administrative sites; and mining leases and contracts.

The OARs direct that the FMP include strategies that accomplish the following.

- Contribute to biological diversity of forest stand types and structures at the landscape level and over time.
- Apply silvicultural techniques that provide a variety of forest conditions and resources.
- Conserve and maintain genetic diversity of forest tree species.
- Manage forest conditions to result in a high probability of maintaining and restoring properly functioning aquatic habitats.
- Protect, maintain, and enhance native wildlife habitats.
- Recognize that forests are dynamic.
- Provide for healthy forests by using an integrated pest management approach and appropriate genetic sources of seed.
- Maintain or enhance forest soil productivity.
- Maintain and enhance forest productivity by producing sustainable levels of timber.
- Apply management strategies that enhance timber yield and value while contributing to the diversity of habitats for native fish and wildlife.

***Providing Greatest Permanent Value**. GPV means healthy, productive, and sustainable forest ecosystems that over time and across the landscape provide a full range of social, economic, and environmental benefits.* © OCTAVE ZANGS

OAR 629-035-0000 defines active management of state forest lands by "applying practices over time and across the landscape to achieve site-specific forest resource goals using an integrated, science-based approach that promotes the compatibility of most forest uses and resources over time and across the landscape." Site-specific forest resource goals can be achieved through deliberate passive management, as well as the active application of silvicultural prescriptions and other activities in accordance with the future objectives and current characteristics of forest stands.

The OARs also direct that landscape context be considered. Landscape is defined as "a broad geographic area that may cover many acres and more than one ownership and may include a watershed or sub-watershed areas" (OAR 629-035-0000). Plans must contain "a description and assessment of the resources within the planning area and consideration of surrounding ownership in order to provide a landscape context" (OAR 629-035-0030).

The counties also have a recognizable interest. The OARs include the following BOF finding:

> The counties in which these forest lands are located have a protected and recognizable interest in receiving revenues from these forest lands; however, the Board and the State Forester are not required to manage these forest lands to maximize revenues, exclude all non-revenue producing uses on these forest lands, or to produce revenue from every acre of these forests lands (OAR 629-035-0010).

The OARs also direct that the FMP be based on the best science available, use monitoring and research to generate new information, and use an adaptive management approach. Adaptive management is defined as:

> The process of implementing plans in a scientifically based, systematically structured approach that tests and monitors assumptions and predictions in management plans and uses the resulting information to improve the plans or management practices used to implement them (OAR 629-035-0000).

PRINCIPLE 2—BIOLOGICAL DIVERSITY

State forest lands will be managed, conserved, and restored to provide overall biological diversity of state forest lands, including the variety of habitats for native fish and wildlife and accompanying ecological processes. The GPV and Forest Management Planning rules are the BOF's expression of providing conservation.

The GPV and Forest Management Planning rule include references to attributes that are directly tied to providing a multitude of environmental, social, and economic benefits associated with biodiversity on BOFL. These references include, but are not limited to, providing and restoring properly functioning aquatic systems; protecting, maintaining, and enhancing native wildlife habitats; contributing to diversity of forest stand types and structures at the landscape level and over time; and conserving and maintaining genetic diversity of forest tree species.

PRINCIPLE 3—REVENUE

The FMP will provide sufficient revenue to ensure ODF's ability to manage, conserve, and invest in the forest in order to provide GPV.

The FMP will provide sufficient revenue to support the stewardship of these forest lands and achieve the blend of economic, social, and environmental benefits. Financial viability is achieved over the long term through continued protection and management of the forest asset, and it is achieved over the short term with operational tools that ensure cash flow is available to ODF for sound management of state forest lands.

In the current business model, 98% of revenue is derived from timber sales and all BOF expenditures and revenues are managed in the Forest Development Fund; 63.75% of BOF revenues are distributed to local counties and taxing districts. The remaining 36.25% of revenue from state forest lands pays for the management of state forest lands. Revenue from CSFL is used to reimburse ODF for management costs and the remaining net operating income is transferred to the Oregon Department of State Lands (DSL). Expanding and diversifying revenue sources to support public benefits can

increase long-term financial stability. While revenues are cyclical, financial viability is achieved over the long term with business strategies that align anticipated funding availability with services that are prioritized by GPV. Several tools are used, including business improvements, financial metrics to assess future investments, new marketing opportunities, revenue projections, Implementation Plans (IPs), the FMP, and risk management.

PRINCIPLE 4—SOCIAL BENEFITS

The FMP will provide for a range of social benefits for all Oregonians, including direct and indirect financial contributions to local and state governments, opportunities for public access and recreational use, support for diverse local employment opportunities, and the inclusion of Oregonians and their broad range of perspectives.

State forest lands support multiple social benefits on a variety of scales, and contribute to community well-being for all Oregonians. They provide ecosystem services including clean air, clean water, shade, carbon sequestration and storage, and wildlife habitat—services that draw in visitors and enhance the quality of life for all Oregonians. Other social benefits include various health factors such as improved mental and physical wellness, in addition to community cohesion around shared natural spaces. ODF provides opportunities for lasting and diverse outdoor recreation, education, and interpretive experiences that inspire visitors to enjoy, respect, and connect with Oregon's state forest lands. Active forest management provides revenue for counties, social services, and education. It builds communities by supporting living-wage jobs and contributing to local, regional, and state economies.

PRINCIPLE 5—FOREST AND WATERSHED RESTORATION

The FMP will recognize that investments in forest and watershed restoration are necessary to achieve desired outcomes that align with the GPV policy direction for the BOF.

Restoration efforts are considered to rehabilitate degraded forest lands. Degraded conditions may exist because of past management practices or natural disturbances such as fire, windstorm, floods, and outbreaks of insect or pathogens. Much of the state forest lands experienced significant degradation

***Providing Revenue and Social Benefits**. The FMP will provide for a range of social benefits for all Oregonians, including direct and indirect financial contributions to local and state governments.*

from repeated, large-scale wildfires and extensive logging in the first half of the 20th century prior to ODF management, and although they are now reforested, additional challenges remain where forests are underproductive or aquatic systems lack key components. Restoration efforts are carried out with the goal of restoring properly functioning ecological conditions and the ability of the forest to produce the benefits required under GPV.

Forest Restoration. Sole reliance on natural regeneration in the wake of large-scale disturbance events (e.g., ice storms, wind events, floods, fires) can extend periods of under-productive forest conditions and susceptibility to insects and disease. More immediate action may be required to improve resilience and productivity to ensure a balance of GPV outcomes in a reasonable timeframe.

The FMP recognizes these restoration needs and seeks creative funding mechanisms to implement them. Restoration efforts will contribute to diverse and healthy forest landscapes that allow for natural disturbance at different scales within the context of a working forest that will be resilient in the face of climate change, fire, or other disturbance events and stressors. Monitoring and adaptive management are key components of the restoration efforts.

Watershed Health. For over 20 years, ODF has made a concerted effort to conserve and improve rivers and watersheds throughout the state, with the direct involvement of local Watershed Councils and Soil and Water Conservation Districts. ODF's management plans and activities have been an important part of those efforts. The FMP will continue to support the Oregon Watershed Enhancement Board's mission to "help protect and restore healthy watersheds and natural habitats that support thriving communities and strong economies" and emphasize a continuing commitment to restoration activities. This commitment recognizes the vital contribution that these forests can make to the success of large-scale regional efforts like the *Oregon Plan for Salmon and Watersheds* (Oregon Watershed Enhancement Board 2006).

PRINCIPLE 6—PACE AND SCALE

The FMP will be developed and implemented on a scale and at a pace that provide a geographic and temporal range of economic, social, and environmental benefits.

The geographic scale of plan strategy and implementation will have an effect on the spatial distribution of plan outcomes. Likewise, the temporal pace of strategy implementation and investments will have an effect on the distribution of environmental, social, and economic outcomes over time. These dynamics will be considered in creating and implementing a plan that provides a range of benefits across space and time.

The FMP will not individually optimize environmental, social, or economic outcomes at each geographic scale or for every time period but will strive for a geographical and temporal blend of environmental, social, and economic outcomes.

PRINCIPLE 7—VARYING LEVELS OF OUTCOMES

The FMP will provide varying levels of social, economic, and environmental outcomes over time as fiscal conditions change. While this approach will result in short-term trade-offs among specific goals, over the long term, GPV will be achieved.

Different GPV outcomes may be emphasized at different time periods, depending on fiscal conditions. For example, when fiscal conditions are favorable, increased investments may be made in aquatic and watershed restoration efforts and to promote forest stand development for both commercial (stand investment) and habitat goals. Fluctuating timber market conditions may favor more or less timber harvest during specific time periods. However, over the long term, the FMP will provide a predictable and sustainable flow of timber. Protection of native fish and wildlife habitats will be maintained consistent with the strategies established in this FMP and the *Western Oregon State Forests Habitat Conservation Plan* (HCP). Services associated with non-revenue-generating activities may fluctuate based on competing priorities and budgetary constraints.

PRINCIPLE 8—LEGAL AND REGULATORY COMPLIANCE

The FMP will comply with other state and federal laws and rules.

In addition to the management mandates specific to state forest lands, the FMP will address compliance with other state and federal laws and rules including, but not limited to, the state and federal Endangered Species Acts (ESAs), the federal Clean Water Act, the Oregon Forest Practices Act (FPA), Oregon fish passage laws, and cultural resource protection administered by the State Historic Preservation Office and coordinated with Tribal Nations[2] (also known as Tribal Partners) and the Oregon State Police.

[2] Tribal Nations include the nine federally recognized Tribes of Oregon: Burns Paiute Tribe, Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz Indians, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation, Coquille Indian Tribe, Cow Creek Band of the Umpqua Tribe of Indians, and The Klamath Tribes.

PRINCIPLE 9—TRIBAL OUTREACH AND ENGAGEMENT

Reach out to and engage with the nine Federally Recognized Tribes of Oregon throughout the planning and implementation processes.

ODF acknowledges Tribes and Confederation of Tribes are the original stewards of the lands currently managed by ODF, and we recognize the value and importance of integrating Tribal interests and perspectives into land management and implementation processes. To the extent possible, and with the upmost respect, we will pursue opportunities to meet with Tribal Government executives and councils, members, practitioners, and staff to listen, learn, and seek opportunities to build collaborative relationships.

PRINCIPLE 10—DIVERSE INPUT

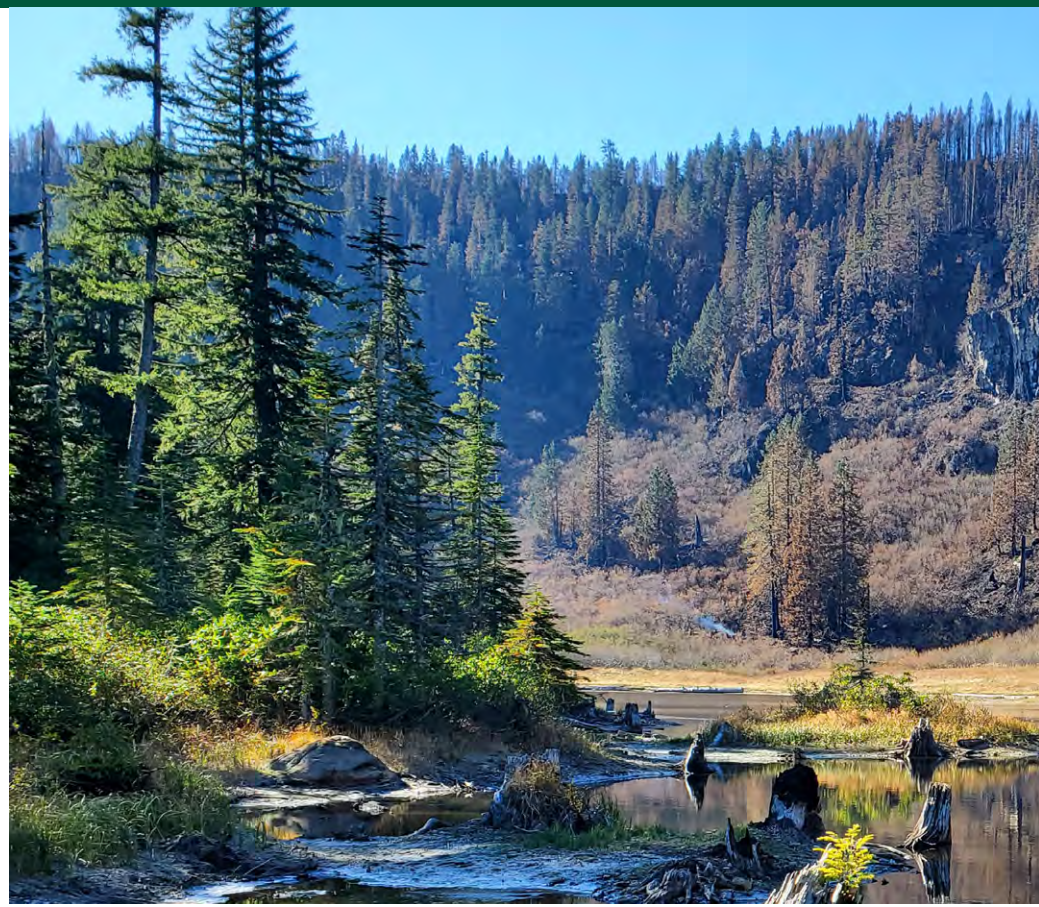
Seek diverse input from Oregonians.

Understanding, acceptance, and support from interested parties contributes to long-term success in managing state forest lands. ODF is committed to open, equitable, and transparent engagement processes. Counties within which BOFL is managed have a statutorily established relationship with the BOF through the Forest Trust Lands Advisory Committee. Additionally, Tribes, the State Forest Advisory Committee, state and federal partners, and local communities provide input through public meetings and public comment periods. ODF provides accurate and timely information to ensure the committee has the information it needs to ensure parties can provide testimony and comment to the BOF and the State Forester.

PRINCIPLE 11—COOPERATIVE EFFORTS

The FMP will achieve goals through cooperative efforts with other agencies and units of local government, user groups, and organizations.

Management objectives can often be achieved more effectively and efficiently through collaboration with others. Consultation and communication with other agencies and entities, including counties, will be important to identify areas where ODF's efforts intersect with other state initiatives.



PRINCIPLE 12—MANAGING FOR CLIMATE CHANGE

The FMP will be implemented to adapt to climate change and mitigate its impacts on the management of state forest lands. The FMP will also contribute to climate change mitigation and sequester carbon.

Temperature, precipitation, other climate variables, and hydrologic processes are changing, and are likely to alter the frequency and severity of disturbances, including insects eruptions, disease, wildfire, and drought. These disturbances are likely to have a disproportionate effect on marginalized communities. Within the context of ODF's adaptive management process, the FMP will contain forest management strategies intended to

***Managing for Climate Change**. The FMP will contain forest management strategies intended to maintain and restore ecological processes and functional characteristics that promote resilient forest conditions.*

maintain and restore ecological processes and functional characteristics that promote resilient forest conditions. Forest stands and wood products derived from active management contribute to carbon sequestration, a factor in mitigating global climate change. A focus on strategies that adapt to climate change will increase the probability that ODF is able to provide GPV over the long term.

1.1.2

Land Ownership and Governance

State forest lands comprise 3% of Oregon's forested landscape. The FMP planning area covers approximately 640,000 acres of state forest lands consisting of BOFL and CSFL, two types of land that were acquired by the state of Oregon in different ways. They are owned by different state government entities. The BOF owns most state forest lands, while the State Land Board owns CSFL. Each land ownership has its own set of legal and policy mandates. The locations of these lands are shown on the vicinity map (Appendix B, *District Maps*, Figure B-1). Lands are organized into management districts called field districts (Appendix B, *District Maps*, Figures B-1 through B-7).

Prior to state ownership, a majority of the acquired state forest lands had been owned and managed by private landowners. Most of these lands had been logged or burned, salvage-logged, and abandoned without the implementation of modern best management practices (BMPs). Tax-delinquent and abandoned lands reverted to county ownership. The counties entered into an agreement with the state that was codified in statute and deeded the lands to the state. Those counties share in all revenues from these lands today (Oregon Revised Statutes [ORS] 530.110, 530.010–530.040).

ODF recognizes that the lands covered by the FMP include ancestral lands of the nine federally recognized Tribes of Oregon. The people living and using the lands were displaced during private land acquisition and management, prior to the lands being deeded to the State. The Tribal Nations were engaged in the development of this FMP's cultural resources goals and strategies with the intention of integrating their interests in the lands that ODF currently manages.

1.1.3

Location

The FMP planning area is west of the crest of the Cascade Range. The planning area is distributed across 14 counties. The lands covered by this FMP include both large blocks and isolated tracts of state forest lands. The three largest blocks are the Tillamook State Forest, Clatsop State Forest, and Santiam State Forest. Smaller tracts are scattered throughout the planning

area. The smaller, isolated tracts are not referred to as state forest lands but are referenced as "scattered state forest lands."

The Clatsop State Forest and Tillamook State Forest are in the northern end of the Oregon Coast Range, roughly 25 miles northwest of Portland. They are managed by the Astoria District (Appendix B, *District Maps*, Figure B-2) and Tillamook District (Appendix B, *District Maps*, Figure B-5), respectively. The Pacific Coast is a few miles to the west and the Columbia River is to the north and east. Local communities include Forest Grove to the east, Astoria to the northwest, and Tillamook to the west.

At 364,000 acres, Tillamook is the largest state forest. It was dedicated in 1973, and is located in the Tillamook and Forest Grove Districts.

Located in the Astoria District, Clatsop State Forest is the second-largest state forest. It was created in 1937. By 1957, Clatsop County had transferred 141,000 acres to the state. 154,000 acres were formally dedicated to the Clatsop State Forest in 1973.

The Santiam State Forest is in the Cascade Range, roughly 25 miles southeast of Salem. It is in the North Cascade District (Appendix B, *District Maps*, Figure B-4). Local communities include Detroit, Mill City, and Scotts Mills. Santiam is the third-largest state forest covered by this FMP. It was dedicated in 1974 and is located in the North Cascade District.

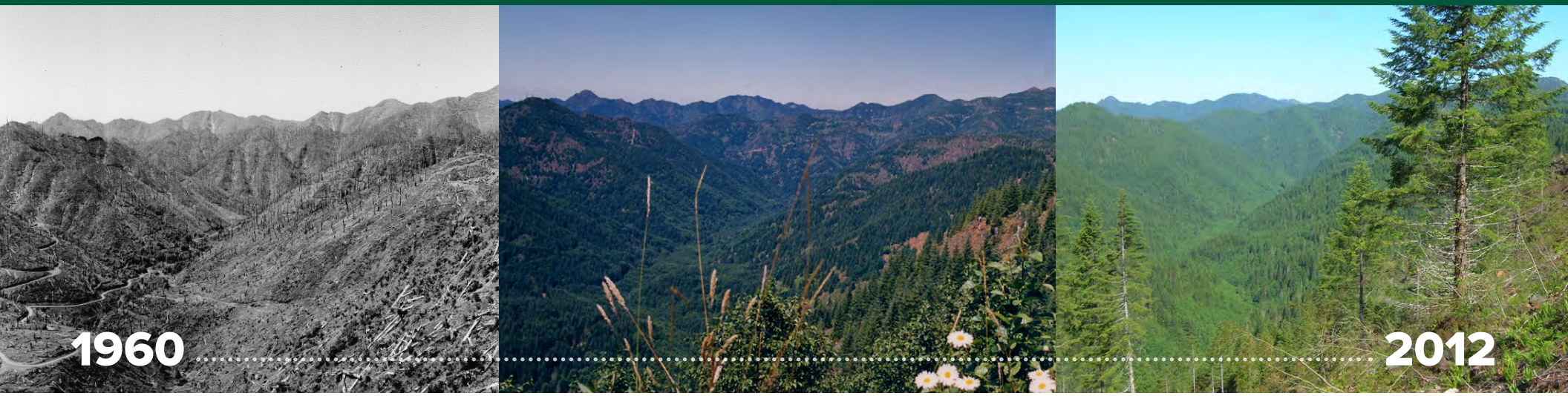
Many scattered state forest lands are in the Coast Range between Newport and Corvallis (Appendix B, *District Maps*, Figure B-7). There are additional tracts between Florence and Eugene in the Coast Range, scattered in a checkerboard pattern, and some tracts between Reedsport and the California border (Appendix B, *District Maps*, Figure B-6).

Dedication of Tillamook and Clatsop State Forests. *Governor Tom McCall speaks at the formal dedication of the Tillamook and Clatsop State Forests on July 18, 1973. Today, these lands remain Oregon's largest state forests, with Tillamook encompassing 364,000 acres and Clatsop encompassing 154,000 acres.*

1.1.4

History of the Forest Management Plan

As with many public forests, goals and management plans for state forest lands have evolved over time in response to shifting public values, changes in environmental conditions, and better understanding of forest management effects on ecosystem function and biodiversity. The *Long-Range Timber Management Plan for Northwest Oregon* (ODF 1984) and *Long-Range Timber Management Plan for the Willamette Region* (ODF 1989) set sustainable timber volume targets as the objective for forest management while giving



***Before and After**. North Fork Kilchis in 1960 and fives decades later in 2012.*

consideration to other forest resource values. By the mid-1990s, species listings under the federal Endangered Species Act had raised significant public concern about how state forest lands were being managed and caused substantial reductions in harvest objectives. Growing recreational use of the Tillamook State Forest also demanded attention, and the *Tillamook State Forest Comprehensive Recreation Plan* was adopted in 1993.

In 1998, the BOF adopted a set of administrative rules (OAR 629-035) that were intended to provide clarity around the benefits that Oregonians derive from state forest lands. The rules were also intended to direct the State Forester to pursue management practices that promote "compatibility of forest uses over time" and "integrate and achieve a variety of forest resource management goals" (OAR 629-035). In response to these revised rules, in 2001, ODF adopted new Northwest and Southwest Oregon State Forests Management Plans. The plans took a much more comprehensive, multi-resource, ecosystem-based approach to forest management than previous long-range plans and used a system of integrated resource management and landscape-level approach to achieve GPV. The FMP underwent modifications in 2010 as part of decadal review and updates. The modifications included species of concern strategies and revision of landscape design.

The State Forester is mandated to manage State Forest lands for multiple benefits including timber, recreation, and fish and wildlife habitat (ORS 530.050). In 1998, the BOF adopted the Forest Management Planning rule (OAR 629-035-0030), which provides the following further direction for state forest management.

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.

1.2
Plan Themes

While the FMP was developed to address all of the guiding principles, five fundamental themes emerged that form the core of the FMP: GPV, DEI, climate change, sustainability, and adaptive management.

1.2.1
Greatest Permanent Value

GPV 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 (OAR 629-035-0020). The FMP is intended to achieve GPV for Oregonians through a comprehensive, multi-resource approach of integrated forest management.

> **GPV** 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. (OAR 629-035-0020)

State forest lands in western Oregon are managed to create healthy, productive forest ecosystems that provide benefits from forest resources such as a reliable sustainable and predictable source of timber, economic benefits to rural communities and schools, clean air and water, high-quality habitat for native fish and wildlife, and a diversity of educational and recreational opportunities for the people of Oregon.

Goals have been developed for forest resources, and while all forest resources are interrelated, each forest resource and its related goal can generally be grouped into social, economic, or environmental categories. GPV category icons are used throughout Chapter 3, *Forest Resources, Goals, and Strategies*, to indicate connections with social, economic, or environmental resources and concepts (**Figure 1-1**).

1.2.2
Diversity, Equity, and Inclusion

GPV calls for providing a full range of social, economic, and environmental benefits to the people of Oregon, which necessarily requires ODF to understand and honor the demographics of our state. While demographics have and will continue to change through time, managing Oregon's state forest lands with DEI embedded within the FMP framework will ensure that state forest lands are managed for the benefit of Oregonians.

Foundational to the approach is to recognize Tribes as the original stewards of Oregon's state forest lands, as well as their continued contributions to these lands as sovereign nations with unique ancestral and local knowledge and stewardship since time immemorial. Further, we recognize humans—past, present, and future—as a part of state forests, not apart from state forests. Oregonians benefit from ecosystem services that the forests provide, but our relationship with state forest lands is grounded in one of reciprocity—we care for the forests and the forests care for us and for our communities (Chapter 2, **Figure 2-1**).

Whether ensuring that ODF provides equitable and inclusive recreational opportunities to Oregonians, recognizing the rural economies and jobs provided by state forest lands, or working to understand and protect cultural resources and support communities of place, the goals and strategies of the FMP will be grounded in serving all Oregonians and will be flexible and responsive to Oregon's changing demographics.

1.2.3
Climate Change

Climate change stresses forest resources and adversely affects the delivery of benefits across GPV categories. Increased incidence of drought limits timber production, aquatic and wildlife habitat, drinking water, and some special forest products. Increased air and water temperature increases the spread of insect and disease, which adversely affects fish and wildlife habitat, as well as timber production. Increasing frequency and intensity of wildfire and storms can increase landslides and debris flows and windthrow and

FIGURE 1-1

Greatest Permanent Value Categories and Icons

GPV category icons are used throughout Chapter 3, Forest Resources, Goals, and Strategies, *to indicate connections with social, economic, and environmental resources and concepts.*

Social

Examples:

- Protection of cultural resources
- Recreation, education, and interpretation opportunities
- Opportunities to collect special forest products such as firewood, edible fungi, and salal

Economic

Examples:

- Sustainable and predictable production of forest products that support local and regional economies
- Revenue generation for local taxing districts
- Revenue generation for the management of state forest lands

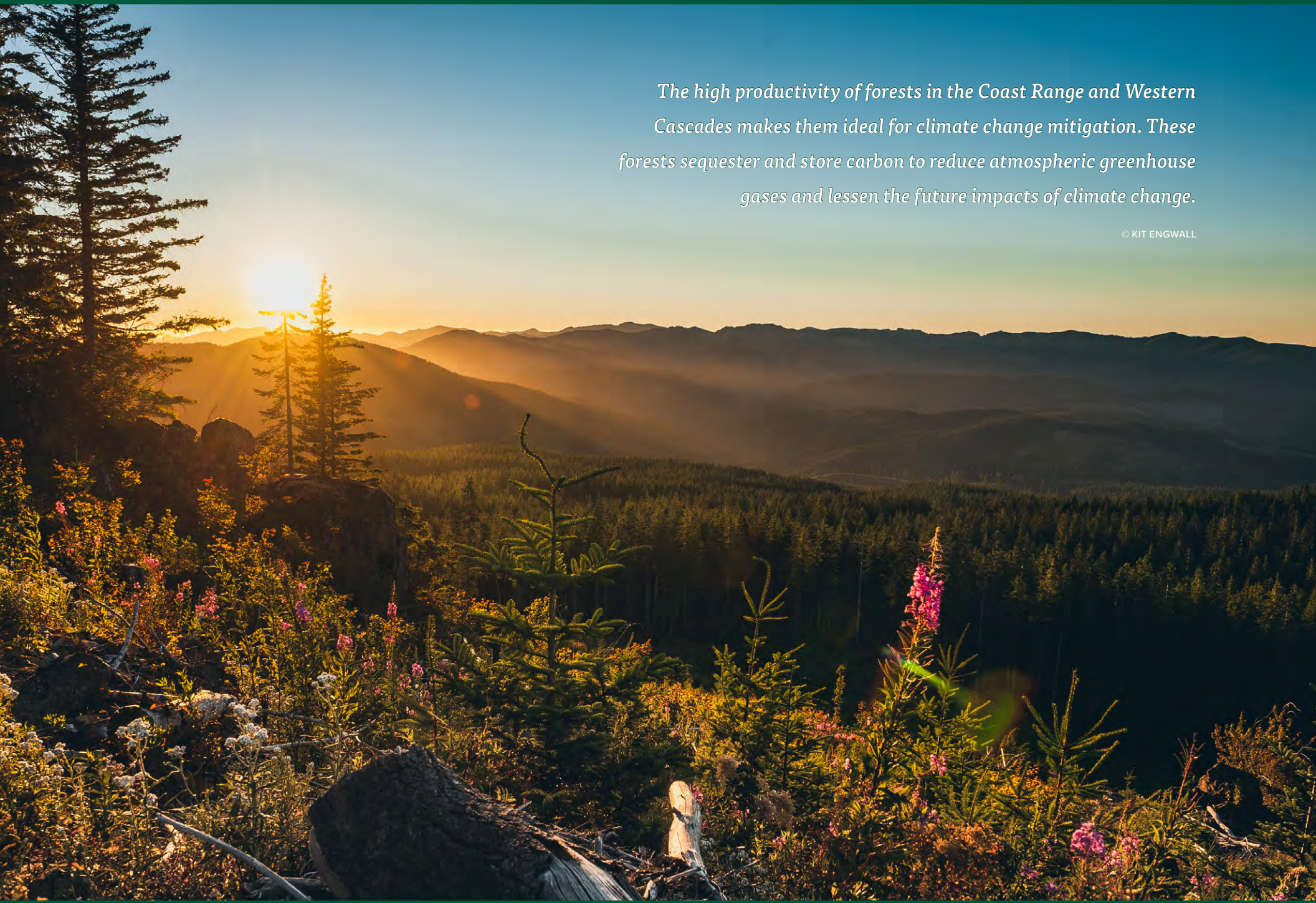
Environmental

Examples:

- Healthy, sustainable, resilient forests
- Properly functioning aquatic habitats for native fish and aquatic life
- Habitat for native wildlife
- Carbon sequestration and storage

change soil composition, which can adversely affect timber production, road and trail conditions, soil productivity, and water quality. The latter changes, in turn, may adversely affect road safety, revenue, future timber productivity, fish and wildlife habitat, recreation, and tribal access opportunities.

In response to these threats to resource conditions, the FMP guides ODF to mitigate climate change and increase the forest's capacity to adapt to climate change. Chapter 2, *Management Approach*, describes the elements of adaptive capacity, how strategies for enhancing adaptive capacity are applied differently across the landscape depending on the resource emphasized in a particular area, and how adaptive management allows ODF to respond according to changes in forest conditions and new findings in climate science. Chapter 3, *Forest Resources, Goals, and Strategies*, describes management strategies that increase adaptive capacity. One way climate adaptation is achieved is through climate-informed silviculture, in which management



The high productivity of forests in the Coast Range and Western Cascades makes them ideal for climate change mitigation. These forests sequester and store carbon to reduce atmospheric greenhouse gases and lessen the future impacts of climate change.

prescriptions are set in line with climate-smart forestry objectives. An example could include altering planting density or species to grow forests to be more resilient to drought or wildfire, which would, in turn, improve long-term outcomes for social and economic goals.

The high productivity of forests in the Coast Range and Western Cascades makes them ideal for climate change mitigation. These forests sequester and store carbon to reduce atmospheric greenhouse gases and lessen the future impacts of climate change. Mitigation goals have co-benefits with other resource goals, such as increasing late seral habitat for wildlife species or producing timber that can store carbon in long-lived structures. Carbon is sequestered and stored long term on the landscape in dedicated conservation areas while areas with a timber production focus contribute to carbon storage in long-lived forest products.

Both adaptation and mitigation are key tenets of climate-smart forestry, in which forests are actively managed in ways intended to achieve resource goals by preparing for climate change, reducing carbon emissions, and supporting communities reliant on wood products or negatively affected by climate change.

1.2.4 Sustainability

Consistent with the guiding principles, the FMP is adopting an ecologically sustainable management approach. The goal of this approach to forest management is to sustain and support the health and function of forest ecosystems, and thereby improve sustainable delivery of ecosystem services. Healthy, diverse, productive, and resilient forests maintain and enhance ecosystem services and the benefits the public derives from them, including timber production, and are the foundation upon which a sustainable managed forests model is built (Spies et al. 2018).

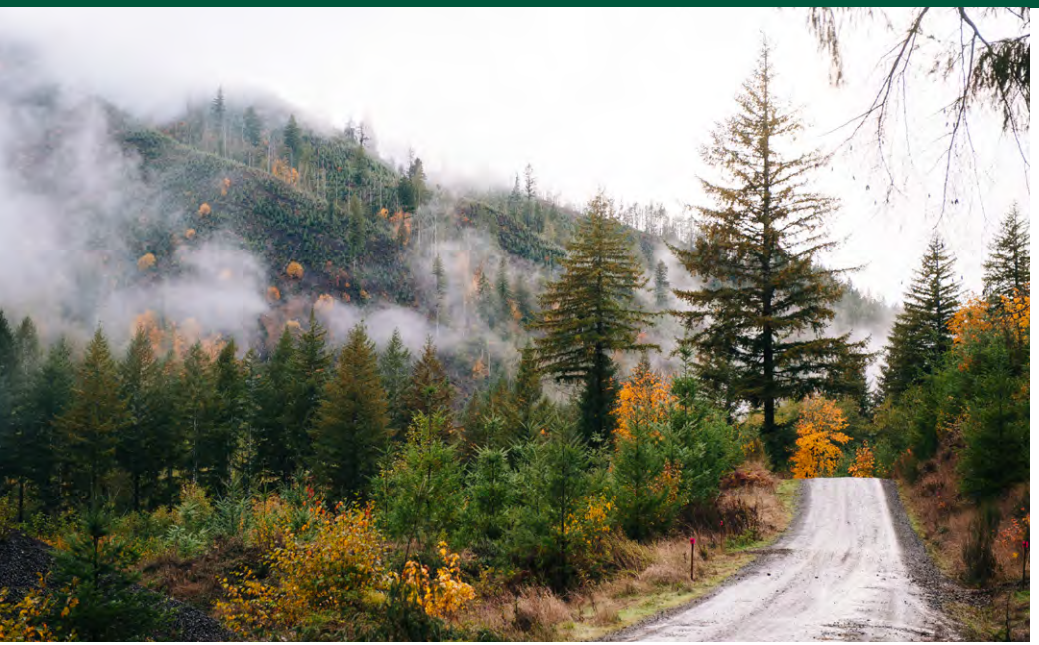
Under ecologically sustainable management, specific areas on the landscape emphasize different ecosystem services and benefits such that management incorporates a sound understanding of the underlying systems and processes that produce those services and benefits. The HCP is central in defining habitat emphasis areas and strategies, which safeguard conservation values while generating regulatory certainty for timber production and other active management activities covered by the HCP.

Ecologically sustainable forest management views resources and benefits within the context of societal values and the forest ecosystem in alignment with the guiding principles and GPV. This approach anticipates change and uncertainty in forest development and disturbances, societal values and demands, and future climate scenarios and effects on forest productivity, species, and ecological processes. To address change and uncertainty, management seeks outcomes to reduce risks to resources and increase future options through applying adaptive capacity strategies and an adaptive management framework. For more information, see Chapter 2, *Management Approach*.

The principles of ecologically sustainable management are reflected in Chapter 3, *Forest Resources, Goals, and Strategies*. Goals and strategies support the delivery of ecosystem services and the values articulated in the guiding principles. The strategies emphasize the function of social, economic, and environmental systems and recognize that specific approaches and the levels of commitment depend on management emphasis areas and economic goals and circumstances.

1.2.5 Adaptive Management

The FMP uses adaptive management to evaluate and learn from decisions and revise plans as changes occur in society, the economy, and the environment, as required by OAR 629-035-0020(3)(f) and 629-035-0030(3)(d). Adaptive management is a systematic and rigorous approach to learning from actions, improving management, and accommodating change. Chapter 2, *Management Approach*, describes how adaptive management is used to achieve sustainable delivery of ecosystem services. All strategies in Chapter 3, *Forest Resources, Goals, and Strategies*, are supported by adaptive management, which tests and monitors the assumptions and predictions that the strategies achieve the FMP goals. Chapter 4, *Guidelines*, describes how it is implemented at ODF.



Adopting an Ecologically Sustainable Approach. *Healthy, diverse, productive, and resilient forests maintain and enhance ecosystem services and the benefits the public derives from them, including timber production, and are the foundation upon which a sustainable managed forests model is built.* © KIT ENGWALL

1.3

Relationship with Other Plans and Planning Processes

Management planning includes three planning levels, as well as fiscal and biennial budgeting. The FMP informs all lower levels of planning (Chapter 4, **Figure 4-1**). Intermediate-level planning is conducted by ODF administrative and field districts and is documented in IPs. Operations Plans (OPs) and budgets (biennial and fiscal) support IP objectives over the short term (1 to 2 years). The HCP, Forest Land Management Classification System (FLMCS), Recreation, Education, and Interpretation programs, Operational Policies and BMPs will be used to implement strategies and further guide the shorter-term plans, and the Adaptive Management Plan (AMP) supports effectiveness monitoring and decision-making. For additional information, see Chapter 4, *Guidelines*.

1.4

Overview of the Forest Management Plan Chapters

In accordance with the Forest Management Planning rule, the following chapters are included in this FMP.

- **Chapter 2, *Management Approach***. Chapter 2 provides a vision for forest management and describes the need to adapt management as new information becomes available to sustainably deliver a diverse array of benefits to Oregonians.
- **Chapter 3, *Forest Resources, Goals, and Strategies***. Chapter 3 describes the forest resource conditions to provide context for management. The chapter also includes the FMP's goals and strategies. The goals are what ODF intends to achieve for each forest resource in the planning area. Strategies describe how ODF will manage the forest resources and identify management techniques the State Forester may use to achieve the plan's goals.
- **Chapter 4, *Guidelines***. Chapter 4 states the general guidelines for asset management, implementation, adaptive management, plan revision, and public engagement. Asset management guidelines provide overall direction on investments, marketing, and expenses. Implementation guidelines provide the process for implementing the FMP. Adaptive management, monitoring, and research guidelines describe the approach for learning from management and applying new findings to adjust management to meet GPV. Plan revision guidelines describe what causes plans to change and how plan changes are governed. Engagement guidelines describe the various levels of public and Tribal engagement by plan level.

Additionally, the FMP includes a *Glossary* and *References* as well as three appendices: Appendix A, *Engagement*, summarizes public, stakeholder, and Tribal engagement efforts during FMP development; Appendix B, *District Maps*, shows the FMP planning area by field district; and Appendix C, *Description of Figures,* describes the content of all FMP figures for accessibility purposes.

CHAPTER 2

Management Approach

2.1 Sustainable Delivery of Ecosystem Services

For millennia, Oregon's forest ecosystems[1] have been a key part of Oregon's culture, history, and economy. Prior to European settlement, many bands of Tribal Nations inhabited Oregon's landscape for time immemorial. They managed the land to produce healthy and abundant species of plants and wildlife for sustenance, demonstrating the concept of reciprocity, where Tribal land preparations contributed to the restoration of natural resources while simultaneously providing healthy and sustainable ecosystems. Although the forests have always provided for multiple uses and benefits, the Oregon Department of Forestry's (ODF) understanding of these uses and how they are interrelated has deepened and evolved over time. From a primary focus on production and harvest of wood products, other benefits (e.g., recreation) have been recently recognized that solicited (1) more emphasis on managing for multiple uses and their associated benefits and values (e.g., clean water, rare species, diverse recreation opportunities) with varying levels of integration; and (2) a much broader recognition that forest uses (i.e., goods and services) and their associated public values are derived from forest ecosystems and ecological processes (Kline et al. 2013; Jaworski et al. 2018).

Ecosystem services are the benefits provided by ecosystems to humans; these services are categorized into the following four groups (Millennium Ecosystem Assessment 2005).

1. **Provisioning services**. Provisioning services are resources provided by forest ecosystems that include a sustainable and predictable supply of timber and special forest products; food, energy and mineral sources; and clean air and water.
2. **Regulating services**. Forests help regulate resources and ecosystem processes.
3. **Cultural services**. Forests provide sustenance; spiritual, recreational, aesthetic, and scientific benefits; and values as numerous and diverse as the people and cultures that use them.
4. **Supporting services**. Forest ecosystems support the function of many systems including nutrient cycling, soil formation, pollination and seed dispersal, and regional biodiversity.

[1] Terms underlined in this document are defined in the Glossary. Defined terms are underlined at the first instance in each chapter.

***Ecologically Sustainable Management**. Ecologically sustainable management anticipates change and uncertainty in forest conditions and disturbances, as well as societal values and demands, forest product markets, future climate scenarios, and effects of climate variability and change on forest ecosystem services.*

In addition to identifying many important outcomes that contribute to community well-being, the concept of ecosystem services creates a framework that recognizes how social and economic needs are supported by healthy ecosystems and how society provides services to those ecosystems by supporting their functions (**Figure 2-1**).

The overall goal of ecologically sustainable management is a functional ecosystem that sustainably delivers ecosystem services. This approach to forest management is to sustain and support the ecological function and productivity of the forest, and thereby improve resilience or adaptive capacity of ecosystems to change over time (Franklin et al. 2018; Lindenmayer et al. 2012; Palik et al. 2022). Healthy, diverse, productive, and resilient forests maintain and enhance ecosystem services and the varied benefits the public derives from them and are the foundation upon which sustainable working forests are built (Spies et al. 2018). In this framework, the ecosystem services provided by the forest are sustained across the landscape and through time (**Figure 2-2**).

Ecologically sustainable management anticipates change and uncertainty in forest conditions and disturbances, as well as societal values and demands, forest product markets, future climate scenarios, and effects of climate variability and change on forest ecosystem services. To address change and uncertainty, ecologically sustainable management seeks outcomes that reduce risk to resources and increase future options to provide ecosystem services through an adaptive management framework and a focus on increasing adaptive capacity. Adaptive management is a key tenet of ecologically sustainable forest management in a changing world and society, especially given uncertainty and risks associated with long-term planning (Millar et al. 2007). Adaptive capacity of State Forests is increased when actions are taken to facilitate or improve the ability of the system to respond to changes that result in the desired ecosystem services (Aplet and Mckinley 2017). Increases in adaptive capacity may be achieved by increasing resistance and resilience of existing stands to discrete disturbance events and chronic climate change (Puettmann et al. 2009; Aquilué et al. 2021) or by guiding or allowing areas to transform to a new state, such as a new species composition.

Resistance refers to the ability of a system to avoid a disturbance. Resilience refers to the ability to recover from a disturbance. Transformation refers to the emergence of a new ecosystem different from its historic structure, composition, or function. Both active and passive management techniques can increase adaptive capacity, guide transformations, or respond to transformations to sustain ecosystem services (Lynch et al. 2021).

The management approach reflects complex social and ecological systems that require integrated understanding of the relationships between resources distributed across space and time and their interacting processes (Fischer 2018; Thompson et al. 2021). This understanding informs decision-making to achieve the overall goal of sustaining ecosystem services. In this context, the forest is a system that collectively provides ecosystem services. The following sections describes how ODF applies ecologically sustainable management to state forest lands.

FIGURE 2-1

Social, Economic, and Environmental Reciprocity

Ecosystem services deliver social and economic benefits, and social and economic benefits can be obtained in a way that supports environmental benefits.

ADAPTED FROM COMBERTI ET AL. 2015; LINDENMAYER ET AL. 2012

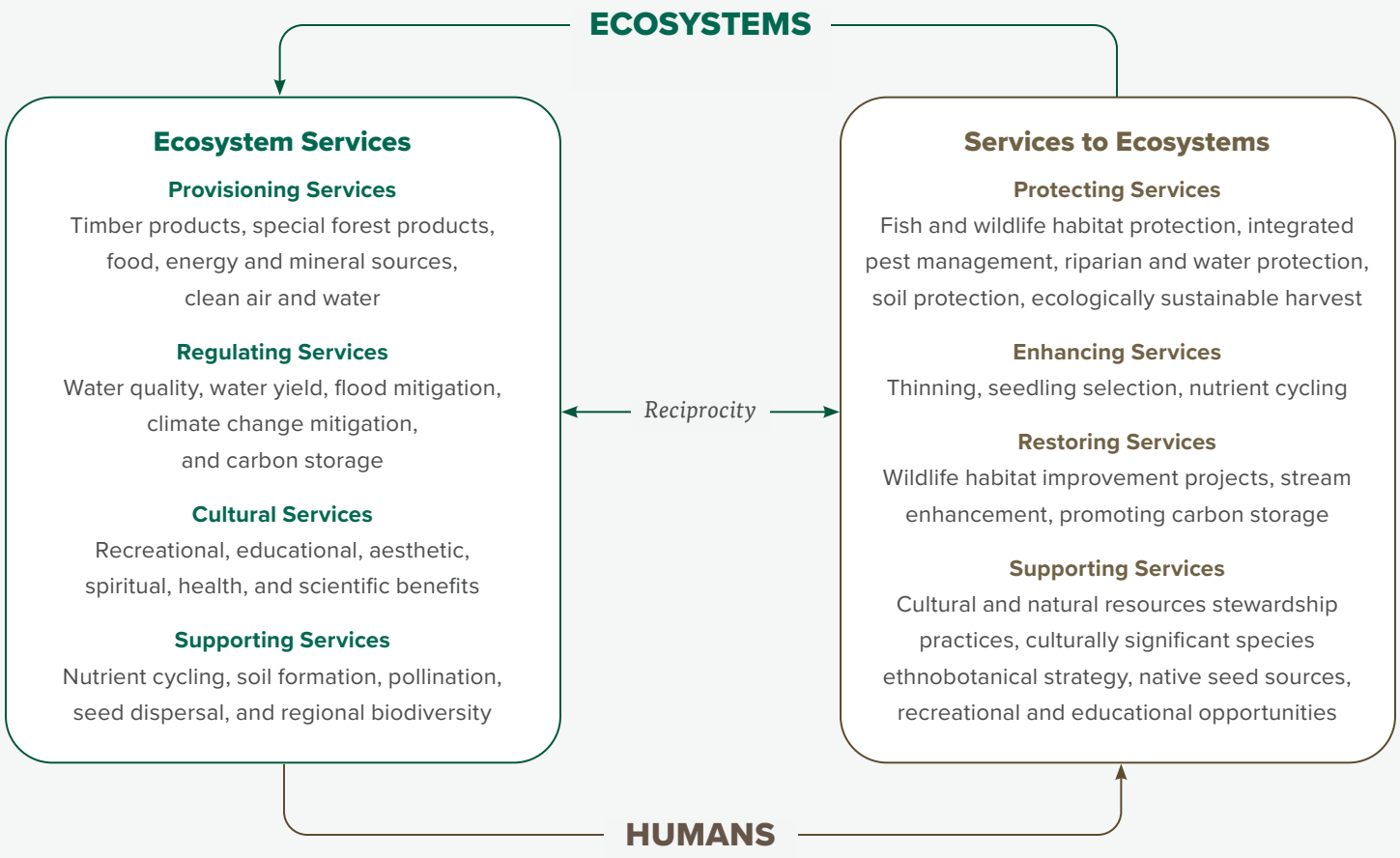
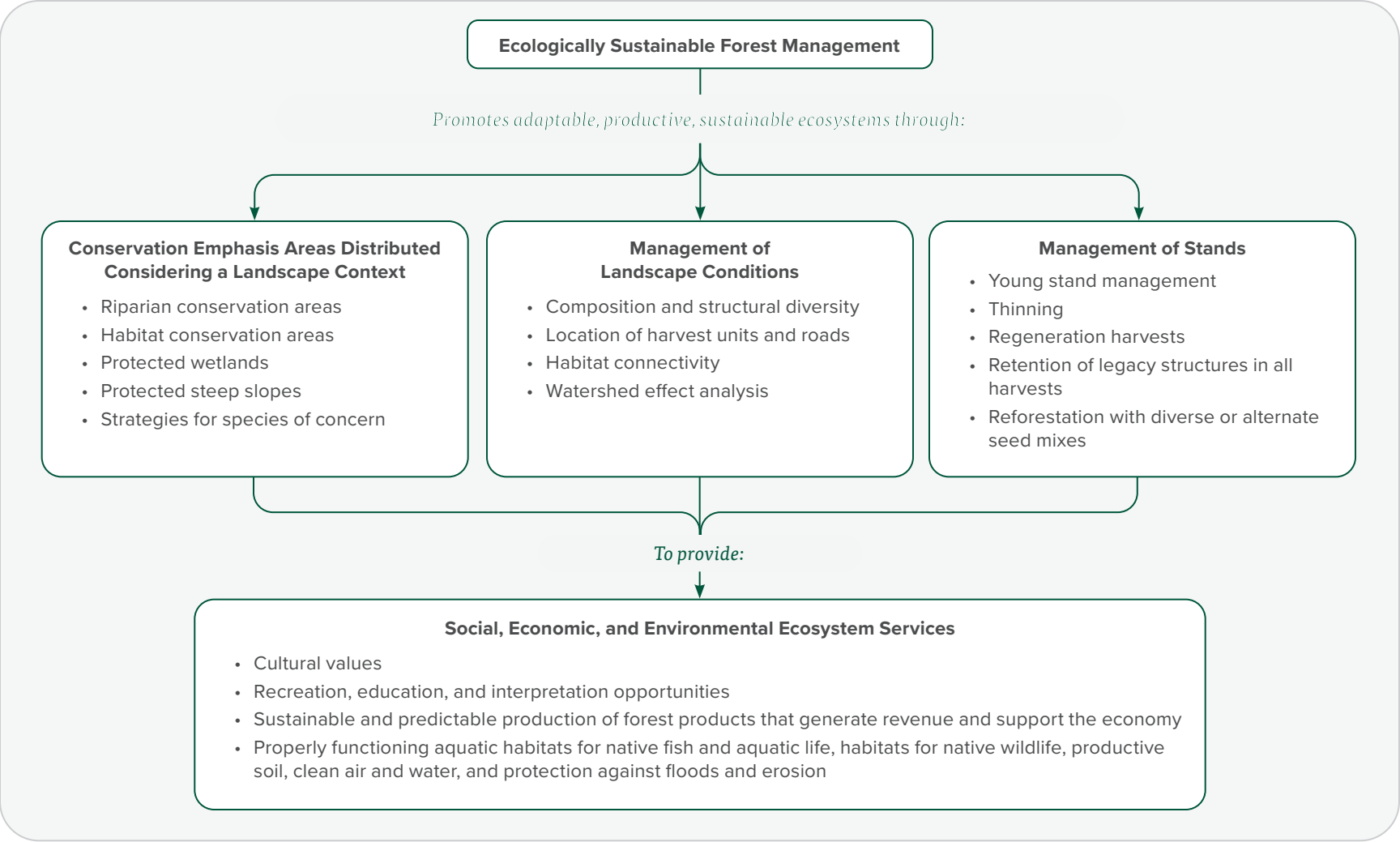


FIGURE 2-2

Ecologically Sustainable Management

Practices that promote adaptive capacity to secure GPV.

ADAPTED FROM LINDENMAYER ET AL. 2012



2.2 Ecologically Sustainable Management of State Forest Lands

Under ecologically sustainable management, ODF will manage state forest lands in western Oregon to support the delivery of ecosystem services into the future to provide greatest permanent value (GPV) to Oregonians. The following sections layout how ODF manages state forest lands for sustainability of forest ecosystem services.

2.2.1 Emphasis Areas Integrate Ecosystem Services

GPV requires integrated resource management such that the planning area continues to produce benefits under the context of potentially transformative conditions driven by climate change. ODF's management approach achieves GPV by designing spatially explicit emphasis areas whose overlapping layout emphasizes different combinations of resource goals designed to complement each other to support long-term ecosystem function and increase adaptive capacity over time and across the landscape.

The Forest Land Management Classification System (FLMCS) is a method of describing the management emphasis of parcels of state forest lands and has been implemented in accordance with Oregon Administrative Rule (OAR) 629-035-0055. The management emphasis of FLMCS identifies the extent to which a parcel of land can be managed for a variety of forest resources. It also identifies when a particular forest resource may need a more focused approach in its management, or possibly an exclusive priority in its management. The spatial locations of the emphasis areas are delineated by FLMCS. The resource objectives emphasized therein, and the rules governing management activities in them, are found in the *Western Oregon State Forests Habitat Conservation Plan* (HCP) (ODF 2022), operational policies, OARs, and other laws and regulations. The Western Oregon State Forests Management Plan (FMP) Integrated Goals and Strategies apply across the landscape but are more strongly emphasized in certain locations according to the particular area's combination of emphasis areas. Management activities in any particular area must be designed to emphasize the resource goals according to the emphasis areas that apply in that particular area.

The spatial layout of emphasis areas is intentionally designed with ecosystem function and related processes in mind. In particular, the HCP's habitat conservation area (HCA) layout, as discussed in HCP Chapter 4, Section 4.7.6, *Conservation Action 6: Establish Habitat Conservation Areas*, is complemented by adjacent portions of the landscape that are more actively managed, an arrangement known as land sparing (Harris and Betts 2023). HCA layout provides late seral habitat connectivity and complexity, while more actively managed adjacent areas provide early and mid-seral stand diversity (Donato et al. 2012; Puettmann et al. 2016; Stokely et al. 2022). Forest stand and landscape diversity, complexity, and habitat connectivity support functional systems. This, in turn, promotes other elements of biodiversity and related ecosystem processes, such as seed and fungal spore dispersal, soil and nutrient cycling, water quality, and aquatic habitat, which further enhances function. These positive feedback loops foster adaptive capacity and, thus, resistance and resilience to stochastic and chronic disturbance within stands and across the landscape (Carey 2007; Franklin et al. 2018). Both HCAs, and more actively managed areas, individually and collectively are intended to adapt to change. Operational policies and riparian conservation areas (RCAs) further define and guide more actively managed areas to protect other resources where they benefit the most. In this way, all emphasis areas are integrated across the landscape, such that lands produce timber and protect other ecosystem services.

Figure 2-3 depicts how areas where timber is produced create younger forests, which supports different wildlife species than the older forests created by conservation areas. Together, adjacent timber production and conservation areas will be managed to support species diversity for multiple values, which improves GPV. Management for diversity occurs at various spatial (genes to ecosystems, individual trees to ecoregions) and temporal (annual, decadal, plan term) scales and within the context of each emphasis area.

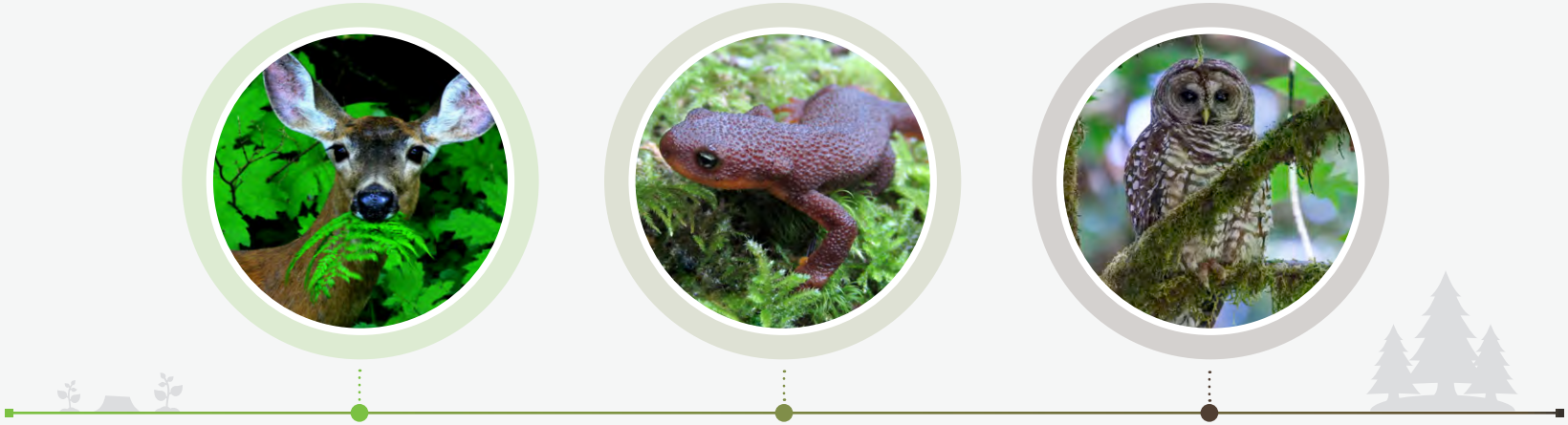
Management strategies intended to increase adaptive capacity to climate change and other disturbances will vary across the landscape depending on

FIGURE 2-3

Emphasis Areas and Their Value to the Ecosystem

The design of emphasis areas across the landscape supports diversity, connectivity, complexity, and redundancy, which support adaptive capacity of the ecosystem for sustained ecosystem services delivery under changing conditions.

SOURCE: OREGON FOREST RESOURCES INSTITUTE 2022



YOUNG
forests

These sunlight-filled forests provide many wildlife species with abundant food resources including berries, forbs, and grasses.

MIDDLE-AGE
forests

These transitional forests contribute to wildlife habitat connectivity as they mature and develop stand characteristics found in older forests.

OLDER
forests

These forests contain multi-layered canopies, large trees, snags, and downed wood that provide wildlife nesting, roosting, and denning habitats.

how particular areas are designated by the FMP, HCP, and other laws or policies. FLMCS describes the type of management that will be applied to a particular area, the allowable range of activities in these areas, and the resources the classification is intended to address. The HCP designates lands for conservation and commits to conservation actions across the forest. Legal requirements and policies define requirements to protect resources. The FMP goals and strategies further define ecosystem benefits that will also guide management activities.

For example, FMP cultural goals and strategies include provisions for Tribal access and culturally significant species. Additionally, FMP strategies include recreation, education, and interpretation considerations for highly used trail systems, or areas that have unique interpretive and educational qualities. The following sections describe the emphasis areas and how landscape-level systems, processes, and risk are managed.

Forest Land Management Classification System

The FLMCS framework places all state forest land within one of four land management classifications: General Stewardship, Focused Stewardship, Special Use, and High Value Conservation Areas (HVCAs). Subclasses are assigned for the specific forest resources that require a Focused Stewardship classification, Special Use classification, or HVCA classification (*for subclasses and stewardship classes, see box at right*).

General Stewardship lands will be primarily managed for sustainable and predictable supply of timber. Trees younger than the criteria used in the definition of old growth in the HCP are available for harvest.

General Stewardship. On state forest lands, timber revenue funds the majority of management activities, including habitat restoration, fuels reduction management, recreation and education programs, and infrastructure. These funds are also the primary vehicle for providing economic benefits to rural communities across the state. Emphasis on timber-production goals and related silvicultural strategies will, therefore, take priority on a significant portion of the landscape. Production of timber will be the primary objective of General Stewardship lands. These lands will provide a suite of additional

Subclasses of the Forest Land Management Classification System

Each area designated as focused, special, or high value conservation stewardship is categorized according to subclasses that denote the resource emphasis.

SUBCLASSES	
Administrative Sites	S
Agriculture, Grazing, Wildlife Forage	F S
Aquatic and Riparian Habitat	F H
County or Local Comprehensive Plan	S
Cultural Resources	F S
Deeds	F S
Domestic Water Use	F S
Easements	F S
Energy and Minerals	F S
Operationally Limited Recreation	S
Plants	F
Recreation	F S
Research/Monitoring	F S
Transmission	F S
Unique Threatened or Endangered Plants	H
Visual	F S
Wildlife Habitat	F S H

STEWARDSHIP CLASS

- F — Focused Stewardship
- S — Special Use
- H — High Value Conservation Area

ecosystem services such as clean water, carbon sequestration and storage, and early seral wildlife habitat (Stokely et al. 2022).

According to the OAR, General Stewardship lands shall be actively managed "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" (OAR 629-035-0055(4)(a)).

General Stewardship lands provide more opportunities for harvest operations relative to other land classifications. Each harvest entry provides opportunities to increase the subsequent stand's adaptive capacity by actively resisting or directing climate change effects through planting species mix, adjusting planting densities, and other factors to maintain productivity and diversity. Retention of biological legacies (old growth, leave trees, snags, downed wood) provide for additional structure, function, and diversity in regenerating stands (Lindenmayer et al. 2012). General Stewardship lands may also employ fuels reduction management to reduce the risk of ignition and spread of wildfire, while maintaining the standards set forth in the HCP, and seek alternative revenue sources, such as biochar and small-diameter wood products. Careful salvage harvest of damaged stands will ensure recovery of economic values and allow new stands to be established with the species mix and planting strategies that are best suited for production under evolving conditions. Environmental goals and strategies in Chapter 3, *Forest Resources, Goals, and Strategies*, guide ODF to protect, maintain, and enhance soils, aquatic, and wildlife resources during management of General Stewardship lands.

Focused Stewardship. "Focused Stewardship lands include all those whose forest resources are managed using integrated management practices in a manner which is intended to accomplish forest management planning goals." (OAR 629-035-0055(3)(b)) "Because one or more specific forest resources on these lands require heightened or focused awareness, supplemental planning and/or modified management practices may be required to achieve the goals of forest management plans, habitat conservation plans or legal requirements." (OAR 629-035-0055(4)(b))

There are several subclassifications of Focused Stewardship lands, including areas with cultural resources or recreation use, where additional management strategies are designed to maintain and protect these resources. These additional strategies are considered through supplemental planning process (OAR 629-035-0055(3)(b)), described in ODF operational policies and state and federal regulations.

Special Use. Special Use areas shall be "managed for a specific forest use. Integrated management is conducted on these lands to the extent possible without interfering with the management of the specific forest use" (OAR 629-035-0055(4)(c)).

On lands classified as Special Use, "a forest management plan, habitat conservation plan, or other legal requirement identifies one or more of the

Focused Stewardship and Special Use Lands*. There are several subclassifications of Focused Stewardship and Special Use lands, including areas with cultural resources or recreation use, where additional management strategies are designed to maintain and protect these resources.* © KIT ENGWALL

following: a legal or contractual constraint dominates the management of the lands and precludes the integrated management of all forest resources; lands are committed to a specific use and management activities are limited to those that are compatible with the specific use" (OAR 629-035-0055(3)(c)). The Tillamook Forest Center and Smith Homestead day use area are examples of Special Use lands.

High Value Conservation Areas. HVCAs will be managed for a specific conservation value. "Forest management may be conducted to the extent that forest management activities promote the conservation values and are consistent with applicable legal requirements and will avoid long-term adverse impacts to the specified conservation value" (OAR 629-035-0055 4(d)). HCAs and RCAs are examples of HVCAs.

HCP Conservation Areas

HCP Chapter 4, *Conservation Strategy*, defines the two types of conservation areas: HCAs and RCAs. They are delineated and guided by the requirements described in the HCP. A mix of passive and active management in HCAs will maintain and develop late-seral, structurally complex stands as they relate to specific habitat needs for covered species. Predominantly passive management in RCAs will improve habitat for covered species and increase resilience by buffering ecological function against changes in streamflow and temperatures resulting from climate change. Within HCAs and RCAs, opportunities to increase adaptive capacity through silvicultural activities are more limited than they are for General Stewardship lands. However, certain conservation actions to promote habitat enhancement will provide specific opportunities to promote adaptive capacity or guide transformation. For example, stream restoration and culvert replacement are allowed in RCAs, which can increase resilience of streams and resistance of roads to floods and landslides. Management of HCAs will promote habitat development and adaptive capacity with the following approach. Management of HCAs will incorporate principles of ecological silviculture and adaptation silviculture (Palik et al. 2020, D'Amato and Palik 2020). Ecological silviculture is based on the spatial heterogeneity and historical range of variation found in unmanaged old forests and seeks to emulate stand initiation and development processes that result from small-scale natural disturbances (e.g., windthrow, lightning, insects, disease) to promote within-stand diversity and complexity. Natural history (forest development, dynamics, species, and structures) is a model for management and provides insight into potential pathways, trajectories, limitations, risks, and options. Natural forest development principles (e.g., disturbance, succession) inform management strategies and prescriptions related to stand initiation and development, maintenance of forests, retention of biological legacies, and landscape mosaics (Carey 2007). Management based on historical conditions may become less relevant with climate change, leading to greater use of adaptation silviculture that increases the forest's ability to adapt to changing conditions and continue to deliver ecosystem services. The outcomes of ecological silviculture—stands with greater diversity and complexity—remain relevant to adapting to novel conditions (D'Amato and Palik 2020). Habitat conditions and ecosystem services will be continually assessed in HCAs in light of novel conditions to determine when to modify management principles.

At the stand level, species composition, structural complexity, and function may increase adaptive capacity (Franklin et al. 2018). Management activities will seek to create, restore, and maintain structurally complex and biologically rich stands, considering local forest types and other site-specific conditions. Prescriptions should provide complex and diverse forests of all types and stages, and activities should be timed appropriately within the context of natural forest development (Carey 2007; Puettmann et al. 2016).

Both active and passive management can be used to promote complex stands and heterogeneous landscapes that enhance adaptive capacity and have co-benefits for habitat development. For example, active management can reduce stand density in young stands to encourage trees more likely to withstand wind (Mitchell 2000; Moore et al. 2003). The location of limited treatments in HCAs can also be a factor to help build resistance to disturbance. Fuels can be managed in portions of HCAs identified as high fire risk, using variable-retention harvest or variable-density thinning that also creates spatial heterogeneity for habitat development purposes (e.g., robust shrub and forb communities) in closed-canopy, homogeneous stands. Conifer restoration actions in Swiss needle cast (SNC)-infected stands and some

hardwood-dominated stands, although limited in HCAs, will be implemented to guide stand development to resilient stands with more desirable long-term habitat quality. Reforestation will use a diverse tree species mix with limited site preparation and young stand management, introducing complexity early in stand development. Variable density thinning will also promote spatial heterogeneity, complexity, and diversity (e.g., robust shrub and forb communities) in closed-canopy, simple stands. While treatments and management actions in HCAs will be designed to increase habitat quantity and quality, some of these treatments will result in timber revenue.

Allowing for passive development of complex older stands may also increase adaptive capacity (Nagel et al. 2017). Passive management retains biological legacies on the landscape and accommodates small-scale disturbances followed by natural regeneration. Both active and passive management can facilitate transformative change, e.g., by actively introducing warm-adapted tree stocks or a diverse species mix during reforestation or allowing transformation over time to warm-adapted species within the existing plant community. Transformative changes after disturbances and under climate change will be assessed with regard to habitat requirements for HCP-covered species under an adaptive management framework. The varied sizes and distribution of HCAs across the landscape, coupled with more regular distribution of RCAs, is intended to create a functional network of habitat patches across the plan area, which supports resilience. RCAs will produce increasingly complex and resilient riparian conditions over time. **Figure 2-4** shows how RCAs, recreation, and timber harvest activities are integrated across the landscape.

2.2.2 Implementation Considerations across the Landscape

HCP conservation strategies, FMP strategies, and the planning process are intended to integrate management of ecosystem services across the landscape. Planning and operations work together across the landscape to provide social, economic, and environmental benefits. During the planning process, management activities are reviewed to ensure alignment with goals and strategies. Important habitat types and ecological features are identified and managed according to the HCP and FMP. Consideration is given to recommendations, Implementation Plan (IP) targets, best management practices (BMPs), and operational policies to achieve GPV. The resulting landscape provides a range of integrated social, economic, and environmental benefits.

For example, harvest operations on General Stewardship lands are planned with the emphasis of revenue and timber production. Other values are integrated into these operations. Harvested timber contributes to carbon storage in manufactured wood products. RCAs, in addition to leave tree and downed wood requirements, defined in HCP Chapter 4, *Conservation Strategy*, contribute to carbon storage on the landscape, fish and wildlife habitat, and clean water. A special stewardship-designated campground adjacent to a harvest area may be considered a visual buffer per the FMP strategies. A special stewardship domestic water intake may be in or adjacent to a harvest area and is protected according to applicable rules and policies.

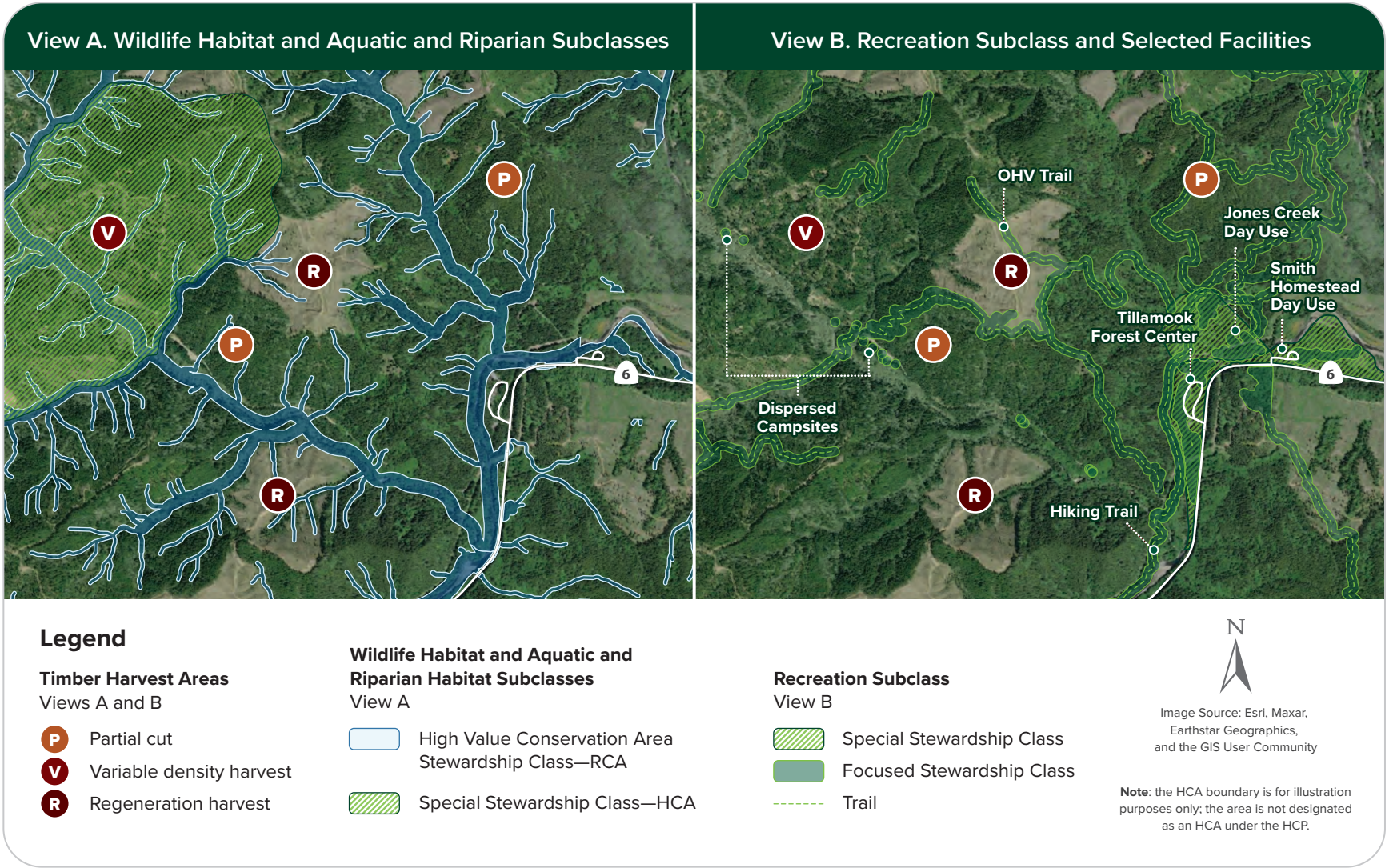
2.2.3 Adaptive Capacity, Landscape Context, and Adaptive Management

To provide GPV, state forest lands management must sustain interrelated social, economic, and environmental benefits while continuing to promote the ecosystem services that support their delivery and the adaptive capacity of the system in the face of change and uncertainty. Resources change over time, economic cycles produce swings in the value of timber harvested, species move across the landscape, disturbance events alter conditions, public use patterns change, and ecosystems undergo transformation. Regional and global conditions such as climate change create uncertainty around future forest productivity and health, species distributions and biodiversity, the severity and frequency of disturbance patterns, and the potential for ecosystem transformation. To deliver ecosystem services in the face of change and uncertainty, the management approach focuses on building adaptive capacity, evaluates trade-offs between ecosystem services across the landscape, and leverages adaptive management to address uncertainty and change over time.

FIGURE 2-4

Examples of Emphasis Areas across the Landscape

Active management is integrated across the landscape guided by resource management emphasis areas.



Adaptive Capacity

Maintaining or increasing adaptive capacity across the landscape reduces risk associated with change and uncertainty. Increasing resistance reduces the likelihood of impacts, increasing resilience reduces the degree of consequences, and transformation allows for change.

Examples of management actions that promote resistance to disturbance include fuels reduction management and establishment of fuel breaks prior to a fire event that can reduce the likelihood of fire spread and severe burn. Examples of management options that promote resilience to disturbance include reforesting with diverse tree species that can reduce the extent of insect and disease on timber inventory or enhancing stream habitat conditions throughout a watershed to ensure sufficient aquatic resources are available to accommodate increasing fluctuations in streamflow over time. Examples of increasing transformation include allowing an HCA to follow natural fire recovery processes. In general, species diversity, structural complexity in HCAs and RCAs, and spatial heterogeneity contribute to adaptive capacity—the ability of the forest to accommodate changes from both discrete events and gradual change.

Evaluating Trade-offs in a Landscape Context

Evaluating trade-offs associated with provision of different ecosystem services is paramount to evaluation and revision of desired conditions and related strategies (Bradford and D'Amato 2012;Burton et al. 2014; Franklin et al. 2018). Trade-offs include but are not limited to management emphasis (e.g., timber, aquatic and riparian function, biological diversity and conservation, scenic, recreation), desired future condition, integration of resources, applicable policy restrictions, landscape context, and revenue.

Trade-offs are considered at every level of planning. For example, at the HCP level, they were considered in the designation of HCAs and RCAs and the development of conservation goals and objectives. At the IP level, they are considered in deciding the type and amount of activities that will occur over the life of the IP in a particular region. Site-specific trade-offs are considered during Operations Plan (OP) development, which designates operations in shorter time periods to achieve the IP. At the adaptive management level, trade-offs are evaluated prior to making any changes to IPs, FMPs, or the HCP. Additional details are provided in Chapter 4, *Guidelines*.

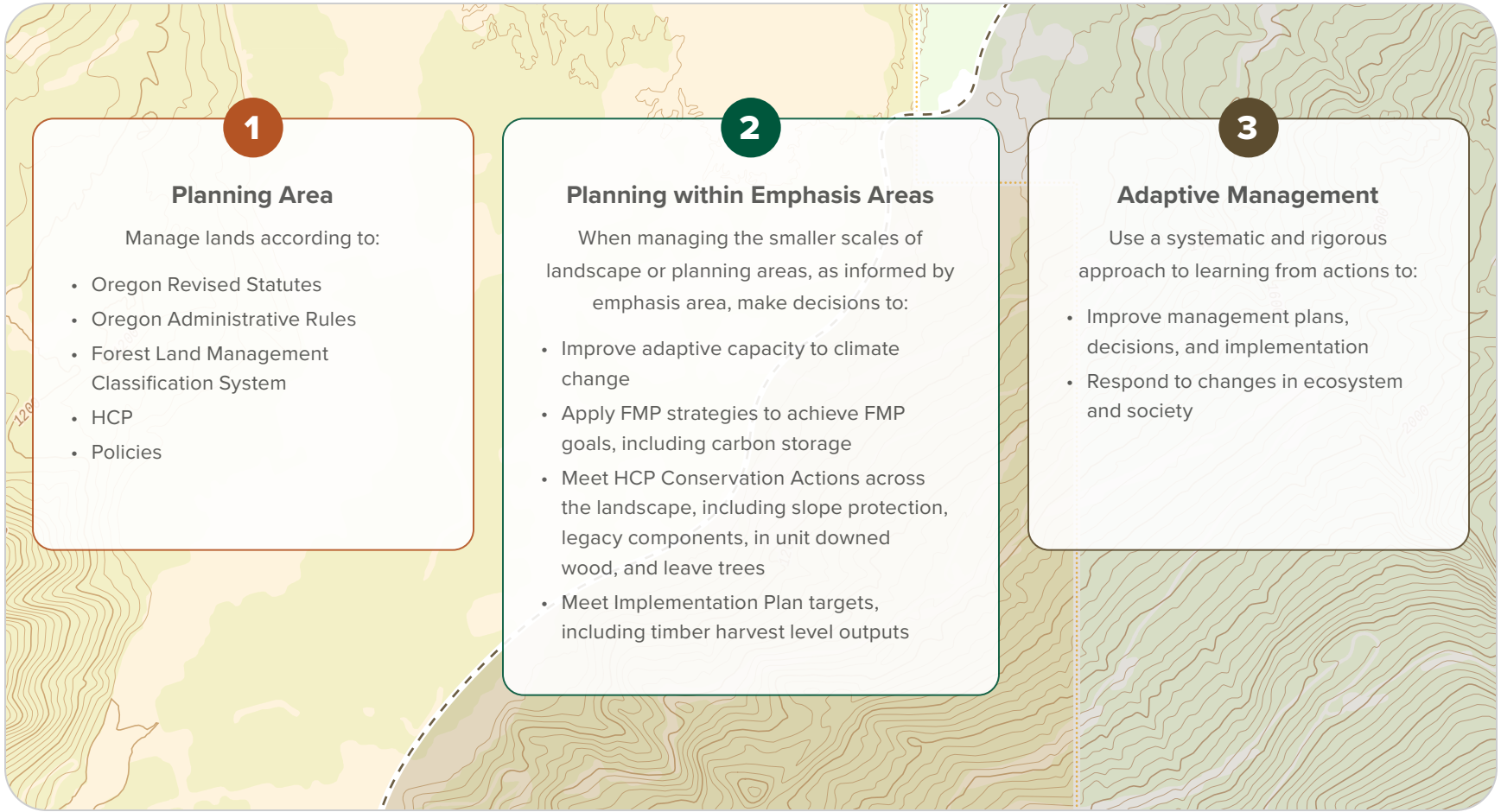
Adaptive Management

Adaptive management is a systematic and rigorous approach to learning from actions, improving management, and evaluating decisions in response to changes in ecosystems and society (Millar et al. 2007). FMP and HCP strategies are expected to sustain delivery of specific ecosystem services over time. Adaptive management is structured within a clear decision-making framework that connects the evaluation of management alternatives relative to important resources and values with subsequent decision points that provide the opportunities to change management approaches (Gregory et al. 2012). With an adaptive approach to management, long-term targets and modeling may require more frequent revision and adjustment based on monitoring to achieve the FMP goals and better understand trade-offs in delivering ecosystem services. Adaptive management is incorporated into different levels of planning to respond to changes in the ecosystem and society. For the FMP, monitoring assesses the effectiveness of strategies for meeting forest resource goals. At the HCP level, monitoring assesses whether biological goals and objectives are being met. Investments in monitoring projects for adaptive management are prioritized during IP planning while on-the-ground monitoring operations are included in OP development. ODF's decision-making framework acknowledges the different values that Oregonians present to forest management when assessing tradeoffs between management alternatives, including those affected by these decisions. Additional details of this decision framework are presented in Chapter 4, *Guidelines*. **Figure 2-5** shows the process from planning area implementation, to learning and adapting actions to meet GPV.

FIGURE 2-5

Application of Ecologically Sustainable Management to Deliver Ecosystem Services

The emphasis areas, policies, and strategies are applied across the planning area to support decision-makers as they strive to further improve conditions, adapt plans to respond to change, and improve performance over time.



2.3

Strategy Integration for Ecosystem Services Delivery

The principles of ecologically sustainable management are reflected in Chapter 3, *Forest Resources, Goals, and Strategies*. Each goal represents a forest resource and management strategies are designed to deliver multiple ecosystem services: cultural values; timber production; fish and wildlife habitat enhancement; special forest products; soil processes; water quality; recreational, educational and interpretive opportunities; and carbon storage.

The strategies address climate change and other disturbance effects by adaptively managing for resistance, resilience, and directed or accepted change of ecosystems to sustainably deliver benefits. While HCAs and RCAs will receive less active management, and General Stewardship lands will have a timber-production focus, the entire forest functions as a whole; therefore, management considers the dependencies among ecosystem services to provide sustainability over time. The primary goals of the emphasis areas will guide their management.

The FMP strategies support rural economies and public services by aiming to produce a sustainable and predictable timber supply. The strategies emphasize the function of economic systems that support forest management and recognize that specific approaches and the levels of commitment depend on economic goals and circumstances. Maintaining economic benefits is key to supporting implementation of all plan activities and maintaining public trust in ODF's ability to deliver plan outcomes. Chapter 3, *Forest Resources, Goals, and Strategies*, and Chapter 4, *Guidelines*, describes the methods for implementation, operations, and adaptive management.

CHAPTER 3

Forest Resources, Goals, and Strategies

OAR 629-035-0030 requires that the *Western Oregon State Forests Management Plan* (FMP) contain "forest resource management goals, which are statements of what the State Forester intends to achieve for each forest resource within the planning area consistent with OAR 629-035-0020 (Greatest Permanent Value)" and "management strategies, which describe how the State Forester will manage the forest resources in the planning area to achieve the goals articulated in the plan. The strategies shall identify management techniques the State Forester may use to achieve the goals of the plan during the implementation phase of the plan."

Chapter 3 describes the types and conditions of forest resources,[1] how they reflect greatest permanent value (GPV), and what management of each resource is intended to achieve and how. There are 16 forest resource goals and 40 strategies for accomplishing those goals. The resource description, goals, and strategies reflect the five plan themes (Chapter 1, Section 1.2, *Plan Themes*) and concepts from the management approach (Chapter 2, *Management Approach*).

Performance measures are specific measures reported to the Board of Forestry (BOF) that track the accomplishment of select FMP goals. Review of performance measures is the pathway for feedback and adjustment in the decision-making framework for Adaptive Management Plans (AMPs) and policies described in Chapter 4, *Guidelines*, and shown in **Figure 4-1**.

3.1 Forest Condition

To better understand and provide context for the resource goals and strategies, the current state forest condition is detailed here. Forests are complex ecosystems with numerous biotic and abiotic interactions. Trees are the dominant group of plants on state forest lands. Many state forest lands were affected by repeated, large wildfires or were extensively logged prior to acquisition by the state in the first half of the 20th century. Reforestation and restoration efforts were implemented across state forest lands to replant burned or harvested lands after the State took ownership. The age and species distribution of state forests lands reflects the history of large fires, salvage logging, and reforestation (**Figures 3-1** and **3-2**).

1 Terms underlined in this document are defined in the Glossary. Defined terms are underlined at the first instance in each chapter.

State forests comprise different species of trees at different ages. *The distribution of dominant tree cohort age and species has important implications for future management, particularly in the development of silvicultural pathways aimed at improving adaptive capacity of ecosystem processes to deliver GPV.* © OCTAVE ZANGS

FIGURE 3-1

Distribution of Stand Ages as a Percentage of Western Oregon State Forests

Compared to even-aged stands, forests with uneven-aged stands often support a greater number of species and are more resistant to windfall and insect outbreaks.

SOURCE: ODF 2022A

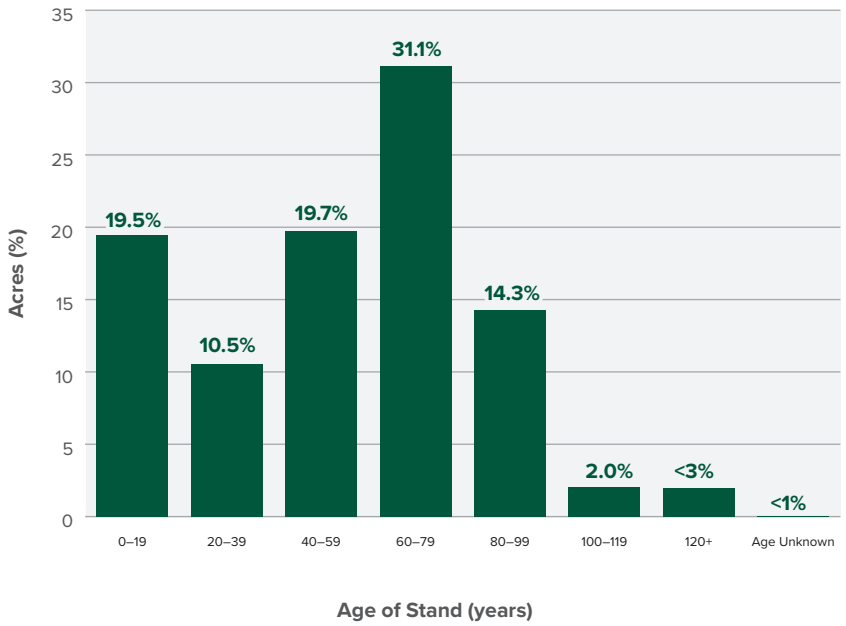
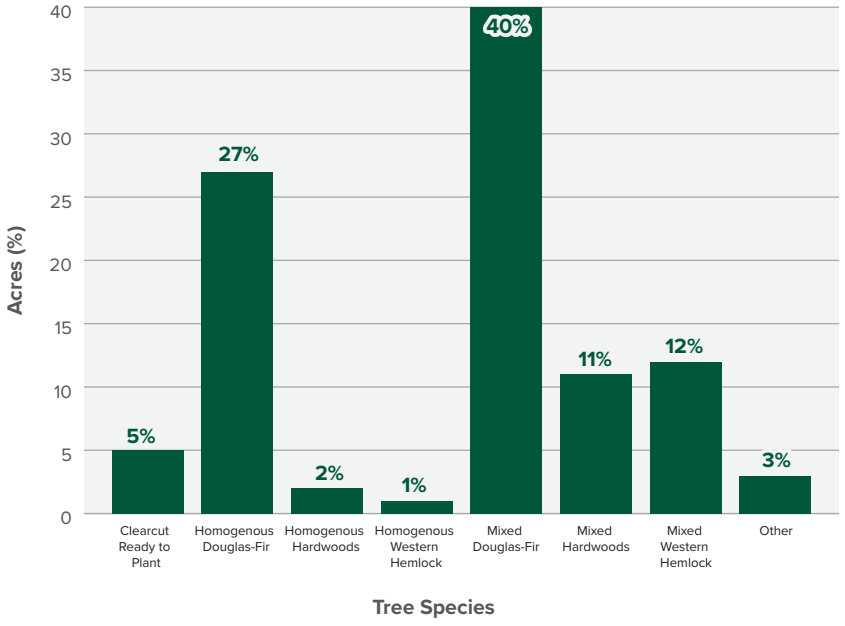


FIGURE 3-2

Dominant Tree Species in Western Oregon State Forests

Tree species richness and composition affect potential vulnerabilities to disturbances and stressors such as insect outbreaks, pathogens, fire, windthrow, drought, and climate change.

SOURCE: ODF 2022A



Note: Stands that experienced stand-replacing fire within the Beachie Creek Fire (North Cascade District) had their stand initiation date reset to 2020. Thus, the distribution of stand ages will likely differ markedly from previously published reports that used Stand Level Inventory.

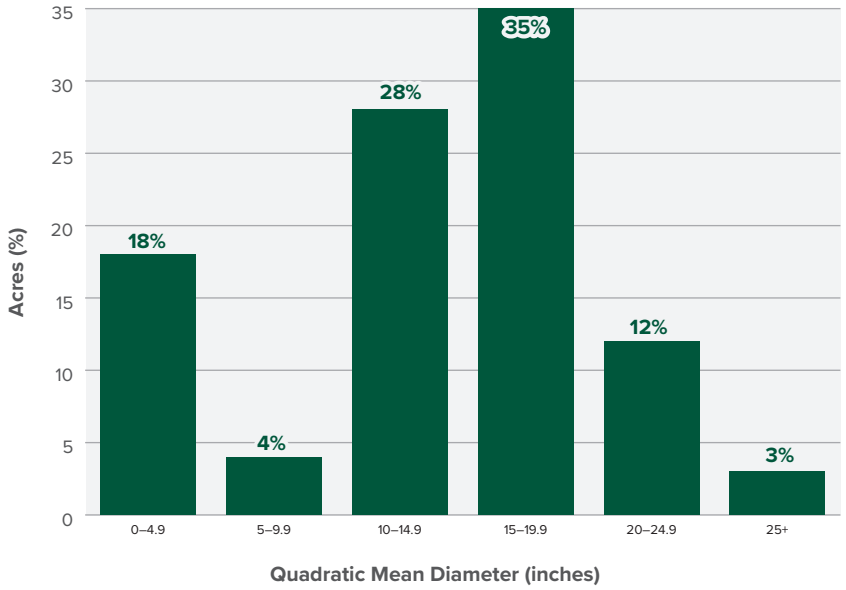
The distribution of dominant tree age on state forest lands affects future management, particularly in the development of silvicultural pathways and conservation strategies aimed at improving adaptive capacity and promoting ecosystem processes that deliver high-quality habitat. Compared to simple stands, forests with complex stands will support more biodiversity and will be more resilient to windfall and insect infestations. Currently, approximately 45% of state forest lands in the planning area have a dominant cohort of trees between 50 and 79 years old. These lands include 53% of the merchantable standing volume in the planning area. Stand ages reflect periods of salvage logging prior to State ownership and subsequent reforestation efforts by the Oregon Department of Forestry (ODF) that occurred after a series of wildfires in 1933, 1939, 1945 and 1951, collectively known as the Tillamook Burn.

FIGURE 3-3

Distribution of Quadratic Mean Diameter of Trees in Western Oregon State Forests

Quadratic mean diameter affects the quality of habitat for some wildlife species and tree bole merchantability.

SOURCE: ODF 2022A



Note: Stands that experienced stand-replacing fire within the Beachie Creek Fire (North Cascade District) had their stand initiation date reset to 2020. Thus, the distribution of stand ages will likely differ markedly from previously published reports that used Stand Level Inventory.

However, dominant cohort age is not the only factor that influences forest functioning condition. Site productivity, past management practices, and disturbance and disease history interact to produce the forests that ODF manages today.

Douglas-fir-dominated forests are the most common forest type on state forest lands (**Figure 3-2**). Western hemlock (*Tsuga heterophylla*)-dominated forests and red alder-dominated forests are the next most common forest types.

On average, trees in state forest lands have a quadratic mean diameter (a measure of average tree diameter) between 11 and 20 inches (**Figure 3-3**). A relatively small fraction of trees in the planning area have a quadratic mean diameter of more than 20 inches, reflecting the history of fire, regeneration harvesting, and reforestation on state forest lands. Silvicultural prescriptions may help accelerate radial growth in trees and may help achieve silvicultural and habitat management goals for average tree diameter.

Management history and geography strongly influence the dominance of tree species and stand age across space and through time (**Figure 3-4**). Douglas-fir-dominated forests comprise the majority of forests. While other multispecies forest patches exist on state forest lands, they cover a minimal proportion of the planning area. In general, each of these forest types will present distinct silvicultural opportunities, offer different economic return, and provide habitat for different species. These differences are particularly relevant habitat development and timber production.

3.1.1 Hardwood Management

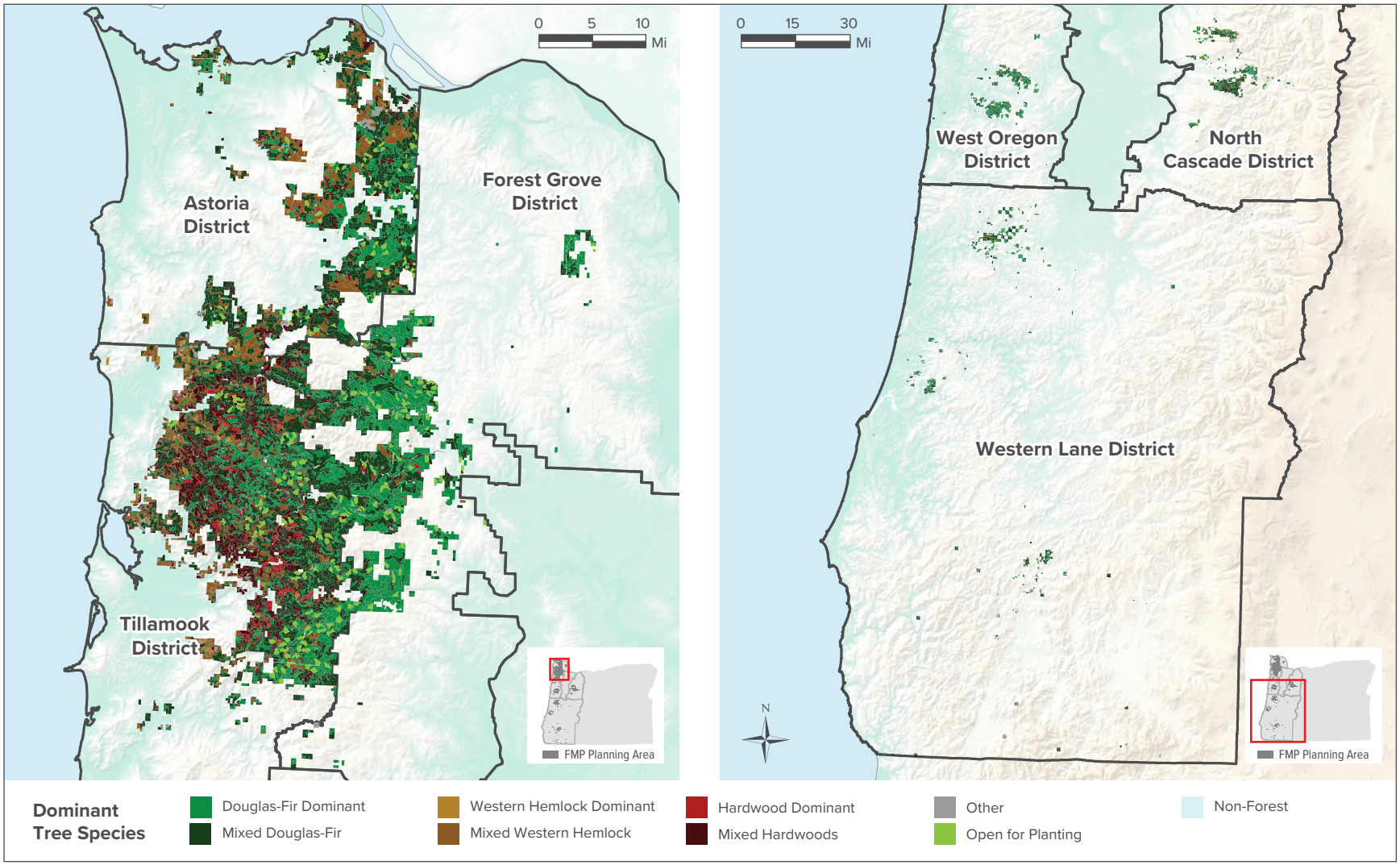
Native hardwood trees provide a diversity of ecological functions and resources for wildlife that complement the conifer-dominated forests typical on state forest lands (Ellis and Betts 2011). Maintaining hardwood diversity within stands may involve appropriate silvicultural interventions, including selecting leave trees during harvests or replanting with diverse species. Management actions for hardwoods may depend on the focus of the stand, such as whether it is intended for harvest of conifers, or a habitat conservation area (HCA) intended to grow more complex habitat. In some cases, hardwood-dominated stands may not provide desired values, such as large trees for wildlife habitat or carbon storage, and may be converted, as in the example of anticipated red alder management below. At the time of writing, stands dominated by hardwoods accounted for just under 15% of total acres in the planning area.

Red alder is a native hardwood that is ecologically and commercially important. In Pacific Northwest forests, red alder readily colonizes disturbed areas, particularly when reseeding or planting of conifers does not occur. Alders contribute to soil creation and nutrient cycling, and improve soil

FIGURE 3-4

Distribution of Dominant Tree Species on Western Oregon State Forests

Douglas-fir-dominated forests comprise the majority of all districts other than Tillamook, but forests dominated by species other than Douglas-fir or by multiple species exist in all districts. SOURCE: ODF 2022A



nutrients by fixing nitrogen, while supporting regeneration of shade-tolerant conifers (Hibbs et al. 1994). This ecological role is particularly important where soil has been damaged by disturbance (e.g., high severity wildfire), such as in portions of the Tillamook Burn area that were subject to repeated fire events. Goals and strategies for soil resources are discussed in Section 3.2, *Integrated Resource Management, Soils and Geology*.

A history of repeated fires and cut-and-run logging practices, prior to the creation of state forest lands, resulted in relatively large areas dominated by alder on the North Coast and on the Tillamook and Clatsop State Forests in particular. There are more than 70,000 acres of alder-dominated stands in the Tillamook District alone. The age of the dominant cohort in red alder-dominated forests primarily ranges between 40 and 80 years old. Red alder rarely live more than 100 years (Hibbs et al. 1994); thus, red alder mortality in the Tillamook District could increase in the next 20 years as these trees approach the end of their life expectancy. Dead and dying alders provide important nesting and denning habitat for diverse wildlife species (Carey et al. 1997). As red alder-dominated stands unravel, the regenerating forest can provide diverse and complex early seral habitats. Goals and strategies for wildlife habitat are discussed in Section 3.2, *Integrated Resource Management, Wildlife*.

The relatively large proportion of alder stands in some state forests landscapes provides opportunities for both passive and active management for specific resource values. The pace, scale, and intent of active management will be different in different emphasis areas. In production emphasis areas, conversion of some hardwood stands to conifer forests is an important priority, but ensuring a continued supply of hardwood logs to local mills remains a priority as well. In conservation emphasis areas (including HCAs), conifer restoration treatments will be more limited, and intended to promote development of habitat for the *Western Oregon State Forests Habitat Conservation Plan* (HCP) covered species. Hardwood stands in the riparian area would be protected under the HCP, which does not allow conifer restoration treatments in riparian conservation areas (RCAs).

There are at least 30,000 acres of hardwood-dominated stands on operationally limited ground across the planning area. Stand development in these areas will continue to occur without active management. Areas that are not actively managed (e.g., operationally limited areas) provide a basis for comparison of strategies intended to promote conifer and habitat development. The intent is not to remove hardwoods from the landscape or ignore their key roles in biodiversity and ecosystem function, but rather to learn from a broad suite of management approaches in an adaptive management framework.

3.1.2 Forest Health

There are several forest health challenges for state forest lands over the planning area. Some forest health concerns are due to past practices and history of the lands, while others are due to an increase of forest visitors. For example, much of the Tillamook Burn was planted or seeded with Douglas-fir from non-local seed sources, with unknown long-term consequences and are considered part of the factors for Swiss needle cast (SNC) impacts on stands. Increasing popularity of recreational activities in state forest lands of northwest Oregon increases the likelihood of new invasive species being introduced, which in turn, could affect long-term forest health. Increases in the frequency, duration, and magnitude of drought and heat waves may stress the forest ecosystem. Under climate change, hotter and drier summers will provide more favorable conditions for insect outbreaks and will make trees more vulnerable to infestation. Drought-stressed trees are often subsequently attacked by secondary agents, such as pathogens.

Forest health strategies are addressed on a site-specific basis when reforestation prescriptions are developed for planting and other young stand management treatments. Site-specific prescriptions consider target species, aspect, elevation, soil types, SNC risk where applicable, *Phellinus weirii* (laminated root rot) presence, required stocking guidelines, natural advanced regeneration, and the desired future condition of the stand. Such prescriptions also anticipate drier, hotter future conditions resulting from climate change. This will provide for a diverse, healthy, productive, and sustainable forest ecosystem over time that will be more resilient to change.

ODF will follow the integrated pest management process using site-specific management objectives while decreasing non-target impacts of control

measures on other forest resources and ecosystem processes. The integrated pest management process will be similar across the landscape designations. Actual use of pest management will depend on the issue, regional context, Forest Land Management Classification System (FLMCS) designation, existing conditions, and desired outcomes. For example, insect and disease may be treated differently in HCAs than outside of HCAs, where they have wildlife benefits. Through the AMP and Structured Decision-making (Chapter 4, *Guidelines*) process, ODF will participate in cooperative applied research and monitoring projects with partner agencies, universities, and organizations that enable cross-ownership, adaptive integrated pest management.

Diseases

Swiss Needle Cast. SNC is a native disease of Douglas-fir that has intensified on coastal lands managed by ODF since 2010 (**Figure 3-5**). It affects trees of all ages and causes premature loss of needles, especially in the upper crown, which reduces tree growth and vigor. The growth reduction, especially if sustained, will not only reduce yields but also will affect ODF's ability to manage stands into desired conditions. While native throughout the range of Douglas-fir, SNC is most prevalent on the west slopes of the northern Coast Range from the coastline to 28 miles inland. The 2018 SNC aerial survey detected over 53,000 acres of moderate to severe SNC infection. Roughly 90% of infected acres were moderately infected. Most of the acres are concentrated on the Astoria and Tillamook Districts, followed by the West Oregon District (**Table 3-1**). The remaining acres were split evenly between Forest Grove, Western Lane, and North Cascade Districts. Management actions have occurred over 20 years to harvest the most severely affected Douglas-fir stands and replant with other species such as western hemlock or SNC-tolerant Douglas-fir more suited for sites.

Laminated Root Rot. Laminated root rot, a native fungal disease that affects many conifer species, is the most widespread and destructive root disease of Douglas-fir in the Coast Range and western Cascade Range. On average, it affects about 5% of the Douglas-fir forest, but is distributed unevenly. Results from several surveys show that in northwest Oregon state forest lands, at least 10% of the Douglas-fir-dominated stands is affected by this disease. The acres affected in

FIGURE 3-5

Swiss Needle Cast on State Forest Lands

Annual observations and 3-year moving average of Swiss needle cast-infected acres across state forest management since 2010.

SOURCE: SWISS NEEDLE CAST COOPERATIVE 2018

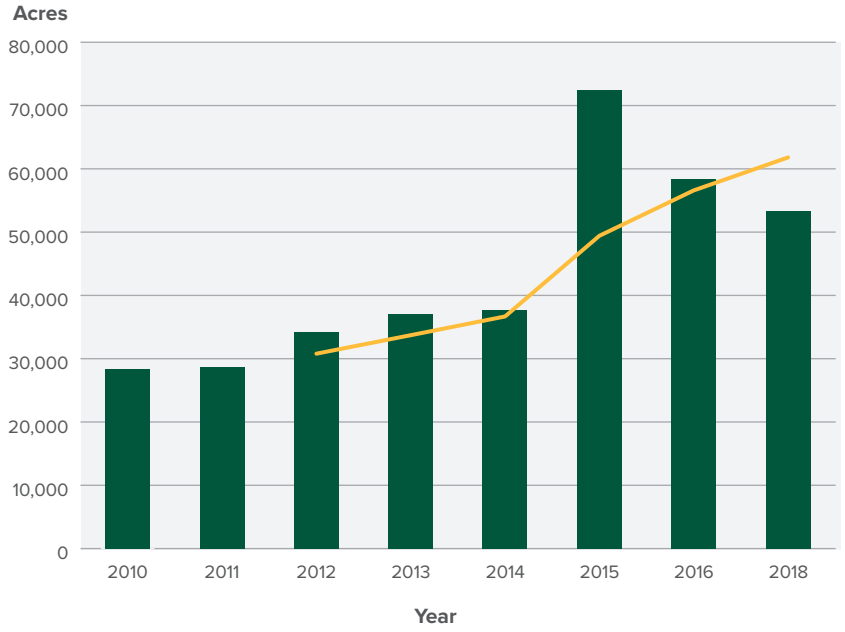


TABLE 3-1

Swiss Needle Cast by District

Results of 2018 aerial survey of Swiss needle cast-affected acres on state forest lands.

District	Acres Affected in 2018
Astoria	12,319
Tillamook	35,909
West Oregon	4,196
Remaining Districts	1,478

individual stands ranges from 0% to over 75% of the area. 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.

Black Stain Root Disease. Black stain root disease, caused by the fungus *Leptographium wageneri*, has been detected in many areas but is thought to be more localized in southwest Oregon. In recent years, reports of black stain root disease in young, intensively managed Douglas-fir stands has increased in the northwest part of the state.

Forest Insects

Douglas-fir Bark Beetle. Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) usually infest trees following windthrow, disease, or drought. When major disturbance occur, the large supply of high-quality downed Douglas-fir allows beetle populations to erupt. Outbreaks typically last 2 to 4 years, though can be prolonged when conditions are favorable.

Sitka Spruce Weevil. Sitka spruce weevil (*Pissodes strobi*) commonly kills the current and 1-year-old terminal shoots of Sitka spruce. The weevil typically affects trees between 3 and 20 years old. Foresters have avoided planting Sitka spruce in western Oregon because repeated weevil outbreaks slow tree growth and produce severe stem deformations (ODF 2007).

Spruce Aphid. Spruce aphid (*Elatobium abietinum*) is an invasive species that causes premature loss of older needles in Sitka spruce and eventually kills branches or the entire tree. Much of the spruce decline along the Oregon coast is attributable to the spruce aphid.

Noxious Weeds

Noxious weeds are terrestrial, aquatic, or marine plants designated by the Oregon State Weed Board under Oregon Revised Statutes (ORS) 569.615 as representing the greatest public menace and are a top priority for action by weed control programs. Depending on the classification, ODF is responsible for developing and implementing an eradication plan. Currently, roughly 120 species are listed as a noxious weed across Oregon. Many of these species occur on state forest lands. The most common, Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and Japanese knotweed (*Reynoutria japonica*) are well established throughout all state forest lands. Other non-native invasive species on the state's noxious weed list expanding on state forest lands include false brome (*Brachypodium sylvaticum*), English ivy (*Hedera helix*), garlic mustard (*Alliaria petiolata*), and non-native geraniums (*Geranium* spp.).

Wildfire

The history of western Oregon state forests is connected to wildfire. There are many examples of historic fire and salvage activities across the planning area as well as catastrophic fires like Tillamook Burn (1933, 1939, 1945, 1951). The

Rum Creek Fire burned near Ennis Riffle County Park after igniting by lightning on August 17, 2022. *Wildfires have always been part of Oregon forests and can contribute to forest health and development.*

2020 fires across Oregon had a significant impact on the Santiam State Forest. Climate projections suggest that these trends will likely accelerate in the future (Dalton and Fleishman 2021). Forest wildfires in Oregon are expected to become more frequent, burn larger areas, and possibly become more severe (Dalton and Fleishman 2021; Reilly et al. 2022).

Figure 3-6 describes the distribution of the overall fire risk level across the planning area. Areas shown as low risk, in the northwestern districts, have a lower likelihood to burn on average, but when a wildfire ignites it is more likely to be severe, because there is more biomass to burn (Reilly et al. 2022).

Areas outside of HCAs and RCAs provide a broad array of options for exploring fire mitigation and response. Options in HCAs and RCAs are limited to those consistent with the HCP, but HCAs and RCAs also provide opportunities to include alternative approaches and unmanaged control areas in monitoring programs and adaptive management.

3.1.3 Forest Resilience

Through activities on the forest (management and conservation), the over-arching goal is to ensure healthy, sustainable, and resilient forest ecosystems that over time help achieve environmental, social, and economic goals that benefit all Oregonians. Functioning ecosystems on state forest lands provide a variety of benefits including clean water, recreation, wildlife habitat, timber, and other ecosystem services.

The health of these forests is defined for this FMP as their ability to increase or maintain productivity while maintaining resistance and resilience to biotic and abiotic stressors. Fire, windstorms, ice storms, landslides, people, insects, and diseases periodically affect forest health, injuring or killing trees and other living things. These disturbances are natural and necessary processes of the forest ecosystem; however, sometimes active management is necessary to reset trajectories toward goals based on the management emphasis of the affected area.

The forest will be actively managed to achieve objectives within stands and across the landscape to create a variety of forest conditions designed to improve capacity for adapting to climate change. Resilience through management starts with successful stand initiation by planting a variety of tree species and harvest activities that retain a forest condition with multiple age groups, densities, and stand complexity that are resilient to disturbance and climate change and deliver ecosystem services. Restoration practices include diversifying tree species, spacing, spatial patterns, variable density thinning, and weed control (Ares et al. 2010).

Trade-offs of various silviculture prescriptions and their effectiveness are evaluated during the planning processes described in Chapter 4, *Guidelines*.

Stand Management. Stand management operations will include a full suite of silvicultural prescriptions. These include partial cuts with variable density retention, patch cuts, and regeneration harvests. Leave trees, downed wood, and stream buffer requirements are defined in the HCP as part of the conservation strategies. Stand-level management decisions and tradeoffs will be informed by other resource goals and strategies at stand, basin or landscape level.

Reforestation and Young Stand Management. Stand initiation after harvest, salvage, or areas affected by wind or fire will be conducted through tree planting on the majority of sites and some areas of natural regeneration. Stand initiation and young stand development are imperative to set a stand on course to meet its management objectives. Each area planted is assessed to determine the number of trees per acre to plant, which species to plant, size of the seedlings, and site preparation needs such as slash piling or herbicide treatment. In areas where there was a disease present, seedlings are selected that are more resistant or tolerant to the disease, if available.

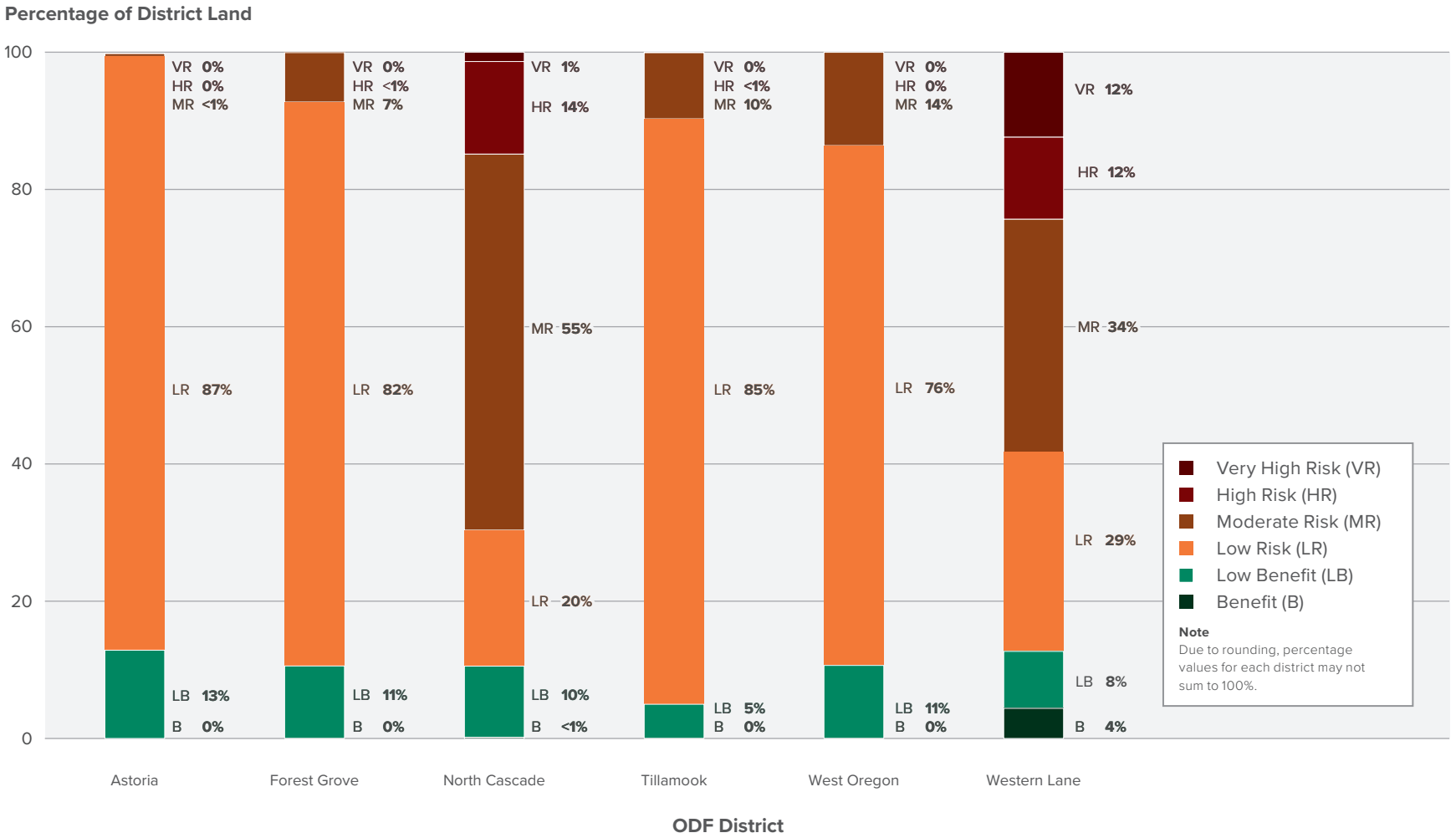
Young stand management activities are important because they can ensure a stand is on a path to reach the long-term goal for the stand based on its emphasis areas, adaptive capacity needs, and role in meeting (Implementation Plan [IP]) targets. Young stand management can include pre-commercial thinning for spacing and species selection or release of overtopped trees to provide more growing space and accelerate tree and stand development Incorporating uneven-aged stands across the landscape promotes a diverse structure, with small, medium, and large trees providing a multilayered canopy. A diverse forest in species, age, and structure can

FIGURE 3-6

Percent of Planning Area District Lands by Overall Wildfire Risk Category as of 2018

Risk is a product of the likelihood and consequences of wildfire to infrastructure and natural resources. Wildfire can be either beneficial or detrimental.

SOURCE: USFS 2018



provide needed or preferred habitat for many plant and wildlife species, increase the resilience of forests to climate change, and provide resistance to diseases and insect-infestations that will affect stand health and timber productivity in the long term.

Over the time of this FMP, there will likely be disturbances from wind, fire, and insect or disease. When disturbance events occur, there will be assessment of areas impacted to better determine response. The assessment will consider scale, location, and long-term goals of the forest for habitat development or management. Details for actions and activities such as salvage or no activity will be addressed at the IP and Operations Plan (OP) level and through operational policies.

Actions will take place to reduce the risk from wildfires to life, property within state forest lands, and the forested landscape through fuel management, prevention and education. Fuel management will prioritize restoration actions and treatment areas and may include activities such as density management, slash reduction, controlled burns, and working with Tribal Partners to reintegrate traditional cultural fire practices.

Disturbance Response. A necessary part of managing for sustainable timber production is responding to changing landscapes and climate change by increasing adaptive capacity and ecological function. Disturbances such as wildfire, ice damage, windthrow, insects, and disease affect state forest lands. These disturbances can kill or damage trees. Damaged trees often experience reduced growth and subsequent rot while snags begin to decay soon after dying. Chronic stressors such as increased temperatures and drought associated with climate change can affect general forest productivity and affect sustainable timber production. Strategies that provide for forest resilience and adaptive capacity are also a key component of ensuring sustainable timber production.

Silviculture and stand management techniques can reduce the risk of damage to timber from climate change. Among the management techniques in response to disturbance, salvage harvest can be used to remove timber after a natural disturbance affects forest health. Harvest intensity can range from the selective harvest of individual trees to regeneration harvest, depending on the degree of the disturbance event and forest management goals. Salvaging can be employed to remove merchantable timber from disturbed areas, prevent the spread of disease or insect infestation, reduce safety hazards, and promote forest health for future harvest, while considering potential negative impacts (Lindenmayer et al. 2012). Responding to disturbance and managing state forest lands in accordance with the resource goals of a particular area, promotes sustainable ecological silviculture and the continuation and enhancement of ecosystem services.

3.2 Integrated Resource Management

The goals and strategies represent the integration of multipurpose, ecologically sustainable, and adaptive approaches necessary for maintaining ecosystem services and GPV across state forest lands over time. Each of the management goals for the forest resources support and contribute to different aspects of GPV at varying levels. In the following sections, GPV category icons (Chapter 1, **Figure 1-1**) and the resource descriptions are used to indicate connections with social, economic, or environmental resources and concepts. GPV can be tracked using the highlighted icons next to each goal.

Because forest resources coexist in space and time, integration of goals and strategies is necessary to minimize conflicts, facilitate decision-making, and balance social, economic, and environmental benefits. Chapter 2, *Management Approach*, provides a discussion of FLMCS stewardship classes and across the landscape. Chapter 4, *Guidelines*, provides additional detail on implementation and how trade-offs are considered. Adaptive management (Chapter 4, *Guidelines*) enables assessment and modifications of goals and strategies and their application in response to new information and changing circumstances, such as natural disasters, climate change, and new research findings. Effective integration entails synthesis of knowledge, experience, and best available science from multiple disciplines including forestry, wildlife and fisheries ecology, geology and hydrology, engineering, and recreation resource management.

FOREST RESOURCE

Timber Management

Timber is vital to Oregon's economy and job creation, especially in some rural areas of the state. Average weekly wages in the western Oregon timber industry are higher than the average weekly wages in other industries in western Oregon (Daniels and Wendel 2020). Timber harvest directly affects local jobs and mills, and indirectly affects the number of additional jobs in local communities.

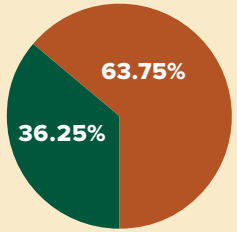
In addition to being a vital part of the economy, forest products and sales are used to build homes, businesses, schools, and other structures needed by society. Revenues from state forest lands come primarily from timber sales, while a significantly smaller contribution comes from special forest products sales, recreation fees, and special use fees. Today, counties share in all revenues from these lands (ORS 530.110, ORS 530.010, ORS 530.040); 63.75% of BOF revenues are distributed to local counties and taxing districts. This revenue is used to pay for local community services such as education, law enforcement, roads infrastructure, and community health. Revenue from state forest lands is a significant contributor to local budgets, which support social benefits.

The remaining 36.25% of revenue from state forest lands pay for the management of state forest lands. This management includes items such as reforestation, young stand management, threatened and endangered species surveys, fish and wildlife habitat improvements, fire protection, and recreation, education, and interpretation programs, staff, and infrastructure. These silvicultural activities provide environmental benefits by increasing adaptive capacity to sustain a forested landscape under climate change and improving habitat quality. Revenue from Common School Forest Lands (CSFL) is transferred to the Oregon Department of State Lands (DSL). DSL reimburses ODF for costs incurred on CSFL. Net operating income from revenues and costs is deposited into the Common School Fund.

98%

of State Forests Division Revenue is Generated from Timber Sales

State Forests Revenue Disbursement



Retained by the **State Forests Division**

Distributed to **Local Counties and Taxing Districts**

Timber log deck during harvest operations in Santiam State Forest. *Forest product sales are a vital part of the economy, and forest products are needed to build homes, businesses, schools, and other structures needed by society.*

GOAL

Timber Production

Provide a sustainable and predictable supply of timber that provides for economic opportunity, jobs, and availability of forest products.

Strategy—Sustainable Harvest Objective

Determine a sustainable harvest objective during IP development, and complete this harvest objective with predictable year-to-year timber supply over the life of the IP.

Strategy—Timber Salvage

Implement a timely response to natural disturbances (fires, windstorms, ice storms, etc.) to salvage merchantable timber, based on the management emphasis of the affected areas and operational policy.

Strategy—Silviculture Practices for Stand Management and Development

In general stewardship land, silvicultural prescriptions will be designed for sustainable timber production and economic performance, whereas in HCAs, silvicultural prescriptions will be designed for resilient wildlife habitat. For example, red alder may be harvested in general stewardship and left as snags and stand diversity in HCAs. Other stewardship classes may require silviculture prescriptions that emphasize other objectives, such as safety in Recreation special use and focused stewardship classes, or traditionally important natural resources in cultural resource special use and focused stewardship classes.

Within HCAs and RCAs, opportunities to increase adaptive capacity through silvicultural activities are more limited than they are for General Stewardship lands. However, certain conservation actions to promote habitat enhancement will provide specific points to promote resiliency and resistance or to observe transformation. Management of HCAs will incorporate principles of ecological silviculture, which seeks to emulate stand initiation and development processes that result from small-scale natural disturbances (e.g., windthrow, lightning, insects, disease) to promote within-stand diversity and complexity and late seral stands. A proportion of HCAs that are stunted due to SNC cast will be managed early in the permit term, which will retain unaffected conifers and hardwoods, and will be replanted with habitat-suitable species mixtures. The majority of treatments to reduce fire, insect, and disease risk will occur in stands outside of the HCAs.

FOREST RESOURCE

Transportation

The road system is an integral part of achieving GPV. The road system supports economic benefits by facilitating timber and special forest product harvest and firefighting, which protects the timber resource. Roads provide access for a wide range of social benefits such as recreation and cultural activities and firefighting to protect public safety.

There are approximately 4,300 miles of road on state forest lands with 88% of all acres located within 0.25 mile of a road. Approximately 83% of the roads are surfaced. The road system has the potential to adversely impact natural resources, particularly water quality and aquatic species migration. The road system on state forest lands is managed to protect resources in accordance with the HCP, ODF guidance, best management practices (BMPs), Oregon Forest Practices Act (FPA), and other applicable laws.

GOAL

Transportation System

Manage the transportation system in a manner that provides for resource protection, transportation efficiency, safety, and sound fiscal management while meeting forest management objectives.

Strategy—Transportation Planning

Use transportation planning principles, engineering standards, and BMPs to ensure that the transportation system facilitates achievement of GPV, provides for safe and efficient traffic flow and minimizes impacts on natural resources.

Strategy—Transportation Assessment

Periodically monitor and assess the transportation system to ensure alignment with GPV management objectives, resource protection standards, and safety.

Bridge replacement in the Tillamook State Forest. *Stream crossing improvements can help protect water quality, reduce the risk of flood damage, and improve aquatic habitat by enabling organism passage to upstream habitats.*

FOREST RESOURCE

Cultural and Historical Resources

Cultural and historical resources provide a record of our shared past, present, and future relationship with the land, and how this relationship changes over time. Remnants of past cultures and lifeways represent thriving cultures of the past and of today. This is often observed in physical forms, such as historic buildings, arrowheads, rock art, basketry, etc. What is not as apparent is the interconnectedness of humans and the natural and cultural resources that support them. These relationships with the land are illustrated though practices, such as preserving sites and objects of cultural importance, and cultivating plants and trees and other natural resources for traditional uses. Protecting cultural practices is a shared responsibility for all Oregonians, as they provide an opportunity to apply knowledge from past civilizations to inform management practices and approaches to living with the land.

The Tribal cultural resources goals for the FMP were developed in collaboration with the nine federally recognized Tribes of Oregon in the government-to-government forum.

Tribal Nations:[2] Natural Resources Protection

ODF recognizes that Tribal Nations (also referred to as Tribal Partners) lived in reciprocity with the landscape for time immemorial, using sustainable management practices to achieve quality, abundance and self-sustaining plant and wildlife populations. Each Tribe has a unique perspective and history, with cultural identities that are intrinsically tied to their ancestral lands. ODF acknowledges this relationship with ancestral lands that are currently considered State Forests and seeks to honor these ties by working with Tribal Nations in partnership and shared stewardship toward a sustainable future. ODF is committed to integrating Tribal cultural stewardship practices and Traditional Ecological Knowledge[3] (TEK) into planning, implementation, and adaptive management processes to ensure that State Forests management activities respect and honor the Tribal cultures whose ancestral lands comprise these lands.

Current landscape-scale stressors and perturbations such as droughts, floods, wildfires, plant and animal extinctions, and changes in climate occurred in the past, as did human adaptations. Working with the Tribes to integrate their cultural and natural resources knowledge and stewardship practices will build

2 Tribal Nations include the nine federally recognized Tribes of Oregon: Burns Paiute Tribe, Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz Indians, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation, Coquille Indian Tribe, Cow Creek Band of the Umpqua Tribe of Indians, and The Klamath Tribes.

3 Traditional Ecological Knowledge (TEK) is grounded in social, spiritual, cultural, and natural systems that are frequently intertwined and inseparable, offering a holistic perspective. TEK is inherently heterogeneous and unique to each Tribe, due to the cultural, geographic, and socioeconomic differences as well as their history and the surrounding environment.

adaptive capacity across the landscape. Tribal Nations, their communities, peoples, ancestors, and culturally significant places persist, as do their ancestral knowledge and practices. They hold a rich diversity of holistic strategies, technologies, and management techniques that have sustained throughout many generations and can help inform current conversations regarding climate change and landscape resiliency.

ODF is committed to working with Tribal Partners to understand, identify, manage, and provide access to native populations of culturally significant plants, trees, animals, places, and waters on ODF-managed lands. This includes working with Tribal Partners to develop ethnobotanical strategies that are adaptive to the effects of climate change, using native seed sources to encourage self-sustaining plant communities over time, and using fire-adapted successional plants to prevent erosion. ODF will also consider diversifying tree species in reforestation efforts to encourage proliferation of traditional plants.

The following description of culturally significant natural resources is intended to provide a generalized sense for the past and present cultural and natural resources that occur or have existed on state forest lands. Culturally significant natural resources, their uses, and associated management practices are extensive. A few examples are provided with the intention of demonstrating the concept of reciprocity, in which all plants, trees, animals, and humans were a part of and contributed to a whole and healthy ecosystem.

Among the many traditionally important natural resources, western redcedar (*Thuja plicata*) (canoe cedar) is one of the most important culturally significant trees on ODF land (Whereat-Phillips 2016). It has healing and symbolic properties that are at the source of many Tribal Nations' ideological and cultural

Cultural and Historical Resources *(continued)*

Traditional cedar bark collection in the Astoria District. *Western redcedar (*Thuja plicata*; canoe cedar) is one of the most important culturally significant trees.*

Cultural and Historical Resources *(continued)*

identities. The cultural significance of western redcedar is inextricably tied to its ideological value, as well as its many uses, including medicine-making and ceremonial use. The western redcedar provided material for basketry, mats, building materials, canoes, cups, buckets, backpacks, spears, bedding, pest abatement, and much more.

Yew (*Taxus*) and ash (*Fraxinus*) trees provide the raw material for bows. Arrows are sometimes made from hazel (*Corylus*), oceanspray (*Holodiscus discolor*), or other available plant species, and vine maple (*Acer circinatum*) are used for making net and spear handles. Sitka spruce is culturally important in basketry and the making of multiple types of fishing and foraging devices to gather eel, smelt, and salmon, etc. In addition, this tree species' versatility serves well for making larger bowls and cups and other vessels. Management of spruce required careful tending of roots to strengthen the root system and promote healthy growth. Another example of management of resources is fire management, which promotes growth of successional plants like serviceberry (*Amelanchier alnifolia*). Various parts of serviceberry were used for medicinal purposes and consumption (raw, dried, or made into a preserve), and the branches served as tool handles, ropes, and sometimes spears or arrow shafts. These species decline as forest canopy closes and shading prevents their growth. They are, therefore, prominent examples of successfully fire-managed species as they colonize created clearings.

Bear grass (*Xerophyllum tenax*), bulrush (*Typha*), hazel (*Corylus cornuta*), and fireweed (*Chamaenerion angustifolium*) are a sampling of other plant species requiring cultural burning for production and use of their many attributes. Understory burning also produced habitat for large and small game including elk, deer, and other sustenance-providing animals. However, animals were more than food; the animal shared its life with people to make clothing, bones for fishing implements, sinew for binding, brains for hide tanning, bones for gaming pieces, and shells for trade, jewelry, rituals, and symbolic displays. Many animals were not used for food or other utilitarian purposes but held—and continue to hold—deep symbolic meaning in the form of cultural origins, religious prescription, and qualities. For example, northern flicker (*Colaptes auratus*) flight feathers represent healing and healers who make people whole again; ravens, owls, eagles, are all of ideological and symbolic importance.

Tribal Nations: Cultural Resources Protection

European settlement in western states destabilized human-ecological systems and severed ties between the past and present that are culturally significant to Tribal Nations. Historic and even modern practices, behaviors, and laws physically, emotionally, and spiritually forced Tribal peoples from their lands and ways of life. Yet the history, language, and people endure. Human remains (ancestors), funerary objects (tangible pieces of death rites and ceremonies), objects of cultural patrimony (spiritual and material associations), and culturally significant objects (religious or spiritual objects used in religion and religious ceremonies) are prevalent across Oregon, including on state forest lands. These non-renewable resources may include culturally

modified trees, rock cairns, waterfalls, caves, etc. Visible evidence of ancestral communities would include items of everyday life, such as animal bones, mollusks, beads, needles, and obsidian tools. Protection of culturally significant sites and objects is critical in honoring and maintaining connections from ancestors to current Tribal members and future generations of Tribal descendants.

ODF is committed to the shared and facilitated protection and repatriation of any items[4] (spiritual or material) that are considered culturally significant by Tribal Partners. Protection includes known sites and locations, identification of undocumented sites, and avoidance of spaces and places of concern. It also extends to management and recovery activities related to fire, restoration, flooding, wind, landslides and other disturbance events.

The FMP provides for access, availability, protection, and enhancement of cultural and natural resources on state forest lands. It recognizes these lands are a part of a long historical relationship, and access to Traditional Cultural Places[5] for spiritual, ceremonial, and traditional practices enables them to maintain cultural identity, which is deeply rooted in the land. These locations are typically kept from common knowledge because of their sanctity and are almost exclusively known to Tribes and membership; sometimes only certain groups within a Tribe are keepers of such knowledge.

Traditional Cultural Places and culturally significant forest and natural resources are confidential, and as such, ODF is committed to shared stewardship with Tribes, with stewardship being the protection of locational knowledge, meaning, and materials (ORS 192.005–192.170). ODF is also committed to increase internal and external cultural awareness, understanding, and accountability for cultural resources protection through regular training focused on prioritizing, recognizing, and protecting cultural resources. These commitments will only be successful through shared stewardship and partnership, built from mutual respect, trust, and understanding.

Cultural and Historical Resources *(continued)*

4 43 CFR § 10 (Native American Graves Protection and Repatriation Act); 16 U.S.C. § 1B (Archaeological Resources Protection Act); 16 U.S.C. § 470 (National Historic Preservation Act), ORS 97.740–97.760, ORS 358.905–961, and ORS 390.235–390.240. Oregon EO 17–12, 368.905–358.961; 97.740–97.760; 390.235.

5 The National Historic Preservation Act and the 36 CFR 800 regulations implementing it refer to “properties of traditional religious and cultural significance.” They are geographic places prominent in a particular group’s cultural practices, beliefs, or values, when those practices, beliefs or values: (i) are widely shared within the group, (ii) have been passed down through the generations, and (iii) have served a recognized role in maintaining the group’s cultural identity for at least 50 years.

GOAL

Tribal Access and Use of Natural Resources

In coordination with federally recognized Tribal governments of Oregon, ODF will provide access, availability, and enhancement of cultural resources and natural resources for their membership on state forest lands.

Strategy—Tribal Engagement

Engage Tribal Partners in planning processes for state forest lands and provide opportunities for implementation of cultural and natural resources stewardship practices appropriate to location and habitat.

Strategy—Coordinate Tribal Ethnobotanical Strategy

Coordinate with Tribal Partners to develop and implement an ethnobotanical strategy that is adaptive to the effects of climate change and ensures self-sustaining populations of culturally significant species are abundant and available on state forest lands.

Strategy—Tribal Seed Sources

Collaborate with Tribal Partners on native seed source recommendations that consider appropriate habitat in planting regimes, climate resiliency, and legacy seed source information that contributes to a storied landscape understanding.[6]

Strategy—Tribal Access

Work with Tribal Partners to develop and administer processes that facilitate unimpeded[7] access, with protected allowances for Tribal Partners' membership to access, use, and manage cultural and natural resources (e.g., western redcedar bark peeling, bear grass collection) on state forest lands.

6 Within Tribal contexts, storied landscape refers to a multitude of intrinsically linked and deeply held understandings, relationships, and actions between indigenous cultures and the landscapes with which they interact throughout time, including but not limited to creation stories, landscape features and wildlife attributes that signal hunting, gathering, planting, and other seasonal use patterns.

7 Provide reasonable opportunity for access, considering public safety, infrastructure, and topographic constraints.

GOAL

Tribal Cultural Resources Protection

Take an inclusive and proactive approach to working with Tribes to identify, record, preserve, protect, and keep confidential[8] culturally significant resources, including but not limited to archaeological and historic sites and objects, considerations for human remains, historic artifacts, and real property.[9]

Strategy—Tribal Relationships
Develop and maintain relationships with Tribal Partners to facilitate consistent information sharing and collaboration on state forest management activities that may affect cultural resources, including timber harvest and related activities, wildfire suppression and recovery, and habitat restoration.

Strategy—Cultural Resources Inventory
Develop a comprehensive and ongoing cultural resources survey and inventory strategy to increase the understanding of culturally significant archaeological, historical, and cultural sites and objects on state forest lands and implement the strategy in coordination with Tribal Partners over time.

Strategy—Determining Level of Cultural Significance
Coordinate with Tribal Partners to identify Tribes that have direct ties to state forest lands (by location, materials, knowledge, practice, etc.); determine the level of significance of archaeological, historical, and cultural sites and objects; and solicit recommendations for protection and preservation thereof.

Strategy—Cultural Resource Awareness
Increase internal and external cultural awareness, understanding, and accountability for cultural resources protection through regular training focused on prioritizing, recognizing, and protecting cultural resources.

Strategy—Intergovernmental Agreements
Use intergovernmental agreements[10] with federally recognized Tribes of Oregon to facilitate cooperation, information, and cost sharing.

8 Includes culturally sensitive locations in State Historic Preservation Office and Tribal databases, and places known by affiliated Tribes.

9 EO 96-30; EO 17-12; ORS 358.640 and 358.653, ORS 97.740 to 97.760; 358.905 to 358.955; and 390.235.

10 ORS 190.110, National Historic Preservation Act Section 106, ORS 358.653.

Cultural and Historical Resources *(continued)*

Historic Cultural Resources

Historic sites and artifacts are not just records of white settlement; they record the protohistoric era where European and Tribal interactions and assimilations occurred, Chinese immigrants worked toward freedom from servitude on western railroads, and Russian colonies pre-dating, non-Spanish westward expansion. Historic sites and artifacts across Oregon's historical landscape tell a rich history of diversity, conflict, trauma, and persistence, which collectively represent in the diversity of descendants of Oregonians today.

European explorations that began in the 1830s expanded significantly with the 1850 Oregon Donation Land Law bringing over 30,000 white settlers.[11] This cultural shift, predicated on colonization and western cultivation of the landscape, brought extractive agriculture, ranching, logging, and homesteading (a foreign concept of land ownership and control for Native Americans). The European explorers and settlers also brought diseases that decimated Native American peoples and life ways. The Native Americans that survived this era of disease and genocide were forced to join an unfamiliar labor culture to provide for their families.

Other groups also found their way to what is now Oregon, despite laws that intended to keep them out. Even before Oregon became a U.S. territory, the Provisional Government enacted laws that banned both free and enslaved Blacks from Oregon and threatened violence to those who stayed. Oregon's state constitution was the first to ban Black residents and barred Chinese residents from voting, who had worked and lived in Oregon since the early 1800s. Despite these laws and bans, these marginalized communities endured. For example, Maxville, a logging camp east of the town of Wallowa, was home to a multicultural logging camp, with 400 residents, 40 to 60 of which were African American. It was the largest town in Wallowa County between 1923 and 1933 and is memorialized by the Maxville Heritage Interpretive Center.

Non-European immigrants continued to find their way to Oregon, including the Basque (primarily sheepherders), Mexicans who mined gold and tended livestock and Chinese who established mining camps in southwest and northeast Oregon, and continued to work on building the transcontinental railroad. The Chinese Exclusion Act of 1882 forced many Chinese immigrants, and their American-born children, to leave the state. The resultant labor shortages that were filled by immigrants from Japan. and other parts of Asia. The marks of these many communities can still be found upon the state's landscape and made visible in the historic cultural resources memorializing their experiences.

Historic cultural resources are some of Oregon's most valuable and important assets. Buildings, structures, sites, furnishings, art objects, and items of personal property that are important to local, state, or national history can tell the story of a region's cultural history and might be protected under the National

11 The 1850 Donation Land Act specifically excluding Blacks, Native Americans that were not "half-breeds" and Hawaiians.

Historic Preservation Act and Oregon state law if they meet certain criteria, including being at least 50 years old.[12] ODF is committed to cultural resources stewardship, using various methodologies designed to identify and protect culturally sensitive areas and locations across state forest lands. Cultural resources protection contributes to diversity, equity, and inclusion which are guiding principles of the FMP and provide an opportunity for visitors to state forest lands to connect with its history and people.

12 National Historic Preservation Act Section 106, ORS 358.653.

Cultural and Historical Resources *(continued)*

GOAL

Historic Cultural Resources Protection

Identify and protect historic cultural resources.

Strategy—Archaeological Review

Perform archaeological review of all operation locations and protect historic resources following applicable rules and statutes.

FOREST RESOURCE

Recreation, Education, and Interpretation

ODF's recreation, education, and interpretation program manages developed and dispersed recreational opportunities in all state forest lands, with the largest concentration of recreational opportunities and use occurring in northwest Oregon on the Clatsop, Santiam, and Tillamook State Forests. Recreation, education, and interpretation programs are aimed at welcoming all visitors to enjoy and learn about Oregon's state forest lands and their stewardship, and providing lasting, diverse, and accessible outdoor recreation, education, and interpretation opportunities. Research conducted in conjunction with the *Oregon State Comprehensive Outdoor Recreation Plan 2019–2023* (Oregon Parks and Recreation Department 2019–2023) reveals that the demand for outdoor opportunities in Oregon is increasing, the popularity of specific activities is changing over time, and some groups or persons have not accessed state forest lands for a variety of reasons. This reflects ever-evolving changes in user demographics, advances in technology, shifting economic trends, and outdoor recreation trends and opportunities for more inclusion overall.

State forest lands provide recreational opportunities for both residents and visitors to the state, such as camping, hunting, boating, angling, target shooting, hiking, birding, mountain biking, horseback riding, and motorized and non-motorized trail use. Public use is regulated through OAR 629.25.

The availability of recreational activities is an ecosystem service that contributes to the quality of life, and additionally provides economic benefits to communities adjacent to state forest lands. For many Oregonians, recreation on state forest lands is part of their cultural heritage. Some of these recreational opportunities are discussed in more detail in the following sections.

Motorized Trail Use

State forest lands offer some of the most diverse and challenging off-highway vehicle (OHV) trail opportunities in the Pacific Northwest, filling an important recreational niche in the state and region. OHV staging areas (campgrounds and day-use areas) provide parking and camping opportunities that support OHV trail system access.

OHV areas in the Clatsop and Tillamook State Forests include trails for motorcycle, quad, side-by-side, and four-wheel use that range from easy to extremely challenging. OHV areas on the Santiam State Forest and the West Oregon District offer easy-to-moderate opportunities for motorcycle and quad use. The OHV trail system accommodates year-round use, with the highest use levels occurring in the spring and fall.

Non-motorized Trail Use

Non-motorized trails and supporting infrastructure, such as trailheads and campgrounds, accommodate hiking, horseback riding, trail running, and mountain biking. The non-motorized trail system is primarily used by day-use visitors. The trail system includes a variety of purpose-built mountain bike trails, including cross country and all-mountain trails, downhill trails, and free-ride opportunities. The Black Rock Mountain Bike Area in the West Oregon District is managed in collaboration with the Black Rock Mountain Bike Association.

Camping

ODF offers three types of camping opportunities: developed campgrounds, designated campsites outside of developed campgrounds,

***Mountain biking on one of ODF's many trail systems**. Demand for outdoor opportunities in Oregon is increasing.* © OCTAVE ZANGS

and dispersed camping across state forest lands. Developed campgrounds vary in size and amenities offered.

Campground opportunities are diverse and include regular drive-in site campgrounds that accommodate recreational vehicle (RV) and tent use, walk-in tent site campgrounds that accommodate tent use only, horse camps, that are designed for equestrian users, and OHV campgrounds designed and managed to accommodate OHV enthusiasts.

Day-Use Activities

State forests are popular destinations for day-use activities, such as swimming and water play, target shooting, fishing, hiking, mountain biking, horseback riding, OHV trail use, and picnicking. Day-use facilities provide parking and restrooms, and some locations have picnic tables and cooking grills. Facilities are generally rustic in nature, but often provide river access and support other day-use activities.

Developed facilities include trailheads, picnic areas, boat launches, target-shooting lanes, interpretive sites, and a demonstration forest.

Aquatic Activities

State forest rivers are a destination for fishing, boating, and water play. In support of fishing and boating activities, ODF manages several primitive boat launches, some of which are managed in partnership with the Oregon Department of Fish and Wildlife (ODFW). Small lakes in the Santiam and Clatsop State Forests also provide opportunities for swimming, angling, and non-motorized boating.

Hunting

Oregon has a long history of hunting on state forests. ODF works with ODFW and hunting organizations to better manage hunting access, through Travel Management Areas and selected road closures to provide walk-in hunting opportunities.

Target Shooting

Target shooting is most active in districts closest to the Willamette Valley and the Portland metropolitan area. Most target shooting takes place at established shooting lanes

Recreation, Education, and Interpretation *(continued)*

Recreation, Education, and Interpretation *(continued)*

and dispersed locations such as rock quarries, rock stockpiles, and at the end of spur roads.

Interpretation and Education Services

ODF has been supporting interpretative and educational programs since the mid-1990s, providing information about current and past land management, natural disturbance, and forest stewardship occurring on Oregon lands to both locals and a diverse array of visitors. One facility that is a popular stopping-off point between the valley and the coast is the Tillamook Forest Center, which was constructed in the Tillamook State Forest in 2006. This center is a destination for Oregonians and out-of-state visitors and is one of the region's largest forest-based learning centers providing information about the natural and cultural history of Oregon's forests, wildfire science, and sustainable forest management. A variety of educational and interpretation opportunities are provided there, including interpretive exhibits in the museum, a movie theater showing an award-winning film about the Tillamook Burn, accessible trails, seasonal presentations, traveling exhibits, educational programs for school groups, and facility rentals at the Smith Homestead Shelter. A primary focus of the interpretive and educational services and programs is intended to assist the public in developing an understanding of basic ecological processes, which in turn may foster a sense of environmental awareness and long-term stewardship of shared natural resources.

TILLAMOOK FOREST CENTER

2021 OVERVIEW

Visitors
46,678

Volunteer Hours
3,070

Education Programs (people)
5,657

Interpretive Contacts (people)
6,575

Interpretive Programs (people)
12,306

Visitors to Tillamook Forest Center explore exhibits about the importance of woody debris for soil health and habitat. *GPV calls for providing a full range of social, economic, and environmental benefits to the people of Oregon.*

GOAL

Recreation, Education, and Interpretation

Provide forest recreation, education, and interpretation opportunities to create meaningful and enjoyable experiences that foster appreciation and understanding of state forest lands and contribute to community health, sustainable working forests, and economic wellbeing.

Strategy—Welcoming, Inclusive, and High-Quality Recreation, Education, and Interpretation Opportunities

Reimagine and adapt recreation, education, and interpretation opportunities across state forest lands to provide a diversity of experiences, services and programs, improve delivery of services, and increase access. Opportunities include interpretation and education services for forest visitors and communities to learn about and connect with Oregon's history, people, and forests.

Strategy—Visitor Use Research and Monitoring

Conduct visitor use research and monitoring to inform recreation, education, and interpretation program management, leverage capacity of future investments into recreational infrastructure and services, and enhance support for the program.

Strategy—Recreation, Education, and Interpretation Community Engagement

Enhance community engagement to foster partnership development, investment, and sense of ownership, as well as the capacity to advance recreation, education, and interpretation program goals.

Through these connections the recreation, education, and interpretation program can engage diverse audiences and potential partners, which in turn fosters community collaboration and support for the work of the program and promotes investment in the program and associated activities. Creating strong community connections increases the diversity, capacity, and adaptability of recreation, education, and interpretation services.

FOREST RESOURCE

Visual Resources

Western Oregon state forest lands are near some of Oregon's major cities. Several scenic highways and rivers cross the planning area and attract people to recreational infrastructure including many campgrounds and extensive trail networks. Sightseeing is popular in state forests and visual resources play a major part in the quality of experience in social activities, such as camping, trail use, fishing, wildlife watching, rafting, and driving. Visual resources enhance the quality of social benefits and attract tourists whose spending supports the local tourism economy and contributes to revenues.

The Clatsop and Tillamook State Forests, the largest consolidated blocks of state forest lands, are the state lands most likely to dominate viewsheds and be recognized as state forests by the public as they visit the area. In many places, state forest lands blend with the surrounding forest and are not recognized as state land by visitors. Goals for retaining visual buffers from timber harvest are balanced with goals for maintaining safe conditions for motorists and recreationists.

State forest lands provide a unique experience as these lands are actively managed and provide for a wide range of forested settings. Visitors can expect to see settings that contain views of regeneration harvest with leave trees and snags, harvest buffers to protect resources, streams and rivers, and forest stands in stages from newly planted seedlings to mature trees. The varied views from state forest lands reflect the social, economic, and environmental values for which these forest lands are managed.

State forest lands are also home to state-designated scenic waterways, which are designated to create a balance between protecting the natural resources, scenic value, and recreational use of these rivers.

Scenic Highways, Byways, and Visually Sensitive Corridors

State forest lands are a major part of the view along some stretches of Highway 6 and Highway 26 in the Coast Range. Along major highways, the immediate visual foreground is protected either by Oregon Department of Transportation-owned scenic buffers or by statute. Many highways in western Oregon are designated as scenic for the purpose of visual corridor management (ORS 527.755) and are within or adjacent to state forest lands.

Special rules apply to timber harvest in visually sensitive corridors. Goals for retaining scenic buffers are balanced with goals for maintaining motorist safety. Additionally, Highway 6, located in the Tillamook State Forest, is designated as a portion of the Trees to Sea Scenic Byway and must be maintained as a scenic corridor per the *Trees to Seas Highway 6/131 Scenic Byway Corridor Management Plan* (ODF 2018).

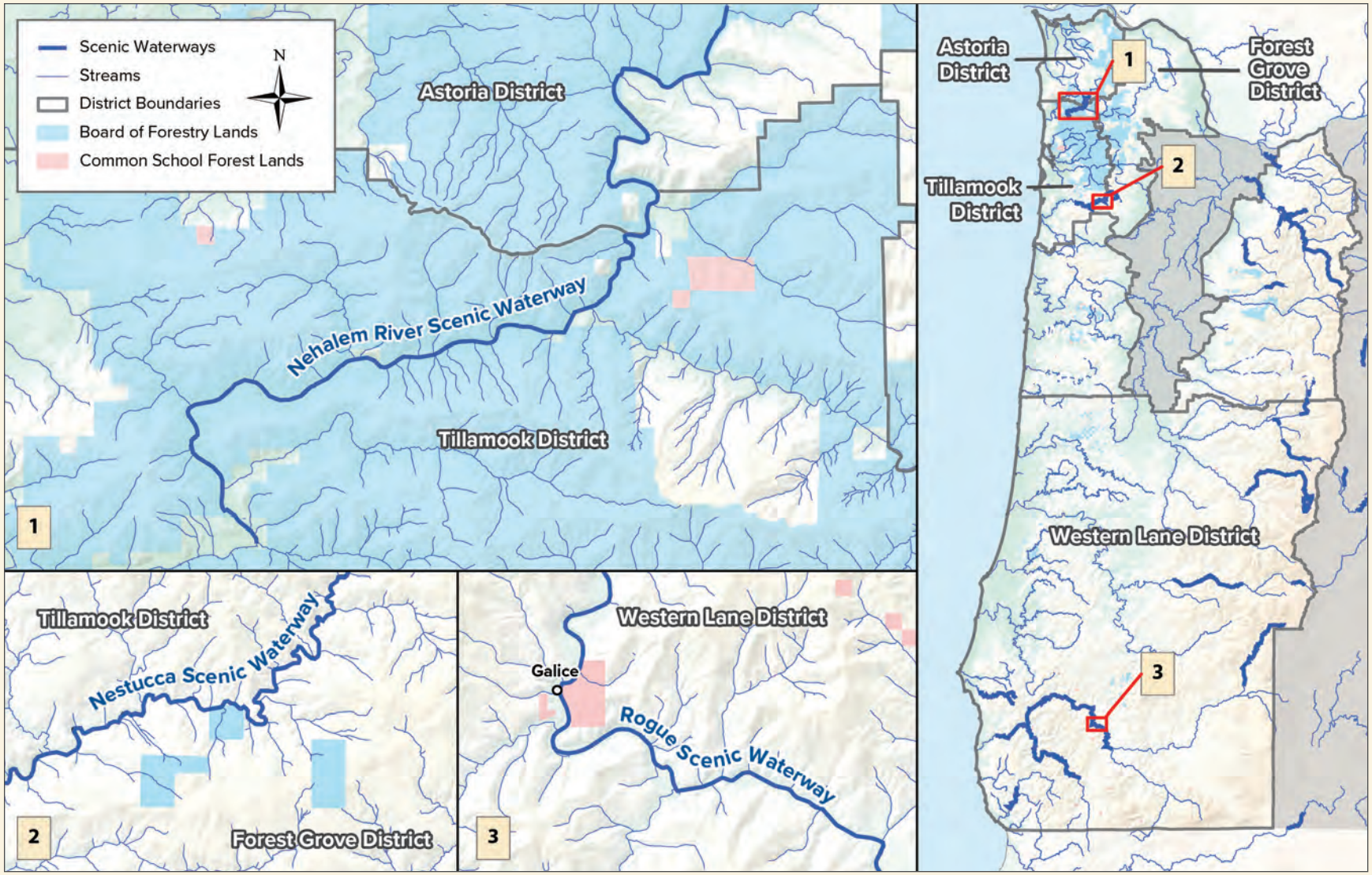
Scenic Waterways

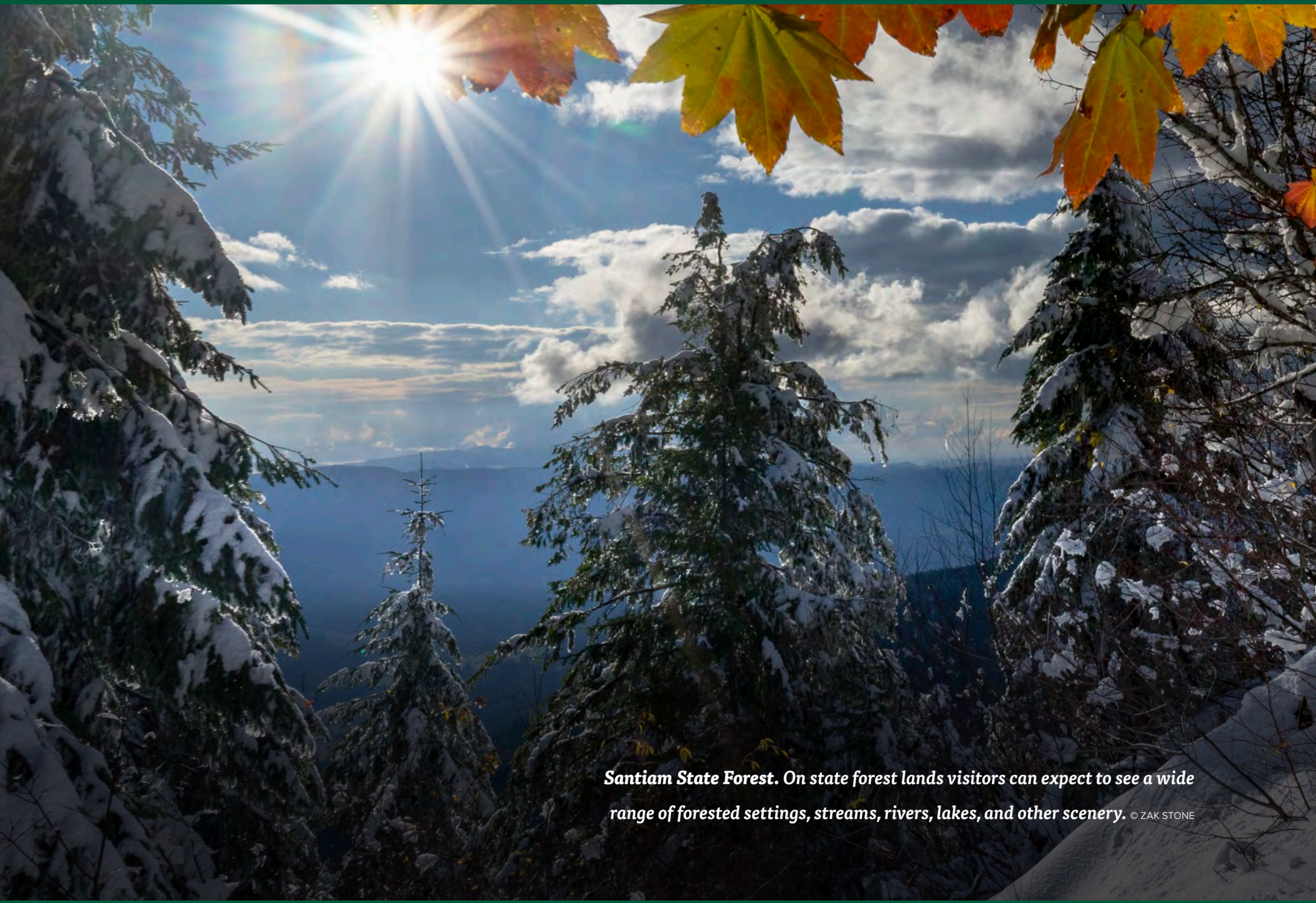
There are three state scenic waterways located on state forest lands. Management of lands in and adjacent to designated scenic waterways is subject to the provisions of ORS 390.805 to 390.925, and administrative rules adopted by the Oregon Parks and Recreation Department. The first designated waterway is the Nestucca River Scenic Waterway in Forest Grove and Tillamook Districts (designated by ORS 390.826(11); OAR 736-040-0041) (**Figure 3-7**). The second state

FIGURE 3-7

Scenic Waterways

Scenic-designated segments of the Nestucca, Nehalem, and Rogue Rivers flow through the planning area.





***Santiam State Forest.** On state forest lands visitors can expect to see a wide range of forested settings, streams, rivers, lakes, and other scenery.* © ZAK STONE

scenic river is a 17.5-mile section of the Nehalem River located in the Clatsop and Tillamook State Forests (designated by Executive Order 2019-05; OAR 736-040-0120).

CSFL near the small town of Galice (16 miles northwest of Grants Pass) and near the well-known Grave's Creek Boat Launch are located within the corridor of the collocated Lower Rogue National Wild and Scenic River (established by Public Law 90-542) and Rogue River Scenic Waterway (designated by ORS 390.826(9)). The Lower Rogue National Wild and Scenic River was one of eight rivers established under the passage of the Wild and Scenic Rivers Act in 1968.

Visual Resources
(continued)

GOAL

Visual Resources

Manage forests in ways that value scenery and a range of forested settings to meet emphasis area management objectives.

Strategy—Scenic Classification System and Considerations

Implement the scenic classification system defined in the FLMCS as Special Use and apply state and federal regulations to integrate scenic considerations into management decisions.

FOREST RESOURCE

Special Forest Products

Special forest products are those non-timber products that are collected for personal and commercial uses. They include firewood and other products identified by the Board of Forestry (ORS 530.050 and 164.813; OAR 629-028).

In western Oregon State forest lands, special forest products include, but are not limited to, beargrass (*Xerophyllum tenax*), evergreen boughs, cedar shakes, cones, ferns, firewood, moss, mushrooms, vine maple cuttings, poles, Oregon grape (*Mahonia* spp.), salal (*Gaultheria shallon*), and Pacific yew (*Taxus brevifolia*) bark.

The special forest products industry makes an important contribution to Oregon's economy, cultural values, and social wellbeing. The quantity and quality of products vary among districts.

Managing special forest products as a viable, sustainable commodity program, compatible with other forest resources, provides economic and social benefits for local communities and allows the special forest products industry to adapt and serve changing needs over time.

Hand-picked Chantrelle mushrooms (Cantharellus formosus). *Special forest products provide social and economic benefits for communities.*

GOAL

Special Forest Products

Provide opportunities for sustainable harvest of special forest products for recreational, personal, and commercial use.

Strategy—Special Forest Products Harvest

Sell permits for sustainable commercial harvest of special forest products and provide the public with information on locations of products, consistent with other goals and the protection of forest resources.

FOREST RESOURCE

Mining, Agriculture, Grazing, Administrative Sites

Mining, agriculture, grazing, and administrative sites provide direct economic benefits by generating income and revenue and indirect social benefits by supplying education and interpretation facilities and materials for developing and maintaining the transportation network.

The mineral, oil, and gas potential of western Oregon state forest lands is largely unknown. Few systematic surveys have been conducted for most commodities, and no regional geochemical studies have been conducted to define or eliminate areas of possible metal mineralization.

Mineral and geothermal resources are owned by the state of Oregon and managed by DSL (ORS 273.551). Revenues derived from the sale of these mineral resources are allocated to the Common School Fund (ORS 273.780).

However, ODF may use soil, clay, stone, sand, and gravel for constructing or repairing roads or other state facilities (ORS 530.050). State forest lands have provided high-quality rock for local road surfacing and ballast rock. This rock is an important resource for road construction and maintenance of roads.

Although state laws permit agriculture and grazing on state forest lands if those uses are compatible with other forest resources, the topography of state forest lands is generally not suitable for most agricultural uses. Historically, under the open-range laws, all of the districts in western Oregon allowed grazing on burned or logged areas. As forests were re-established, grazing diminished. Open-range grazing ended in the early 1980s, and grazing is now almost non-existent on state forest lands.

GOAL

Mining, Agricultural Use, Administrative Sites, Grazing, and Administrative Sites

Permit mining, agricultural use, administrative sites, and livestock grazing when these uses are compatible with other forest resource goals.

Strategy—Special Use Permit Evaluation

Consider mining, agricultural use, administrative sites, and livestock grazing on a case-by-case basis, such that use is not detrimental to the best interest of the state, is allowed by law, and is compatible with ODF resource management policies and plans.

FOREST RESOURCE

Soils and Geology

The landscape upon which forest management of any scale occurs is controlled by a historic geologic process and their resulting formations. Volcanic activity, sediment deposition, uplift, soil formation and erosion are the driving forces that have given western Oregon its unique terrain. The soils—the most visible of the geologic materials—are the bedding from which Oregon's forests grow providing many ecosystem services key to delivering all three types of GPV. For example, timber and other plant community production is determined largely by the soil characteristics, slope aspect, and access, as well as precipitation. Road and other recreation infrastructure siting and conditions depend on soil and topographic characteristics for stability, seasonal accessibility, and visual resource offerings. Inoperable areas and landslide-prone areas, while less opportune for vegetation harvest, provide other ecosystem functions such as habitat and carbon storage. Soils and near-surface formations are moveable parts of the landscape. Landslides, part of the natural erosive process, are a testament to the changing nature of the terrain and can affect, or be affected by, forest management.

Geology

Volcanic activity below the surface of the ocean and offshore of Oregon, in conjunction with deposition of marine sediments derived from volcanoes in the Cascades Range to the east, produced a submarine assemblage of volcanic rocks layered with marine siltstones, sandstones, and mudstones.

Compression by tectonic activity uplifted and moved this assemblage of material east, where it added to the ancient Oregon coastline. This uplift occurred later in the northwestern-most portion of the planning area (north of the present-day Tillamook Highlands) and, as a result, that area received deposition of much younger marine sediments than other areas.

Concurrently, huge volumes of fluid basalt (flood basalts) flowed down the ancestral channel of the Columbia River Gorge, into the developing low area of the Willamette Valley, to the present margin of the coastline throughout much of the northern portion of the planning area. These flood basalts seem to be absent in the area of the Tillamook Highlands and further south, indicating that those areas were probably topographically higher at the time.

Erosion has modified this uplifted terrain to today's highly dissected topography. Landslides, along with down-cutting and transport of sediment by streams fueled by heavy precipitation, produced the Coast Range. Concurrent tectonic activity produced periodic large earthquakes, which may have triggered many of the largest, most deep-seated ancient landslides observable in the planning area today. Large swaths of land in the northern portion of the planning area were extensively altered by these landslides.

Concurrent with erosion along the coastal mountains, the high Cascade volcanic mountains were formed along the eastern margin of the planning area. After volcanism, major changes to topography were not only affected by erosion processes similar to the coastal mountains, but also by glaciation.

The net effect of geology, erosion, and climate is apparent in the distribution of slope steepness

Soil composition. *Dynamic processes, such as forest succession, wind, and fire affect the accumulation of organic matter and available nutrients in the soil.*

Soils and Geology *(continued)*

across the planning area. Nearly 33% of state forest lands have a slope greater than 60% (**Figure 3-8**).

Soils

There are three general soil types: those formed from underlying volcanic formations, those from underlying marine formations, and those from alluvium (unconsolidated materials deposited by streams and rivers). Soils are almost always thinner along ridgetops and thicker in swales due to faster and deeper weathering of underlying formations, which are wetter for longer periods, and gradual downslope soil movement, which increases soil depth in low areas. All soils contain organic and biological components in addition to the mineral fraction described below.

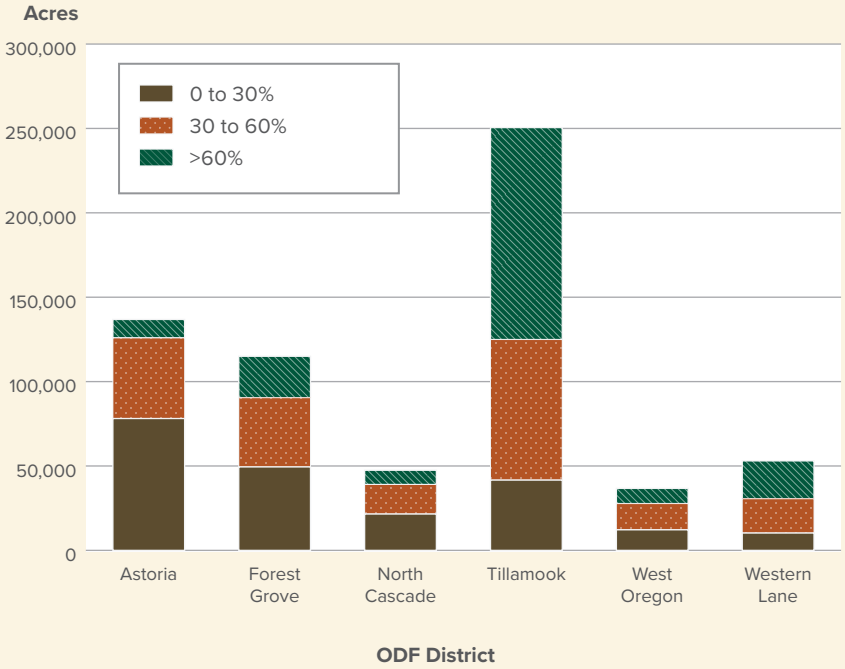
Soils formed on volcanic formations in the planning area are classed predominantly as gravels with some sand and very few silt-sized materials. These soils are very well drained, often occur on the steepest slopes in the planning area, and tend to be thinner than soils formed from marine formations or alluvium. The highest concentration of volcanic soils is in the Tillamook Highlands, the Cascade foothills, and near the Columbia River.

FIGURE 3-8

Slope Steepness across the Planning Area

The highest percentage of steeper slopes in the planning area are on the Tillamook and Western Lane Districts.

SOURCE: OREGON LIDAR CONSORTIUM 2007–2020



Soils formed on underlying marine sedimentary formations are predominantly silts, sands, and clays with minor amounts of gravel. These occur in many areas outside the Tillamook Highlands. These soils are well drained on hillslopes but can be wet most of the year in low-lying areas. Water permeates through these fine-grained soils much slower than the volcanic soils owing. They occur on relatively flat locations in the planning area.

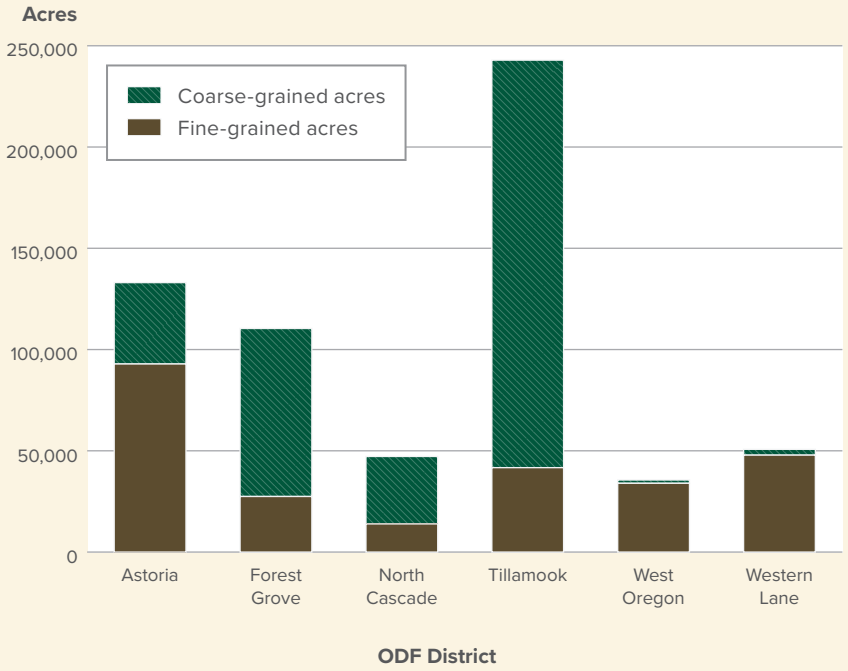
Due to the influence of ancient volcanism, the Forest Grove, North Cascade and Tillamook Districts

FIGURE 3-9

Fine- and Coarse-Grained Soils by District

The Tillamook District has the highest proportion of coarse-grained soils in the planning area.

SOURCE: ODF ANALYSIS OF UNDERLYING GEOLOGY IN DOGAMI 2015



have predominantly coarse-grained soils, while the remaining districts' soils are fine-grained and were derived from softer marine sediments (**Figure 3-9**).

Forest site productivity is controlled by a complex relationship among topography, slope, aspect, soil depth, porosity, biology, and the availability of nutrients in the soil. Dynamic processes, such as forest succession, wind, and fire affect the accumulation of organic matter and available nutrients in the soil. The amount and composition of organic matter affect soil fertility. Small materials such as needles and twigs have the highest concentration of nitrogen. Large materials such as downed trees influence soil nutrient availability and soil moisture and can stabilize soils on moderate and steep slopes.

Most of the Coast Range soils vary from "highly productive" (Site Class I) for Douglas-fir to "limited in potential productivity" (low Site Class III). However, there are Site Class IV and V soils, many of which are located on or near steep rocky outcrops. Soils in the western Cascades vary from high productivity (Site Class II) to Site Class V for both Douglas-fir and western hemlock. Site class productivity depends largely on soil profile depth, gravel content, topographic position, and to some extent, soil parent material. However, in general, the parent materials of these soils all provide a potential basis for high productivity. Site class productivity has a more complex genesis than a simple relationship to geology and topography.

Slope Stability

All types of soil movement occur in both managed and unmanaged forests. Landslides occur in both mature forest and recently

Soils and Geology
(continued)

harvested areas, sometimes in conjunction with other anthropogenic influences such as forest roads. Slides can deliver woody debris along with gravels, sands, and silt-sized material to streams. These organic and inorganic components can contribute positively to the aquatic ecosystem.

Landslides occur when a mass of soil, rock, and debris moves downward, generally together, at similar rates. In forest management, it is useful to discuss two main categories: shallow rapidly moving landslides and slow deep-seated landslides. Examples of mass wasting processes of rapid and slow-moving landslides are apparent across all areas, in all ownerships and management jurisdictions in northwest Oregon. Slides are the dominant erosional process in the planning area.

Shallow rapidly moving landslides usually only involve soils and remove them entirely, along with the vegetation they support, from a steep slope. Underlying geologic formations usually form the base of these slides. Once the soil begins to move, the slide mass rapidly accelerates downslope, often entering a stream and traveling through the stream gully for thousands of feet. As the debris passes it scours soil and entrains boulders and woody debris, increasing in volume. These slides impart large forces when moving and can destroy, and sometimes remove, structures such as homes, concrete road barriers, and guardrails.

These slides then deposit material where the stream gradient becomes less steep, where the gully widens, or where a stream junction becomes too sharp for the debris torrent to make a turn. Often, the larger components of the resulting debris deposit may settle permanently due to the size of the host stream. In larger streams or rivers, the debris can shift and remobilize during subsequent high-water events, which will scatter the debris downstream over time.

Shallow, rapidly moving landslides can be caused or affected by forest management activities. Poor road-building practices with a major influence on slope stability include placement of fills on steep slopes, ill-conceived culvert placement, poor maintenance, and failure to recognize and plan for landslide during road alignment planning and. Timber harvest can increase the rate of occurrence of these types of slides. For a limited period after canopy removal, the frequency of slides increases in western Oregon (Turner et al. 2010; Robison et al. 1999). Data from landslide inventories after the major precipitation events in 1996 (**Table 3-2**) illustrate the effect of stand age and slope on landslides. Background landslide density can be inferred by examining data for the unmanaged stands (>100 years old). Between 13 and 26 slides per square mile occurred in the largest storms in stands over 100 years old. Comparing unmanaged stands to those in the <10-year-old age class implies that slide densities can increase on recently harvested steep terrain.

The second type of landslide—slow-moving, deep-seated—can shift portions of the ground surface up to 20 feet each year. These phenomena commonly move 1,000 to tens of thousands of cubic yards of material, slowly changing drainage patterns, destroying road grades, and in some cases deforesting large areas.

Within the planning area there are hundreds of examples of these deep-seated landslides, a few of which are active and many more that are prehistoric and presently

TABLE 3-2

Landslide Density Associated with 100-Year Storm Intensity as a Function of Stand Age and Slope

Both the age of a stand and the slope steepness affect the likelihood of slide initiation during large storms.

SOURCE: ROBISON ET AL. 1999

Stand Age (years)	Landslide Density per Square Mile (steepest slopes)	Landslide Density per Square Mile (all slopes)
0 to 9	51.2	12.9
10 to 30	22.4	7.2
31 to 100	19.2	6.5
Greater than 100	26.2	12.8

not moving. Almost all of these examples are naturally caused, many probably initiated by large offshore earthquakes. However, some forest practices can affect the initiation and movement of these slides. These practices include large topographic modification such as quarrying, aggregate stockpiling, placement of large fills, and construction of large road cuts, especially along the bottom edges of these features. Since these practices are relatively rare, the potential for destabilization of slopes and initiation of a deep-seated slide is low in northwest Oregon forests.

Soils and Geology
(continued)

GOAL

Soil

Maintain natural soil processes, protect soils from damage, and increase soil carbon and other nutrients.

Strategy—Soil Protection

Follow BMPs during forest operations, such as road building, harvesting, trail construction, and site preparation to ensure protection of soils against erosion and loss of organic materials and soil structure.

FOREST RESOURCE

Carbon

Forests provide carbon storage and sequestration as ecosystem services. Carbon storage and sequestration help mitigate climate change by reducing the amount of greenhouse gases in the atmosphere. Greenhouse gas mitigation supports sustainable GPV delivery by assisting with slowing the pace of climate change to allow systems time to adapt to climate change consequences, such as increased severity and frequency of drought, extreme heat, wildfire, insect and disease outbreaks, and storms that can otherwise damage timber, other plants, habitats, drinking water quality and quantity, air quality, infrastructure, and diminish human health and safety.

Forest vegetation sequesters carbon dioxide from the atmosphere in living tissues and provides long-term storage of carbon in trees, snags, downed wood, other plants, and soils. Areas managed as HCAs would be long-term stores for carbon dioxide. Areas of land managed for timber harvest have trees that actively sequester carbon while they grow and shift to static carbon storage as trees are harvested and transformed to wood products. Timber harvest will result in a portion of sequestered carbon released back into the atmosphere through burning or decay of harvest residuals and harvest operations (**Figure 3-10**). Carbon stored in wood products can serve as short-term or longer-term sinks depending on their use and longevity.

Harvesting trees reduces the carbon sequestration capacity of the forest, but replanting seeds and seedlings after harvest maintains a landscape of actively growing trees to again act as carbon sinks as they age.

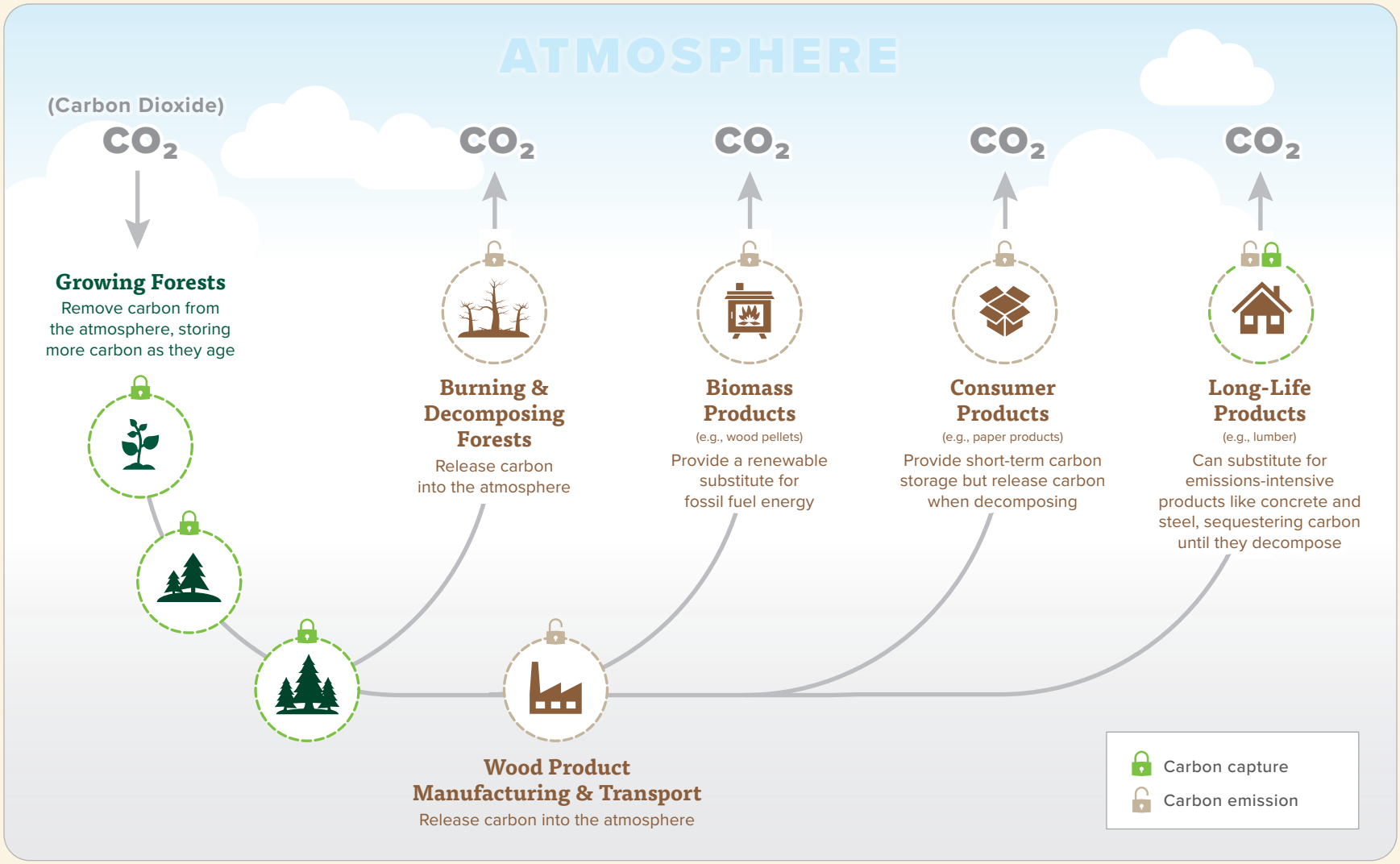
Forests in the Coast Range and Western Cascades accumulate some of the highest densities of carbon on Earth through their productivity. Forest carbon is distributed among different carbon pools, of which live trees is the component most affected by management (**Table 3-3**).

Growing trees sequester carbon. *Forests provide long-term storage of carbon in trees, snags, downed wood, vegetation, and soils.*

FIGURE 3-10

Paths of the Forest Carbon Cycle

Forest vegetation sequesters carbon dioxide from the atmosphere in living tissues and provides long-term storage of carbon in trees, snags, downed wood, other plants, and soils.



Carbon
(continued)

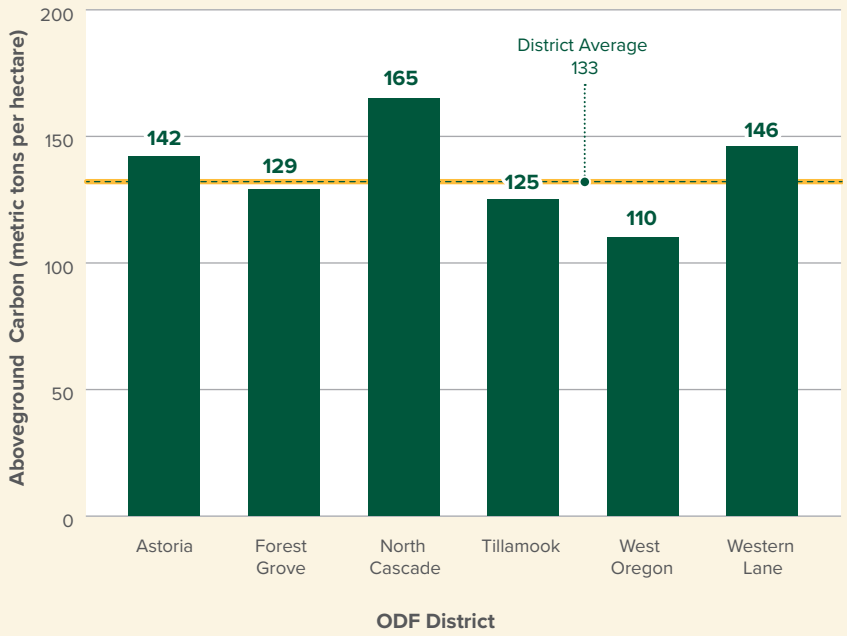
Forests continue to sequester carbon as trees grow. State forest lands have an average of 132.5 metric tons of aboveground carbon per hectare (mT/ha) stored in live trees. Estimates of average aboveground carbon storage varies by district due to stand types, ecoregions, and management history (**Figure 3-11**).

Strategies for improving carbon storage could include older stands in HCAs and RCAs, and encouraging long-lived wood products, restoring underproductive stands, or treating harvest residuals differently. Across the landscape, conservation areas will sequester and store a substantial amount of carbon in the forest. In contrast, other areas have a production emphasis and are actively managed for wood product production, which sequester carbon as the forest regenerates. Restoring underproductive stands and treating harvest residuals differently can also increase carbon storage. These silvicultural strategies will interact with other forest resource goals through co-benefits and trade-offs, which are evaluated during implementation planning and adaptive management. Ecological silviculture practices that can be employed are planting alternative tree species, planting in alternative planting spaces and densities, planting multiple species, to increase the adaptability under changing climate, and maintaining sustainable forests that serve to sequester carbon.

FIGURE 3-11
Estimated Average Aboveground Carbon in Woody Biomass across ODF Districts

Data are based on the 2020 Forest Inventory and Analysis Plots on western Oregon State forests.

SOURCE: ODF 2022B



Note: Data in this figure were collected prior to the 2020 Labor Day fires.

TABLE 3-3

Forest Carbon Pools

Approximate percentage of carbon stored in each pool on state forest lands in the Oregon Coast Range.

SOURCE: CHRISTENSEN ET AL. 2019

Forest Carbon Pools	Description	Percentage[a]
Live trees	Roots, bole, branches, bark, and foliage of live trees	44.8%
Standing dead trees	Roots, bole, branches, and bark of snags	2.5%
Fallen dead trees	Logs and large branches lying on the forest floor, larger than 3 inches diameter	6.6%
Forest floor	Litter, duff, and low vegetation	2.8%
Soil	Organic material, excluding coarse roots	43.3%

[a] Percentage includes some lands outside of ODF jurisdiction.

GOAL

Carbon Storage

Contribute to carbon sequestration and storage on state forest lands and carbon storage in harvested wood products.

Strategy—Long-term Carbon Storage

Implement silviculture treatments and management actions that improve long-term carbon storage. Evaluate proposed actions with respect to carbon storage relative to baseline state forest land carbon inventory.

The intent of this strategy is to consider long-term carbon storage impacts and benefits in the decision process in concert with other goals. Some areas of the forest will see limited or no harvest or timber management, e.g., HCAs, RCAs, and inoperable areas. Forest managers make decisions on silviculture treatments and the timing of harvest to best achieve a suite of goals and objectives.

FOREST RESOURCE

Air Quality

A healthy and productive forest ecosystem provides clean air, which is an important ecosystem service that supports the health and safety of affected communities. In addition, if air quality is poor, tourists may delay or cancel their visits, which could have a negative impact on the tourism economy in local communities. Wildfires and prescribed burns can adversely affect air quality. Advanced planning and consideration of best burning practices protect air quality and the associated health risks to the public.

Timber harvest results in a large quantity of debris material, such as limbs, tops, and non-merchantable material. This material is an important pool of carbon, serves as an input of organic matter to humus and soil, and provides habitat for a variety of organisms. In some cases, this leftover slash can be a barrier to tree planting, be a fire hazard, and increase the potential for pest infestations (Buhl et al 2021). Where the quantity and spatial distribution of residual debris poses enough of an impediment to achieving management goals, prescribed burns may be used as a tool to remove this material. This burning can affect air quality and is regulated under the federal Clean Air Act, the primary law regulating air quality. Under the law, the U.S. Environmental Protection Agency (EPA) sets the National Ambient Air Quality Standards (NAAQS).

In Oregon, the Oregon Department of Environmental Quality (DEQ) develops and carries out programs to meet the NAAQS. Two air quality plans affect forest management directly: the *Oregon Smoke Management Plan* (OAR

Mount Jefferson as seen from the Santiam State Forest. *Protecting air quality is an important part of prescribed burn management.* © ZAK STONE

629-048) and *Oregon Clean Air Act Implementation Plan* (OAR 340-200-0040). The *Oregon Smoke Management Plan* is intended to comply with the *Oregon Visibility Protection Plan* (OAR 340-200-0040 (5.2)).

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. Class I areas include national parks and certain wilderness areas (OAR 629-048-0005(5)).

Current annual levels of burning on state forest lands represent less than 10% of the total burning annually on all ownerships west of the Cascade Crest. Prescribed burning on state forest lands is estimated to contribute much less than 1% of the air pollution in western Oregon cities (ODF 2021).

When burning is used on state forest lands, slash is typically piled on a landing and burned. This results in less burning overall and more woody debris left in harvest units. For units that are burned, the prescribed burns are generally scheduled in the fall.

Air Quality
(continued)

GOAL

Air Quality

Maintain and protect healthy air quality.

Strategy—Smoke Management

Follow OAR 629-048 on Smoke Management and *Air Quality Control Program State Implementation Plan* (DEQ 2022a), which includes planning guidance, visibility objectives, and best practices, as well as information on regulated and sensitive areas and special protection zones to reduce smoke and smoke-related consequences.

Strategy—Reduce Burning

Dispose of slash and debris in other manners, such as selling to small-diameter timber markets.

FOREST RESOURCE

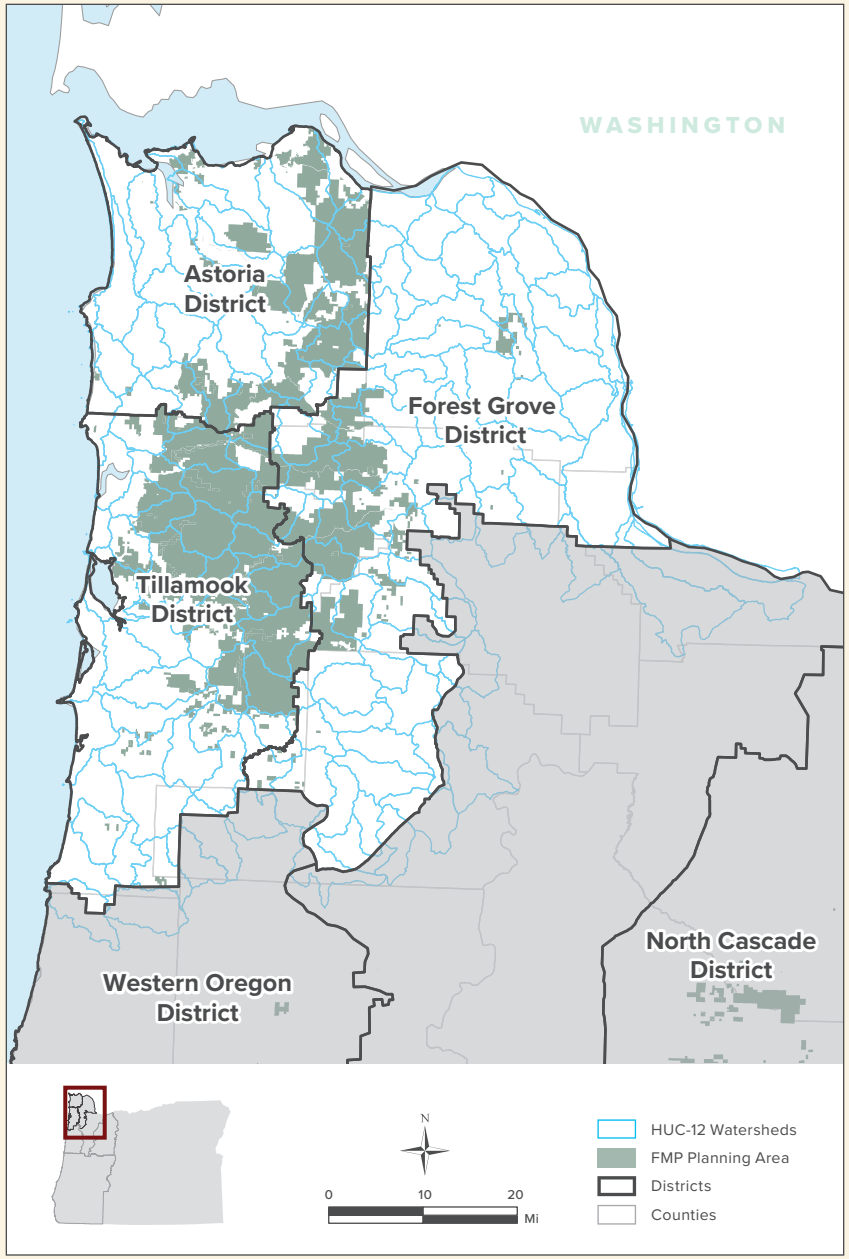
Aquatic and Riparian Resources

Management of aquatic and riparian resources contributes to a sustainable forest ecosystem that protects ecological processes and ecosystem services, provides resilience to climate change, and serves many communities. Aquatic and riparian processes support all three types of GPV. In addition to the environmental benefit of providing life-sustaining habitat to many species, major social activities, such as fishing, swimming, and sightseeing, depend on these resources in the planning area. Whereas downstream, the commercial fishing industry, which is a major component of the regional economy, relies on spawning habitat and cold water sources, originating in headwater streams such as those found in the planning area. Properly functioning aquatic and riparian systems also protect drinking water quality, quantity, and reduce flood risk to downstream infrastructure by reducing erosion, attenuating peak-flows, and providing shade, thereby sustaining additional social and economic benefits associated with access and public health.

Aquatic resources include surface waters such as rivers, streams, lakes, springs, seeps, and wetlands and subsurface waters contained in aquifers or subsoils. Aquatic ecosystems interact closely with the surrounding terrestrial systems, both at the landscape scale and at the scale of stream reaches and riparian areas. The riparian area is the zone of influence between the terrestrial and aquatic environments.

In headwater streams, the riparian zone is particularly important as streams are narrow and riparian vegetation contributes strongly to shading and terrestrial organic inputs to the food web. From headwaters to downstream, riparian forests influence water temperature, filter contaminants (sediments, etc.), and provide inputs like woody debris and fine and course sediments that improve structure of habitat for some species and reduce erosion and downstream flood risk. Conversely, the structure and composition of riparian forests can be influenced by the aquatic environment, such as the influence of floods on forest dynamics and the deposition or erosion of material in the floodplain. Major disturbance events, such as floods and landslides, are natural processes that can add key elements, such as wood, boulders, and gravel, that maintain stream ecosystems. With climate change, stream temperature, floods, and droughts are expected to increase. A functioning riparian

Juvenile coho salmon (Oncorhynchus kisutch). *Aquatic and riparian ecosystems provide essential habitat and resources for many species, including food and drinking water for humans (Homo sapiens).* WILD SALMON CENTER



area increases the streams' adaptive capacity to deliver the multitude of ecosystem services derived from forest waterbodies. 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 spatial scales.

The level of influence ODF can have on protecting, restoring, and enhancing aquatic resources is commensurate with the proportion of the watershed it manages. **Figure 3-12** depicts the distribution of ODF-managed lands across watersheds in the northwest districts, where ODF manages the most contiguous lands.

Aquatic and Riparian Resources *(continued)*

FIGURE 3-12
Watersheds Overlapping with Northwest Districts and FMP Planning Area

The median percentage of ODF-managed lands in northwest districts by HUC-12-sized is 26% (range <1% to 100%).

Note: Hydrologic Unit Code (HUC)-12 watersheds are the smallest sized watershed delineated by the U.S. Geological Survey.

Aquatic and Riparian Resources *(continued)*

Waters and Protection Classification

At the time of FMP publication, the FPA Water Protection Rules classified waters for the purpose of applying protection measures, especially riparian buffers, in compliance with the Clean Water Act (OAR 629-635-0200; DEQ 2021; DEQ 2018). Stream classification is based on fish and drinking water use, persistence of flows, and stream discharge size. The total length of streams on state forest land in the planning area is approximately 8,500 miles. Approximately 40% of the streams are classified as perennial, and 15% are classified as fish-bearing. Within the planning area, almost 50% of all streams by length, with an estimated 3,500 miles, are in the Tillamook District. The Astoria and Forest Grove Districts have the second- and third-highest concentration of streams, with 1,911 and 1,297 miles of streams, respectively (ODF 2022c).

Headwater streams are small streams at the highest end of a watershed. Due to their smaller channel widths, headwater streams are especially sensitive to changes in the surrounding riparian areas. These small streams serve important functions in maintaining water quality and quantity, providing habitat for aquatic species (sometimes only seasonally), and contributing to watershed-level processes (Olson et al. 2007).

In both fish-bearing and non-fish-bearing waters, wood pieces can slow stream velocities, reduce soil erosion, trap and store sediment and organic matter, and store water higher in the overall watershed. In-stream wood recruitment and retention will facilitate the creation of steps and pools, which creates areas of slower water velocities where sediment sorting contributes to high-value habitat for fish, amphibians, and other aquatic organisms. Wood also creates cover from predation and complex habitats for all life histories of aquatic species. Forestry practices that promote wood recruitment include preserving riparian forest, retaining trees within harvested stands, and selective slope-buffering. Headwater streams can also serve as spawning areas, refugia from high water, and refugia from high stream temperatures particularly in summer for some species of concern.

Habitat Conditions

The current conditions in aquatic systems and riparian forests are a product of soils and hydrology, and have been shaped over time by disturbances, such as wildfire windthrow, logging, and road building. According to recent studies conducted by ODFW, the overall condition of riparian and stream habitats in Oregon's coastal streams, which include state forest lands, indicate a lack of woody debris in streams and large conifers in riparian areas, compared to historical values (ODFW 2019). These results are a legacy of the area's history of large fires and historic logging practices, which included harvest and road building in riparian forests and removal of woody debris from streams, resulting in an abundance of young riparian forests in many watersheds. Increased riparian protections and active stream restoration projects during recent decades have begun to ameliorate degraded conditions on state forestlands.

Riparian vegetation can help regulate water temperature and velocities, reduce sedimentation, provide habitat for aquatic associates and nutrients for aquatic systems. Removal of riparian vegetation can increase water temperature and have cascading effects on water quality and quantity that negatively

TABLE 3-4

Water Temperature Impairments

Percentages of planning area within watersheds that have temperature impairment indicating waters are warmer than DEQ standards for either part of the year, particularly during spawning of salmonids, or year-round.

SOURCE: DEQ 2022B

District	Percent of Planning Area in Temperature Impaired Watersheds
Astoria	46%
Forest Grove	37%
North Cascade	9%[a]
Tillamook	18%
West Oregon	31%
Western Lane	18%

[a] Water temperature impairment classifications in North Cascade District pre-date the 2020 wildfires.

affect fish, recreation, and drinking water. **Table 3-4** summarizes the extent of water temperature impairment in the planning area by district. Climate change is expected to exacerbate water quality issues by increasing stream temperature and decreasing summer low flows, which can concentrate other pollutants.

Threatened and Endangered Fish Species and Other Aquatic Species of Concern

At least 28 species of fish occur either in the planning area or downstream of state forest lands and, therefore, may be influenced by state forest management. Some evolutionarily significant units (ESUs) or distinct populations of coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*Oncorhynchus tshawytscha*), steelhead trout (*Oncorhynchus mykiss*), and Oregon chub (*Oregonichthys cramer*) are listed as threatened or endangered under the federal ESA, or are under review for listing. At least 32 species of reptiles and amphibians also occur in the planning area, including species of concern and species designated as sensitive species in the *Oregon Conservation Strategy* (Oregon Conservation Strategy 2016). Approximately half of these species, such as torrent salamanders and the coastal tailed frog, depend on the aquatic environment for at least part of their life cycle. Of these fish and amphibian species, nine fish are listed as threatened or endangered under the state or federal ESA, two amphibians are state listed as sensitive species.

ODF's species of concern list was developed using federal and state lists of threatened, endangered, and candidate species, as well as the Oregon Conservation Strategy and ODFW's sensitive species list (ODFW 2021). They identify species

Aquatic and Riparian Resources *(continued)*

that need immediate and focused conservation effort. The list is a component of ODF's species of concern operational policies and is updated semi-regularly and will be captured in IPs as state and federal lists are updated or new data or science becomes available. Species of concern identified as part of this FMP's associated policies are currently present or have the potential to be present on state forest lands.

Stream Restoration

Although protection of riparian areas improves conditions over the long term, direct restoration projects such as culvert replacements, road decommissioning, and in-stream placement of woody debris can accelerate the recovery of degraded aquatic systems (e.g. O'Neal et al. 2016; Hoffman and Dunham 2007; Whiteway et al. 2010). Recognizing American beavers (*Castor canadensis*) can enhance in-stream and riparian habitat through dam construction activities, stream restoration opportunities may also be identified in areas able to support beaver colonization where impounded water would benefit aquatic fish and wildlife species. Activities on state forest lands that contribute to watershed restoration projects (as defined by the Oregon Water Enhancement Board) include projects that directly improve in-stream habitat and road-related projects that provide aquatic organism passage, decouple road drainage systems from streams, and minimize sediment delivery to streams (**Table 3-5**). For more information on the condition of road-stream interactions, see *Transportation*. ODF is committed to ongoing stream restoration on state forest lands as described in the HCP and the strategies below.

Drinking Water

Forests produce the highest quality and most sustainable sources of fresh water on Earth (NRC 2008; Neary et al. 2009; Creed et al. 2011). Oregon's extensive and diverse forests generally produce very high-quality water—an important social, economic, and environmental benefit.

Drinking water must meet specific regulatory and engineering standards. Timber harvest, road management, and related activities can affect the supply, storage, and quality of water through various mechanisms. These mechanisms include altering annual average water yield (Moore and Wondzell 2005); changing timing, duration, and magnitude of peak flows (Grant et al. 2008); severity of summer low flows (Coble et al. 2020); the quantity of sediment

***Improving aquatic organism passage**. Culvert replacements like this one on Warner Creek (Astoria District) improve aquatic organism passage, which increases habitat accessibility and habitat quality.*

TABLE 3-5

Selected In-Stream and Road Projects by District Reported to Oregon Water Enhancement Board (1995–2020)

The Oregon Water Enhancement Board maintains an inventory of Oregon watershed restoration actions intended to improve habitat for aquatic species and water quality.

SOURCE: OWEB 2021

Stream Enhancement Projects	Astoria, Forest Grove, and Tillamook Districts	North Cascade and West Oregon Districts	Western Lane District	Total
Number of In-stream Projects	106	29	66	201
Number of Trees Donated	3,874	1,362	2,382	7,618
Miles of Stream Enhanced	85	32	57	[173]
Number of Fish Barriers Removed	252	48	51	351
Miles of Fish Access Restored	192	44	50	286
Number of Type N Crossing Fixed	1,626	600	113	2,339
Number of Road Relief Culverts Installed	3,574	717	188	4,479
Miles of Road Closed or Vacated	113	11	43	167
Miles of Road Improved or Relocated	1,005	108	67	1,180
ODF In-kind Contribution ($)	$39,818,227	$4,446,162	$3,252,727	$47,517,116
Other Contributions ($)	$5,228,014	$885,347	$4,761,886	$10,875,247

Aquatic and Riparian Resources *(continued)*

yield to intakes and reservoirs; and various water quality parameters (Institute for Natural Resources 2020). Thus, forest management has the potential to affect the operations and planning of water suppliers and their ability to provide clean water to their customers especially as climate changes.

Drinking water quality is regulated by EPA through the Safe Drinking Water Act. In Oregon, DEQ and the Oregon Health Authority (OHA) implement the Safe Drinking Water Act through a partnership instituted by the Drinking Water Protection Program (DEQ 2022c). While OHA ensures that customers receive drinking water that meets Safe Drinking Water Act standards, DEQ protects the sources of drinking water by implementing the Clean Water Act. DEQ assists public water suppliers by identifying source areas of drinking water, developing source water assessments, and assisting in the development of place-based

Aquatic and Riparian Resources *(continued)*

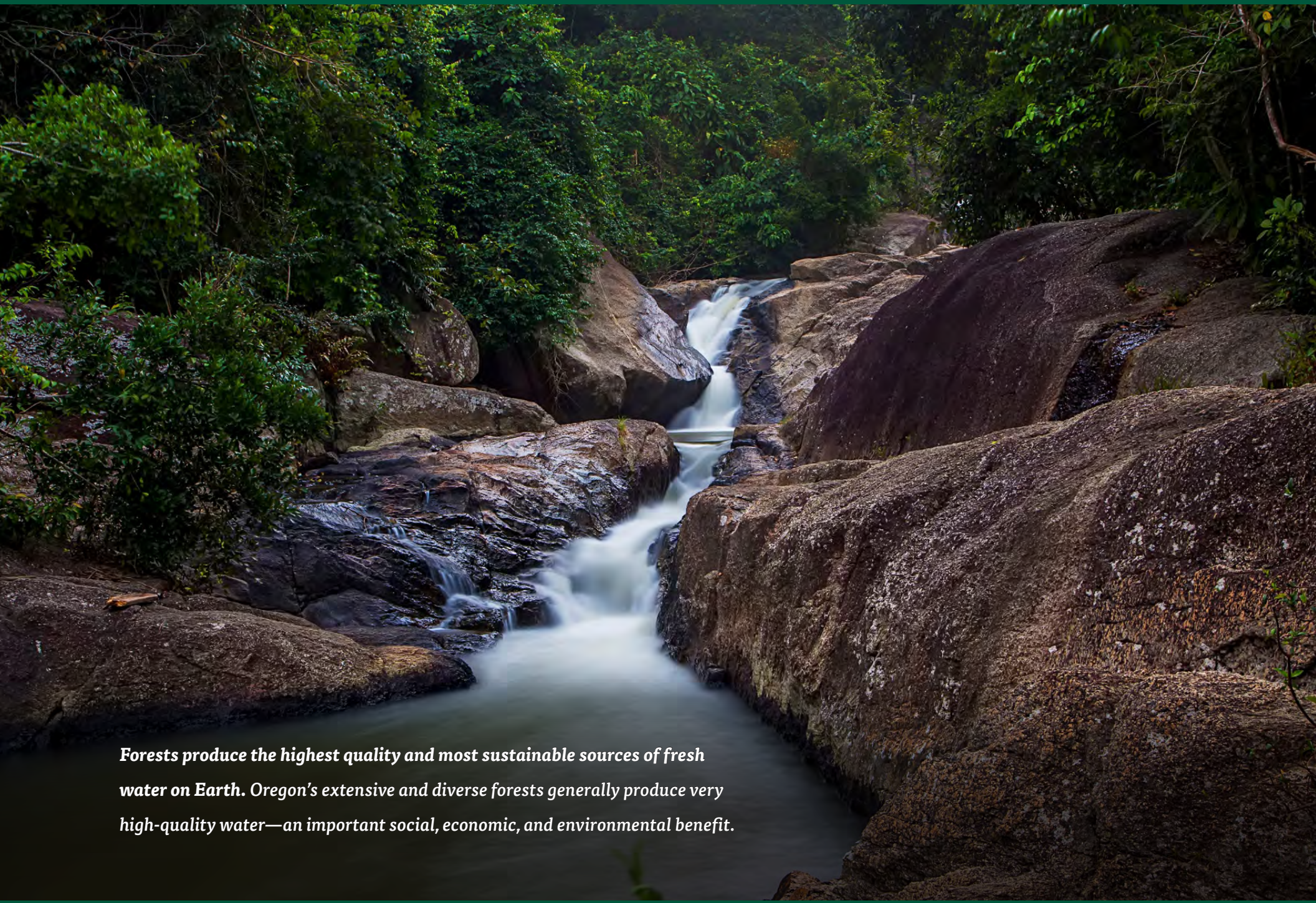
plans to reduce pollutants. A source area is the area in which a watershed delivers water to a water system.

The potential for ODF to affect drinking water in the planning area depends largely upon the percent of the drinking water source area under ODF management (Coble et al. 2020; Grant et al. 2008; Institute for Natural Resources 2020). Less than 1% of Oregon surface water drinking water source areas are located on ODF lands (DEQ 2017). It is possible to compare the planning area with the Drinking Water Protection Program's public water systems (PWS) (i.e., systems that serve more than three homes or connections) source areas to identify PWSs where ODF has the potential to affect public drinking water in the planning area. Three of Oregon's Public Water Systems have more than 45% of their source area on ODF lands: Timber Water Association, Hillsboro-Cherry Grove PWS' in Forest Grove District, and Jewell Sd #8 PWS in Astoria District (DEQ 2019). Very few community drinking water intakes are supplied from state forest lands. There are eight municipal or quasi-municipal points of diversion on ODF lands: three in the Astoria District, three in the Tillamook District, one in the Forest Grove District, and one in the North Cascade District.

Although not regulated by EPA, private and domestic drinking water can also be affected by forest management. However, only approximately 6% of known private and domestic water system intakes in Oregon are located on state or locally adjacent lands (OWRD 2023). There are 125 private or domestic points of diversion on ODF lands in six districts with Tillamook and Astoria having the most at 62 and 32, respectively (OWRD 2023). While these numbers are based on the most current data available, the number of drinking water intakes and source areas may change over time.

The FPA contains rules and the HCP contains conservation strategies that protect water quality. The FPA protects both private and domestic drinking water intakes and prevents non-point source pollution from entering water supplies. DEQ reviews the FPA for sufficiency to implement the Clean Water Act (DEQ 2021). By protecting riparian and aquatic ecosystems, many of the HCP conservation strategies are also protecting drinking water quality.

At the time of writing, the FPA water protection rules and the HCP conservation strategies pertain to water quality and sediment delivery, but not to annual average water supply or to the timing, magnitude, or duration of peak and low flows. In cases where state water quality standards are not met, DEQ may issue additional requirements, such as total maximum daily loads (TMDLs). The following goal and strategies serve to ensure that management is more aware of their potential impact on drinking water and coordinates with DEQ where waters may be impaired.



Forests produce the highest quality and most sustainable sources of fresh water on Earth. *Oregon's extensive and diverse forests generally produce very high-quality water—an important social, economic, and environmental benefit.*

GOAL

Aquatic and Riparian Resources

Protect, maintain, and enhance aquatic and riparian resources, that support the life history needs of aquatic and riparian-dependent fish and wildlife species.

Strategy—Aquatic Habitat

Protect, maintain, and enhance aquatic habitat for aquatic and riparian-dependent species.

Strategy—Headwater Processes

Maintain and enhance headwater processes that collectively trap and store sediments and organic matter, and export wood, substrate, and food to downstream reaches.

Strategy—Functional Landslide Processes

Maintain functional landslide processes including sediment routing and woody debris supply for slopes that could fail by identifying slopes that could fail and retaining trees on those slopes.

Strategy—Wetlands

Maintain the natural functions and attributes of wetlands, allow for new wetlands to form over time, and restore degraded wetlands where consistent with other resource goals.

Strategy—Threatened and Endangered Species and Other Species of Concern

Protect, maintain, and enhance habitat for threatened and endangered species and other species of concern. The following considerations are used to implement this strategy.

- Comply with state and federal ESA requirements and adopt management approaches that contribute to the persistence of threatened and endangered species.
- Implement the HCP and associated conservation actions targeted to benefit the species covered under the Incidental Take Permit.
- Conduct species assessments during IP development and related revisions to determine which species warrant special consideration and whether existing conservation measures are adequate.

GOAL

Aquatic and Riparian Resources *(continued)*

Strategy—Aquatic Organisms
Incorporate aquatic organism passage considerations into transportation planning and engineering design processes to meet state and federal passage criteria.

Strategy—Partnerships for Habitat
Foster partnerships with other agencies, Tribes, universities, and non-governmental organizations to plan, implement, and monitor aquatic and riparian habitats and ecosystem function, and to conduct research that fills gaps in scientific knowledge.

GOAL

Drinking Water

Protect, maintain, and enhance forest drinking water sources for private and domestic use.

Strategy—Drinking Water Effects Analysis
Develop and incorporate drinking water effects analysis into planning processes to identify and protect drinking water source catchments that overlap with the planning area.

Strategy—Department of Environmental Quality Total Maximum Daily Loads
Follow DEQ-issued TMDLs, including any additional site- or source-specific IPs, and monitoring and reporting requirements.

FOREST RESOURCE

Wildlife

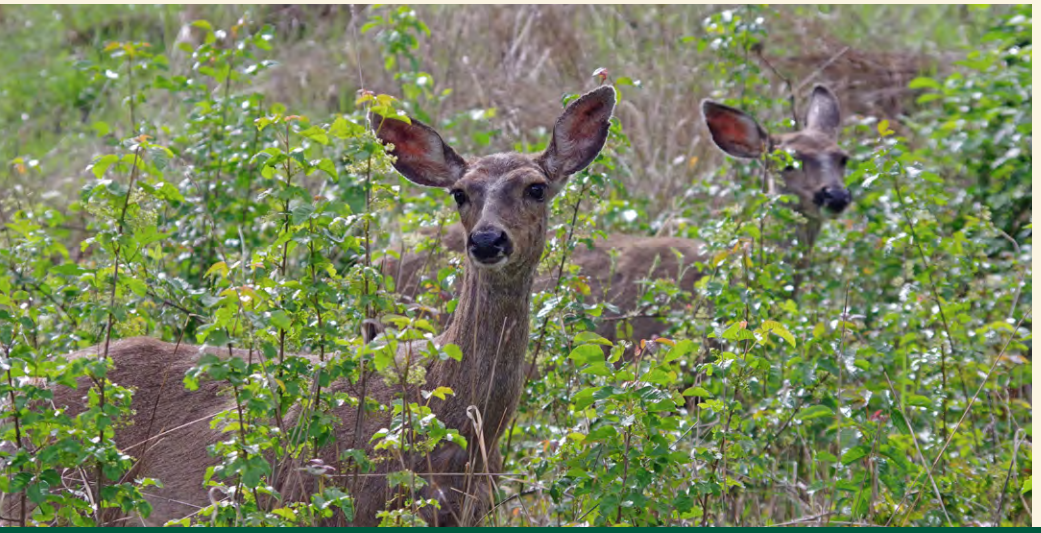
Like aquatic and riparian resources, management of wildlife habitat contributes to all three types of GPV. Protecting and enhancing wildlife habitat not only sustains the wildlife communities themselves but also the social and economic benefits derived from them. Abundant wildlife enhances recreation, subsistence, and cultural activities such as bird watching and hunting. These activities contribute to the local tourism economy and tax revenues from licensing fees.

Habitat Condition

The amount and quality of habitat for different species results from interactions between natural processes and management history. Environmental gradients, underlying geology, species distributions, and natural disturbance have always provided for variability in vegetation types across state forest lands in western Oregon. Extensive disturbances, such as wildfire and windstorms, continue to influence species' habitat. Disturbances over smaller areas, such as insect and disease outbreaks, create spatial heterogeneity within and among individual stands.

As described in *Forest Condition*, many of the state forest lands in western Oregon have a legacy of repeated, large wildfires or had been extensively logged prior to acquisition by the state. Managing the current landscape for multiple values including timber production, forest health, aquatic systems, and wildlife habitat has ultimately produced a complex mosaic of stand types and ages and within-stand habitat features. The variety of stand types resulting from ODF's management of state forest lands provide well-dispersed diverse habitat across the landscape at regional scales and broad connectivity to and between older forests on federal lands, as well as habitats where comparatively little other public forest lands exist (e.g., Clatsop State Forest). Young stands and associated early seral characteristics are important for diverse game and non-game species, including many species of state or federal concern (Swanson et al. 2014). Older stands on the landscape foster and support a variety of late-seral associates, such as northern spotted owls (*Strix occidentalis caurina*), marbled murrelets (*Brachyramphus marmoratus*), and red tree voles (*Arborimus longicaudus*). Forests in mid-seral stages (e.g., 30–80 years old) provide habitat for most native forest species, including early and late-seral associates, and enhance broader landscape function (Swanson et al. 2014).

Current ODF forest inventory data document the age class distribution of state forest lands and provide insight into the range of habitat types provided therein (*Forest Condition*). Additional variation in stand composition and structure due to stand development,



Blacktail deer near Roseburg, Oregon. *Many species of wildlife are found in Oregon's state forest lands—individual species use different stand types and habitat features at varying spatial scales.*

management history, site productivity, topography, region, and numerous other factors contribute to diversity across spatial scales. For example, rare or unique habitats, such as talus slopes and caves, add to landscape diversity, the broader ecological function, and resilience. There is considerable variation both within and among districts in the relative proportions of tree age classes and associated habitat types on the landscape. Individual species use different stand types and habitat features at varying spatial scales. Thus, state forest lands provide for diverse habitat across the landscape.

Harvest strategies, practices, and prescriptions in young stands have promoted high-quality, complex early seral habitat. This is important because complex early seral habitats can support a diverse and unique array of wildlife species from insect pollinators to a variety of insect-eating songbirds; to hunting opportunities for forest raptors along edges adjacent to older stands. With adequate snag retention in harvested units, complex early seral habitats can even provide denning and nesting cavities for sensitive species, such as fisher (*Pekania pennanti*), ringtail (*Bassariscus astutus*), purple martin (*Progne subis*), and bluebirds (*Sialia mexicana*).

Mid-seral stands are highly variable in habitat structure and function depending on natural disturbance, management history, and other factors, but all provide some degree of habitat to meet various life-history needs of native wildlife species, and also provide connectivity between other habitat types and across basins. Mid-seral habitat can provide for dispersal and foraging habitat for resident raptors, as well as cover and overall landscape connectivity for movement of forest carnivores and herbivores. Terrestrial salamanders can also be supported in early and mid-seral landscapes where adequate downed wood is retained (Kluber et al. 2008).

Late-seral habitats provide for associated wildlife when arranged in a manner that maximizes interior forest, reduces edge effects, and are arranged in a way that minimizes the distance between patches to maintain connectivity between mid-seral habitats and older stands. The recruitment and retention of large-diameter snags and downed wood is key for all seral stages and patch sizes across the landscape. The data also suggest state forest lands may lack habitat to support late-seral species, such as northern spotted owls and marbled murrelets. Approximately 87% of state forest lands are less than 80 years old. In general, the districts in the central and southern Coast Range and the Santiam State Forest have a greater proportion of total acreage in older stands. The Tillamook and Clatsop State Forests have comparatively little older forest, largely due to the extensive fires and logging that occurred prior to state acquisition. Despite large improvements in habitat diversity and quality since then, the state forests' habitat story largely remains one of restoration, rehabilitation, and enhancement in a young forest landscape (**Figure 3-1**).

General Wildlife Species

Western Oregon state forest lands currently have habitat suitable for most native species found in forests of the Coast Range and West Cascades. Vertebrate species known or suspected to be found on, adjacent to, or in some cases, downstream of, state forest lands in both aquatic and terrestrial environments include approximately 270 species, including 63 mammals, 147 birds, 32 amphibians and reptiles, and 28

Wildlife
(continued)

Wildlife
(continued)

fishes. This excludes the many species of marine fishes, birds, and mammals that may be found in the estuaries adjacent to state forest lands, unless they use state forest lands for some portion of their life history requirements.

Wide-ranging mammals such as deer (*Cervidae)*, elk (*Cervus canadensis roosevelti)*, American black bear (*Ursus americanus*), cougar (*Puma concolor*), and bobcat (*Lynx rufus*) make use of a variety of habitats in and near state forest lands to meet their life history needs. Forests stands are host to most native weasel species (*Mustelidae*), skunks (*Mephitidae*), squirrels (*Sciuridae*), voles (*Microtus*), mice (*Mus*), and other forest-floor small mammals. The full native assemblages of forest resident and migratory songbirds and raptors, including rare and sensitive species, are present on state forest lands. Upland game birds, such as grouse (*Tetraoninae*), quail (*Odontophoridae*), and Rio Grande wild turkeys (*Meleagris gallopavo intermedia*) are also present. Resident and migratory waterfowl and other aquatic birds are dependent on riparian, aquatic, and wetland habitats within state forest lands. Mammals such as river otters (*Lontra canadensis*) and American beavers (*Castor canadensis*) make almost exclusive use of these habitats. Many amphibians are associated with aquatic habitats, such as tailed frog (*Ascaphus*) and torrent salamanders (*Rhyacotritonidae*), yet other amphibians use terrestrial habitats and are strongly tied to the abundance and quality of downed wood (lungless or plethodontid salamanders; e.g., Oregon slender salamander [*Batrachoseps wright*], clouded salamander [*Aneides ferreus*]). Many birds, reptiles, and some mammals use rocky habitats (including caves or rock outcrops) for a variety of life history needs. Bats (*Chiroptera*) make use of many structures throughout the forest for roosting and hibernation and forage over nearby aquatic habitats.

Threats to wildlife on state forest lands include poaching, illegal dumping, habitat destruction and modification from management activities or public misuse, and extreme natural disturbances. Many of these issues can be addressed via forest planning and management in collaboration with other agencies and stakeholders. The long-term effects of climate change on wildlife are more difficult to assess and address by management. Changes in temperature, precipitation, and other aspects of climate will likely alter the quantity and quality of many species' habitats.

Under GPV, the overarching goal of ODF's strategies for wildlife is to protect, maintain, and enhance habitat for native wildlife species. Restoration and enhancement needs remain where fire and subsequent salvage logging or reforestation have reduced the extent or quality of habitat for some species (e.g., in the Tillamook Burn). Vegetation complexity and late-seral features, in particular, will take many decades to develop through both passive and active management. While moving the landscape toward more diverse habitat conditions, some individual species of concern, and their habitats may require special consideration.

Species of Concern

Species of concern are wildlife species that have been identified as at risk due to declining populations or other factors (e.g., having a limited range). Some (e.g., coastal marten and Pacific fisher) appear to be largely missing from forests in the region although habitat for the

species seems to be present. These and many others are species of concern to state and federal managers and the public. Numerous public and private entities designate wildlife species of concern for conservation and management, from local to global scales. The U.S. Fish and Wildlife Service, U.S. Forest Service, and U.S. Bureau of Land Management publish relevant lists for the Coast Range and Cascade Mountains Districts. At the state level, ODFW and the Oregon Biodiversity Information Center (formerly Oregon Natural Heritage Program) publish statewide and county lists.

ODF's species of concern list was developed with federal and state lists of threatened, endangered, and candidate species, as well as the Oregon Conservation Strategy and ODFW's sensitive species list (ODFW 2021). They identify species that need immediate and focused conservation effort. The list is a component of ODF's species of concern operational policies and is updated semi-regularly and will be captured in the IPs as state and federal lists are updated or new data or scientific understanding become available. Species of concern identified as part of this FMP's associated policies are currently present or have the potential to be present on state forest lands.

Threatened or Endangered Species

Forest management activities must comply with all federal and state laws, including those related to protection and conservation of wildlife populations and their habitat (e.g., the state and federal ESAs, federal Bald and Golden Eagle Protection Act, federal Migratory Bird Treaty Act, FPA). Although many laws apply to the management of state forest lands, legal requirements for protection of threatened or endangered species can have some of the most significant effects on planning and operations.

ODF has an extensive survey history for ESA-listed species (i.e., northern spotted owls and marbled murrelets) and continues to monitor activity at known sites on an annual basis. ODF, in various capacities over time, has supported research related to habitat relationships of numerous species (e.g., deer, elk, owls, murrelets, early seral birds, tree voles) and wildlife responses to forest management practices (songbirds, small mammals, amphibians). However, because relatively little inventory or monitoring work has been conducted on state lands for non-game species, some species may be present that have not been detected or documented yet (e.g., coastal marten). Other listed species are not currently known to be present but could become re-established as a result of habitat improvements, regional population recovery, or potential re-introductions (e.g., Pacific fisher, Oregon spotted frog).

The HCP (ODF 2022d) describes the status and occurrence of five wildlife species listed under state and federal endangered species protection acts. Species include northern spotted owl, marbled murrelet, Oregon slender salamander, coastal marten, and red tree vole. Fish are discussed under *Aquatic and Riparian Resources*. There are many other species of concern including birds, bats, and aquatic amphibians. Habitat needs vary for listed species of concern. Some species of concern are associated with late-seral habitats, others (e.g., flycatchers and warblers) are associated more with complex early seral habitats, and others (e.g., bats) are associated with more specific habitat elements like suitable roost structures or hibernacula.

Wildlife
(continued)

GOAL

Wildlife

Maintain, protect, and enhance functional and resilient landscapes that provide the variety and quality of habitat types and features necessary for long-term persistence of all native wildlife species.

Strategy—Habitat Diversity

Manage for diverse habitats across the landscape and over time.

a. Manage for a diverse array of seral stages.

b. Protect, maintain, and enhance habitats that account for the range of forest types, topography (slopes, aspects, elevations), and habitat features at the district level.

c. Identify and protect rare and unique habitats, particularly those that are fragile, sensitive, or potentially vulnerable to climate change.

The intent of this strategy is to conserve and enhance diversity as it promotes resilience and ecosystem function, which provides for many ecosystem services (e.g., pest control, pollination) and public benefits (hunting, fishing, birding, existence value). Managing for diversity helps ensure the full suite of habitats for native wildlife persist on the landscape in spite of short-term disturbances or chronic perturbations.

HCAs will provide the majority of late-seral stands and the total amount of late-seral forest increases therein over time. Early and mid-seral stands will exist both inside and outside of HCAs and contribute to the diversity of habitat types on the landscape. Treatment of 30,000 acres of SNC and hardwood-dominant stands over the first 30 years of the HCP permit will provide a complex early seral component in HCAs, as will natural disturbances. RCAs and leave-tree strategies provide for some older habitat components outside of HCAs. Operationally limited areas contribute to diversity and older age classes outside of HCAs. HCAs were designed to account for the range of forest types and topography and most habitat features at the district level. Rare, unique, and otherwise vulnerable habitat types and features outside of HCAs can be addressed with fine-filter strategies (e.g., bat hibernacula) and other policies (e.g., wetlands).

Strategy—Habitat Complexity

Manage for complex habitats of all ages and types.

a. Promote structural complexity, compositional diversity, and spatial heterogeneity at stand and landscape scales.

b. Adapt standards to regional and stand-level goals (e.g., habitat enhancement, forest restoration, fuels and fire risk, timber production, harvest age), and over time as stand and landscape conditions change.

GOAL

Wildlife *(continued)*

The intent of this strategy is to conserve and manage for habitat complexity as it enhances function of many ecosystem processes and services. Complexity is a key feature of high-quality habitat at all spatial scales for many species of concern and contributes to forest and habitat resiliency through time. The following considerations are used to implement this strategy.

- Protect, maintain, and enhance legacy structures, including remnant old growth trees, residual green trees, snags, and downed wood. Allow exceptions for public safety.
- Promote vertical layering where habitat restoration or enhancement are primary concerns or compatible with other goals and where species composition makes this strategy reasonably attainable.

Stands in HCAs are the foundation for this strategy and will provide the majority of complex stands of mid- to late-seral forest. Management in HCAs (thinnings and regeneration harvest of SNC and alder) will enhance complexity over time and provide for a complex early seral component. Outside of HCAs, leave-tree strategies, RCAs, and operationally limited areas contribute to stand and landscape complexity. Multi-species plantings inside and outside of HCAs further promote complexity and resilience. Silvicultural prescriptions will vary at the stand-level based on past management, current conditions, and desired future condition (e.g., production-emphasis versus habitat emphasis, fuels reduction management needs). These will also vary by district based on forest types, HCP covered species distribution, ownership patterns, and forest health concerns.

Strategy—Functional Landscapes

Manage for functional landscapes for native wildlife.

a. Create a variety of patch types, patch sizes, and patch arrangement over time.

b. Provide for adequate interior forest habitats.

c. Maintain connectivity between habitats, and broad landscape permeability, for diverse wildlife species including species of concern.

d. Foster and maintain redundancy at various ecological scales (e.g., species, stand types).

The intent of this strategy is to develop functional patches and resource arrangements with redundancy to help ensure resistance, resilience, and long-term persistence that meets GPV with climate change and long-term sustainability in mind. The following considerations are used to implement this strategy.

This strategy will mostly be achieved by HCP conservation actions inside and outside of HCAs. HCAs were designed to provide for functional landscapes for the covered species. As habitat develops therein, it will promote a variety of patch types, sizes, and arrangement, adequate interior forest habitat, and broadscale connectivity. Outside of HCAs, leave-tree strategies, RCAs, and inoperable areas further enhance landscape function, habitat distribution, and connectivity. Northern spotted owl dispersal habitat requirements further

GOAL

Wildlife *(continued)*

enhance the function of the areas outside of HCAs. Age-class structure outside of HCAs contributes to the variety of patch types on the landscape. Redundancy occurs both inside and outside of HCAs and contributes to forest resilience.

Strategy—Rare and Unique Habitats

Identify, protect, and restore rare and unique habitats, particularly those that are fragile, sensitive, or potentially vulnerable to climate change.

The intent of this strategy is to target locations on the landscape that are unique and support the life history needs of vulnerable species.

Strategy—Threatened and Endangered Wildlife Species and Other Species of Concern

Protect, maintain, and enhance habitat for threatened and endangered species and other species of concern. Use the following considerations to implement this strategy.

a. Comply with state and federal ESA requirements and adopt management approaches that contribute to the survival and recovery of threatened and endangered species and other species of concern.
b. Implement the HCP and associated conservation actions targeted to benefit the species covered under the Incidental Take Permit.
c. Conduct species assessments during IP development and related revisions to determine which species warrant special consideration and whether existing conservation measures are adequate.
d. Collaborate across ownership boundaries to meet common wildlife conservation goals.
e. Support habitats beneficial to pollinator species (including invertebrates) by integrating alternative management practices, where appropriate.

The intent of this strategy is to comply with state and federal ESA requirements and the HCP, while also managing for other species of concern. ODF will implement management approaches that contribute to the persistence of threatened and endangered wildlife species. Where appropriate, ODF will also apply these approaches to the conservation of species of concern not formally listed under state or federal ESA. Implementation ensures that wildlife habitats are managed in a way that meets all legal requirements and that listed and imperiled species will persist on the landscape using the conservation actions specified in the HCP. While the HCP captures currently listed and some

GOAL

Wildlife *(continued)*

candidate species, ODF will continue to remain informed about any potential future candidate species and species listings.

Applying the above considerations to management approaches provides a coarse filter - fine filter approach to addressing species of concern, while following the directions within the HCP ensures ESA compliance. Other species of concern are determined through regular policy review with assessment of need for additional fine filter strategies beyond FMP and HCP commitments. This strategy ensures ODF is managing habitat for all native species as required under GPV, while also working to prevent future listings.

HCP commitments provide the majority of tactics needed to achieve this goal. The HCAs' leave-tree strategies, northern spotted owl dispersal habitat outside of HCAs, and RCAs are the primary coarse filters for species of concern. Additional fine filters are added during IP development and implementation to address species of concern that have habitat requirements inadequately addressed by coarse filters. Fine filters are species- and site-specific, and generally of minor/minimal impact or complementary to operations. Examples include 1) protecting rock outcrops and caves of known use by Townsend's big-eared bats; 2) creating/retaining smaller-diameter, short snags on ridgetops in areas of known purple martin occupancy; and 3) implementing seasonal restrictions near known active peregrine falcon nests.

ODF considers pollinator habitat as part of wildlife habitat restoration efforts for species of concern. Pollination is an important ecosystem service that benefits forest health and resiliency. Pollinators have more specialized habitat needs that can be pursued alongside other management objectives with small shifts in practices or in areas unsuitable for timber production (Buhl et al 2021). In general, pollinator abundance and diversity may benefit from more open forest canopies and from native plant communities (Hanula et al. 2016). Focus for these practices could be within HCAs and stewardship classes with a subclass designation of cultural resources, plants, research/monitoring, unique threatened or endangered plants, or wildlife subclasses. Where practices are implemented, pollinators would provide ecosystem services to adjacent stewardship areas and nearby agricultural lands (Rivers 2018).

FOREST RESOURCE

Sensitive Plants

State forest lands have hundreds of species of plants. Native plants fill many roles in the forest ecosystem. They provide organic matter to forest soils, influence micro-climate, support native pollinators, contribute to biodiversity, and are used as cover and forage by many animals. In addition to their ecological functions, some plant species are harvested commercially or for cultural uses. Commercial uses of understory plants are discussed in the *Special Forest Products* section. This section focuses on threatened, endangered or rare plants (collectively, sensitive plants), as listed under the state of Oregon's ESA and administratively protected by the Oregon Department of Agriculture Native Plant Conservation Program (ORS 564.105; OAR 603-073).

The Oregon Biodiversity Information Center provides a list of sensitive plants that may be found on state forest lands, as well as records of known locations. Most of these species occur in non-forested areas, such as open, high-elevation rocky areas; open meadows; bluffs; and coastal areas. Six sensitive plant species are known to be present on state forest lands: Coast Range fawn lily (*Erythronium elegans*), Nelson's checkermallow (*Sidalcea nelsoniana*), Saddle Mountain bittercress (*Cardamine pattersonii*), cold-water corydalis (*Corydalis caseana* ssp. *Aquae-gelidae*), Chambers' paintbrush (*Castilleja chambersii*), and frigid shootingstar (*Dodecatheon austrofrigidum*). ODF is not aware of any other state-listed plant species that are likely to occur on state forest lands.

ODF protects listed plant species in accordance with the state and federal ESAs. ODF has identified listed species that occur, or are suspected to occur, on state forest lands and continues to update these lists (listings and occurrences) in consultation with the Native Plant Conservation Program. During operations planning, the districts determine if listed species occur or are likely to occur on lands where management activities are planned. If so, the district will determine whether the proposed management activities are consistent with the conservation program for the listed species and whether specific protection or mitigation measures are warranted.

GOAL

Sensitive Plants

Ensure the long-term persistence of sensitive plant species.

Strategy—Sensitive Plants

Identify, protect, maintain, enhance, and adaptively manage sensitive plant species.

CHAPTER 4

Guidelines

This chapter describes the processes for implementation and revision of the Western Oregon State Forests Management Plan (FMP).

4.1 Asset Management Guidelines

Assets,[1] as they are discussed in this section, are the tangible resources and infrastructure (e.g., parcels of land, forest products, forest roads and related improvements, trails, campground facilities) on state forest lands. Maintaining or enhancing value of assets described in this plan is fundamental to long-term sustainability of resources described in the greatest permanent value (GPV) rule (Oregon Administrative Rule [OAR] 629-035-0020) such as timber, revenue, aquatic and wildlife habitat, and recreation. The asset management guidelines discussed in this section align with the Oregon Revised Statutes (ORS), OAR, and Oregon Department of Forestry (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. The guidelines are influenced by the following implementation priorities under which the State Forests Division (Division) is operating.

- Conserve forest lands by maintaining the state forest land base.
- Maintain a land exchange and acquisition program to consolidate state forest lands for management efficiencies, economic values, or enhanced stewardship.
- Implement marketing strategies that increase the value of forest products.
- Prioritize and invest in stand management activities that increase quality and quantity of timber and enhance other ecosystem services.
- Maintain, develop, and protect investments in infrastructure such as roads, bridges, and facilities, while recognizing that in some cases investments may need to be moved, removed, or decommissioned.
- Maintain existing assets that support recreation, education, and interpretation activities, while recognizing that in some cases investments may need to be moved, removed, or decommissioned.
- Maintain investments in forest inventory, geographic information system (GIS) technologies, and timber harvest-tracking technologies that support planning and implementation processes and contribute to adaptive management.
- Prioritize and undertake investments in research and monitoring consistent with Section 4.3, *Decision-Making, Adaptive Management, Monitoring, and Research Guidelines*.
- Maintain a budgeting and financial management system that tracks revenues and expenses and aids in financial decision-making.
- Implement and maintain accountability strategies and systems that ensure the state and other beneficiaries receive anticipated financial and other benefits from the forest.

[1] Terms underlined in this document are defined in the Glossary. Defined terms are underlined at the first instance in each chapter.

4.1.1

Implementation Priorities

Funding levels for plan implementation vary with cyclical economic trends. FMP implementation is primarily funded through timber harvest revenues. There may be periods where revenues limit funding.

Annual budget instructions for developing fiscal budgets reflect the Forest Development Fund (FDF) balance and the projected FDF balance. The highest level of implementation and investment occurs when the FDF balance exceeds 12 months of operating expenses, and the balance is forecast to be relatively steady or increasing. The lowest level occurs when the FDF balance is less than 6 months of operating expenses, and the balance is forecast to decrease (**Table 4-1**). To avoid service level decreases, ODF may seek external federal, state, and non-governmental organization (NGO) funding sources, such as grants or legislative funding through policy option packages or legislative concepts. **Table 4-1** shows the forest management investment levels based on the revenue forecast and FDF balance. External funding sources should be considered at investment level 2 and pursued if the investment level is projected to be at level 3 or level 4.

4.2

Implementation Guidelines

The FMP, approved by the Board of Forestry (BOF), identifies the resource management goals and strategies that are intended to achieve an appropriate blend of resources. GPV is achieved through integration of forest management activities through ecologically sustainable management and using an adaptive framework across western Oregon state forests. The FMP does not focus on a single objective, but considers several key social, environmental, and economic goals at different scales. Land managers are tasked with considering all of the goals and strategies, identifying and addressing trade-offs, and meeting GPV when implementing the FMP. The process for implementing the FMP relies on the following set of tools and processes presented in **Figure 4-1.**

TABLE 4-1

Forest Management Investment-Level Guidance Based on Revenue Forecast and FDF Balance

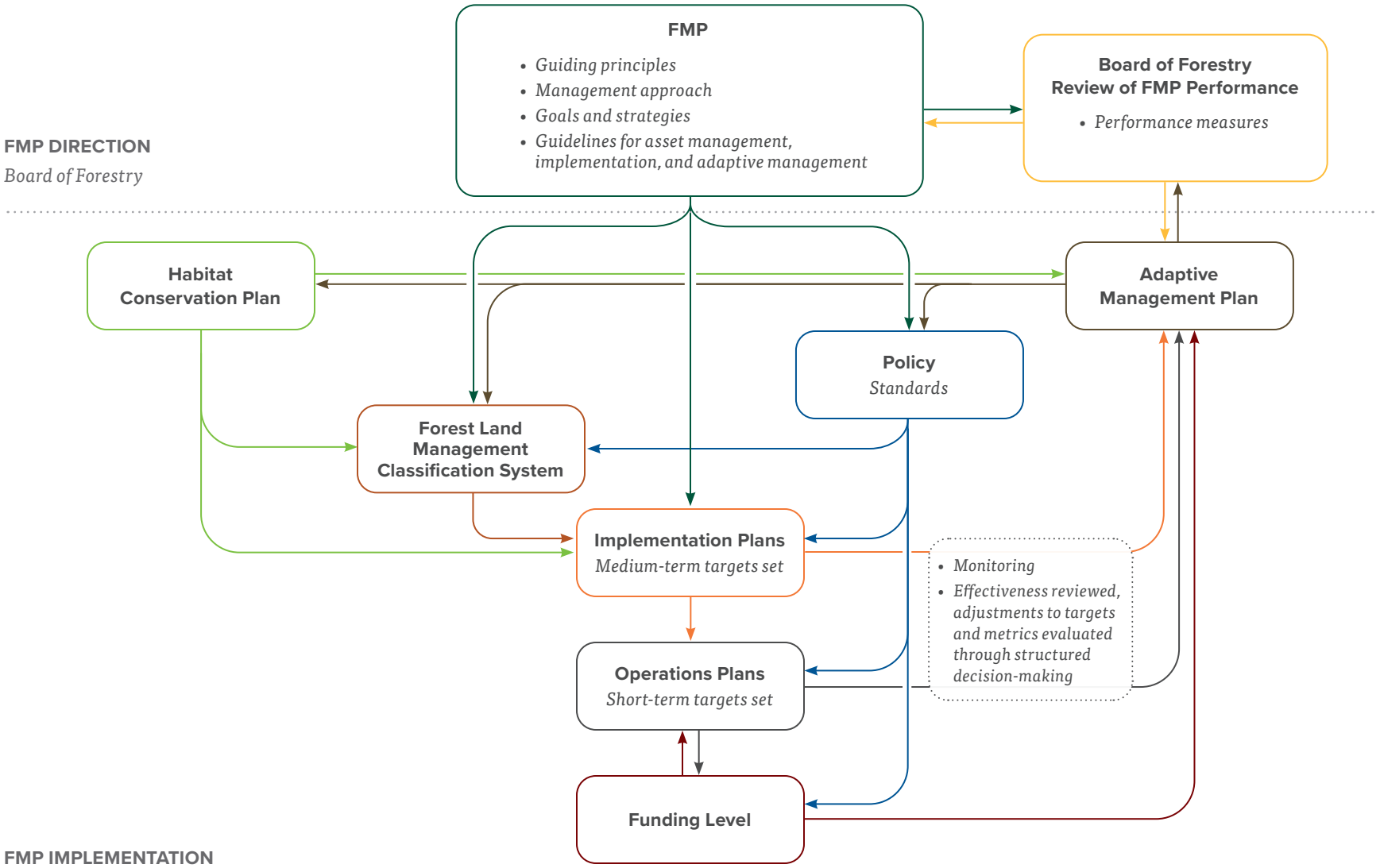
	Increasing 3-year Revenue Forecast	Decreasing 3-year Revenue Forecast
FDF Contains Greater than 12 Months of Operating Expenses	Level 1: Maintain or expand existing investments and fund new strategic investments	Level 2: Maintain or expand existing investments and explore additional strategic investments
FDF Contains 6 to 12 Months of Operating Expenses	Level 2: Maintain or expand existing investments and explore additional strategic investments	Level 3: Invest in deferred maintenance and maintain select strategic investments
FDF Contains Less than 6 Months of Operating Expenses	Level 3: Invest in deferred maintenance and maintain select strategic investments	Level 4: Maintain core business and meet legal obligations; no new investments

Note

Level 1 is the highest level of investment, while level 4 is the lowest.

FIGURE 4-1

Links among the FMP and Other Plans and Policy Guidance



FMP implementation is supported by the following elements.

- ***Western Oregon State Forests Habitat Conservation Plan* (HCP)**. The HCP enables ODF to comply with the federal Endangered Species Act (ESA) for certain covered species while conducting land management activities on state forest lands west of the Cascade crest. During the development of the HCP, land managers, and partners identified and provided feedback on trade-offs. The HCP biological goals and objectives document these decisions, which are implemented through Implementation Plans (IPs) and Operations Plans (OPs).
- **Performance measures**. Performance measures and their targets are developed with direct input from the BOF. Performance measures are monitored and enable the BOF and others to track progress toward FMP goals and to maintain accountability for management commitments.
- **Operational policies**. While the FMP sets certain management standards, primarily associated with resource protection, there are many instances where different management options may achieve FMP goals and IP objectives. Operational policies guide decisions within this range of options by defining specific procedures and best management practices that allow for management flexibility, while ensuring sound management and resource protection. Operational standards describe quantitative measures tied to laws and regulations and FMP and HCP goals and strategies, such as minimum leave trees. These policies and standards enable forest managers to develop IPs and OPs and to evaluate trade-offs. Operational policies are developed within the Division at the direction of the State Forests Division Chief.
- **Modeling**. Modeling is used as a decision-support tool to evaluate trade-offs and objective levels at various spatial and temporal scales, and the costs and outputs associated with each scenario. Modeling aids forest managers in evaluating potential effects and making decisions about allocation of resources across uses.
- **Implementation Plans**. IPs quantify shorter time periods (for example 8–12 years) associated with objectives for each resource at the district or multiple district-level. IPs describe the management approaches and activities designed to achieve the FMP goals and the HCP goals and objectives. IPs provide linkages among the FMP, HCP, operational policies, and on-the-ground activities that are described in OPs. Trade-offs are assessed and considered at the landscape level and are then incorporated into the IPs.
- **Forest Land Management Classification System (FLMCS)**. As codified in OAR 629-035-0050, the FLMCS is a method of describing the management emphasis of parcels of state forest lands. The FLMCS is recorded as a GIS layer. The management emphasis identifies the extent to which a parcel of land can be managed for a variety of forest resources. It also identifies when a particular forest resource may need a more focused approach in its management, or possibly an exclusive priority as designated by this FMP, the HCP, and other laws or commitments. This information is used in the development of IPs and during operational planning.
- **Operations Plans**. OPs describe individual projects for achieving expected FMP and HCP outcomes, over the near term (for example 1 to 2 years), that align with fiscal budgets and IPs. OPs prioritize activities and investments in the forests (e.g., inventory, young stand management, recreation development) on the basis of implementation levels as described in Section 4.1, *Asset Management Guidelines*.
- **Adaptive Management Plan (AMP)**. The AMP describes the adaptive management process used to monitor outcomes, evaluate trade-offs, determine if the strategies are meeting the goals of the FMP and HCP, determine if assumptions used in developing the strategies need to be updated, and inform management decisions.

4.2.1

Implementation Responsibilities

The State Forests Division Chief and Area Directors provide guidance for implementing the FMP and HCP through IPs and OPs. They review IPs, which are approved and signed by the State Forester. District Foresters implement the FMP and HCP within their districts through the oversight of OPs. The tasks and responsibilities for IP and OP development are described in **Table 4-2**.

TABLE 4-2

Roles and Responsibilities of Decision-Makers in the Implementation, Operations, and Revision Approval Process

Task	Responsible Party
Approves IPs and major revisions	State Forester
Approves OPs	District Forester
Implements IPs and OPs	District Forester

4.3

Decision-Making, Adaptive Management, Monitoring, and Research Guidelines

Meeting the goals of the FMP in a changing environment requires adaptive management within a decision-making framework. Adaptive management is "the process of implementing plans in a scientifically based, systematically structured approach that tests and monitors assumptions and predictions in management plans and uses the resulting information to improve the plans or management practices used to implement them." (OAR 629-035-0000(2))

These guidelines describe how adaptive management informs decisions, determines whether strategies are meeting FMP goals, and tests if the assumptions used in the development of the strategies need updating.

The land manager's dedication to learning from management, applying new findings, and acknowledging uncertainty is key to maintaining the social, economic, and environmental benefits of forests (Bormann et al. 2017). While the language of adaptive management is widespread in natural resource management, it is often difficult in practice to change course or evaluate whether an alternative will improve management. More monitoring or greater scientific understanding may not translate into improved management—the uncertainty of outcomes and diversity of values and objectives hinder decision-makers (Gregory et al. 2012). Adaptive management needs to be tailored to the agency's mandate and the social decision-making processes within the institution (Minkova and Arnold 2020). Adaptive management, which includes monitoring and research, supports a decision-making framework that guides the use of new information within the agency.

The guidelines for decision-making, adaptive management, monitoring, and research are presented in this section. They are followed by an outline of the accompanying AMP, which describes how ODF integrates new information, designs monitoring projects, reports on metrics, and facilitates decision-making. The AMP may be changed as we learn how to improve the process to work more effectively.

ADAPTIVE MANAGEMENT Adaptive management is "the process of implementing plans in a scientifically based, systematically structured approach that tests and monitors assumptions and predictions in management plans and uses the resulting information to improve the plans or management practices used to implement them." (OAR 629-035-0000(2))

4.3.1

Decision-Making Framework

ODF will improve its management by applying decision analysis, a process used to simplify decisions by breaking them down into key parts to work through in sequence (Hemming et al. 2022). The PrOACT acronym (Problem, Objectives, Alternatives, Consequences, and Trade-offs) is a popular ordering of the components that go into making a decision (Hammond et al. 2002). These steps for decision analysis have been adapted to many disciplines, and

structured decision-making (SDM) is the predominant process in natural resource management for making complex, multi-objective decisions that emphasize deliberation, estimating outcomes of alternative actions, and clarifying choices upon which the decision-maker can act (**Figure 4-2**) (Gregory et al. 2012). One benefit of SDM is that it scales to the decision's complexity, proving useful for a single person or small group brainstorming management alternatives, for a facilitated process with public input at the level of an IP, or for the BOF evaluating the FMP success through performance measures.

The decision-making framework assesses management questions and trade-offs across multiple objectives for different forest resources; addresses adaptive management needs described in the FMP, HCP, and other policy documents; and updates the learning process following advances in forest management and decision science.

The SDM process (**Figure 4-2**), whether conducted with ODF staff or external interested parties, has six steps. Previous steps can be revisited during the process to make refinements as needed.

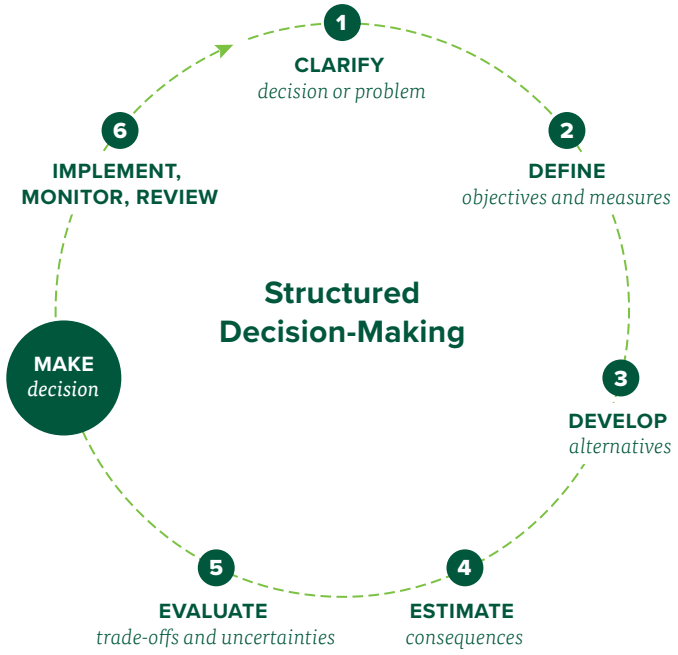
- **Step 1**. Clarify the decision by determining its scope, the relevant management objectives, and the decision-makers.
- **Step 2**. Define the objectives (i.e., "what matters") and the measures that will be assessed if the objectives are met.
- **Step 3**. Develop meaningful management alternatives that approach the problem from different angles that may prioritize different objectives.
- **Step 4**. Estimate the potential consequences, including the uncertainty, of each alternative using technical analysis or expert judgment.
- **Step 5**. Evaluate the trade-offs across multiple objectives and select the preferred alternatives, which may differ among participants, to present to the decision-maker.
- **Step 6**. Monitor the outcomes after the decision is implemented to inform the next iteration of the decision-making process.

FIGURE 4-2

Structured Decision-Making Process

The process supports multi-objective decision-making based on deliberation, estimated outcomes of alternative actions, and clear choices upon which decision-makers can act.

ADAPTED FROM GREGORY ET AL. 2012 FIGURE 1.1.



Engagement in the SDM process depends on the scope and impact of the decision, with greater public outreach for more significant decisions. Public and Tribal participation provides feedback to the technical working group on objectives, alternatives, consequences and trade-offs.

Adaptive Management

Adaptive management is most relevant to decision-making when management has a high impact on the resource objective, the consequences of management alternatives are uncertain, and resolution of uncertainty affects management decisions (Williams et al. 2009). In this case, the time dedicated to learning from different management treatments reaps benefits that outweigh the potential delay in meeting the resource objective. In a situation where the uncertainty about the effects of management is low or has little effect on decision-making, adaptive management is not as useful. Assessing the potential costs and benefits of engaging in adaptive management can be part of the SDM process. In other words, SDM addresses a wider variety of decision-making situations than adaptive management (Gregory et al. 2012).

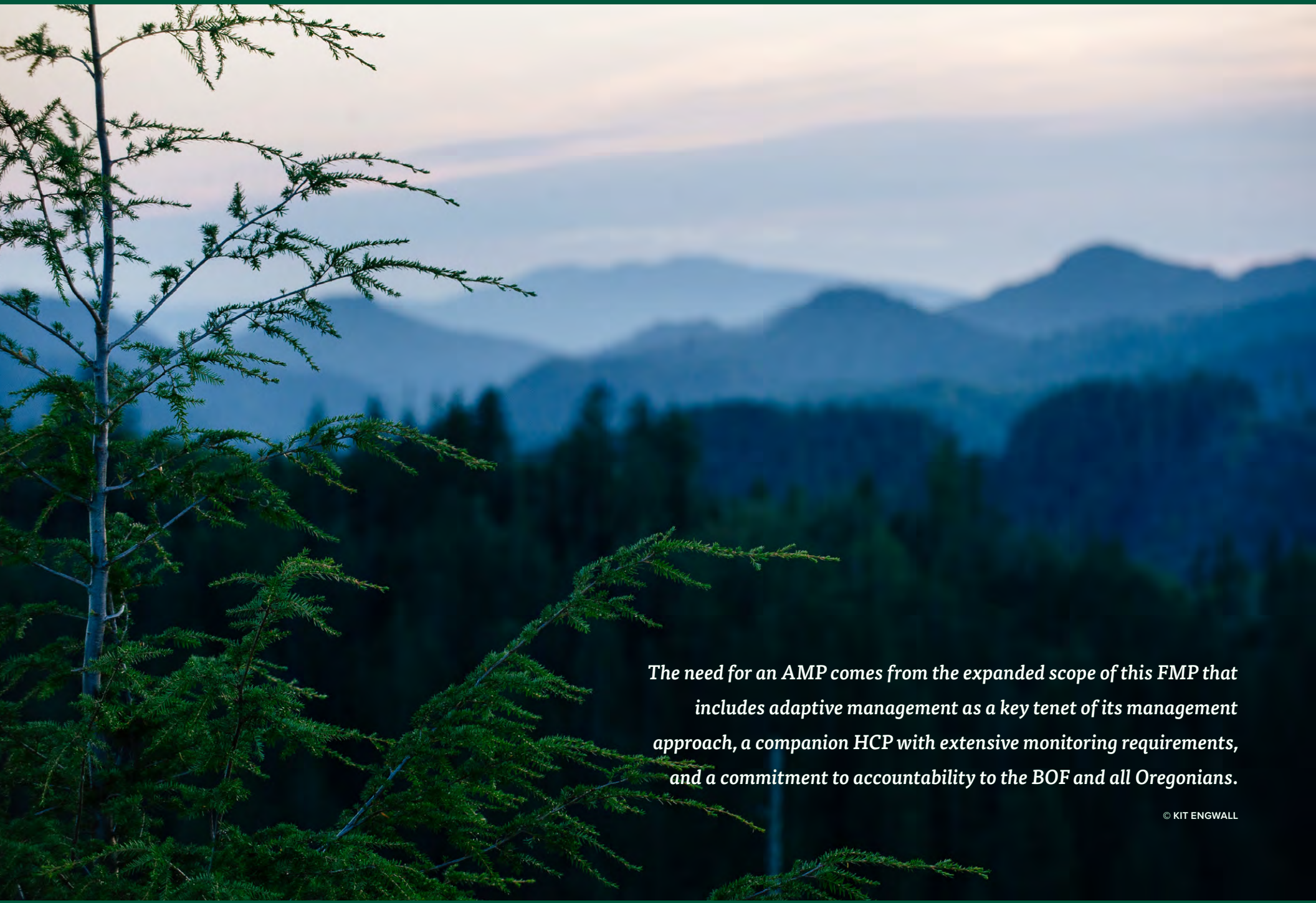
Adaptive management can vary in effort and experimental design, but the key component is learning from alternative management treatments (Williams et al. 2009). Generally, active adaptive management is for cases with high uncertainty and a need for learning about the cause-and-effect relationship of management on the resource objective. Active adaptive management uses a statistically robust experimental design to evaluate alternative management approaches. In passive adaptive management, monitoring data are collected to evaluate the effects of management on a resource. The experiment may not include controls, replicates, or randomized application of management prescriptions, so it is more difficult to establish cause and effect (Williams 2011).

Monitoring

There are a variety of monitoring approaches the Division uses depending on the objectives. Compliance monitoring (i.e., implementation monitoring) involves gathering information to determine whether rules, regulations, or requirements are being followed. Effectiveness monitoring assesses whether the implementation of management actions has the intended outcomes, such as tracking whether forest treatments increase occupied habitat of a species of concern. Effectiveness monitoring may require status monitoring or trend monitoring to judge management success. Status monitoring involves determining the state of a resource (e.g., spotted owl occupancy, snag density) at a point in time. Trend monitoring is an extension of status monitoring, where the change in status over time is examined. Trend monitoring can be used to assess whether management thresholds are being breached (e.g., spread of invasive weeds increased beyond a target density) or whether there appears to be a pattern of change across time (e.g., habitat quality is increasing) (Hilton et al. 2022).

Decision-making processes such as SDM may include a monitoring component to evaluate the effects of the decision and the state of the resource. The outcomes of monitoring inform the next iteration of decision-making. The ideal monitoring approach may change with time. As resource objectives, monitoring technology, and the understanding of the system change over time, the accompanying monitoring efforts also need to adjust to continue providing reliable and relevant information. Adaptive monitoring is a framework that reassesses monitoring questions and protocols in light of these changes while maintaining the integrity of long-term records (Lindenmayer and Likens 2009).

As an example of how new monitoring may be planned, a snapshot estimate (status monitoring) of a resource is compared with the desired state of the resource to determine if a problem exists (Nichols and Williams 2006). Before monitoring begins, hypotheses are developed about how the larger system affects the resource. The differences among the hypotheses capture the range of possibilities about how the system functions. The hypotheses can also affect where and how frequently data are collected. This thoughtful approach helps ensure that the monitoring provides useful information—both an estimate of the resource condition and a test of which hypothesis is best supported. The resource estimate allows the condition of the resource to be evaluated in the absence of temporal data demonstrating a trend, thereby helping to determine whether a management intervention or more targeted monitoring is needed.



The need for an AMP comes from the expanded scope of this FMP that includes adaptive management as a key tenet of its management approach, a companion HCP with extensive monitoring requirements, and a commitment to accountability to the BOF and all Oregonians.

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Research

Research in the context of the FMP is intended to generate reliable scientific information to guide management actions. New research performed by the agency would be designed within a decision framework. The agency supports and relies on several research cooperative partnerships to advance scientific understanding in strategic areas important for achieving management objectives. ODF offers planning support and special use permitting for research performed on state forest lands by scientists outside of the agency.

The decision-making framework describes the process for incorporating new information to ensure that the FMP is using the best available science. Peer-reviewed, published research may change the credibility or applicability of the assumptions that were used to develop the FMP strategies. New information fits into the SDM cycle when assessing the management alternatives, consequences, trade-offs, and uncertainty. Revisiting prior steps in the decision-making cycle is expected when new information is incorporated.

4.3.2

Adaptive Management Plan

The AMP offers direction and administration for (1) facilitating decision analysis and adaptive management; (2) designing monitoring; (3) reporting monitoring results, analyses, and decisions; and (4) identifying and integrating information and decision needs within state forest lands.

The AMP is a separate document from the FMP that provides a current roadmap for monitoring that supports the implementation of the FMP and improves management over time *(see box at right)*. The need for an AMP comes from the expanded scope of this FMP that includes adaptive management as a key tenet of its management approach, a companion HCP with extensive monitoring requirements, and a commitment to accountability to the BOF and all Oregonians. Monitoring, reporting, and decision-making support will be continuously updated in the AMP and reported in a more nimble and integrative manner that enables timely management responses to new information.

Vision for the

Adaptive Management Plan

- **Transparent**. Interested parties and ODF staff can easily access current work plans and planning documents for decision-making processes and anticipated timelines for delivering results.
- **Understood**. Interested parties and ODF staff know about the AMP and understand its mission and purpose, and the AMP is written in plain language.
- **Effective**. State Forests manages its lands to achieve Greatest Permanent Value and can make changes to management practices based on new information.
- **Inclusive**. The AMP integrates interested and affected parties and ODF staff into its processes and incorporates their feedback.
- **Efficient and timely**. The AMP focuses on informing planning and management via developing monitoring efforts that deliver usable results as quickly as possible.
- **Responsive**. When State Forests detects issues through monitoring, it works to address management problems creatively, transparently, and effectively.
- **Valued**. Interested parties and State Forests recognize the social and technical benefit that AMP products provide to State Forests and all Oregonians.
- **Reliable**. Decision analysis and monitoring design use the best available science to produce reliable metrics.

Workflows for Decision Analysis, Monitoring, and Assessment of Information Needs

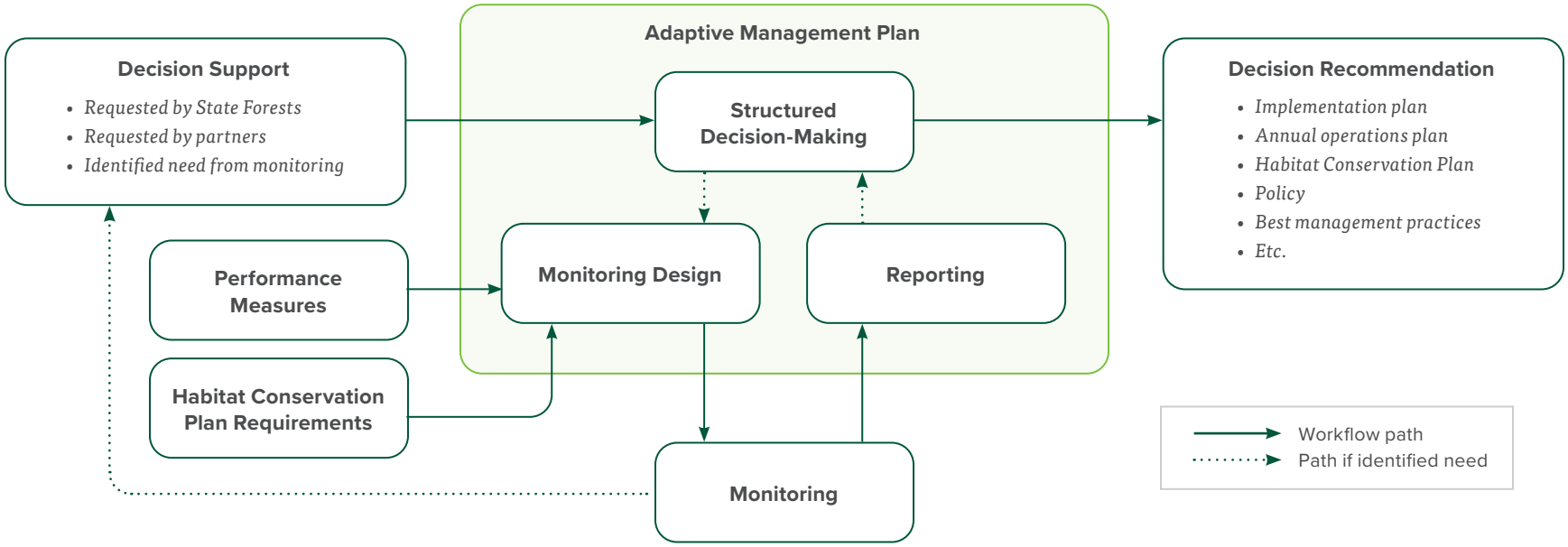
The AMP serves as a hub for information gathering and decision support across other policies and plans that incorporate adaptive management in their objectives. With support from the AMP, decisions are made by individuals or groups at the relevant planning level. For example, if monitoring shows the need for a fundamental change in FMP strategies, the decision would be made by the BOF after a formal public involvement process and codified through OARs. A smaller change, for instance in operational policy or management standards, could be made by the State Forests Division Chief after engaging interested parties through the decision-making process, which may suggest monitoring or adaptive management be included.

In the examples shown in the workflow diagram (**Figure 4-3**), a need for decision support may be identified by State Forests, interested parties, or metrics falling outside a range of acceptable targets identified in the HCP or performance measures adopted by the BOF. The AMP guides the SDM process (**Figure 4-2**) to develop recommendations for the decision-maker to consider. As shown by the dashed lines in **Figure 4-2**, SDM may include designing new monitoring and reporting results as needed for decision support. Decisions may affect IPs and OPs through the process described in Section 4.2, *Implementation Guidelines*.

FIGURE 4-3

Adaptive Management Plan Workflow

This workflow shows key AMP roles and how they can affect FMP implementation through decision support, monitoring, and reporting.



Key Monitoring Needs

The AMP designs monitoring, provides reporting, and responds to needs for additional decision support. Monitoring will include HCP compliance and effectiveness monitoring, BOF performance measures, monitoring of FMP strategies, and adaptive management monitoring recommended through potential SDM processes. These measures are called reporting metrics in the AMP, which describes the strategy for developing new metrics and tracks how data are collected, analyzed, and reported for each metric. Many reporting metrics will have quantifiable targets and acceptable ranges designated to assess whether management is meeting the desired outcomes that were monitored (i.e., lagging indicators) or that are predicted from modeling (i.e., leading indicators). Monitoring and reporting for the HCP and BOF-adopted performance measures are two major commitments addressed in the AMP (**Figure 4-3**).

Implementation of the HCP requires a detailed program of monitoring and adaptive management to ensure compliance and verify progress toward achieving the biological goals and objectives (HCP Chapter 6, *Monitoring and Adaptive Management*). The AMP serves as the structure for the adaptive management program required by the HCP to assess data gaps and scientific uncertainty that could affect how species are managed and monitored over time. The HCP Administrator at ODF serves as the key coordinator to initiate the process when triggers for action are identified from either over- or under-accomplishment of biological goals and objectives, or when alternative conservation practices are available. The HCP adaptive management process fits well within the decision-making framework described in Section 4.3.1, *Decision-Making Framework*, with additional regulatory considerations and involvement with the federal permitting agencies.

The performance measures assess the impact state forest lands have on social, economic, and environmental wellbeing. Performance measures adopted by the BOF will include targets and acceptable ranges that will increase the likelihood of progress toward FMP goals. Some performance measures may be supported through new or existing monitoring programs, which will be organized through the AMP. The AMP develops reporting dashboards to track performance measures for the BOF and public and Tribal engagement.

Project Prioritization and Timeline

The AMP contains a broad suite of monitoring and reporting needs to implement, which may be dependent on the Division's resources. Multiple sources (public and Tribal engagement, the Division's business needs, the HCP, and the BOF) identify needs for decision analysis, adaptive management, or monitoring that will be integrated and prioritized for efficiency.

The AMP sets priorities to develop workplans based on the following criteria comparing potential projects.

- Regulatory requirements, such as HCP compliance monitoring.
- Potential impact on GPV.
- Likelihood of influencing future management decisions.
- Degree of uncertainty or knowledge gap.
- Capacity or feasibility of getting answers in reasonable time and at a reasonable cost.
- Efficient integration with ongoing or planned monitoring.
- Potential for research partnerships.

The timeline for reporting decision analysis products and monitoring results aims to complement IP revisions and comprehensive reviews of HCP implementation. The IP is the key opportunity for the decision-making process, public and Tribal engagement, and adaptive management changes based on monitoring. The AMP workflow focuses on IP information needs in the 2 years leading up to planned IP revisions. New information needs will occur outside of the IP and HCP cycles; the AMP is responsive to opportunities to integrate decision analysis into other Division needs.

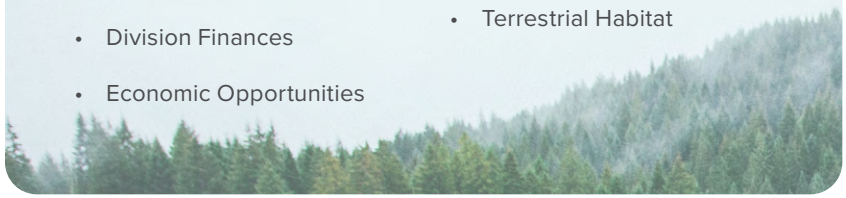
4.3.3 Performance Measures

Performance measures are a select set of metrics that the BOF will use to evaluate management outcomes with respect to the objectives and intent

Performance Measures

(listed alphabetically)

- Adaptive Capacity of Forests
- Aquatic Habitat
- Carbon Storage
- Community Engagement and Public Support
- Division Finances
- Economic Opportunities
- Financial Support for Counties
- Harvest and Inventory
- Recreation, Education, and Interpretation Opportunities
- Terrestrial Habitat



expressed through the FMP guiding principles, management approach, and goals (**Figure 4-1**). The ten performance measures listed below (*see box)* have specific components that will be monitored and reported under the process described in the AMP. Quantifiable targets and acceptable ranges designated by the BOF for performance measures' components will indicate whether FMP strategies are working as intended to provide GPV. While performance measures do not encompass all aspects of ODF monitoring and reporting, their purpose is to provide an up-to-date dashboard for the BOF and the public to track management outcomes readily across a broad range of key ecosystem services provided by State Forests.

4.4 Revision Guidelines

As the environment changes, revisions to plans and processes may be necessary to implement adaptive management and to incorporate new information.

4.4.1 Forest Management Plan

The BOF reviews the management focus of the FMP no less than every 10 years in light of current social, economic, scientific, and silvicultural considerations (OAR 629-035-0020). It may require 10 years or more for monitoring to establish trends. As new information becomes available, it is evaluated in the context of the guiding principles, goals, and strategies of the FMP. If implementation of the FMP is not achieving desired results, as indicated by the performance measures, the Division will revise operational policies.

If poor performance cannot be corrected through revised operational policies, or if research or monitoring shows the need for a fundamental change in FMP strategies, the BOF and the State Forester will weigh the scientific, operational, Tribal, and public input in a transparent and formal public process to determine if changes are needed to the FMP. Any changes will then be codified through OARs.

4.4.2 Habitat Conservation Plan

The HCP modification process is described in HCP Chapter 8, *Implementation*. HCP or permit modifications are expected to be rare and informed by the adaptive management process as outlined in HCP Chapter 6, *Monitoring and Adaptive Management*. The U.S. Fish and Wildlife Service and National Oceanic Atmospheric Administration Fisheries are key decision-makers in the modification process.

4.4.3 Operational Policy

Changes to operational policy occur as needed, in response to information from the adaptive management process, changing laws or conditions, new technology, improved management strategies, or new direction from the BOF or ODF leadership. Key decision-makers depend on the policy.

4.4.4 Implementation Plan

As new information becomes available, the IP may be revised in response to changing conditions or development of new or better implementation strategies identified through adaptive management. Revisions made at the IP level may include the types or amounts of management opportunities and their spatial arrangement. Key decision-makers are outlined in **Table 4-2**.

4.4.5 Forest Land Management Classification System

Revisions may be needed to the FLMCS when there is a change to the management emphasis on a parcel of land. Examples of such changes include the development of a new campground, a new wild and scenic river designation, or the removal of a research area after completion of a project. Definitions of minor and major revisions can be found in OAR 629-035-0060.

4.5 Engagement Guidelines

The goals for public involvement in forest land planning are outlined in OAR 629-035-080 and include providing information, seeking insight, building understanding, and providing public comment opportunities. The goals for Tribal engagement are outlined in Chapter 3, *Forest Resource, Goals, and Strategies*.

The purpose of engagement is to create a relationship that provides meaningful opportunities to contribute to planning decisions. Engagement is most beneficial during the IP process, when input can have the most influence on the levels and types of planned management activities. Input may contribute to setting priorities and identifying general locations of management activities. Input provided at the Operations Plan level would focus on small changes, refinements, or clarification of the plan. **Table 4-3** shows the engagement opportunities by plan level.

TABLE 4-3

Engagement Opportunities and Examples

Engagement Areas	Topic	Example Comment
AMP		
• Feedback and participation in the SDM process with regard to objectives, alternatives, consequences, and trade-offs	• SDM public engagement	• Our user group would like XYZ objectives included in the decision analysis, and this is how the impact of management alternatives on our user group could be measured.
• Performance measures adopted for the BOF to assess the FMP	• BOF public meeting	• The BOF should request an evaluation of the trend in the XYZ Performance Measure reported on the public dashboard because objectives for XYZ resource are not being met and management may need to change. • The BOF should promote the development and implementation of Tribal engagement policies to ensure ongoing consultation and coordination regarding potential impacts from forest management activities at every level.
	• Monitoring prioritization	• Recreational surveys should be prioritized during this IP to gather information that may be used to reduce conflict between user groups. • Integrate Tribal Partners' priorities and practices to ensure protection and proliferation of cultural and natural resources.

Table continues on following page

TABLE 4-3 (CONTINUED)

Engagement Areas	Topic	Example Comment
IP		
• Harvest levels, harvest types, priorities, and general locations • Recreation, education, and interpretation development/ activity levels, types, priorities, and general locations • Stream enhancement levels, types, priorities, and general locations • Road project levels, types, priorities, and general locations • Monitoring and adaptive management priorities	• Management activity type and location	• I would like more mountain biking trails, preferably built inside HCAs to reduce potential conflicts with harvesting. • Work with Tribal Partners to integrate culturally important plant and animal species (such as bear grass, camas, and spruce root). • Work with Tribal Partners to encourage access and co-management opportunities, including cultivation techniques that promote culturally significant attributes, and sharing native seed sources and native seedlings. • Coordinate with Tribal Partners to identify sales that may affect ancestral lands, level significance, and potential measures that may be needed to protect culturally significant resources.
	• Stream enhancement/ road project priority and location	• I propose the "generic" watershed as a high priority for stream enhancement and road improvement projects to align with work being done by the "Generic" Watershed Council in the next 5 years to replace non-fish-passable culverts and enhance 5 miles of the "generic" stream. • Engage Tribal Partners in prioritizing and identifying partnership opportunities to protect culturally significant aquatic species, such as salmonids and lamprey.
OP		
• Ensured consistency with the IP and/or FMP • Improved efficiency or effectiveness • Clarified description of planned operations • Additional information or correction of an error • Solution-oriented comments to increase the probability of achieving GPV goals and objectives	• Efficiency/ effectiveness	• The boundary of XYZ sale could be extended to the southwest where the terrain flattens out. Extending the boundary would eliminate the need to work through young stands while harvesting the timber during future sales. • The XYZ sale includes a culturally significant site that requires coordination with XYZ Tribes to implement XYZ protection measures.
	• Clarification	• I don't understand the terminology being used in this plan. Can you include definitions for BA, shelterwood and MBF in the document? • XYZ Tribe did not have awareness of this sale and has potential concerns and would like more information.
	• Solutions-oriented	• The XYZ sale area will affect approximately one mile of the existing trail. I realize that the forest is a working forest and ask for the following considerations: Limit the timing so the harvest operation is not active during prime horse riding season (July–Sept). If this is not possible then: Fall trees away from the trail whenever possible. Have all slash removed from the trail so the trail is in equal or better shape than pre-harvest conditions. Have trails open for use on weekends if possible.

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Glossary

A

active management, actively managed

Active application of silvicultural prescriptions and other activities in accordance with the future objectives and current characteristics of forest stands.

adaptive capacity (of ecosystems)

The ability of the system to sustain delivery of desirable ecosystem services under changed climate conditions and other disturbances via resistance and resilience to disturbance or transformative change to an acceptable new equilibrium.

The Intergovernmental Panel on Climate Change defines adaptive capacity as the degree to which adjustments in practices, processes, or structures can moderate or offset the potential for damage or take advantage of opportunities created by a given change in climate.

adaptive management

A systematic and rigorous approach to learning from actions, improving management, and accommodating change.

Adaptive management is defined as the process of implementing plans in a scientifically based, systematically structured approach that tests and monitors assumptions and predictions in management plans and uses the resulting information to improve the plans or management practices used to implement them (Oregon Administrative Rule [OAR] 629-035-0000).

- active adaptive management - A range of alternative management strategies are implemented in an experimental framework so that learning is a primary objective. Even though some alternatives may be suboptimal in achieving management objectives, decision-makers can identify and refine an optimal management strategy through a targeted study that reduces uncertainty
- passive adaptive management - Outcomes of a single course of action are monitored and the management decisions are adjusted, if needed, based on the results of the monitoring. Learning, or reducing uncertainty, is a secondary objective and alternatives are not tested experimentally.

Adaptive Management Plan (AMP)

Describes the adaptive management process used to monitor outcomes, evaluate trade-offs, determine if the strategies are meeting the goals of the Western Oregon State Forests Management Plan (FMP) and *Western Oregon State Forests Habitat Conservation Plan* (HCP), determine if assumptions used in developing the strategies need to be updated, and inform management decisions.

adaptive monitoring

Iterative evolution of a monitoring program in response to new management questions; new or changing environmental or socioeconomic conditions, improved monitoring methods, models, and tools; and experience implementing the monitoring program. See definition for *monitoring*.

adaptation silviculture, adaptive silviculture

Use of silvicultural techniques to increase the forest's ability to adapt to changing conditions and continue to deliver ecosystem services.

administrative sites	Lands where administrative requirements restrict the integrated management of forest resources. These lands include but are not limited to building sites, rock stockpile sites, log storage/sorting sites, and demonstration areas (OAR 629-035-0055 39(c)(B)(i).
aggregate	Sand and pebbles added to cement to make concrete, or that are used in road construction.
archaeological and historic resources	Sites, buildings, structures, and artifacts that possess material evidence of human life and culture of the prehistoric and historic past.
archaeological or historic 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 (Oregon Revised Statutes [ORS] 358.905).
archaeological or historic 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 in, or eligible for inclusion in, 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).
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.
aquatic organism passage, passage, fish passage	Aquatic organism passage is the term for removal or improvement of structures that restricts the movement of aquatic animals, such as fish, turtles, amphibians, and insects within and between streams.
aquifer	A sand, gravel, or rock formation that is capable of storing or transporting water below the surface of the ground.
area directors	Leads of the two administrative areas covered by this FMP: northwest and southern Oregon. The northwest Oregon area covers Astoria, Tillamook, Forest Grove, West Oregon, and North Cascade Districts. The southern Oregon area covers the Western Lane district.
asset(s)	Tangible resources and infrastructure on state forest lands.

B

best management practices (BMPs)

Oregon Forest Practices Act (FPA) rules adopted by the Board of Forestry (BOF) to minimize the impact of forest operations on water quality. These rules ensure that, to the maximum extent practicable, forest operations meet the water quality standards established by the Environmental Quality Commission. The rules focus on reducing nonpoint source discharges of pollutants resulting from forest operations.

biochar

Charred forest material, such as slash or dead plants, which can improve soil productivity and water quality and sequester carbon. The practice of charring forest material and mixing it with soil was used for thousands of years by indigenous people in the Amazonian basin. The practice created rich soils, called "terra preta de Indio", in otherwise infertile soils. Modern technologies use pyrolysis to produce biochar. Pyrolisis prevents harmful emissions and produces valuable byproducts in addition to biochar. Pyrolysis is the thermal decomposition of plant material in the absence of oxygen, which prevents combustion (burning). By preventing combustion, the production process prevents the release of greenhouse gases, particulates, and other toxicants to the atmosphere and instead produces bio-oil and synthesis gas, which are captured and can be used as fuel or precursors to other chemical products. Like coal, biochar is a stable form of carbon that can store carbon in the soil for hundreds to thousands of years.

biodiversity or biological diversity

The genetic variation and the variety of microbial, plant, and animal life.

biotic

Any living aspect of the planet.

Board of Forestry (BOF)

The BOF is a seven-member citizen board appointed by the governor and confirmed by the Oregon 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 BOF supervises all matters of forest policy in 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 (ODF).

Board of Forestry Lands (BOFL)

BOFL were acquired by the BOF under ORS 530.010–530.040. Most were transferred from counties to the BOF in exchange for a portion of future revenue from the lands. Some lands were acquired by direct purchase.

C

candidate species

Species being considered by the Secretary of the Interior for listing as an endangered or a threatened species, but not yet the subject of a proposed rule.

carbon pools

Reservoirs of carbon that have the capacity to both take in and release carbon.

carbon sequestration, carbon storage

The process of capturing and storing atmospheric carbon dioxide.

Class I areas	National park lands and some wilderness areas are designated as federal mandatory Class I areas under the Clean Air Act.
Clean Air Act	Federal law passed in 1970 and amended several times since. The authority to implement the act is delegated to states. The Clean Air Act is implemented, in part, through a permit system.
Clean Water Act	Federal law was passed in 1948 under the Federal Water Pollution Control Act but was significantly reorganized and expanded in 1972 and has been known as the Clean Water Act since then. This act, which has been amended several times since 1972 as well, establishes the basic structure for regulating discharges of pollutants into the waters of the United States; states may have their own Clean Water Acts whose standards must meet or exceed the federal mandates.
clearcut	Traditionally, a silvicultural system in which the entire stand of trees is cleared from an area at one time. Some residual trees, snags, and downed wood from the existing stand are retained to meet HCP goals and objectives and FPA requirements. Clearcutting and planting (if needed) result in the establishment of a new even-aged stand of trees.
climate change	Per the United Nations, involves long-term shifts in temperatures and weather patterns. These shifts may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil, and gas), which produces heat-trapping gases.
climate change mitigation	Reducing heat-trapping greenhouse gases in the atmosphere by reducing sources (e.g., the burning of fossil fuels for electricity, heat, or transport) of and sequestering these gases.
climate-smart forestry	An extension of sustainable forest management developed to guide management of forests in ways specific to climate change adaptation and mitigation efforts and to support climate-affected communities. Climate-smart forestry principles can be enacted through climate-informed silviculture, such as reforestation using alternative tree species; reforestation using alternative planting spacings and densities; reforestation using diverse species mix (bet hedging); and leaving legacy trees and downed wood to store carbon on the landscape.
coarse filter – fine filter	An operational approach managing for biological diversity. 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.
cohort	A group of trees regenerating after a single disturbance. The age range within a cohort may be as narrow as 1 year or as wide as several decades, depending on how long trees continue invading after a disturbance.
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 (CSF).

Common School Forest Lands (CSFL)

Common School trust lands that have been listed by the State Land Board for the primary goal of managing these lands for the generation of the greatest amount of income for the Common School Fund over the long term, consistent with sound techniques of land management. Common School trust lands that have been listed by the State Land Board for the primary use of timber production are called Common School Forest Lands. Other Common School trust lands are designated as rangelands or for other uses.

composition

The nature of something's ingredients or constituents; the way in which a whole or mixture is made up.

For an ecosystem, composition refers to the different species of plants and animals that live therein. 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 shape.

concept(s)

An abstract or generic idea generalized from particular instances.

confidential

Limited to persons authorized or entrusted with the information.

conifer forest

These stands occupy most of the state forest lands. ODF classifies conifer stands as those in which conifer species compose 50 percent or more of the basal area. 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.

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 area(s)

Designated land where conservation strategies are applied for the purpose of attaining specific conservation objectives; this may include cultural or biological aspects. In State Forests, conservation areas include habitats used by northern spotted owls and marbled murrelets, riparian conservation areas, rare or unique habitats, and areas requiring special protection for other resource values. Management within conservation areas is aimed at maintaining desired conditions.

cultural resources

An aspect of a cultural system that is valued by or significantly representative of a culture or that contains significant information about a culture. A cultural resource may be tangible, a place or space, or a cultural practice. Tangible cultural resources are categorized as sites, buildings, structures, and objects for listing in the National Register of Historic Places and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources. A cultural place or space may include areas containing a variety of natural and cultural resources that associated people define as heritage resources, including plant and animal communities, geographic features, and structures. Cultural practices may be associated with plant and animal communities or particular places, acknowledge past events or people, and have significant meaning to practitioners.

culvert

Structure that channels water past an obstacle, under a roadway, or to a subterranean waterway. Typically surrounded by soil or road fill (embedded), a culvert may be made from a pipe, reinforced concrete, or other material.

D

debris torrent, debris flow

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, which scours the streambed.

decision analysis

A process used to simplify decisions by breaking them down into key parts to work through in sequence.

deep-seated landslide

Slides in which the bulk of the slide plane lies below the roots of the forest trees, with a depth ranging from 10 feet to several hundreds of feet. These slides are usually caused by a change in the geologic and hydrologic processes in the area of the landslide, such as seismic shaking or increased levels of groundwater. Once formed, deep-seated landslides can persist for a few years or even centuries. See definition for *landslide*.

degraded forest lands

Degraded forest land conditions are those where the forest's biodiversity and ecological processes are diminished or severely constrained. These conditions may exist because of past management practices or large-scale disturbances such as fire, windstorms, floods, and outbreaks of insects or pathogens. Degraded forest land conditions may exist because of past management practices or natural disturbances such as fire, windstorm, floods, and outbreaks of insect or pathogens.

demographics

Demographics is the collection and analysis of general characteristics about groups of people and populations, such as age, gender, and income.

demonstration forests

Timberland that is managed for forestry education, research, and recreation. It demonstrates innovations in forest management, watershed protection and restoration, and environmentally sensitive timber harvesting techniques.

density

The average number of individuals or units per unit of space. In terms of forestry, density is often 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."

deposition

Deposition is when rocks or particles of soil or silt are carried from one location and placed in another, usually by moving water or wind. The wind or water can physically pick up and carry small particles, and these particles are deposited when there is not enough energy to carry them any longer.

desired future condition

A planning goal that describes the conditions land managers are attempting to achieve over a specified period of time in a given geographic area. In some cases, the land may already be in the desired condition and land managers would focus on maintaining those conditions. If the natural area is not currently in the desired condition, managers may take actions to encourage a different pattern of change over time to reach the desired conditions. The desired future condition describes the land or resource conditions of the forest given implementation of management direction contained in the plan if goals and objectives are fully achieved.

dispersal habitat — For northern spotted owls', can be conifer and mixed mature conifer-hardwood stands with a canopy cover greater than or equal to 40 percent but has no suitable nesting habitat and contains understory features that inhibits foraging both through decreased visibility of prey (overgrown vegetation or high twig density) or inadequate understory vegetation to support prey species. (Habitat neither suitable for nesting nor foraging.)

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

district forester — The lead forester for an ODF district. See definition for *field districts* and *ODF district*.

disturbance — A force that causes significant change in an ecosystem's structure and/or composition. Disturbance can be caused by natural events such as fires, floods, extreme winds, earthquakes, and insect or disease outbreaks, or by human activities.

diversity — Variety encompassed within a group. In terms of diversity, equity and inclusion (DEI), diversity means honoring and including people of different backgrounds, identities, and experiences collectively and as individuals. It emphasizes the need for sharing power and increasing representation of communities that are systemically underrepresented and under-resourced. These differences are strengths that maximize the state's competitive advantage through innovation, effectiveness, and adaptability.

downed wood, woody debris — Fallen trees or pieces of trees on the forest floor or in the stream channel that provide many important functions such as mineral cycling, nutrient mobilization, maintenance of site productivity, natural forest regeneration (nurse logs), substrates for mycorrhizal formation, and diverse habitats for fish and wildlife species.

E

ecological silviculture — Based on the spatial heterogeneity found in unmanaged old forests and seeks to emulate stand initiation and development processes that result from small-scale natural disturbances (e.g., windthrow, lightning, insects, disease) to promote within-stand diversity and complexity.

ecologically sustainable management, ecologically sustainable approach — A management approach that focuses on supporting the function of forest ecosystems and processes, to improve capacity to adapt and sustainable delivery of ecosystem services.

ecology — The biological science that deals with the relations of organisms to one another and to their physical environment.

ecosystem function(s) or functioning — The many and varied biotic and abiotic processes that make an ecosystem capable of reproducing outcomes over time (e.g., biogeochemical processes, nutrient cycling, decomposition, regeneration, and succession that supports survival of a common set of species over time).

ecosystem goods and services — Goods produced by ecosystems such as water, food, medicine, fuel, construction materials; and services produced by ecosystems such as clean air, clean water, heat mitigation, flood risk mitigation, water storage, and erosion control.

ecosystem(s)	A complex system comprising populations of organisms considered together with their physical environment and the interacting processes that exchange energy and matter between them (e.g., marsh, watershed, lake ecosystems). Ecosystems do not have boundaries fixed in time or space, or fixed biological or physical compositions, because the form and function of ecosystems change at various rates, depending on prevailing environmental factors and their resistance and resilience to disturbances.
edge(s)	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.
effectiveness monitoring	Monitoring designed to evaluate whether a given management action was effective in meeting a stated management objective. See definition for *monitoring*.
emphasis areas	Spatially explicit areas managed with an emphasis in management to achieve different combinations of resources goals. Layout of emphasis areas across the landscape supports diversity, connectivity, complexity, and redundancy, which support adaptive capacity for sustained ecosystem services delivery under changing conditions.
endangered species	As defined by the Endangered Species Act of 1973 (ESA), any species (including subspecies or qualifying population) that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species Act (ESA)	Provides a framework to conserve and protect endangered and threatened species and their habitats both domestically and abroad.
engagement	The involvement and participatory actions of the public and Tribes in planning and decision-making processes.
engineering	The science or profession of developing and using nature's power and resources in ways that are useful to people (as in designing and building roads, bridges, dams, or machines and in creating new products).
environmental gradient	Changes in physical or chemical characteristics across space, such as elevation, soil characteristics, ground slope, air or stream temperature, soil moisture or humidity, average annual precipitation.
equity	The quality of being fair and impartial. As part of DEI, equity acknowledges that not all people, or all communities, are starting from the same place due to historic and current systems of oppression. Equity is the effort to provide different levels of support based on an individual's or group's needs to achieve fairness in outcomes. Equity actionably empowers communities most affected by systemic oppression and requires the redistribution of resources, power, and opportunity to those communities.
erosion	The geological process in which earthen materials are worn away and transported by natural forces such as wind or water.
ethnobotanical	The scientific study of the traditional knowledge and customs of a people concerning plants and their medical, religious, and other uses.

Evolutionarily Significant Unit (ESU)

An ESU is 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. This term is used by the National Marine Fisheries Service (NMFS) 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 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.

F

field districts

The FMP planning area is organized into management districts, or field districts. Northwest districts are Astoria, Tillamook, Forest Grove, West Oregon, and North Cascade. The southwest district covered in this FMP is Western Lane.

financial viability

Achieved over the long term through continued protection and management of the forest asset; achieved over the short term with operational tools that ensure cash flow is available to ODF for sound management of state forest lands.

fine filter

See definition for *coarse filter-fine filter*.

fiscal conditions

Describes a government's ability to meet its financial and service obligations. If an agency is able to meet these obligations, it is in good fiscal condition; if not, it may experience fiscal stress.

fish passage

See definition for *aquatic organism passage*.

FMP area

See definition for *planning area*.

forest carbon

Atmospheric carbon dioxide that is assimilated by trees and other vegetation through the process of photosynthesis and released during respiration and decomposition.

Forest Development Fund

Fund through which all BOF expenditures and revenues are managed.

forest health, healthy forest landscapes

Severity, extent, and frequency of events causing injury or death of trees and other organisms living in the forest; ability of forest to resist or recover from disturbance events; ecosystem health.

Forest Land Management Classification System (FLMCS)

As codified in OAR 629-035-0050, a method of describing the management emphasis of parcels of state forest lands. The FLMCS is recorded as a geographic information system (GIS) layer. The management emphasis identifies the extent to which a parcel of land can be managed for a variety of forest resources. It also identifies when a particular forest resource may need a more focused approach in its management, or possibly an exclusive priority as designated by the FMP, the HCP, and other laws or commitments. State forest lands are classified as General Stewardship, Focused Stewardship, Special Stewardship, or High Value Conservation Areas.

Forest Trust Lands Advisory Committee

An advisory group of elected county commissioners mandated by statute that advise the BOF and state forester on matters related to state forestland managed by ODF. The council represents the 15 counties with state forest lands on policy matters related to the management of the forestlands and distributions of revenues produced from those lands.

The counties that receive revenues from these forestlands are Benton, Clackamas, Clatsop, Columbia, Coos, Douglas, Josephine, Klamath, Lane, Lincoln, Linn, Marion, Polk, Tillamook, and Washington.

The committee's member roster is established during the middle of November each year when the Council of Forest Trust Land Counties elects their board of directors at the annual meeting of the Association of Oregon Counties.

forestry

The science and practice of establishing, managing, and conserving forests and associated resources in a sustainable manner to meet desired goals, needs, and values.

formation

The action of forming or process of being formed. In geology, a formation is a group of strata, or layers, of the same sort of rock or mineral, or rock having common characteristics. A formation is usually defined distinctive enough in appearance that a geologic mapper can tell it apart from the surrounding rock layers.

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 defined as 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(s), ecological function

An activity or process that occurs in an ecosystem; some typical functions are plant growth, animal reproduction, and decay of dead plants.

G

geographic information system (GIS)

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.

geology

The science that deals with the earth's physical structure and substance, its history, and the processes that act on it.

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.

Greatest Permanent Value (GPV)

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 as defined in OAR 629-035-0020.

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 northwest Oregon state forests.

H

habitat

The resources, conditions, and factors necessary to support living organisms over space and through time.

Improving habitat means improving the resources or conditions that support a species' health and longevity or the population's persistence.

habitat conservation area (HCA)

A protected area with site-specific boundaries established by the HCP intended to conserve, maintain, and enhance habitat for the terrestrial covered species.

habitat conservation plan (HCP)

A comprehensive planning document that is a mandatory component of an Incidental Take Permit (ITP) application pursuant to section 10(a)(2)(A) of the ESA. The *Western Oregon State Forests HCP* enables ODF to comply with the federal ESA for certain covered species while conducting land management activities on state forest lands west of the Cascade Crest.

habitat conservation plan (HCP) administrator

Serves as the key coordinator to initiate the process when triggers for action are identified from either over- or under-accomplishment of biological goals and objectives, or when alternative conservation practices are available.

hardwood stand

Found on a minority of state forest lands. ODF classifies hardwood stands as those in which hardwood species comprise more than 50 percent of the tree canopy.

harvest units

Delineated forest parcels that reflect potential logical harvest operation areas considering topography and access. A unit for clearcut and thinning choices.

healthy forest landscapes

See *forest health*.

historic or historical resources

Defined by state and federal law, these include artifacts, property, and sites:

historic artifacts - Three-dimensional objects including furnishings, art objects, and items of personal property that have historic significance. Historic artifacts do not include paper, electronic media, or other media that are classified as public records (ORS 358.635).

historic property - Real property that is 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.

historic site - Sites created and/or used by humans since the time of Euro-American inhabitance; usually above-ground structural intact remains.

hydrologic processes Describes how water is exchanged (cycled) through Earth's soil, geology, vegetation, and atmosphere through evaporation, transpiration, condensation, precipitation, infiltration, and subsurface flow. Hydrologic processes relate to how the landscape is shaped by water, for example how streams and floodplains form and change over time.

hydrology The study of the properties, distribution, and effects of water on the landscape, under the surface, in the rocks, and in the atmosphere.

I

implementation monitoring Used to determine if objectives, standards, and management practices specified by law, regulation, policy, or the HCP are being implemented. Implementation monitoring is used to determine whether specified actions or criteria are being met. See definition for *monitoring*.

Implementation Plan (IP) An ODF plan that describes the management approaches and activities designed to achieve the FMP goals and the HCP goals and objectives within a shorter timeframe (e.g., 8–12 years).

Incidental Take Permit An Incidental Take Permit (ITP) is a federal exemption to take prohibition of Section 9 of the ESA; the ITP is issued by the U.S. Fish and Wildlife Service pursuant to Section 10(a)(1)(B) of the ESA. An ITP is also referred to as a Section 10 Permit or Section 10(a)(1)(B) Permit. To take is to "… to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with regard to federally listed endangered species of wildlife (Section 3(18) of the ESA). Federal regulations provide the same taking prohibitions for threatened wildlife species (50 CFR 17.31(a)).

inclusion The action or state of including or of being included within a group or structure. In terms of DEI, inclusion is a state of belonging when persons of different backgrounds, experiences, and identities are valued, integrated, and welcomed equitably as decision-makers, collaborators, and colleagues. Ultimately, inclusion is the environment that organizations create to allow these differences to thrive.

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. Integrated pest management techniques may include the use of natural predators and parasites, genetically resistant hosts, environmental modifications, 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). 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 FMP over time and across the landscape.

L

landscape In ecological terms, an area of land containing a mosaic of patches, often within which a particular "target" patch is embedded. Also defined as a unit of land with separate plant communities or ecosystems forming ecological units with distinguishable structure, function, geomorphology, and disturbance regimes.

landscape context Refers to the spatial relation of different patches (land management, habitat type, ecological processes, hydrological process, etc.) within the landscape and the values, constraints, or risks they impose on each other. See *landscape*.

landslide(s) 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.

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.

legacy structures, legacies Structural components within a forest stand that are retained during harvest operations, and that provide habitat diversity in the future stand. Examples of legacy structure include live trees, snags, and downed wood.

lifeways A traditional way of life reflecting an all-encompassing aspect customs, practices, and belief systems. This may include foods consumed, materials collection, religious practices, and so on.

listed, federally listed, or listed species Species, including subspecies and distinct vertebrate populations, of fish, wildlife, or plants, listed at 50 CFR 17.11-17.12 as either endangered or threatened.

live trees Live trees that are retained to provide short-term habitat needs of wildlife species, to serve as a source of future snags and downed wood, and to provide legacy trees in future stands. This term also refers to live trees present in a stand that are legacies of a previous cohort of trees.

M

management prescription The management practices and intensity selected and scheduled for application on a specific area to attain predefined goals and objectives.

mass wasting processes Down slope movement of rock or soil due to the force of gravity. The four most common types of mass-wasting are falls, slides, flows, and creep. Falls are abrupt movements of rocks that have detached from steep slopes of cliffs. Slides are the movement of a mass of earth and rock from a mountain or cliff and can occur slowly or quickly. Examples of flow type are debris, mud, or earth. Creep (or soil creep) is a slow, long-term mass wasting process. The steeper the slope the faster the creep. Precipitation, chemical weathering, lithology (type of rock), and steepness of slope(s) contribute to mass wasting processes.

metrics A quantifiable value, characteristic, or condition measured by monitoring programs (see definition for *monitoring*).

monitoring

The measurement of metrics to determine resource status or trends in some aspect of environmental quality.

adaptive monitoring - Iterative framework that enables monitoring questions and protocols to change over time in response to new information or new questions.

implementation monitoring - Asks the question, “Did we do what we said we would do?” For example, did we leave the number of snags during a timber harvest required by law or policy?

effectiveness monitoring - Asks the question, “Are the management practices producing the desired results?” For example, are snag retention practices resulting in improved habitat for a species of interest?

status monitoring – Asks the question, “What is the state of the resource?” For example, what is the snag density at a point in time?

trend monitoring – Extension of status monitoring, asks the question, “What is the change in status over time?” For example, how has the snag density changed over time?

N

native

Indigenous to Oregon and not introduced.

non-point 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 non-point source.

northwest Oregon state forests

Includes all state forest lands in the FMP planning area. See definition for *planning area*.

noxious weeds

Terrestrial, aquatic, or marine plants designated by the Oregon State Weed Board under ORS 569.615 as representing the greatest public menace and a top priority for action by weed-control programs.

nutrient cycling

Circulation or exchange of elements, such as nitrogen and carbon dioxide, between living and nonliving portions of the environment.

O

objective

A clear and specific statement of results to be achieved within a defined 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 downed wood (such as fallen trees) on the ground. In western Oregon, old-growth characteristics begin to appear in unmanaged forests at 175–250 years of age.

Operations Plan (OP)	Describe individual projects for achieving expected FMP and HCP *outcomes*, over the near term (for example 1 to 2 years), that align with fiscal budgets and IPs.
Oregon Conservation Strategy	Created by the Oregon Department of Fish and Wildlife (ODFW) to outline a set of priorities and recommendations for addressing Oregon's fish, wildlife, and habitat conservation needs. Strategy species in the Oregon Conservation Strategy are Oregon's species of greatest conservation need because they are experiencing population decline, habitat loss, and other issues that put them at risk.
outcomes	Management or plan outcomes.

P

passive management	Typically allows resources to change over time with minimal human intervention. For example, forest stands could be allowed to grow and regenerate along their current trajectory—no reforestation, thinning, harvesting, site preparation or prescribed burning activities would be used.
patch	A term fundamental to landscape ecology and silviculture, it is defined as a relatively homogeneous (same/similar) area of habitat or forest stand that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics.
pathogen	A specific causative agent (such as a bacterium, fungus, or virus) of a disease.
people of Oregon	People living in the state of Oregon.
performance measure(s)	Developed by the BOF, a select set of metrics with targets or acceptable ranges that track progress toward FMP goals and indicate if the FMP strategies are working as intended to provide GPV.
planning area, plan area, or FMP area	Approximately 640,000 acres consisting of BOFL, Common School lands, and administrative sites west of the Cascade Crest.
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(s)	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)).

prescribed burn/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.
private and domestic drinking water	Systems serving three or fewer homes or connections with a water use permit issued by the Oregon Water Resources Department.
properly functioning aquatic habitat *or* condition	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.

R

reciprocity	Ecosystem services deliver social and economic benefits, and social and economic benefits can be obtained in a way that supports environmental benefits.
redundancy	The duplication of components or functions of a system with the intention of increasing the resilience of the system.
reforestation	A management action to renew tree cover by establishing young trees. This can be accomplished by planting an area with trees or aerial seeding or letting an area naturally seed in. This work is done to maintain appropriate forest cover, achieve a desired ecological condition, and/or restore forests for wildlife, watersheds, and recreational experiences.
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, elevated stream temperatures, or human activity, or much longer term, such as periods of glaciation.
regeneration	The process of renewal of a forest or stand of trees, or young trees in a stand.
regeneration harvest(s), regeneration harvesting	The removal of trees to make regeneration possible or to assist in the development of the established regeneration (young trees). Regeneration harvests can range from a clearcut to a retention cut. A clearcut removes almost all trees from a stand (see definition for *clearcut*) resulting in a new even-aged stand of trees. A retention cut retains more residual trees within the unit (between 33 and 80 square feet of basal area per acre), similar in look to a heavy thinning resulting in a stand with two distinct ages of trees following tree planting.
resilience, resiliency, resilient	The ability to recover from the disturbance.
resistance	The ability of a system to withstand the disturbance.

restoration Management actions taken to rehabilitate degraded forest lands to properly functioning condition such that lands are delivering ecosystem goods and services such as timber, fish and wildlife habitat, special forest products, carbon sequestration, and drinking water.

revenue(s) The total income produced by an organization's operations, such as income generated by timber harvest operations.

riparian conservation area (RCA) A protected area with site-specific boundaries established by ODF; the width varies according to the stream classification or special protection needs. The purpose of an RCA is to protect the stream, aquatic resources, and riparian area. Aquatic resources include water quality, water temperature, fish, stream structure, and other resources.

riparian, 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 streambed or lakeshore.

S

salvage harvesting The utilization of standing or downed trees that are dead, dying, or deteriorating, for whatever reason, before the timber values are lost.

scenic Providing or relating to views of impressive or beautiful natural scenery.

scenic waterways, scenic river A river, lake, or segment thereof, including related adjacent land and the airspace above, that has been so designated by or in accordance with the Scenic Waterways Act (ORS 390.805–390.925)

sensitive plants Threatened, endangered, or rare plants (collectively, sensitive plants), as listed under the state of Oregon's ESA and administratively protected by the Oregon Department of Agriculture Native Plant Conservation Program (ORS 564.105; OAR 603-073).

seral, seral stages Developmental stages that succeed each other as an ecosystem changes over time; specifically, the stages of ecological succession as a forest develops.

shallow, rapid landslide Debris-flow slides that occur in the forest rooting zone, generally less than 10 feet deep. They are typically initiated by intense rainfall and/or rapid snowmelt. Shallow slides usually follow a long saturation period that is punctuated by an intense burst of precipitation over several hours or a few days. At some point, gravity overtakes the hillside and the muddy soil mass breaks loose. See definitions for *landslide* and *debris flow*.

silvicultural, silviculture The 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 downed wood to meet the needs and values of society and landowners such as wildlife habitat, timber, water resources, and recreation.

site class	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. In this document, an age of 50 years is used. The five site classes are defined below. Site class I: 135 feet and up Site class II: 115–134 feet Site class III: 95–114 feet Site class IV: 75–94 feet Site class V: below 75 feet
slash	Logging debris left in the forest after a harvest such as tree limbs and tops. Sometimes called logging residue.
slope stability	The degree to which a slope resists the downward pull of gravity. The more resistant, the more stable.
snag	A standing dead tree.
Soil and Water Conservation Districts (SWCD)	The Oregon Department of Agriculture's SWCD Program provides services to the 45 Soil and Water Conservation Districts throughout Oregon. The districts work with local landowners and residents, natural resource organizations, natural resource users, and local, state, and federal governments to conserve natural resources, control and prevent soil erosion, conserve and develop water resources and water quality, preserve wildlife, conserve natural beauty, and promote collaborative conservation efforts to protect and enhance healthy watershed functions. The Oregon Department of Agriculture Soil and Water Conservation District Program offers trainings to help support district operations, directors, and staff. Their staff is also available to provide operational technical assistance by phone, email, or in person. SWCDs in Oregon are governed by an independently elected board of directors.
soil composition	The mixture of minerals, dead and living organisms (organic materials), air and water that make up soil. This mix of ingredients varies from place to place as soil composition varies.
source areas	Areas in which a watershed is delivering water to a water system.
special forest products	Products, other than timber, collected for personal and commercial uses from forests.
species	When referring to the federal ESA, "...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 ESA].
species diversity	Diversity among species in an ecosystem. Species diversity accounts for the number of different species (species richness) and the relative abundance of each species (species evenness).

species of concern	Those species included on federal or state ESA lists, state sensitive species, and ODFW's Oregon Conservation Strategy species, which are currently present or have the potential to be present on state forest lands.
stand density	In silviculture, 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 initiation	Begins when new seedlings actively invade or sprout or are planted and begin to grow following 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	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 management	Silvicultural techniques to be applied at the stand level in pursuit of the owner's management objectives. See *silviculture*.
stand(s)	A contiguous group of trees sufficiently uniform in composition, structure, age, size, class, distribution, spatial arrangement, condition, or location on a site of uniform quality to distinguish it from adjacent communities.
standard(s)	A working principle that establishes the measure of performance extent, values, quantity, or quality for a given activity or item.
state forester	The BOF-appointed chief executive officer and secretary of the State Forestry Department (ORS 526.031).
state forests division chief	The head of the State Forest Division.
State Historic Preservation Office	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	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 CSF.
status monitoring	A snapshot in time of the status of a variable or resource. For example, status monitoring answers a question like, "how many acres are affected by this insect infestation?" See definition for *monitoring*.
stocking	A measure of the number of trees or basal area per acre in a stand.
storied landscape	Within Tribal contexts, refers to a multitude of intrinsically linked and deeply held understandings, relationships, and actions between indigenous cultures and the landscapes with which they interact throughout time, including but not limited to creation stories, landscape features and wildlife attributes that signal hunting, gathering, planting, and other seasonal use patterns.
strategy	A carefully considered plan or method, more encompassing and on a larger scale than tactics, for achieving an objective.

stream	A water course having 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 because this type of flow does not have a defined channel.
stream classification	Used to apply stream protections. Streams are classified using a combination of Oregon FPA and Western Oregon State Forests HCP classifications.
stream reach	A section of a stream along which similar hydrologic conditions exist, such as 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 trees of various sizes, standing dead trees (snags), and fallen dead trees.
structured decision-making	A process that supports multi-objective decision-making based on deliberation, estimated outcomes of alternative actions, and clear choices upon which decision-makers can act.
successional	A series of changes by which one group of organisms succeeds another group; a series of developmental stages in a plant community.
sustainability or sustainable	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.
Swiss needle cast (SNC)	A foliage disease specific to Douglas fir caused by the fungal pathogen *Nothophaeocryptopus gaeumannii*. SNC symptoms include yellow needles and decreased needle retention, resulting in sparse crowns and reduced diameter and height growth.

T

tectonic	Resulting from changes in the Earth's crust.
threatened and endangered species	Endangered species are those plants and animals that have become so rare they are in danger of becoming extinct. Threatened species are plants and animals that are likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Federal and state agencies make formal classifications of wildlife species, according to standards set by federal and state ESAs.
trade-offs	An exchange of one thing for another. Understanding trade-offs is a critical part of decision-making and planning where benefits to all resources are not attainable at the same time.

Traditional Ecological Knowledge (TEK)

A body of observations, oral and written knowledge, innovations, practices, and beliefs developed by Tribes through interaction and experience with the environment. TEK can be developed over millennia, continues to develop, and includes understanding based on evidence acquired through direct contact with the environment and long-term experiences, as well as extensive observations, lessons, and skills passed from generation to generation.

TEK is grounded in social, spiritual, cultural, and natural systems that are frequently intertwined and inseparable, offering a holistic perspective. TEK is inherently heterogeneous and unique to each Tribe, due to the cultural, geographic, and socioeconomic differences, as well as their history and the surrounding environment.

transformation

The process of changing the ecosystem to a condition that is different from historic structure, composition, or function. Both active and passive management techniques can guide or allow transformation, respectively.

In academic literature, "Ecosystem transformation can be defined as the emergence of a self-organizing, self-sustaining, ecological or social–ecological system that deviates from prior ecosystem structure and function." (Thompson et al. 2021)

Travel Management Area(s)

Designated areas where it is restricted to operate or to be transported in a motor-propelled vehicle during certain dates as designated by the Oregon Department of Fish and Wildlife.

trend monitoring

Designed to uncover change in target variables over space and time. For example, trend monitoring may answer a question like, "How many acres are affected by an insect infestation each year?" See definition for *monitoring*.

Tribal Partners, Tribal Nations, federally recognized Tribes

Representatives of one or more of the nine federally recognized Tribes of Oregon. ORS 182.162–168 define state agencies' relations with federally recognized Tribes in Oregon when an agency develops or implements programs that may affect Tribes. The nine federally recognized Tribes of Oregon are Burns Paiute Tribe; Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians; Confederated Tribes of Grand Ronde; Confederated Tribes of Siletz Indians; Confederated Tribes of the Umatilla Indian Reservation; Confederated Tribes of the Warm Springs Reservation; Coquille Indian Tribe; Cow Creek Band of the Umpqua Tribe of Indians; and The Klamath Tribes.

U

understory

The layer of vegetation beneath the main canopy of a forest.

unimpeded access

Provides reasonable opportunity for access, considering public safety, infrastructure, and topographic constraints.

Uplift (geologic)

The process by which Earth's surface slowly rises either due to an increasing upward force applied from below or decreasing downward force (weight) from above.

V

viewshed — An area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point and often is considered valuable or worth preserving for aesthetic reasons.

visually sensitive corridor — The area within 150 feet (measured on the slope) of the outermost edge of the roadway along both sides of the highway.

W

watershed — An area within which all water that falls as rain or snow drains to the same stream or river. Watersheds can vary greatly in size, from that of a small stream to a larger waterbody.

Watershed Council — Based in local communities across the state. While natural resource specialists lead the councils, their boards of directors are made up of local community members. They assess and monitor environmental conditions and conduct voluntary conservation projects to restore and enhance the waters and lands for native species and people. They work with local landowners, community members, companies, elected officials and agencies. The Oregon legislature encourages local governments to form watershed councils (ORS 541.910).

watershed restoration project — Per the Oregon Watershed Enhancement Board, specifies involvement of an on-the-ground element such as riparian planting, fish habitat construction, wetland restoration, livestock grazing plans, and water conservation projects that support watershed processes, which support watershed health.

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.

working forest(s) — As defined by Oregon Forests Resources Institute, "forests where the sustainable production of timber is carefully balanced with protecting other important resources such as water quality and wildlife habitat are known as 'working forests.' After timber is harvested from these forests, they are replanted and harvested again in a sustainable process that may span decades, and even lifetimes."

APPENDIX A

Engagement

The engagement process ensures that interested parties had opportunities to provide meaningful input on the development of the Western Oregon State Forests Management Plan (FMP). This appendix serves as a high-level summary of the stakeholder, public, and Tribal engagement efforts, including the engagement approach, goals, and activities.

Goals, Methods, and Key Audiences

A comprehensive strategy for public engagement and communications was developed early in the FMP process. The goals of the stakeholder engagement process include the following items.

- Fully informing counties, Tribes, stakeholders, and the general public throughout the FMP development process.
- Providing counties, Tribes, stakeholders, and the public with opportunities to engage and offer input at multiple levels throughout the process.
- Obtaining a better understanding of what Oregonians care about when it comes to forest management.
- Ensuring state agencies are engaged as an integral part of the process and are supportive of the FMP outcomes.
- Providing clear expectations for how stakeholder and public input will be used and integrated into the FMP.
- Aligning engagement and outreach opportunities with related processes such as the Western Oregon State Forests Habitat Conservation Plan (HCP) National Environmental Policy Act (NEPA) process and other ODF processes.

The Oregon Department of Forestry (ODF) developed the FMP through a combination of content development by staff and technical experts and feedback from stakeholders and the public. The process for developing the FMP and integrating feedback from stakeholders and the public is listed below.

- **Internal content development**. ODF worked with staff and technical experts to develop draft content.
- **Internal review**. ODF distributed content to ODF leadership, field staff, executive sponsors, and state partners for review.
- **Internal revisions**. ODF staff and technical experts reviewed internal feedback and revised content.
- **Leadership review and approval**. ODF leadership reviewed revised content and requested additional edits or approved content for external sharing.
- **Share content with the Board of Forestry (BOF) and committees**. ODF shared content with the BOF, Forest Trust Lands Advisory Committee, and State Forests Advisory Committee.
- **External review and input**. ODF shared content with the public and stakeholders for review.
- **Review of external feedback and revisions**. ODF reviewed external input and revised content accordingly.

Key Audiences

The engagement effort sought to involve all potentially affected and/or interested individuals, communities, and organizations. The process involved the following groups.

- The BOF
- Business and economic organizations
- Civic groups
- Conservation and wildlife groups
- Counties, including the Forest Trust Land Advisory Committee
- Elected officials
- Existing ODF advisory groups, including the State Forests Advisory Committee
- Federal and state agencies
- General public

- Groups involved in forest management including foresters and fisheries
- Media
- ODF district staff
- Recreational users of the forest
- Small woodland, private forest landowners, and farm and agricultural interest groups
- Tribal representatives
- Timber and forest products industry

The following sections outline the key stakeholder and public engagement activities and include details on the convening interviews, surveys, FMP state agency meetings, meetings open to the public, and stakeholder meetings.

Interviews

A variety of stakeholders and county representatives provided their reflections from the past HCP engagement process, discussed ideas and suggestions for an effective FMP public engagement process, and expressed key interests and concerns related to FMP development. Thirteen virtual interviews took place with individuals of the following entities.

- 350PDX
- Association of Oregon Counties
- Association of Oregon Loggers
- Cascadia Wildlands
- County Commissioners
- EcoTrust
- Forest Land Trust Advisory Committee
- Hampton Lumber
- Oregon Forest and Industry Council
- Oregon Wildlife Society
- Rasmussen Group
- State Forests Advisory Committee
- State Forests Advisory Committee and Recreation
- The Nature Conservancy
- Trout Unlimited
- Wild Salmon Center
- 350PDX

Surveys

ODF developed two surveys to gather feedback from the public on draft goals and strategies. For the draft goals survey, participants were asked to rank support for each goal and provide general feedback. ODF then summarized the goals and posted them to the project website. For the draft strategies survey, participants were asked if the strategies were sufficient to meet their corresponding goal. Participants were also asked to share if the strategies were on the right track, if anything was missing, or if any modifications were needed. A feedback summary was posted to the website. The following is a summary of those results.

- The survey on the Draft FMP Goals was sent out in August 2021; 54 individuals responded, providing a total of 459 comments.
- The survey on the Draft FMP Strategies was sent out in December 2021; 1,344 individuals responded, providing a total of 3,322 comments.
- ODF also solicited email feedback from stakeholders and the public on the Draft FMP Strategies and received 318 email responses.

State Agency Meetings

ODF has continued to work with state agencies throughout the development of the FMP. The FMP state agencies include government agency representatives from the Oregon Department of Environmental Quality, the Oregon Department of State Lands, and the Oregon Department of Fish and Wildlife. Members have been meeting approximately monthly from June 2021 through spring 2023. Members voluntarily work together to provide advice on how the FMP can achieve a mutually acceptable outcome that satisfies, to the greatest degree possible, the interests of all participants. FMP state agencies also serve on the HCP Scoping Team, allowing for continuity between the two processes.

Meetings Open to the Public

Because of COVID-19 concerns and safety precautions, ODF held public meetings via webinars. Stakeholders and members of the public were invited to meetings open to the public using ODF's GovDelivery notification system. GovDelivery was also used to share links to materials, meeting recordings, and surveys.

Five western Oregon FMP meetings open to the public took place between May 2021 and January 2023. The meetings open to the public included updates on the FMP process, presentations, and question and answer discussions followed by informal discussions with meeting participants to discuss topics of most interest to participants. During meetings open to the public, ODF answered questions and received comments on the development of the FMP. Following the meetings, comments related to goals and strategies were provided to ODF to inform revisions.

ODF notification to inform stakeholders and the public about the meetings included the following methods.

- Email distributions to interested parties
- Posts on ODF social media including Facebook and Twitter
- Meeting notices via FlashAlert to media in areas that would be potentially covered in the HCP (including Portland media)
- Posts on the ODF news site
- Posts on the HCP and FMP project webpages

The meetings open to the public received strong participation and engagement. Attendance ranged from approximately 40 to 90 participants (**Table A-1**).

Stakeholder Meetings

The project team conducted meetings with interested parties who expressed a cross-section of interests. The purpose of these meetings was to review and discuss FMP goals and strategies or topics as requested. The project team conducted three large meetings and several small meetings as requested. Stakeholder groups included conservation interests, industry representatives, and recreation interests.

ODF held several joint stakeholder meetings to discuss the development of the FMP (**Table A-2**). These meetings provided an opportunity for stakeholders to learn more about the FMP development process and to provide specific feedback on the draft and strategies of the FMP. Feedback from the meetings was captured in meeting summaries and shared with ODF to inform the FMP. Links to meeting summaries, recordings, and surveys were made available to participants via email.

ODF also engaged in several meetings and phone calls with individual stakeholders throughout the process to check in on the development of the FMP and to understand their interests, concerns, feedback, and suggestions as they relate to the FMP.

Forest Trust Land Advisory Committee

ODF provided updates on the FMP during the following Forest Trust Land Advisory Committee meetings.

- May 28, 2021
- August 27, 2021
- September 17, 2021
- October 8, 2021
- December 3, 2021
- February 18, 2022
- August 12, 2022
- February 24, 2023
- April 14, 2023

State Forests Advisory Committee

ODF provided updates on the FMP during the following State Forests Advisory Committee meetings.

- April 23, 2021
- June 11, 2021
- October 29, 2021
- April 8, 2022
- June 24, 2022
- October 27–28, 2022
- April 7, 2023
- June 1–2, 2023

TABLE A-1

Public Meetings

Open Public Meeting Date	Attendees	Meeting Purpose
May 6, 2021	Over 70 members of the public attended via webinar	• Provide an introduction to the FMP project and describe the engagement process for this effort. • Provide an update on the HCP and orientation to the Draft HCP on the ODF website. • Provide updates on the HCP NEPA process.
August 10, 2021	Over 70 members of the public attended via webinar	• Provide an update on the FMP project and describe the engagement process for this effort. • Provide an update on the Administrative Draft HCP. • Provide an update on the HCP NEPA process.
October 12, 2021	40 members of the public attended via webinar	• Provide an update on the FMP and regional project and describe the engagement process for this effort. • Provide an update on the Administrative Draft HCP. • Provide an update on the HCP NEPA process.
December 7, 2021	Over 50 members of the public attended via webinar	• Provide an update on the FMP and regional project and describe the engagement process for this effort. • Provide an update on the Administrative Draft HCP. • Provide an update on the HCP NEPA process.
February 7, 2023	Over 90 members of the public attended via webinar	• Provide an update on the FMP and describe the upcoming engagement process. • Provide an update on the Administrative Draft HCP. • Provide an update on the HCP NEPA process.

TABLE A-2

Stakeholder Meetings

Meeting Date	Attendees	Meeting Purpose
Joint Stakeholders		
August 18, 2021	24 stakeholders attended the meeting, 71 comments received	• Review and discuss draft FMP goals.
December 9, 2021	42 stakeholders attended the meeting	• Review and discuss draft FMP strategies on climate change, carbon, drinking water, forest resilience, wildfire, and soil.
December 13, 2021	40 stakeholders attended the meeting	• Review and discuss draft FMP strategies on timber production, restoration, wildlife, aquatics and riparian, revenue, and recreation, education, and interpretation.
Conservation Interests		
June 24, 2021	Two stakeholders attended the meeting	• Discuss drinking water issues related to the FMP.
February 14, 2022	Three stakeholders attended the meeting	• Discuss FMP goals and strategies feedback.
Industry Representatives		
February 17, 2022	Three stakeholders attended the meeting	• Discuss FMP goals and strategies feedback.

Tribal Sovereign Nations' Coordination

ODF has engaged Tribal Partners in the Government-to-Government framework on the development of the cultural resources goals and strategies through six individual Tribal Workgroup meetings from August 2021 to March 2022. ODF will continue to work with Tribal Partners in this forum to integrate their interests in ODF's planning and implementation processes at every level.

Tribal Partners include the following nine federally recognized Tribes of Oregon: Burns Paiute Tribe; Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians; Confederated Tribes of Grand Ronde; Confederated Tribes of Siletz Indians; Confederated Tribes of the Umatilla Indian Reservation; Confederated Tribes of the Warm Springs Reservation; Coquille Indian Tribe; Cow Creek Band of the Umpqua Tribe of Indians; and The Klamath Tribes.

APPENDIX B

District Maps

FIGURE B-1

Western Oregon FMP Planning Area

639,542 Acres Managed by ODF

FIGURE B-2

Astoria District Planning Area

136,856 Acres Managed by ODF

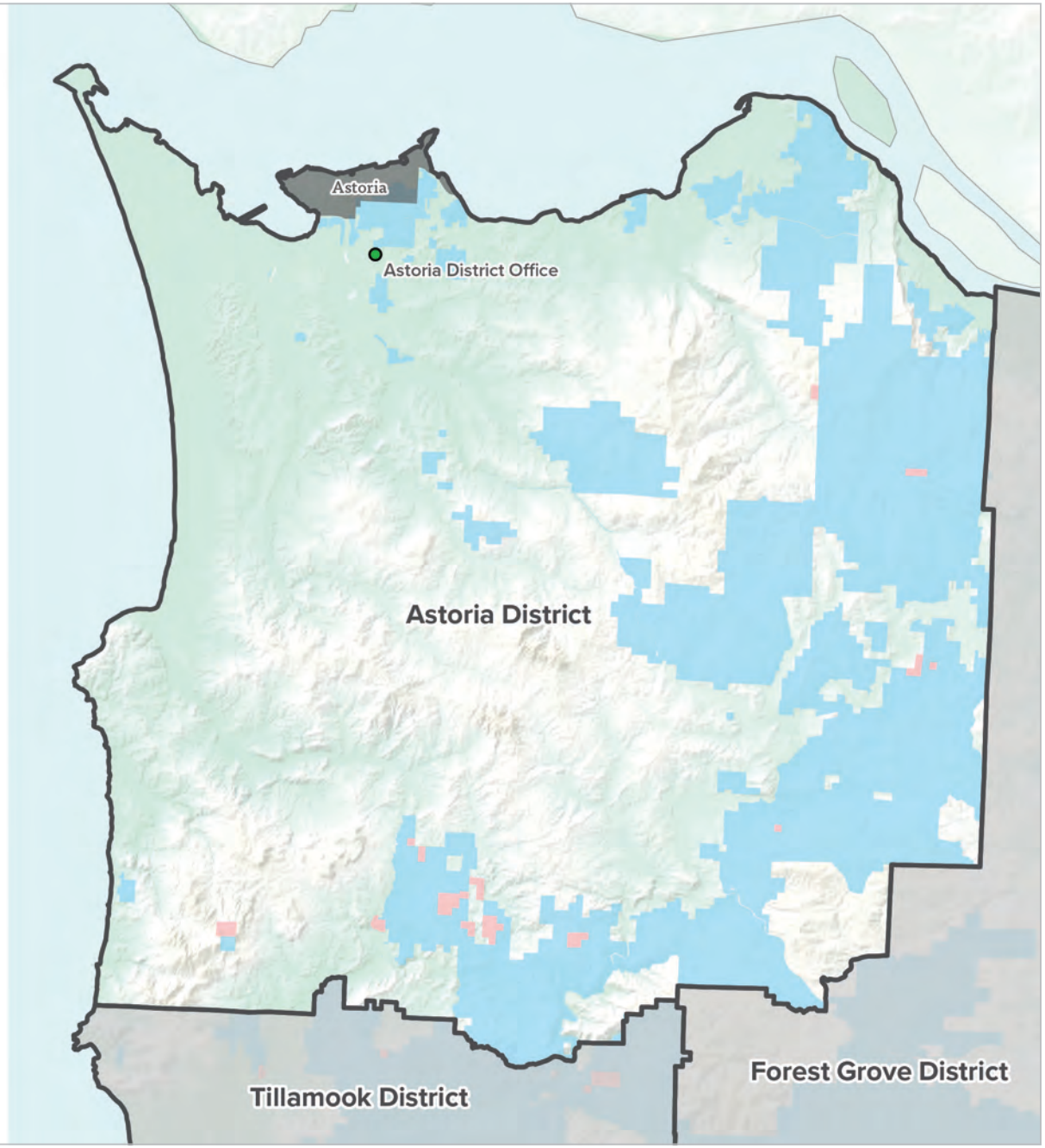


FIGURE B-3

Forest Grove District Planning Area

115,004 Acres Managed by ODF

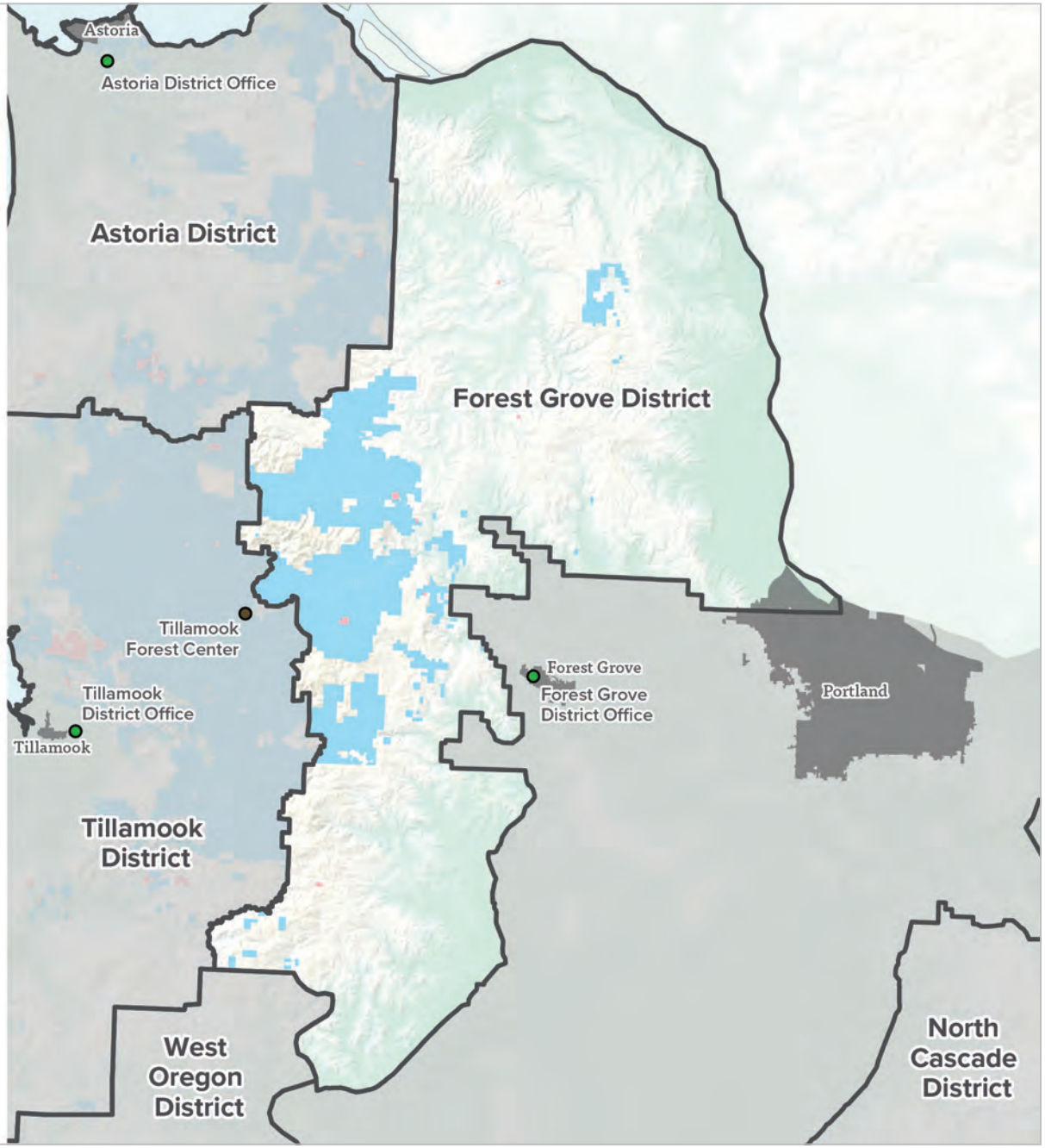


FIGURE B-4

North Cascade District Planning Area

47,475 Acres Managed by ODF

FIGURE B-5

Tillamook District Planning Area

250,583 Acres Managed by ODF

FIGURE B-6

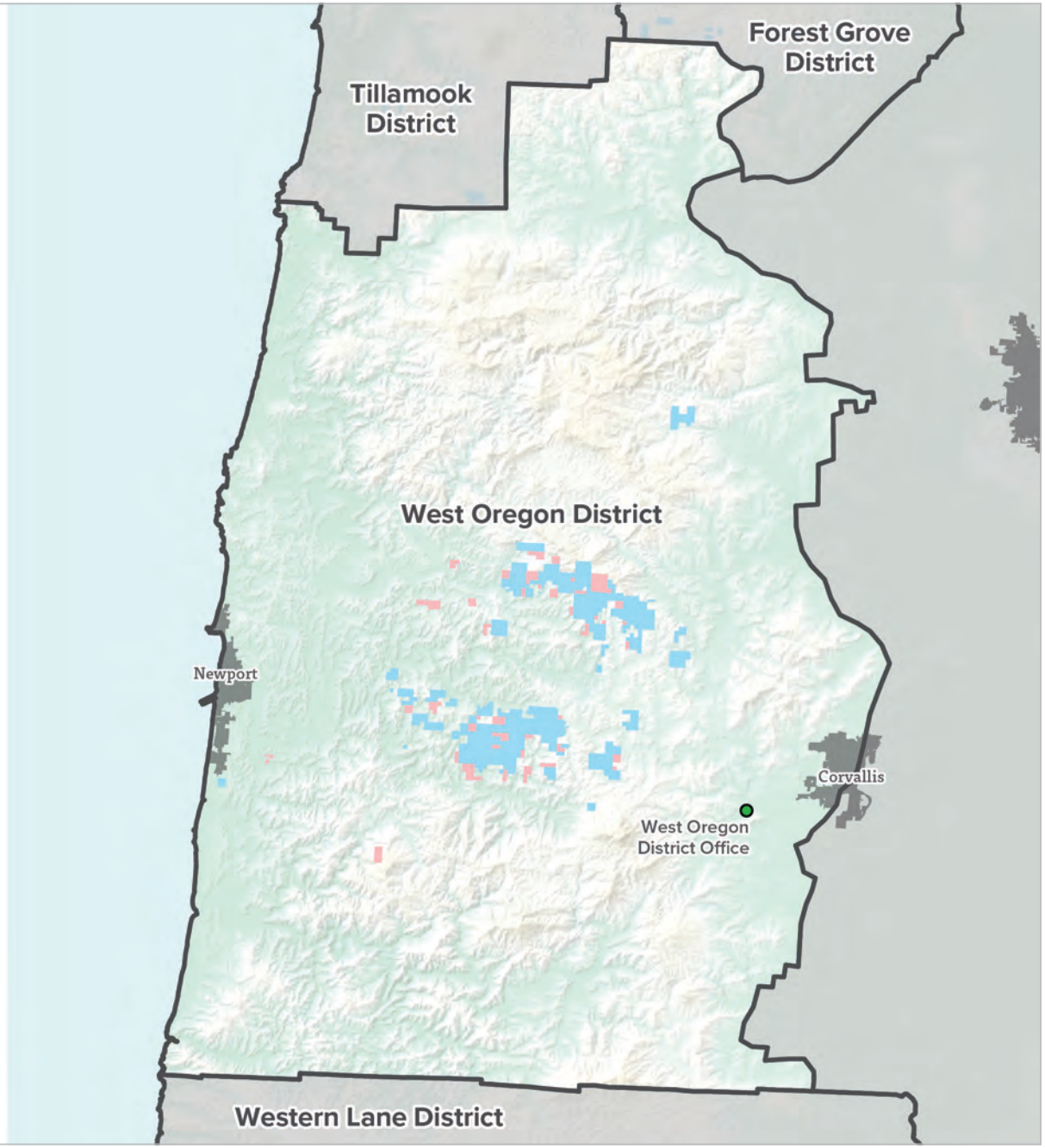
Western Lane District Planning Area

53,035 Acres Managed by ODF

FIGURE B-7

West Oregon District Planning Area

36,587 Acres Managed by ODF



APPENDIX C

Description of Figures

The Oregon Department of Forestry (ODF) makes every attempt to ensure our documents are accessible. Should you need additional assistance, please contact us at ODF.StateForestMP@ODF.oregon.gov for accessibility assistance.

TABLE C-1

Description of Figures

Figure Number	Figure Title	Description of Figure
Chapter 1, Introduction		
1-1	**Greatest Permanent Value Categories and Icons**. GPV category icons are used throughout Chapter 3, *Forest Resources, Goals, and Strategies*, to indicate connections with social, economic, and environmental resources and concepts.	Examples of social connections include the protection of cultural resources; recreation, education, and interpretation opportunities; and opportunities to collect special forest products (e.g., firewood, edible fungi, and salal). Examples of economic connections include sustainable and predictable production of forest products that support local and regional economies, including revenue generation for local taxing districts and management of state forest lands. Examples of environmental connections are healthy, sustainable, resilient forests; properly functioning aquatic habitats for native fish and aquatic life; habitat for native wildlife; and carbon sequestration and storage.
Chapter 2, Management Approach		
2-1	**Social, Economic, and Environmental Reciprocity**. Ecosystem services deliver social and economic benefits, and social and economic benefits can be obtained in a way that supports environmental benefits.	Figure 2-1 is a flowchart that depicts the connections between ecosystems, humans, and the reciprocity between ecosystem services and services to ecosystems. Ecosystem services provided by the ecosystem itself include provisioning services like timber products, food, and clean air and water, regulating services like carbon storage, cultural services like recreational and spiritual benefits, and supporting services like soil formation and pollination. Human actions that can serve ecosystems include protecting services like fish and wildlife habitat protection, enhancing services like thinning, restoring services like stream enhancement projects, and supporting services like natural resource stewardship practices.
2-2	**Ecologically Sustainable Management**. Practices that promote adaptive capacity to secure GPV.	Figure 2-2 is a flowchart of ecologically sustainable forest management that promotes adaptable, productive, sustainable ecosystems through conservation emphasis areas in a landscape context, management of landscape conditions, and management of stands. Ecologically sustainable forest management aims to provide social, economic, and environmental ecosystem services, such as recreation, education, and interpretation opportunities; properly functioning aquatic habitat for fish and aquatic life; habitats for native wildlife; clean air and water; and other important services.
2-3	**Emphasis Areas and Their Value to the Ecosystem**. The design of emphasis areas across the landscape supports diversity, connectivity, complexity, and redundancy, which support adaptive capacity of the ecosystem for sustained ecosystem services delivery under changing conditions.	Figure 2-3 shows three pictures characterizing different forest ages: young, middle-age, and older. All emphasis areas contribute value to the ecosystem. The design of emphasis areas across the landscape supports diversity, connectivity, complexity, and redundancy, which enhance function and improve adaptive capacity. Young forests (depicted by picture of a deer) are sunlight-filled and provide many wildlife species with abundant food resources, including berries, forbs, and grasses. Middle-age forests (depicted by picture of a salamander) are transitional forests contributing to wildlife habitat connectivity as they mature and develop stand characteristics found in older forests. Older forests (depicted by picture of an owl) contain multi-layered canopies, large trees, snags, and downed wood that provide wildlife nesting, roosting, and denning habitats.

TABLE C-1 (CONTINUED)

Figure Number	Figure Title	Description of Figure
2-4	**Examples of Emphasis Areas across the Landscape**. Active management is integrated across the landscape guided by resource management emphasis areas.	Figure 2-4 shows two aerial views of the same landscape highlighting different subclasses and stewardship classes. View A shows an emphasis on aquatic and riparian habitat subclasses with the stewardship class focused on areas of high value conservation around and near streams in a landscape of partial-cut, variable-density, and regeneration harvest. View B shows recreation subclass emphasis areas, where special stewardship and focused stewardship classes are depicted.
2-5	**Application of the Ecologically Sustainable Approach Management to Deliver Ecosystem Services**. The emphasis areas, policies, and strategies are applied across the planning area to support decision-makers as they strive to further improve conditions, adapt plans to response to change; and improve performance over time.	Figure 2-5 is an infographic with three text boxes describing different planning and management levels in western Oregon state lands. Box 1: Within the overall planning area, lands are managed according to: Oregon Revised Statutes, Oregon Administrative Rules, Forest Land Management Classification System (FLMCS), Habitat Conservation Plan (HCP), and policies. Box 2: When managing the smaller scales of landscape or planning areas, as informed by emphasis area, decisions are made to improve adaptive capacity to climate change; apply Forest Management Plan (FMP) strategies to FMP goals, including carbon storage; meet HCP Conservation Actions across the landscape, including slope protection, legacy components, in-unit downed wood, and leave trees; and meet Implementation Plan targets, including timber harvest level outputs. Box 3: Adaptive management uses a systematic and rigorous approach to learning from actions to improve management plans, decisions, and implementation; and respond to changes in ecosystem and society.
Chapter 3, Forest Resources, Goals, and Strategies		
3-1	**Distribution of Stand Ages as a Percentage of Western Oregon State Forests**. Compared to even-aged stands, forests with uneven-aged stands often support a greater number of species and are more resistant to windfall and insect outbreaks.	Figure 3-1 is a bar graph showing the age distribution of stands in western Oregon State forests in percentages by 20-year-old age groups. The percent of acres with stands 0–19 years old is 19.5%, 20–29 years old is 10.5%, 40–59 years old is 19.7%, 60–79 years old is 31.1%, and 80–99 years old is 14.3%. The rest of the age-class groupings, from 100 years or older, are <2% of forests.
3-2	**Dominant Tree Species in Western Oregon State Forests**. Tree species richness and composition affect potential vulnerabilities to disturbances and stressors such as insect outbreaks, pathogens, fire, windthrow, drought, and climate change.	Figure 3-2 is a bar graph showing the percent of acres of different tree species in western Oregon State forests in percentages. The dominant forests are mixed Douglas-fir at 40%, followed by homogenous Douglas-fir at 27%. Hemlock and mixed hemlock stands are approximately 13%. Hardwoods and mixed hardwoods are 12%. Open and ready for planting is at 5%, and other species and non-forested lands are at approximately 3%.
3-3	**Distribution of Quadratic Mean Diameter of Trees in Western Oregon State Forests**. Quadratic mean diameter affects the quality of habitat for some wildlife species and tree bole merchantability.	Figure 3-3 is a bar graph showing the distribution of the quadratic mean diameter of trees in western Oregon State forests as a percentage of forest acres. There is approximately 18% of stands that are non-forested or 0.1–4.9 inches. There is 4% that range between 5 and 99 inches, 28% that is 10–14.9 inches, 35% that is 15–19.9 inches, 12% that is 20–24.9 and 3% that is 25 inches or greater.

TABLE C-1 (CONTINUED)

Figure Number	Figure Title	Description of Figure
3-4	**Distribution of Dominant Tree Species on Western Oregon State Forests**. Douglas-fir-dominated forests comprise the majority of all districts other than Tillamook, but forests dominated by species other than Douglas-fir or by multiple species exist in all districts.	Figure 3-4 shows two side-by-side maps showing tree distribution in different districts on western Oregon State forest lands. One map shows the districts in the north which includes Astoria, Forest Grove, and Tillamook. The other map shows the districts in the south which includes West Oregon, North Cascade, and Western Lane. Douglas-fir-dominated forests comprise most of all districts other than Tillamook, which also has a large proportion of mixed hardwoods and hardwood-dominated forests. However, forests dominated by species other than Douglas-fir or by multiple species are present in all districts.
3-5	**Swiss Needle Cast on State Forest Lands**. Annual observations and 3-year moving average of Swiss needle cast-infected acres across state forest management since 2010.	Figure 3-5 is a combination of a bar graph showing acres infected by Swiss needle cast on state forest lands in annual observations from 2010 until 2018 and a line graph showing the 3-year moving average. From 2010 to 2014, the total and average acres infected remained below 40,000. In 2015, the annual observations increased to 70,000 acres and 3-year average increased to 50,000. By 2018, while the annual observation of acres has dropped since 2015 to approximately 55,000, the moving average has continued to increase to above 60,000.
3-6	**Percent of Planning Area District Lands by Overall Wildfire Risk Category as of 2018**. Risk is a product of the likelihood and consequences of wildfire to infrastructure and natural resources. Wildfire can be either beneficial or detrimental.	Figure 3-6 is a bar graph that describes the overall fire risk level for each district by percentage of its' land within wildfire risk categories as of 2018. Most district lands are low risk, with 76–85% falling within that category and ≤14% in any of the moderate, high, or very high risk classifications. Two districts have higher wildfire risk than other districts. North Cascade has 55% of its lands at moderate risk and 14% at high risk, with 1% at very high risk. Western Lane has 34% at moderate risk, 12 % at high risk, and 12% at very high risk.
3-7	**Scenic Waterways**. Scenic-designated segments of the Nestucca, Nehalem, and Rogue Rivers flow through the planning area.	Figure 3-7 is a four-panel map showing the scenic-designated segments of rivers within different districts of the planning area. One panel shows an overview of western Oregon State forest districts and the state's scenic-designated water ways. The other panels show details of which districts have sections of scenic waterways. A segment of the Nehalem River Scenic Waterway flows through the Astoria and Tillamook Districts. A segment of the Nestucca Scenic Waterway flows through both Tillamook and Forest Grove Districts. And a segment of the Rogue Scenic Waterway flows through Western Lane District.
3-8	**Slope Steepness across the Planning Area**. The highest percentage of steeper slopes in the planning area are on the Tillamook and Western Lane Districts.	Figure 3-8 is a bar graph showing acres of each district that are 0–30% slope, 30–60% slope, and >60% slope. Tillamook District has approximately 125,000 acres of the total district area of 250,583 acres that have slopes greater than 60%, the largest area of all districts.
3-9	**Fine- and Coarse-Grained Soils by District**. The Tillamook District has the highest proportion of coarse-grained soils in the planning area.	Figure 3-9 is a bar graph showing acres of each district that are either fine- or coarse-grained soils. Astoria, West Oregon, and Western Lane Districts have predominantly fine-grained soils. Forest Grove, North Cascade, and Tillamook Districts have predominantly coarse-grained soils.
3-10	**Paths of the Forest Carbon Cycle**. Forest vegetation sequesters carbon dioxide from the atmosphere in living tissues and provides long-term storage of carbon in trees, snags, downed wood, other plants, and soils.	Figure 3-10 is a flow diagram showing carbon dioxide capture and emissions as part of a forest's carbon cycle. Carbon dioxide is removed from the atmosphere as forests grow and age. Carbon dioxide is released by fire, decomposition, biomass products like wood pellets, and short-term consumer products like paper. Long-lived products, like lumber, can sequester carbon until they start to decompose.

TABLE C-1 (CONTINUED)

Figure Number	Figure Title	Description of Figure
3-11	**Estimated Average Aboveground Carbon in Woody Biomass across ODF Districts**. Data are based on the 2020 Forest Inventory and Analysis Plots on western Oregon State forests.	Figure 3-11 is a bar graph of aboveground carbon in woody biomass measured by metric tons per hectare. The average aboveground carbon of all districts is 133. The aboveground carbon of individual districts are as follows: Astoria is 142, Forest Grove is 129, North Cascade is 165, Tillamook is 125, West Oregon is 110, and Western Lane is 146.
3-12	**Watersheds Overlapping with Northwest Districts and FMP Planning Area**. The median percentage of ODF-managed lands ownership in northwest districts by HUC-12-sized is 26% (range <1% to 100%).	Figure 3-12 is a map of the FMP planning area districts with Hydrologic Unit Code (HUC)-12 watersheds overlayed. HUC-12s are the smallest-sized watershed delineated by the U.S. Geological Survey.
Chapter 4, Guidelines		
4-1	**Links among the FMP and Other Plans and Policy Guidance.**	Figure 4-1 is a flow diagram showing the connections and feedback between FMP direction and implementation. FMP direction described as falling under the Board of Forestry (BOF), shows two boxes with arrows connecting them in both directions: one for the FMP and one for the BOF review of FMP performance measures. The FMP box in turn connects to a separate section with many interacting components under FMP implementation, which is carried out by the State Forester/ODF Department of Forestry staff. Implementation Plans, which set medium-term targets are informed by the FMP, FLMCS, HCP, and policies lead to Operation Plans, which set short-term targets. Funding level, Operation Plans, and monitoring lead back to adaptive management plans that are reviewed by the BOF and then informs the FMP, HCP, and FLMCS, and operational policies.
4-2	**Structured Decision-Making Process**. The process supports multi-objective decision-making based on deliberation, estimated outcomes of alternative actions, and clear choices upon which decision-makers can act.	Figure 4-2 is a diagram depicting the circular connection between the five steps for making decisions in a structured process; all steps are connected by a dashed line. After the five steps are taken and a decision is made, step six is to implement, monitor and review, which connects back to step one of the process.
4-3	**Adaptive Management Plan Workflow**. This workflow shows key AMP roles and how they can affect FMP implementation through decision support, monitoring, and reporting.	Figure 4-3 is a workflow diagram for adaptive management, which uses a structured decision-making process that necessitates monitoring and reporting. Monitoring leads to decision support for adaptive management and reporting that will inform any needed structured decision-making. Monitoring is also designed to incorporate performance measures and habitat conservation plans. Decision recommendations through the adaptive management structured decision-making process leads to Implementation Plans, HCPs, policies, best management practices, etc.
Glossary		
No figures.		
References		
No figures.		

TABLE C-1 (CONTINUED)

Figure Number	Figure Title	Description of Figure
Appendix A, Engagement		
No figures.		
Appendix B, District Maps		
B-1	**Western Oregon FMP Planning Area, 639,542 Acres Managed by ODF**	Figure B-1 is a map of the FMP planning area with all districts managed by ODF that are west of the Cascade Mountains.
B-2	**Astoria District Planning Area, 136,856 Acres Managed by ODF**	Figure B-2 is a map of the Astoria District that is in the north-coast part of the FMP planning area.
B-3	**Forest Grove District Planning Area, 115,004 Acres Managed by ODF**	Figure B-3 is a map of the Forest Grove District that is in the northern part of the FMP planning area, east of the Astoria and Tillamook Districts.
B-4	**North Cascade District Planning Area, 47,475 Acres Managed by ODF**	Figure B-4 is a map of the North Cascade District that is in the northern part of the FMP planning area. The North Cascade District is east of Astoria, Tillamook, Forest Grove, and Western Oregon Districts. The district goes as far north as the Astoria District and ends in the south at the Western Lane District, but state forest lands are generally east of Salem.
B-5	**Tillamook District Planning Area, 250,583 Acres Managed by ODF**	Figure B-5 is a map of the Tillamook District that is in the north-coast part of the FMP planning area, south of the Astoria District and west of the Forest Grove District.
B-6	**Western Lane District Planning Area, 53,035 Acres Managed by ODF**	Figure B-6 is a map of the Western Lane District that is in the southern part of the FMP planning area. The Western Lane District lies south of all other western districts.
B-7	**West Oregon District Planning Area, 36,587 Acres Managed by ODF**	Figure B-7 is a map of the West Oregon District that is in the western part of the FMP planning area. It is north of the Western Lane District and south of the Tillamook and Forest Grove Districts.