ECOnorthwest

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Economic Analysis of ODF Western Oregon Forest Management Plan Scenarios

Final Report

Prepared for: Oregon Department of Forestry

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Acknowledgments

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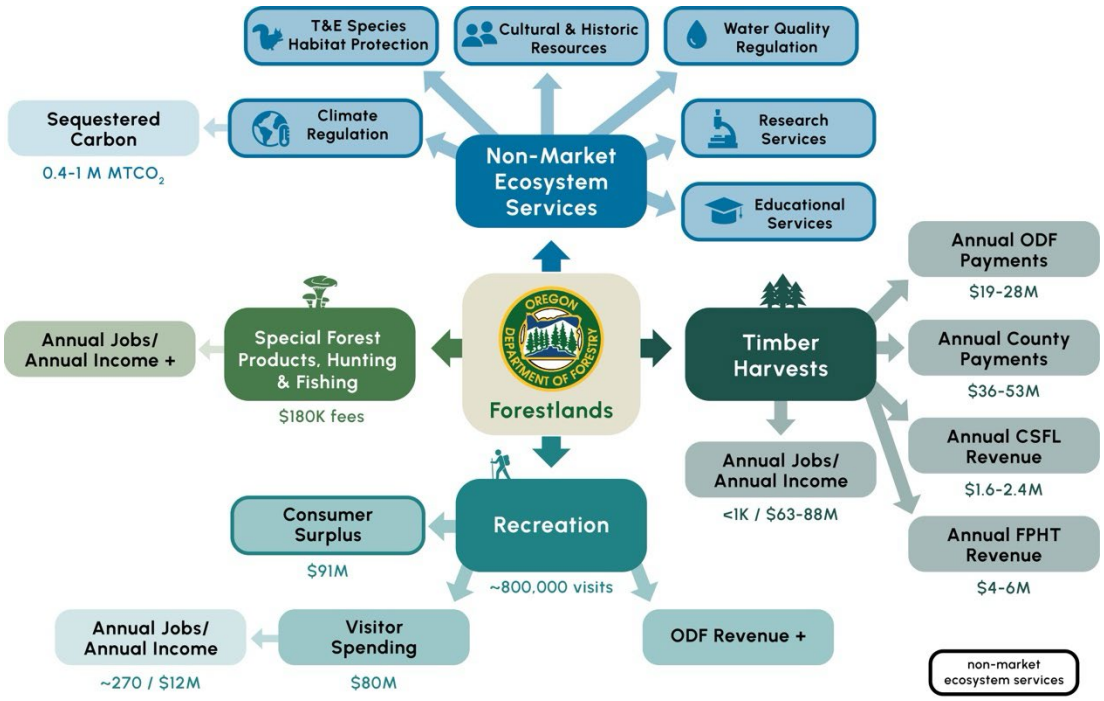
Executive Summary

The Oregon Department of Forestry (ODF) is updating its Forest Management Plan (FMP) to guide the management of 640,000 acres of ODF-managed state forestlands west of the Cascades. These forestlands serve multiple functions—generating timber revenue, providing habitat for sensitive species, storing carbon, and supporting recreation and traditional uses. Through the FMP, together with the Western Oregon State Forests Habitat Conservation Plan (HCP), ODF outlines a strategy to manage these lands for Greatest Permanent Value (GPV), which encompasses a balance of social, economic, and environmental benefits. This economic analysis supports that process by evaluating the projected socioeconomic outcomes of four modeled harvest scenarios.

ODF-managed forestlands create value for Oregonians in multiple ways (ES Exhibit 1). Timber harvests support employment and income in rural communities and contribute to revenue for county governments, local taxing districts, and state programs. Forests also provide timber, clean water, plants and animals, and first foods that are culturally significant to Tribal Nations. Non-timber products are also important to low-income households. Recreation infrastructure—including trails, campgrounds, and access points—facilitates outdoor use by residents and visitors, generating economic activity in local economies. The forestlands further provide ecosystem services, including carbon sequestration, water filtration, and habitat for threatened and endangered species, which have local, regional, and global benefits.

ES Exhibit 1. Economic Value Supported by ODF Forestlands



This analysis evaluates four management scenarios developed by ODF, each reflecting different objectives for harvest intensity, rotation age, and revenue optimization:

- 30-Year Volume Target: Maintains a steady harvest volume for the first 30 years, followed by a non-declining even flow.
- Long Rotations: Emphasizes longer tree rotations that supports a balanced distribution of age classes across managed acres by year 70.
- Maximize Volume: Prioritizes harvest volume to maximize productivity over the long term, with fluctuations over time.
- Maximize Net Present Value (NPV): Focuses on generating the highest economic return using a 4% discount rate.

Each scenario results in different patterns of timber products, harvest costs, harvest volume, revenue distribution, employment, and ecosystem services over the analysis period. The analysis discusses socioeconomic outcomes for both the 70-year permit term of the HCP and the long-term implications over a 150-year modeling timeframe.

Income and Employment

Timber Harvest Activities

Income and employment impacts follow harvest volume trends. Higher volumes of timber harvests under scenarios like Maximize NPV and Maximize Volume support more direct jobs in logging and milling over the 150-year period.

Direct logging and milling jobs are highest in the first few decades, initially supporting over 1,000 jobs annually for all scenarios, except the 30-year Volume Target scenario, and decline over time (ES Exhibit 2). The steepest declines occur under the Maximize NPV and Long Rotations scenarios. Maximize NPV, 30-year Volume Target, and Maximize Volume scenarios stabilize into small cyclical variation between 500 and 1,000 jobs after year 50, while jobs under the Long Rotations scenario drop then increase again after Year 70.

Direct logging jobs are concentrated in Clatsop and Tillamook, the counties with the highest levels of timber harvest. The analysis estimates that direct milling jobs may be concentrated in

Key Findings

- **Scenario outcomes range from 3,000 to 7,000 annual jobs over the 150-year period.**
- **Maximize NPV supports the most timber-related jobs but also has high variability through time with a precipitous drop after 30 years.**
- **Maximize Volume and 30-year Volume Target scenarios result in less variability but lower levels of employment.**
- **Long Rotations results in the fewest cumulative direct jobs over the 150 years but has less variability later in the period.**
- **Tillamook and Clatsop counties lead in logging jobs, while Yamhill, Tillamook, and Columbia counties lead in milling jobs.**
- **Forest management, collection of special forest products, and recreation also support jobs.**

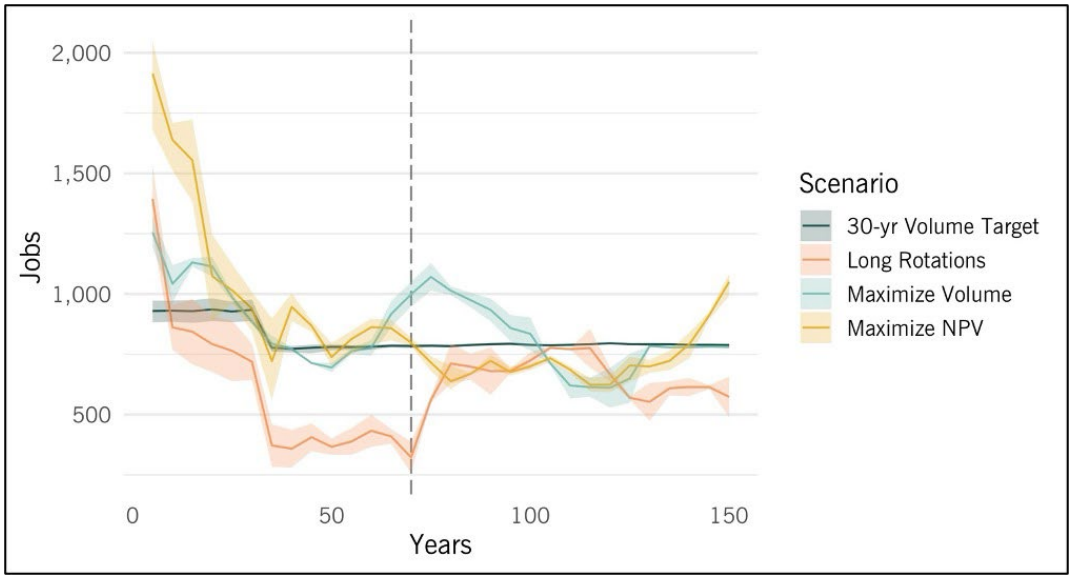
Yamhill, Tillamook, and Columbia counties, but the location of the jobs will likely change with changing trends in milling capacities.

Over the first decade, timber harvests on ODF forestlands can support between 3,400 (30-year Volume Target) to 7,000 (Maximize NPV) jobs annually. These jobs include indirect jobs in the upstream supply chain and induced jobs by increasing overall wages and spending in the regional economy, along with direct logging and milling jobs. Long-term economic shifts make estimating indirect and induced jobs beyond the first decade too uncertain.

All scenarios, except Maximize NPV, fall within historic annual harvest levels (170–235 MMBF/year vs. ~248 MMBF/year historic average), in the first 30 years, indicating that current mill capacity should be sufficient to produce the modeled jobs. Under Maximize NPV, however, timber harvests are expected to be higher than historic harvests. Whether existing mill and logging operator capacity will be sufficient or not depends on whether existing mills are operating at capacity and how they may respond to larger trends in harvest. Timber from ODF forestlands make up a smaller share of timber processed in western Oregon when compared to the supply from private and federal forestlands. Regardless, the steep declines in harvests and associated jobs and income during the first 30-50 years for most scenarios add complexity for operators and mills as they plan investments to capture the value of the short-term increases in harvest that would not be sustained in the long-term.

Under all scenarios, Douglas-fir and western hemlock stands dominate timber harvests with minimal harvests of red alder. The Long Rotations scenario has the highest harvest of large logs with substantial variability over time, which may create logistical challenges for the industry to manage.

ES Exhibit 2. Estimated Annual Direct Jobs (Logging and Milling), 150-year Period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs

Non-Timber Harvest Forest Management Activities

Other forest management activities, such as pre-commercial thinning, reforestation of stands, road construction and maintenance, land surveys, and monitoring surveys for threatened and endangered species also support income and employment in the region. ODF hires private contractors or engages internal staff for these activities. ODF expenditures on reforestation are proportional to harvest volumes. Reforestation expenses and associated jobs are expected to be highest under the Maximize NPV scenario at $92–97 million over 150 years and lowest under the Long Rotations scenario at $49–65 million, similar to the volumes of timber harvest.

Collection of Special Forest Products

People collect special forest products such as salal, edible fungi, moss, and other products on ODF forestlands for commercial sale, personal use, and subsistence. When collected for commercial sale, these products generate jobs and income and can be inputs to production of other goods and services. Collection of special forest products also generates revenue for ODF through the issuance of collection permits for commercial use. Between 2019 and 2024, ODF issued an average of 3,000 permits and collected an average of approximately $180,000 in permit fees annually. Permits are issued most often for the collection of salal and edible fungi like mushrooms and for collection in Forest Grove, Astoria, and Tillamook districts.

Forest management scenarios influence forest structures and the kinds of special forest products that may be available for collection. For example, supply of salal, a shrub used for florist greenery, becomes more abundant following timber harvest or thinning and would be favored under scenarios with higher levels of harvest like Maximize NPV and Maximize Volume. Supply of moss and some types of fungi that are most associated with late-seral and old-growth forests could be more abundant under the Long Rotations and Maximize Volume scenarios. Under all scenarios, the spatial distribution of forest products would dynamically shift across the management area as forest structure responds to management treatments.

Government Revenue

Board Of Forestry Lands (BOFL) Revenue

Counties and ODF share revenues from timber harvests on BOFL; counties receive 63.75 percent while ODF receives the remaining revenue.

During the 150-year period, cumulative discounted county payments range from approximately $1.1 billion (Long Rotations) to $2.0 billion (Maximize NPV).[1] Payments to ODF range from approximately $0.5 billion (Long Rotations) to $1.0 billion (Maximize NPV). Revenue patterns mirror harvest volumes, log dimensions, and harvest costs with Maximize NPV yielding the highest near-term payments and Long Rotations yielding the most volatile and lowest revenues.

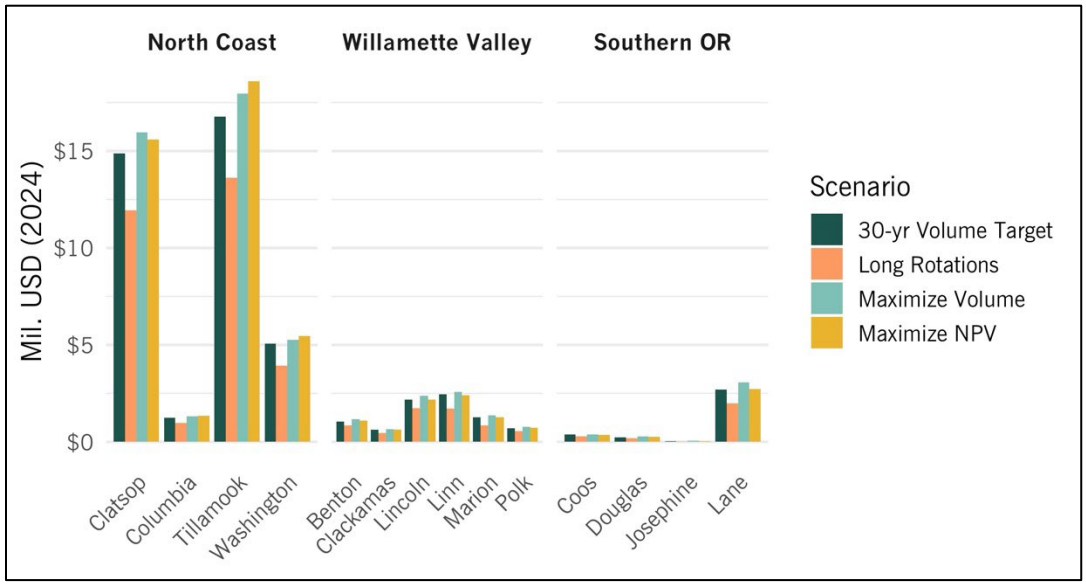
Key Findings

- **Maximize NPV produces highest total county payments but is also more variable over 150 years.**
- **Tillamook, Columbia, and Washington counties receive most payments under Maximize NPV while other counties receive most payments under Maximize Volume**
- **Common School Fund and FPHT revenues follow similar patterns, scaling with harvest volume.**

County-level outcomes vary (ES Exhibit 3). Columbia, Tillamook, and Washington counties receive the highest average annual payments under Maximize NPV, while other rural counties see their highest payments under the Maximize Volume scenario. Over time, the 30-Year Volume Target scenario produces relatively stable payments, while Long Rotations introduces greater year-to-year variability.

[1] In discounted 2024 dollars

ES Exhibit 3. Average Annual County Payments (2024 dollars), 150-year period



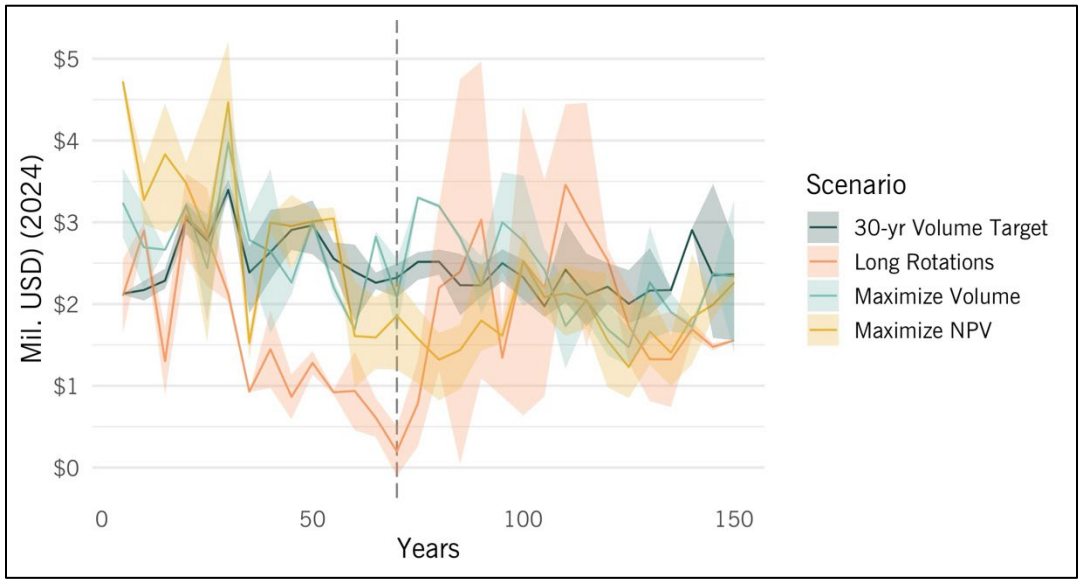
Source: ECOnorthwest's analysis of ODF modeled data

Contributions to the Common School Fund (CSF)

The revenue generated from timber harvests on Common School Fund Lands contributes to the Common School Fund, which provides funding and resources to schools in Oregon. Contributions to CSF are highest under the Maximize NPV Scenario ($83–84 million) followed by the Maximize Volume Scenario ($70–72 million), the 30-year Volume Target Scenario ($61–63 million), and the Long Rotations Scenario ($43–56 million) (in discounted dollars). (ES Exhibit 5).

Unlike the trends observed so far, contributions to CSF fluctuate considerably year over year across all modeled scenarios, because CSFL are a small portion of the lands managed by ODF. Contributions to CSF are lowest under the Long Rotations Scenario during the first 70 years but increase sharply during the latter half of the 150-year period.

ES Exhibit 4. Annual Contributions to CSF (in millions, 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

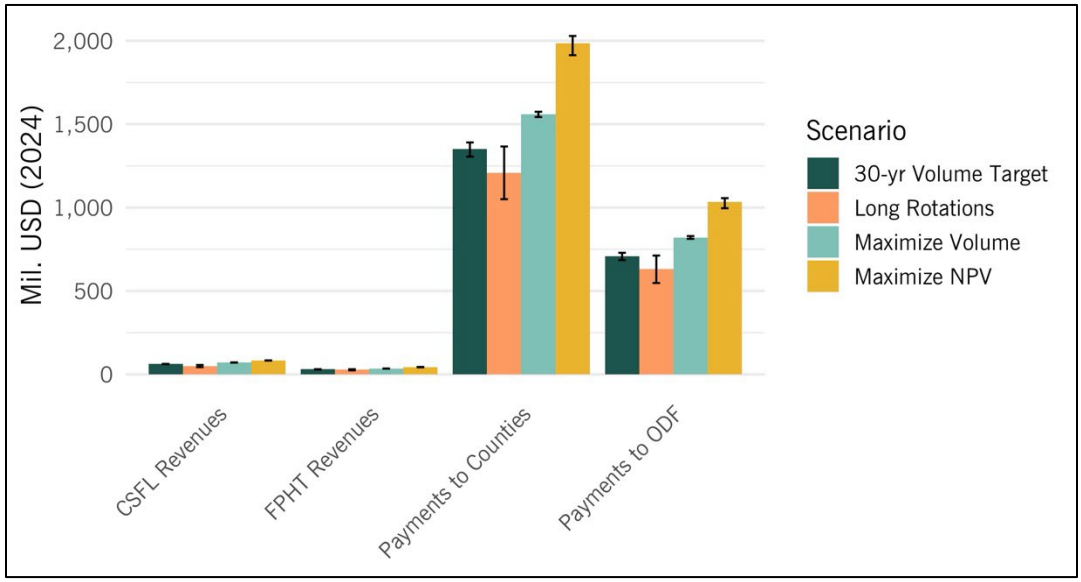
Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs

Forest Products Harvest Tax (FPHT) Revenue

Timber harvests in Oregon are subject to the Forest Products Harvest Tax, a volume-based tax paid by harvesters. The state distributes revenues for fire suppression, administration of the Forest Practices Act, forestry research and education at Oregon State University, and to the Oregon Forest Resources Institute.

Over the 150-year analysis period, annual FPHT revenue is highest under the Maximize NPV Scenario ($1.13–1.14 million) followed by the Maximize Volume Scenario ($1.10–1.11 million), the 30-year Volume Target Scenario ($1.05–1.06 million), and the Long Rotations Scenario ($0.75–0.9 million). Annual revenues vary the most under the Maximize NPV and Long Rotations scenario and the least under the 30-year Volume Target scenario.

ES Exhibit 5. Total Government Revenue from ODF Forestlands (discounted, 2024 dollars), 150-year period



Source: Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Recreation

ODF forestlands are popular sites for developed and dispersed recreation. They support a wide variety of recreational activities such as camping, hiking, hunting, fishing, target shooting, OHV (Off-Highway Vehicle) riding, mountain biking, equestrian use, mushroom picking, sightseeing, wildlife watching, picnicking, boating, and swimming. Astoria, Tillamook, Forest Grove, and North Cascade Districts have the highest supply of developed infrastructure in the form of campgrounds, motorized and non-motorized trails, OHV staging areas, day-use areas, and other facilities like boat launches, target shooting lanes, and interpretive sites. Dispersed recreation is also popular across the districts.

- **Key Findings**
- **ODF forestlands receive 840,000 visitors for a variety of recreational activities**
- **Carbon sequestration ranges from ~67 million MT CO_2 (Maximize NPV) to ~148 million MT CO_2 (Long Rotations) over 150 years.**
- **ODF supports collection of food, materials, hunting and fishing**
- **ODF forestlands protect 1% of Oregon's drinking water sources**
- **ODF lands provide habitat for endangered and threatened species**
- **Tribes rely on the land and local resources for culture and subsistence**

In fiscal Years 2023 and 2024, campgrounds in the Tillamook, Clatsop, and Santiam state forests hosted an annual average of 26,000 campers and 62,000 visitor nights over 312 campsites. Majority of the campsites operate at full capacity on summer weekends with campers primarily residing in urban centers like

Portland, Salem, and Eugene. There are 497 miles of OHV trails and 145 miles of non-motorized trails across ODF forests that accommodate a variety of recreational activities. Trails are most densely concentrated near Oregon Route 6 in Tillamook County and are within driving distance of nearby population centers.

As Oregon's population grows over time, the local population base of visitors will also increase. Coupled with a growing interest and participation in outdoor recreation, recreational visitation to ODF forestlands is expected to grow over the analysis period. In 2024, approximately 843,000 unique recreational visits took place on ODF forestlands. These annual visits may grow to 891,000 in ten years. These visits will generate value for visitors in the form of consumer surplus of approximately $0.9 billion and spending of approximately $0.8 billion over ten years. This would support approximately 2,700 jobs and $0.1 billion in labor income.

Ecosystem Services

Climate Regulation

Carbon sequestration benefits differ substantially by scenario. Over the 150-year period, carbon sequestration ranges from 69 million Metric Tonnes of CO_2 (MT CO_2) (Maximize NPV scenario) to 129–154 million MT CO_2 (Long Rotations scenario). Long Rotations scenario sequesters more carbon earlier, maximizing climate value in the first half of the 150-year period.

Other Services

ODF's management scenarios would continue to support these ecosystem services. Differences in the type of management treatments over geography and time mean that some goods and services would vary in abundance and proximity for the populations that enjoy them, but in general, the variation would be minor compared to total supply. Other goods and services, like drinking water protection, would be the same across scenarios. ODF's ability to deliver educational programming and support research would depend on revenue availability and is more related to agency capacity than ecosystem productivity.

ODF forestlands provide important benefits beyond timber and recreation. Tribal communities utilize these lands for collecting food and materials for sustenance and to maintain their cultural heritage. In addition, many rural communities also rely on ODF forestlands for food and materials. Many communities in Oregon depend on these lands for **collecting food and materials** like edible fungi, berries, firewood, and medicinal plants. These activities support family needs, cultural traditions, and community well-being. In 2022, about 16% of Oregon's population participated in foraging trips, and over 1,500 firewood permits were issued in 2024. Forest conditions affect how much and what kinds of plants people can collect, so management choices matter. **Hunting and fishing** on these lands are also important food sources for many households.

These forests help **protect drinking water** and **provide habitat for wildlife**. Forests naturally filter water, reduce erosion, and protect clean drinking water for communities that rely on nearby sources. Although less than 1% of Oregon's surface drinking water sources overlap with ODF lands, the forests play a key role in protecting source water for three public systems and over 100 private users. Timber harvests and roads can increase runoff and treatment costs if not carefully managed. ODF forestlands also support many species listed as threatened or endangered, including salmon and the northern spotted owl. Research shows that Households are willing to pay to protect these species, reflecting strong public support for conservation measures.

ODF lands are a part of **Tribal culture**. These forests are ancestral lands for many Tribal Nations. They contain plants and animals that are essential to Tribal traditions, ceremonies, and food systems. ODF's management plan includes a commitment to continue working with the nine federally recognized Tribes in partnership to protect these cultural resources and ensure forests are managed in ways that support both traditional uses and long-term resilience.

Finally, ODF lands provide opportunities for **education and research**. The Tillamook Forest Center, with over 60,000 annual visitors, delivers environmental education through exhibits, programs, and workshops. Research partnerships with universities and agencies advance forest science and adaptive management

1. Introduction

Background

Oregon Department of Forestry (ODF) manages state forestlands in western Oregon to achieve Greatest Permanent Value (GPV) for the citizens of Oregon. GPV encompasses social, economic, and environmental benefits measured in terms of revenue and non-monetary ecosystem services, over time and across the landscape.[2] Timber harvests on ODF forestlands provide raw materials for the forest products and related industries, thereby supporting local economies through employment and income generation. Timber revenues support state and—through revenue sharing—county and other local public services, including roads, law enforcement, fire protection, and education. The forests provide critical habitat for listed species, including northern spotted owl, marbled murrelet, and salmonids. Communities and tribal nations in the region rely on the forestlands for hunting, fishing, and the collection of berries, edible fungi, and other food, medicine, and materials. People enjoy the forests for recreation in many forms, including motorized. The forestlands are critical to adapting and managing for regional climate change impacts while providing clean air and water, protecting against erosion, and supporting soil formation. They also facilitate research, contribute to education, and provide the foundation for spiritual and cultural traditions. All these goods and services are recognized in ODF's Greatest Permanent Value mandate and have economic value.

ODF is developing a new Western Oregon State Forests Management Plan (FMP) that would, in conjunction with the draft Western Oregon State Forests Habitat Conservation Plan (HCP), guide the management of ODF forestlands over the next seventy years. The FMP outlines the goals, strategies, and guidelines for implementation and adaptive management that would be used to manage and monitor different forest resources while building resilience and resistance to climate change disturbances. By shaping forest resource conditions over time, the FMP and HCP together will influence access to and use of ODF forestlands and the value Oregonians derive from them.

This report supports ODF's FMP development by describing the ways ODF-managed forestlands in western Oregon create economic value and how proposed management scenarios affect the forests' value. Building on ODF's FMP management scenario modeling effort, the economic analysis quantifies changes in economic value, economic activity (e.g., employment), and government revenue directly tied to different harvest regimes. To assess how the proposed management scenarios affect other dimensions of greatest permanent value, including recreation, climate regulation, and other ecosystem services, the report

[2] Oregon Secretary of State, "Oregon Administrative Rule 629-035-0020," accessed November 19, 2024, https://oregon.public.law/rules/oar_629-035-0020.

describes - and where possible quantifies - the economic value of the forest ecosystem services.

Organization of the Report

The report is organized as follows:

Section 2 (Methods and Key Assumptions) provides an overview of the study area and outlines the methodology used to describe and analyze economic values in the report. It also summarizes the assumptions underlying the scenarios that ODF modeled.

Section 3 (Timber Harvests, Costs, and Revenues) summarizes and compares the outputs of the modeled scenarios, focusing specifically on how timber harvests, gross revenues, harvest costs, and net revenues vary over the 150-year analysis period and by county.

Section 4 (Income and Employment Effects) describes the economic activity (income and employment) associated with timber harvests, non-timber harvest forest management activities, and commercial collection of special forest products.

Section 5 (Effects on Government Revenue) describes how timber harvests contribute to forest product harvest tax revenue and revenue for ODF and county governments.

Section 6 (Effects on the Value of Recreation) describes the supply of recreation infrastructure like campground and trails on ODF forestlands, the demand for outdoor recreation in western Oregon, and the economic value of associated recreational experiences.

Finally**, Section 7 (Effects on the Value of Other Ecosystem Services)** describes the economic value of ODF forestland ecosystem services, including climate regulation, cultural values for tribes, drinking water filtration, habitat provision for sensitive species, educational and research services, and non-commercial collection of special forest products.

Appendix A provides a detailed description of the methodology and assumptions used to quantify economic effects in this report. It supplements the discussion in Section 2.

2. Methods and Key Assumptions

See Appendix A for a detailed discussion *of methods for IMPLAN and other quantitative analysis.*

Study Area

This report focuses on the geography covered by the Western Oregon State Forests Management Plan, an area of about 640,000 acres of ODF-managed lands west of the Cascade Mountains within ODF's Northwest Oregon and Southern Oregon Areas (see footnote for link to map).[3] The forest management activities that contribute to economic effects assessed in this report occur wholly within this area.

The study areas defined for each economic effect analysis vary somewhat, based on the specific geography that contributes to or is related to each economic effect.

- **Impacts on income and employment** are analyzed for the regional economy, defined as the counties that comprise western Oregon.[4] This area is sufficiently large to capture the economic relationships between rural areas and urban centers and accounts for most economic impacts likely to occur statewide.
- **Impacts on government revenue** are primarily analyzed for entities and agencies at the state level, except for harvest revenue from Board of Forestry Lands (BOFL), which is also analyzed at the county level.
- **Effects on the economic value of recreation, hunting, fishing, collection of special forest products, and other ecosystem services** are assessed through the lens of populations and communities in western Oregon, though the analysis recognizes the potential for many of the benefits to accrue to people outside this region as well. The analysis of the forestlands' carbon sequestration potential captures potential benefits globally via the methodology used to estimate the social cost of carbon.

Scenarios for Analysis

ODF has developed scenarios for consideration within the FMP. These modeled scenarios estimate timber harvest, stand ages, forest inventory, and timber revenues over a 150-year planning timeframe. The first 70 years of this timeframe align with the HCP's permit term. Differences in volumes and revenues across scenarios reflect differences in underlying products (log species, grade, dimensions) and the costs associated with harvest methods (thinning vs clearcut, harvest of large vs small trees).

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[3] Oregon Department of Forestry, "ODF Districts," accessed December 2, 2024, https://ago-item-storage.s3.amazonaws.com/fb282a24c401465c80cb22233ced6e9f/ODF_Districts.pdf.

[4] These counties include Benton, Clackamas, Clatsop, Columbia, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Polk, Tillamook, Washington, and Yamhill counties.

The scenarios include:

- **30-year Volume Target Scenario:** This scenario achieves volume targets on BOFL for the first 30 years with a 5 percent volume variation limit. After 30 years, it resets to a non-declining even harvest flow for the remaining period. This scenario includes:
  - Run a, which achieves a volume target of 185 million board feet (MMBF).
  - Run b, which achieves a volume target of 195 million board feet (MMBF).
  - Run c, which achieves a volume target of 205 million board feet (MMBF).
- **Long Rotations Scenario:** This scenario maximizes harvest volume with longer rotations and a balanced distribution of age classes across managed acres by year 70. This scenario includes:
  - Run a, which uses a rotation age of up to 120 years outside HCAs.
  - Run b, which uses a rotation age of up to 150 years outside HCAs.
- **Maximize Volume Scenario:** This scenario maximizes for harvest volume and productivity. This scenario includes:
  - Run a, which allows for unlimited periodic volume variation.
  - Run b, which limits periodic volume variation to 10 percent.
- **Maximize NPV Scenario:** This scenario maximizes net present value of gross revenues using a discount rate of 4 percent, allowing for departure. This scenario includes:
  - Run a, which allows for unlimited periodic volume variation.
  - Run b, which limits periodic volume variation to 10 percent.
  - Run c, which limits periodic volume variation to 30 percent.

Methods

Section 3 of the report provides a summary of the forest model outputs for the scenarios described above. These model outputs form the basis of the analysis of income and employment, and government revenue associated with timber harvests on ODF forestlands in western Oregon. The model outputs and analysis for income and employment and government revenue are summarized and presented over the 150-year modeling period and the 70-year HCP permit term to emphasize differences in the timing of harvests among the scenarios.

The analysis of income and employment focuses on both direct and secondary contributions of timber harvest activities within western Oregon. Direct employment is calculated based on historic relationships between harvested volumes and labor, reported in decadal increments in Section 4. Secondary labor and income contributions are estimated for the first decade of the analysis period using the IMPLAN model. The analysis also estimates income and employment contributions from spending associated with projected recreational trips to ODF

forestlands between 2025 and 2034, the first decade for which visitation has been estimated.

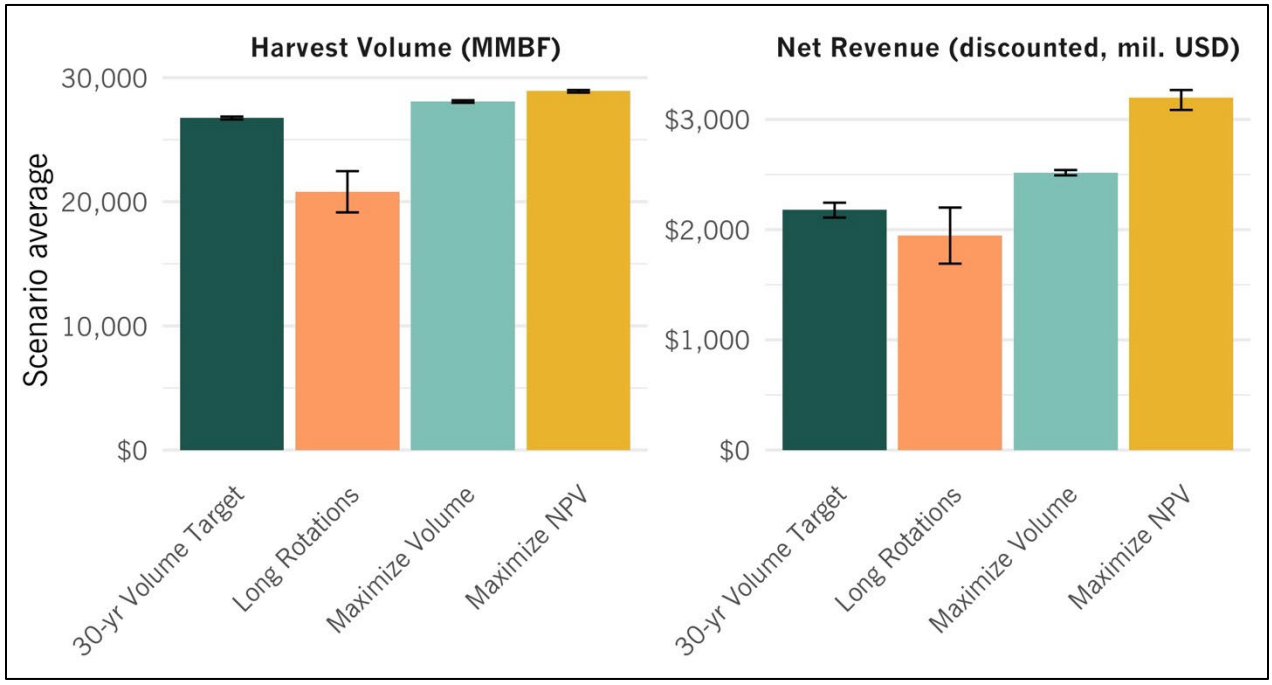
For government revenue, the analysis estimates revenue distribution to county governments and ODF from harvests on BOFL, to the Common School Fund from harvests on the Common School Forest Lands (CSFL), and to state agencies from the Forest Products Harvest Tax. The analysis also considers the value of ecosystem services, including both goods (such as firewood and edible fungi) and services (such as clean water and carbon sequestration). This portion of the study assesses how changes in the availability and quality of these services affect their value, as well as potential changes in demand due to the proposed actions.

3. Timber Harvest, Costs, and Revenues

This section describes the outputs of the modeled scenarios. The model produces data for the estimated volume of timber harvest and the associated gross revenues, harvest costs, and net revenues. Harvest costs refer to expenses related to logging and hauling timber, and constructing roads to access timber. These outputs are summarized across BOFL and CSFL. These outputs form the basis of the analysis of harvest-related income and employment and government revenue in Section 4 and 5.

Exhibit 1 presents a comparison of the modeled timber harvest volumes and net revenues for each scenario, with the whiskers representing the minimum and maximum values based on the individual runs. Timber harvest volumes and net revenue are highest under the Maximize NPV scenario, followed by the Maximize Volume scenario, the 30-year Volume Target scenario, and finally the Long Rotations Scenario. Maximize NPV is the only modeled scenario that specifies a revenue goal, resulting in meaningful differences from other scenarios that lack a revenue goal. The Maximize Volume scenario results in similar levels of timber harvest volumes as the Maximize NPV scenario over the entire 150-year timeframe, but results in lower overall discounted net revenue, which can be attributed to the timing of harvest and the model's selection of stands.

Exhibit 1. Timber Harvest (in MMBF) and Discounted Net Revenue (in millions, 2024 dollars) by Scenario, 150-year period



Source: ECOnorthwest analysis of ODF's modeled outputs

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Within each scenario, different runs yield varying estimates, with some scenarios resulting in a wider range of outcomes. For instance, in the Long Rotations Scenario, increasing the rotation age from 120 to 150 years results in approximately 3,321 MMBF less harvest volume and $475 million less in net revenue (Exhibit 2). Under the Maximize Volume scenario, run b (with periodic volume variation limited to ±10%) produces about 207 MMBF less harvest volume than its unlimited counterpart, run a (Exhibit 2).

Exhibit 2. Timber Harvest (in MMBF) and Discounted Revenue and Costs (in millions, 2024 dollars) by Scenario and Run, 150-year period

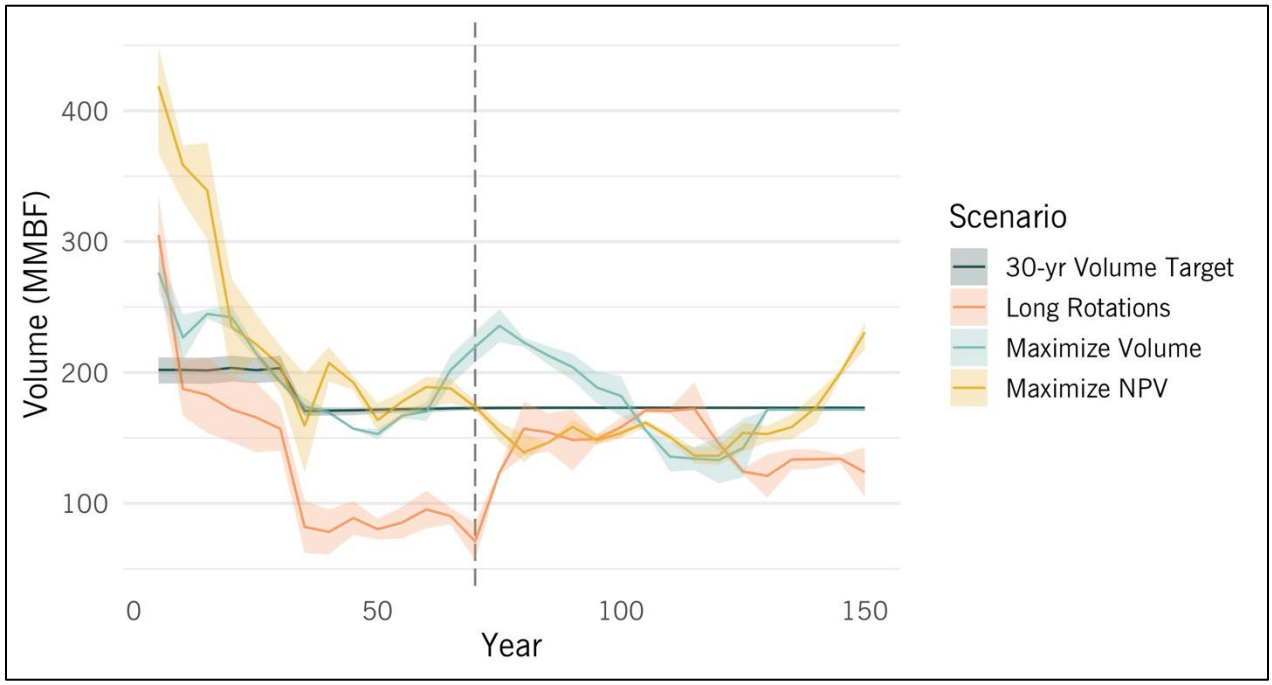
SCENARIO AND RUN	HARVEST VOLUME	GROSS REVENUE	TOTAL COSTS	NET REVENUE
30-year Volume Target Scenario				
run a: 185 MMBF	26,624	$3,353	$1,385	$1,968
run b: 195 MMBF	26,851	$3,486	$1,445	$2,041
run c: 205 MMBF	26,865	$3,573	$1,479	$2,094
Long Rotations Scenario				
run a: 120 years	22,463	$3,527	$1,475	$2,053
run b: 150 years	19,142	$2,747	$1,169	$1,578
Maximize Volume Scenario				

SCENARIO AND RUN	HARVEST VOLUME	GROSS REVENUE	TOTAL COSTS	NET REVENUE
run a: no limit	28,174	$4,004	$1,634	$2,662
run b: +/- 10%	27,973	$3,933	$1,607	$2,612
Maximize NPV Scenario				
run a: no limit	28,998	$5,071	$2,023	$3,048
run b: +/- 10%	28,791	$4,805	$1,925	$2,879
run c: +/- 30%	28,961	$5,039	$2,017	$3,023

Source: ECOnorthwest's analysis of ODF modeled data

Across all four modeled scenarios, timber harvest volumes show a net decline over the 150-year period, with the most significant drop occurring within the first 30–50 years (Exhibit 3). Over the subsequent years, volumes remain below initial levels but fluctuate somewhat depending on the scenario. Notably, during the latter half of the analysis period, harvest volumes under the Maximize Volume, 30-year Volume Target, and Long Rotations scenarios occasionally exceed those of the Maximize NPV scenario. The Maximize NPV scenario shows the highest initial harvests, followed by a sharp decline and later recovery. Under the Maximize Volume scenario, harvest levels are relatively high throughout the 150-year period, while the 30-year Volume Target scenario shows lower but more consistent and stable harvests over time. The Long Rotations scenario yields the lowest volumes overall, with significant cyclical fluctuations. Modeled net revenues follow a similar trend to harvest volumes, with a noticeable decline within the first 30–50 years, followed by lower levels coupled with cyclical fluctuations in the subsequent years (Exhibit 4).

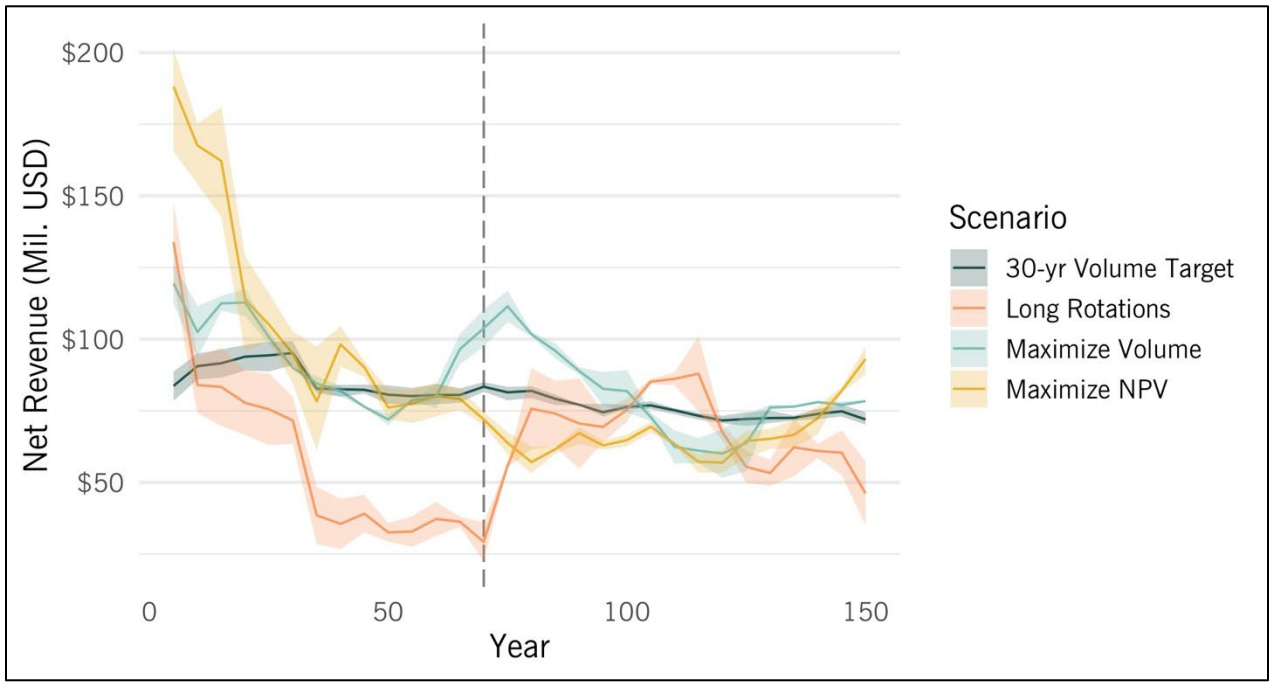
Exhibit 3. Modeled Annual Timber Harvest (in MMBF), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs. The vertical dashed line identifies the end of the 70-year HCP permit term.

Exhibit 4. Modeled Net Revenue (Stumpage) (in millions, 2024 dollars), 150-year period

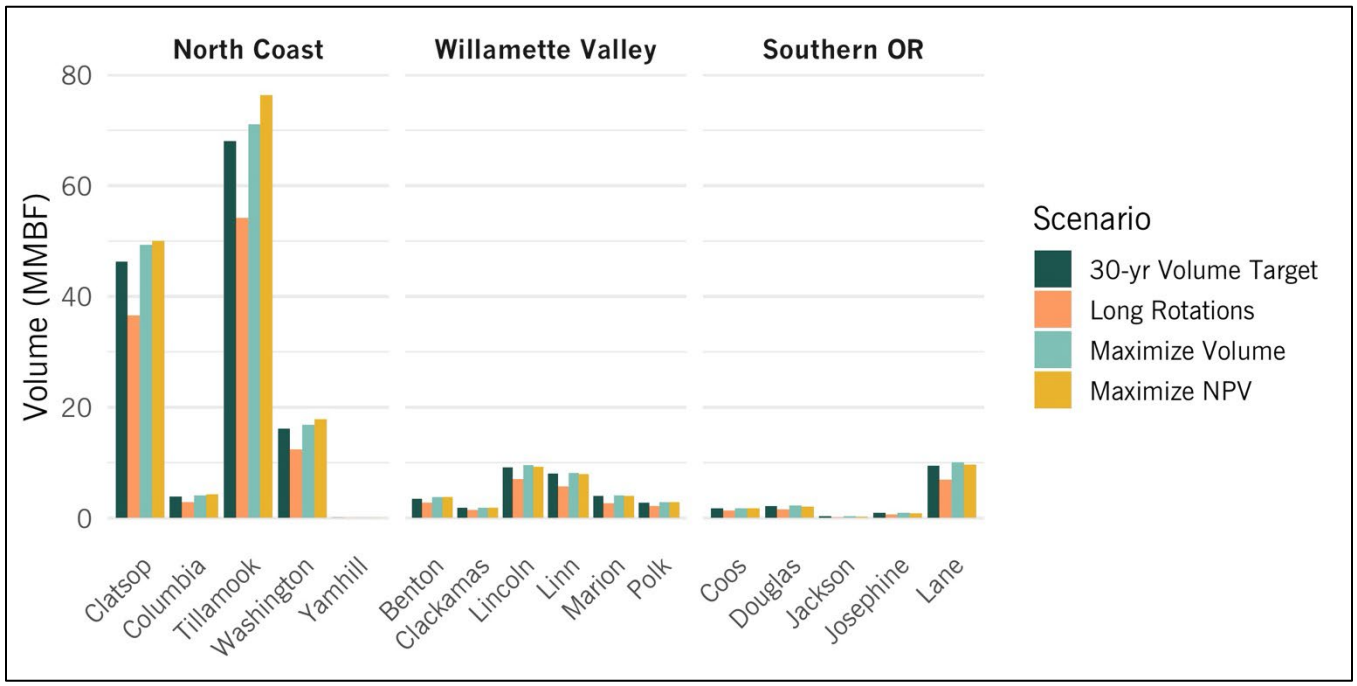


Source: ECOnorthwest's analysis of ODF modeled data

Note: Values are annual averages calculated over 5-year periods. Solid lines represent the average, while bands represent minimum and maximum values under scenario runs. The vertical dashed line identifies the end of the 70-year HCP permit term.

Over the 150-year period, on average, annual harvest volumes and net revenues are highest in the North Coast, where most of ODF's managed forestland acreage is located (Exhibit 5 and Exhibit 6). In most counties within the Willamette Valley and Southern Oregon, harvest volumes and net revenues are highest under the Maximize Volume scenario. In the North Coast, timber harvest volumes and net revenues are highest under the Maximize NPV Scenario for most counties except Clatsop County and Yamhill County. In Clatsop County, net revenues are highest under the Maximize Volume scenario. In Yamhill County, the 30-Year Volume Target scenario produces the highest net revenues. Across all counties, the Long Rotations scenario results in the greatest variability in annual revenues, as measured by the coefficient of variation (Exhibit 7).[5]

Exhibit 5. Average Annual Volume (MMBF) by County, 150-year period

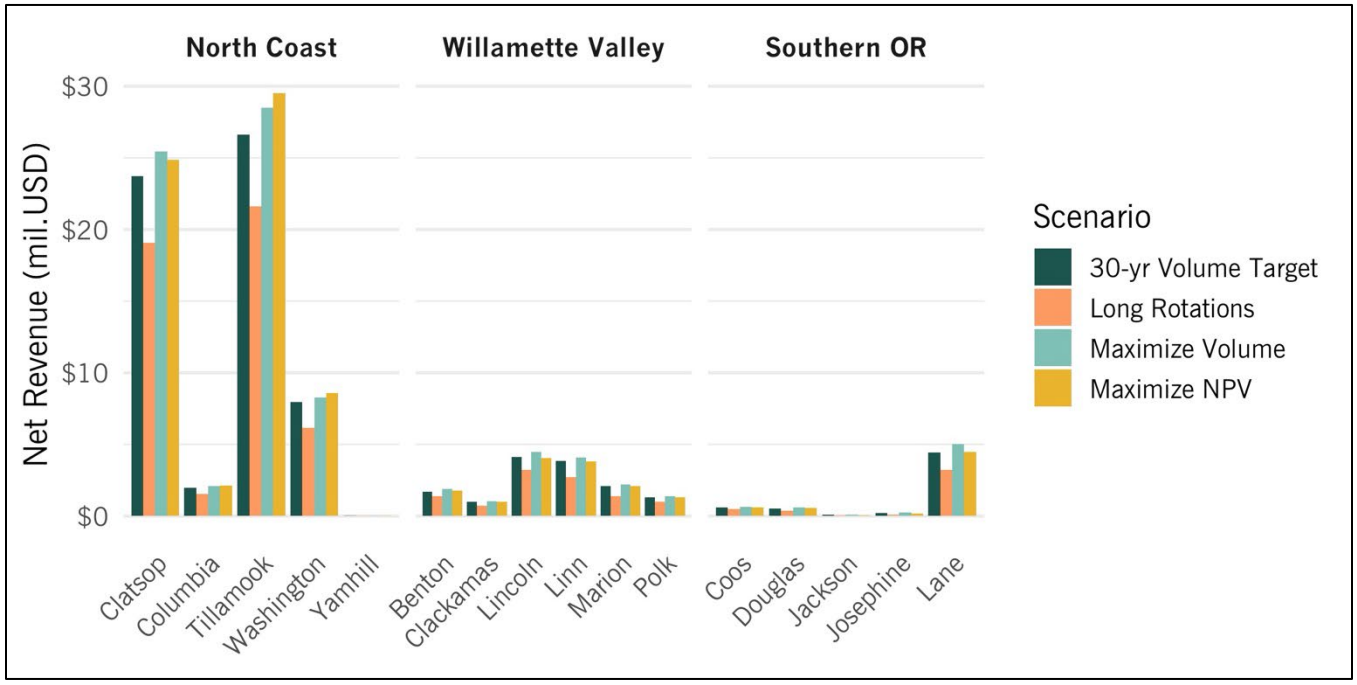


Source: ECOnorthwest's analysis of ODF modeled data

Note: Values are averaged across runs for each scenario.

[5] The coefficient of variation is a measure of variability relative to the mean. It can be calculated by dividing the standard deviation by the mean.

Exhibit 6. Average Annual Net Revenue (Stumpage) (in millions, 2024 dollars) by County, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Values are averaged across runs for each scenario.

Exhibit 7. Variability of Annual Net Revenue (Coefficient of Variation) by County, 150-year period

Source: ECOnorthwest's analysis of ODF modeled data

Note: Values are averaged across runs for each scenario.

4. Income and Employment Effects

ODF forestlands in western Oregon directly support economic activity (e.g., monetary transactions, income generation, and employment) through timber harvest, other forest management activities, and commercial collection of special forest products. This section presents available data on these categories of economic activity and how the scenarios would affect them.

Recreation infrastructure development and use within ODF-managed forests also generate economic activity. The income and employment supported by recreational use and investments are described in Section 6.

Timber Harvest Activities

Timber harvests support income and employment before, during, and after harvest. Following the auction of timber, logging and milling companies harvest the timber, sort by species and grade, and then transport it to a raw processing site. Processing sites include sawmills, paper/pulp mills, and veneer mills.

This analysis assumes that logging jobs occur in the county where the harvest occurs and the number of Full-Time Equivalent (FTE) employees per unit of harvest stays constant over time. This assumption will not always be true in instances where loggers travel from outside counties or even outside western Oregon to a job site—while they are physically laboring in the county where harvest occurs, their job may be captured in employment data reported elsewhere, e.g., the county where their employer is located. Milling jobs occur at the location of the mill. According to ODF data on the flow of timber to scaling locations, most mills receiving timber harvested from ODF forestlands are in Western Oregon. In FY 2024, approximately 169 MMBF of timber harvested on ODF forestlands was processed in mills in western Oregon with mills in Lane, Tillamook, and Yamhill counties accounting for 55 percent of the processing by volume.[6] The distribution of milling jobs across the counties will likely change in the future as the flow of timber from ODF forestlands to mills changes with mill closures and expansions. In 2024, seven mills closed or curtailed some operations across Oregon while various companies like Timberlab, Stimson Lumber, Sierra Pacific,

[6] Oregon Department of Forestry, *Flow of timber to scaling locations between 2018 and 2024*, (October 18, 2024).

Hampton Lumber, Roseburg Forest Products, and Rosboro planned expansions of existing facilities or development of new processing facilities.[7,8,9,10,11,12,13]

This section describes the direct, indirect, and induced jobs, labor income, and economic output supported by logging and milling of timber harvested from ODF forestlands across the scenarios. Direct jobs, income, and output capture the immediate effects on the logging and milling sectors associated with changing volumes of timber harvest. Indirect jobs, income, and output capture the "upstream" effects as logging and milling companies change spending on production inputs. These include costs incurred by logging and milling companies on activities like harvesting and transportation.[14] Induced jobs, income, and output capture the effects on the rest of the economy from changes in household incomes and spending brought about by direct and indirect effects.

We use historic statewide employment and weekly wage data from the Bureau of Labor Statistics for the relevant logging and milling NAICS sectors to understand the average direct jobs and labor income associated with 1 MMBF of timber harvested in Oregon.[15] We combine this average direct economic contribution of timber harvests with the modeled timber harvest volumes for each scenario to estimate the total and average annual direct jobs and labor income supported by timber harvests under each scenario. These are then used as inputs to the input-output modeling (IMPLAN 2023) to estimate direct, indirect, and induced economic contributions.

IMPLAN is a static model that represents the relationships in an economy at a single point in time. It is built from economic data that reflect annual averages and assumes that wage rates, input prices, productivity of labor or capital, and migration or business location patterns hold constant and are not influenced by the activities being modeled. In other

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[7] Brad Fuqua, "Three Things: Philomath Grows Bigger, Toledo Sawmill Closes and Lots of Fire Calls," *Philomath News*, March 27, 2024, accessed April 3, 2025, https://philomathnews.com/three-things-philomath-grows-bigger-toledo-sawmill-closes-and-lots-of-fire-calls/.

[8] Wilk, Nathan, "Springfield, Oregon's Rosboro Timber Company Plans Expansion," *Oregon Public Broadcasting*, October 4, 2024, https://www.opb.org/article/2024/10/04/springfield-oregon-rosboro-timber-company-plans-expansion/.

[9] Stimson Lumber Company, "Stimson Lumber Sawline Investment," July 2024, https://stimsonlumber.com/wp-content/uploads/2024/07/Stimson-Lumber-Sawline-Investment-FINAL.pdf.

[10] Philomath News, "Timberlab Announces Millersburg as Site of New Plant," *Philomath News*, accessed October 4, 2024, https://philomathnews.com/timberlab-announces-millersburg-as-site-of-new-plant/.

[11] Adam Duvernay, "Sierra Pacific Industries Plans for Big Expansion at Eugene Sawmill," The Register-Guard, February 17, 2023, accessed March 5, 2025, https://www.registerguard.com/story/news/local/2023/02/17/sierra-pacific-industries-plans-for-big-expansion-at-eugene-sawmill/69915398007/.

[12] Jonathan Bach, "Hampton Lumber: Inside an Oregon Family Company's Efforts to Adapt to a Changing Industry," Portland Business Journal, July 8, 2024, accessed March 5, 2025, https://www.bizjournals.com/portland/news/2024/07/08/hampton-lumber-oregon-family-company.html.

[13] LBM Journal, "Roseburg Forest Products Announces 2 New Plants in Oregon," May 26, 2022, accessed March 5, 2025, https://lbmjournal.com/roseburg-forest-products-announces-2-new-plants-in-oregon/.

[14] These include sectors like support activities for agriculture and forestry, truck transportation, and forestry, forest products, and timber tract production.

[15] These include five NAICS sectors: commercial logging (113310), sawmills (321113), hardwood veneer and plywood mills (321211), softwood veneer and plywood mills (321212), and pulp, paper, and paperboard mills (3221).

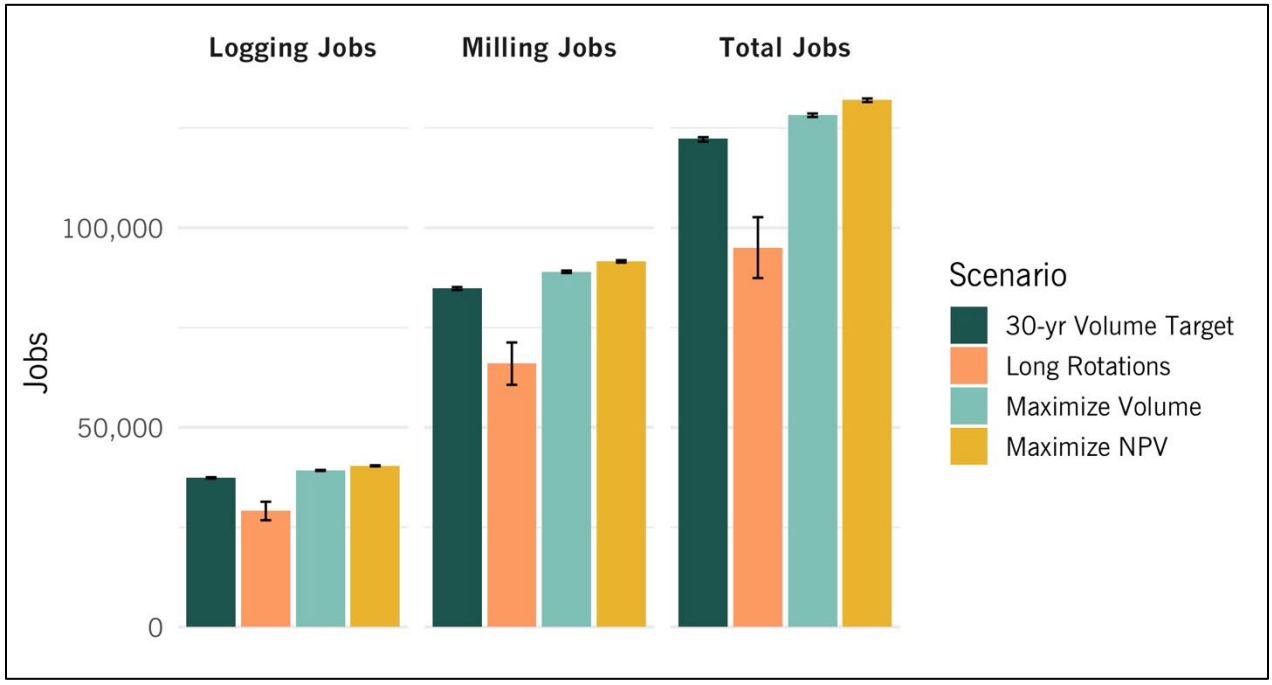
words, IMPLAN calculates changes in employment, income, and output based on changes in inputs through pre-defined relationships. It is useful to understand how changes in timber harvest may affect the economy in the near term, assuming the changes are unlikely to be of a scale that reshapes an industry. It is not capable of measuring economic effects over a longer period, as it cannot account for how an economy is likely to change in the future. Because of these considerations, the analysis of secondary impacts (i.e., indirect and induced effects) reports only changes in the first ten years of the analysis period.

The estimates for jobs and employee compensation do not include jobs and compensation supported by timber harvests outside ODF forestlands or in forestry and milling operations outside western Oregon. Economic factors such as timber harvests from non-ODF forestlands would likely affect individual mills and logging operations in western Oregon, but impacts on individual operations are outside the scope of this analysis.

Estimated Jobs and Income

Exhibit 8 shows the estimated number of direct logging jobs, milling jobs, and total jobs, generated under each scenario over the 150-year period. The number of logging and milling jobs in Western Oregon are a direct output of the amount of timber harvested under each scenario such that direct jobs and income are highest under the Maximize NPV Scenario (131,000–132,000 jobs) followed by the Maximize Volume Scenario (128,000–129,000 jobs), the 30-year Volume Target Scenario (122,000–123,000 jobs), and the Long Rotations Scenario (87,000–103,000 jobs) over the 150-year period.

Exhibit 8. Estimated Direct Logging, Milling, and Total jobs, 150-year period

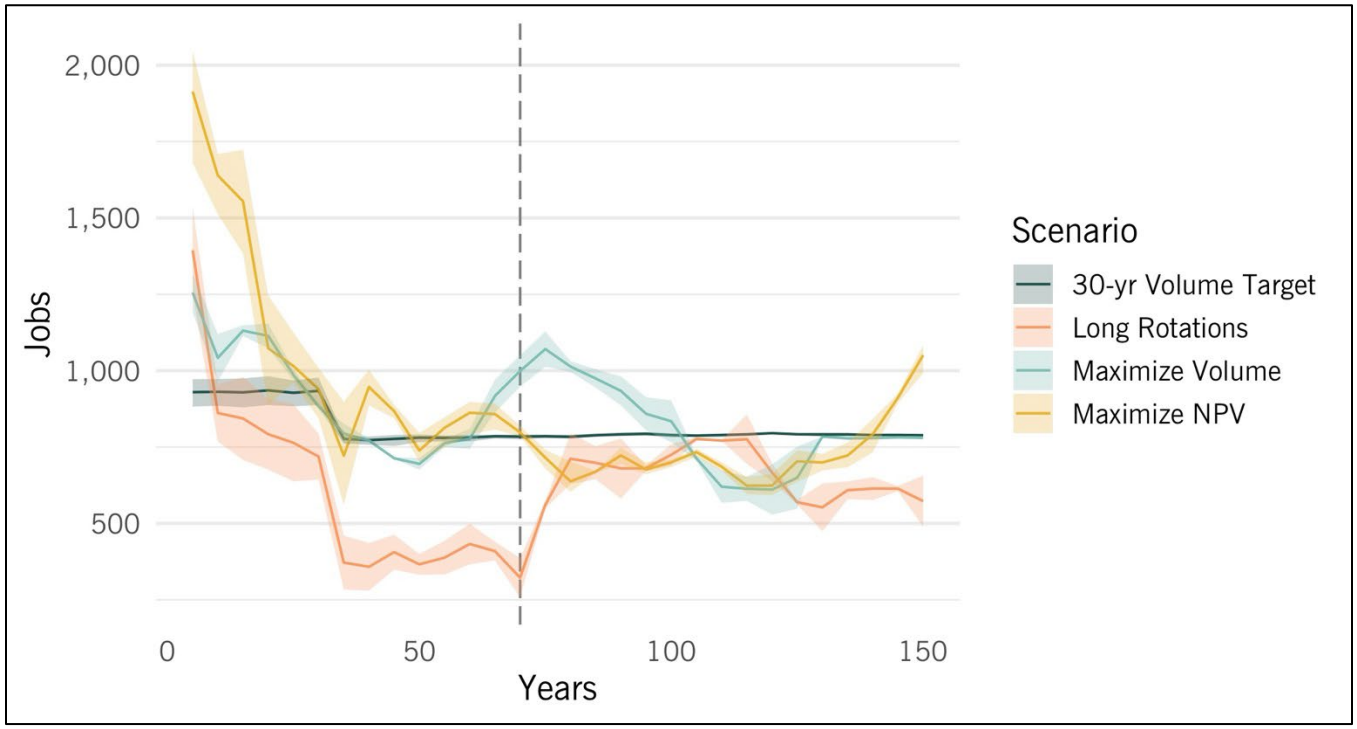


Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Consistent with the changes in harvest volumes and net revenue over time, direct jobs over the 150-year period show a sharp decline across all modeled scenarios during the first 30-50 years, followed by a relative stabilization with some fluctuation over the subsequent years (Exhibit 9). The Long Rotation scenario results in a steep initial drop in direct jobs, falling from approximately 1,400 jobs in the first five years to approximately 300 jobs by Year 70, before rising and fluctuating between 550 and 800 annual jobs in the subsequent years. Similarly, the Maximize NPV scenario results in an initial decline from about 1,900 to 700 annual jobs, then stabilizes around 700 annual jobs before increasing to 900 and 1,050 annual jobs in the final ten years. While the 30-year Volume target and Maximize Volume scenarios also show changes in total jobs over time, the shifts are less pronounced compared to those observed in the Long Rotations and Maximize NPV scenarios.

Exhibit 9. Estimated Annual Direct Jobs (Milling and Logging), 150-year Period



Source: ECOnorthwest's analysis of ODF modeled data

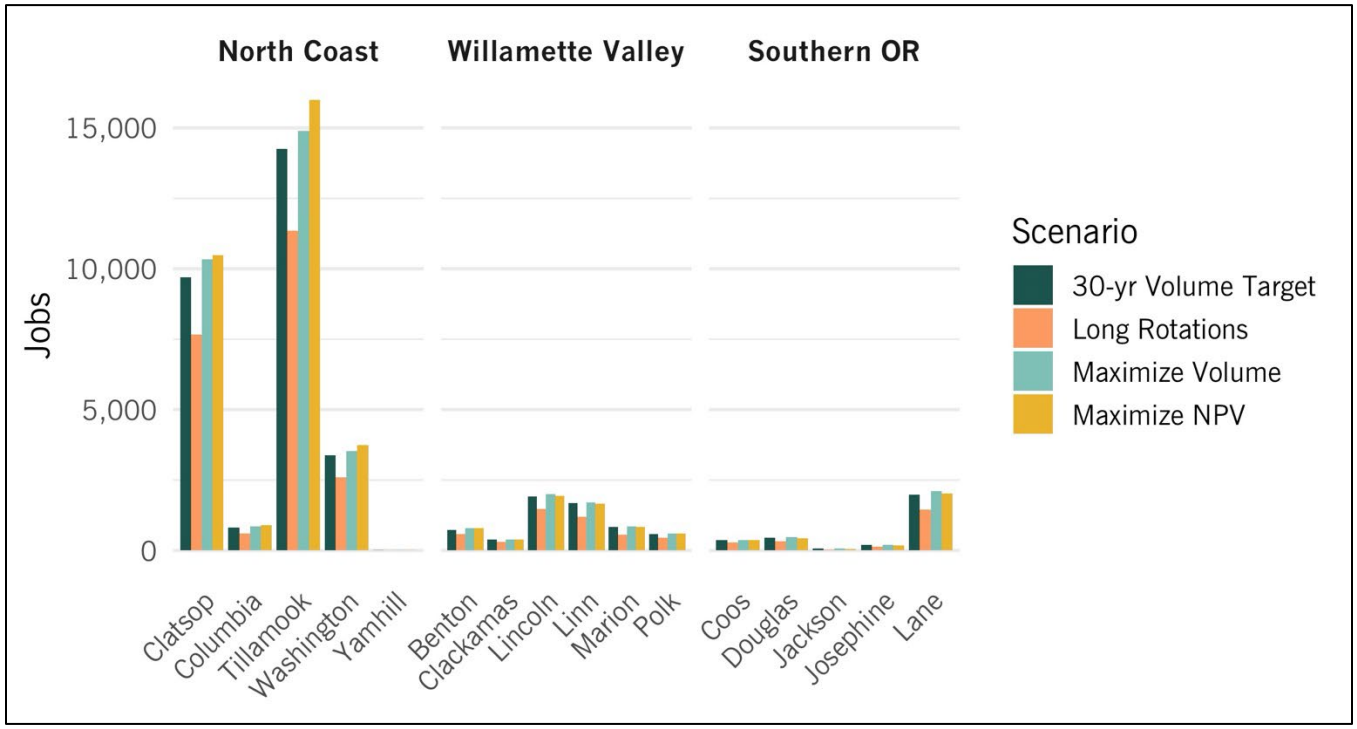
Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs.

Exhibit 10 and Exhibit 11 display county-level data on direct jobs in logging and milling, respectively. Tillamook and Clatsop counties have the highest estimated number of direct logging jobs given the high volumes of timber harvested in these counties. In the North Coast region, the total number of logging jobs is highest under the Maximize NPV scenario. In the Willamette Valley and Southern Oregon, logging jobs are highest under the Maximize Volume scenario in all counties except for Polk, Jackson, and Josephine.

Using the recent trends in the flow of logs from harvest locations to scaling locations, direct milling jobs are highest in Yamhill, Tillamook, and Columbia counties. Across all counties in the North Coast region, the number of direct milling jobs is highest under the Maximize

NPV scenario and lowest under the Long Rotations scenario. In the Willamette Valley, there is more variability. In Benton and Lincoln counties, milling jobs are highest under the Maximize Volume scenario. In Clackamas, Linn, and Polk counties, milling jobs are highest under the Maximize NPV scenario. In the Southern Coast, milling jobs are highest under the Maximize Volume scenario. The flow of logs will likely change over time, particularly as mills change capacities, new mills open, or mills close down, substantially changing where milling jobs will actually occur over the next 150 years.

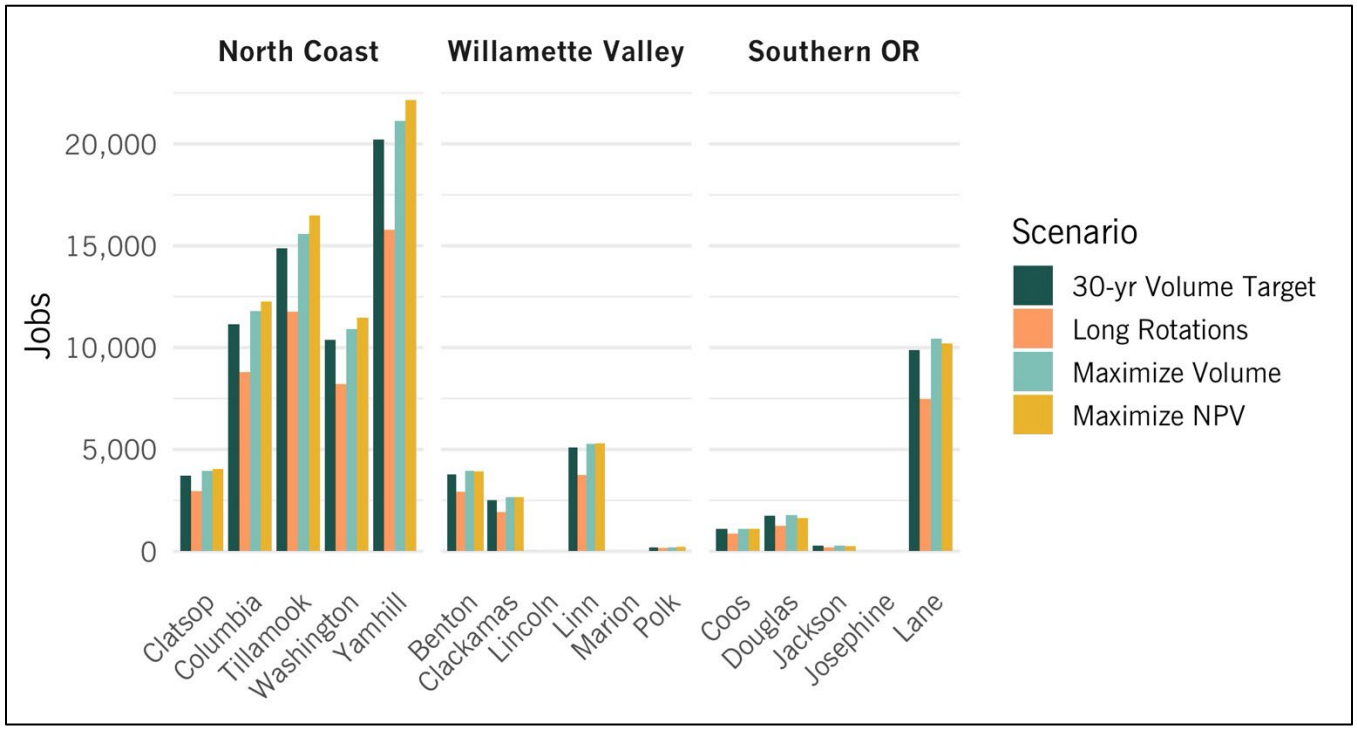
Exhibit 10. Total Direct Logging Jobs by County, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Values are averages across scenarios and runs.

Exhibit 11. Total Direct Milling Jobs by County, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Values are averages across scenarios and runs.

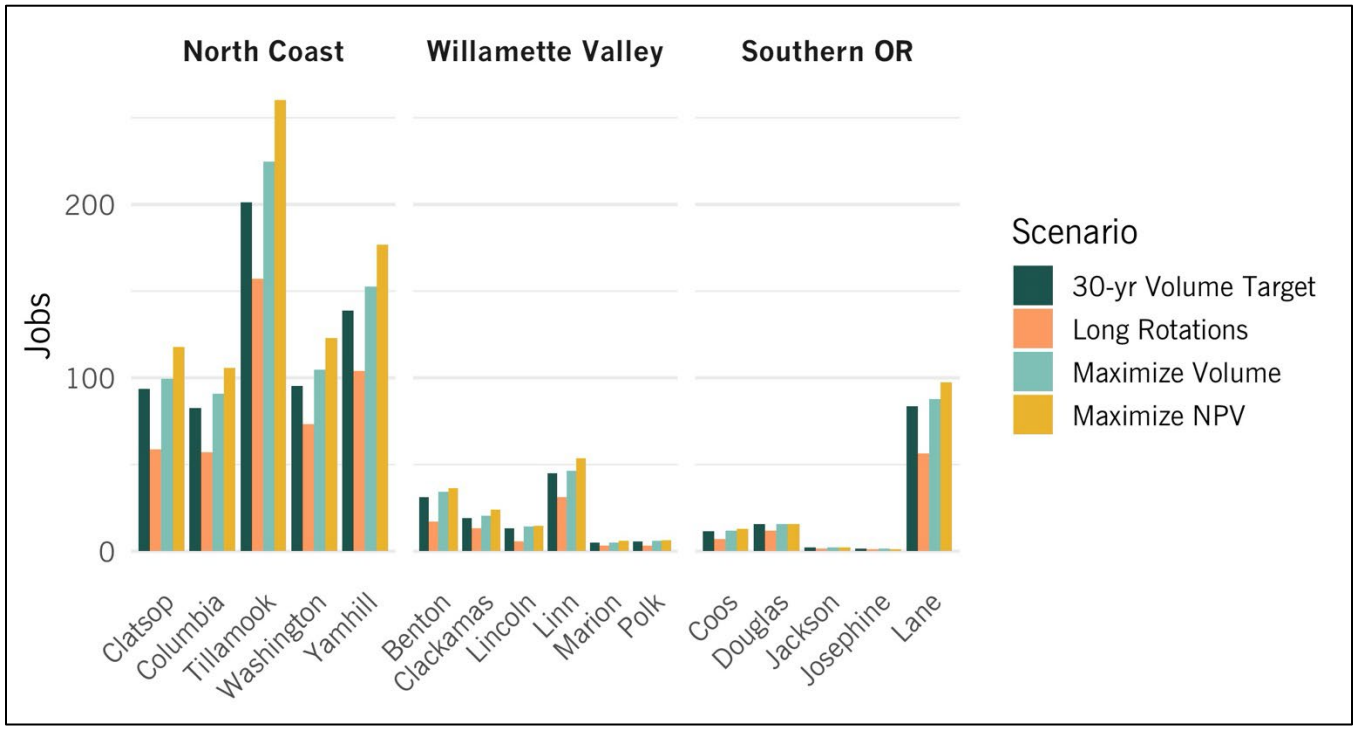
Across all counties in the North Coast Region, average annual jobs are highest under the Maximize NPV Scenario and lowest under the Long Rotations Scenario over the 150-year period. On the other hand, Maximize Volume results in the highest average annual jobs for most counties in the Willamette Valley and Southern Coast Region, except for Josephine, Clackamas, and Polk. Throughout the 150-year period, average annual number of jobs vary the most under the Long Rotations scenario across most counties. However, in Washington, Yamhill, Linn, Josephine, and Lane counties, jobs vary the most under the Maximize NPV scenario.

Exhibit 12. Average Annual Jobs by County, 150-year period

Source: ECOnorthwest's analysis of ODF modeled data
Note: Values are averages across scenarios and runs.

Similar trends in average annual jobs can be observed when looking at the first 70 years of the 150-year period. Average annual jobs are highest under the Maximize NPV Scenario and the lowest under the Long Rotations Scenario across all counties, except Josephine County where the Maximize Volume scenario produces the highest average annual jobs. During this period, jobs vary the most under the Maximize NPV for the North Coast counties and most of the Willamette Valley counties (Marion County is the exception). In the Southern Coast, no one scenario produces the most variability in jobs. For Coos and Lane counties, jobs are most variable under the Long Rotations scenario. For Jackson and Josephine counties, jobs are most variable under the Maximize NPV scenario. Finally, for Douglas County, jobs are most variable under the Maximize Volume Scenario.

Exhibit 13. Average Annual Jobs by County, 70-year period



Source: ECOnorthwest's analysis of ODF modeled data
Note: Values are averages across scenarios and runs.

IMPLAN models indirect and induced economic contributions from direct jobs and income for the first ten years of the analysis period. These indirect and induced contributions capture the additional economic activity spurred upstream in the supply chain and through increases in overall labor wages in the region (See Appendix A for details). The annual direct, indirect, and induced jobs range from 3,500 under the 30-year Volume Target scenario to 7,000 under the Maximize NPV scenario during the first decade of the modeling period. The 30-year Volume Target scenario yields the most conservative harvests in the beginning and correspondingly results in lower economic contributions in the first ten years of the analysis period. The Long Rotations and Maximize Volume scenario result in mid-range economic contributions across jobs, labor income, and economic output.

Exhibit 14. Average Annual Economic (Direct, Indirect, Induced) Contributions (in millions, 2024 dollars), First Decade

SCENARIO AND RUN	JOBS	LABOR INCOME	VALUE ADDED	ECONOMIC OUTPUT
30-year Volume Target Scenario				
run a: 185 MMBF	3,472	$298	$489	$1,101
run b: 195 MMBF	3,665	$294	$482	$1,084
run c: 205 MMBF	3,794	$326	$536	$1,202
Long Rotations Scenario				

SCENARIO AND RUN	JOBS	LABOR INCOME	VALUE ADDED	ECONOMIC OUTPUT
run a: 120 years	4,796	$413	$682	$1,518
run b: 150 years	3,904	$336	$554	$1,236
Maximize Volume Scenario				
run a: no limit	4,440	$382	$630	$1,408
run b: +/- 10%	4,475	$385	$636	$1,418
Maximize NPV Scenario				
run a: no limit	7,046	$609	$1,013	$2,224
run b: +/- 10%	6,007	$519	$864	$1,896
run c: +/- 30%	7,005	$606	$1,007	$2,211

Source: ECOnorthwest's analysis of ODF modeled data

Oregon's Timber processing capacity

The scenarios modeled above estimate varying volumes of timber that will be harvested from ODF forestlands over the permit term. The 30-year Volume Target Scenario estimates an even flow of timber harvest over time, with overall harvest levels being highest under the Maximize NPV Scenario, with higher harvests at the beginning of the permit term that decline with time. All scenarios, except Maximize NPV, result in an annual average timber harvest volume between 170 and 235 MMBF in the first 30 years. This level of annual harvest is within the historic annual levels of timber harvest from ODF lands—from 2015 to 2024, approximately 248 MMBF of timber was harvested from ODF forestlands annually, indicating current mill capacity should be sufficient for those scenarios (Exhibit 15). Under Maximize NPV, however, timber harvests are expected to be higher than historic harvests. Whether existing mill capacity will be sufficient or not depends on whether existing mills are operating at capacity and how they may respond to larger trends in harvest. Timber from ODF forestlands makes up a smaller share of timber processed in western Oregon when compared to the supply from private and federal forestlands. Regardless, the steep declines in harvests and associated jobs and income during the first 30-50 years for most scenarios add complexity for operators and mills as they plan investments to capture the value of the short-term increases in harvest that would not be sustained in the long term.

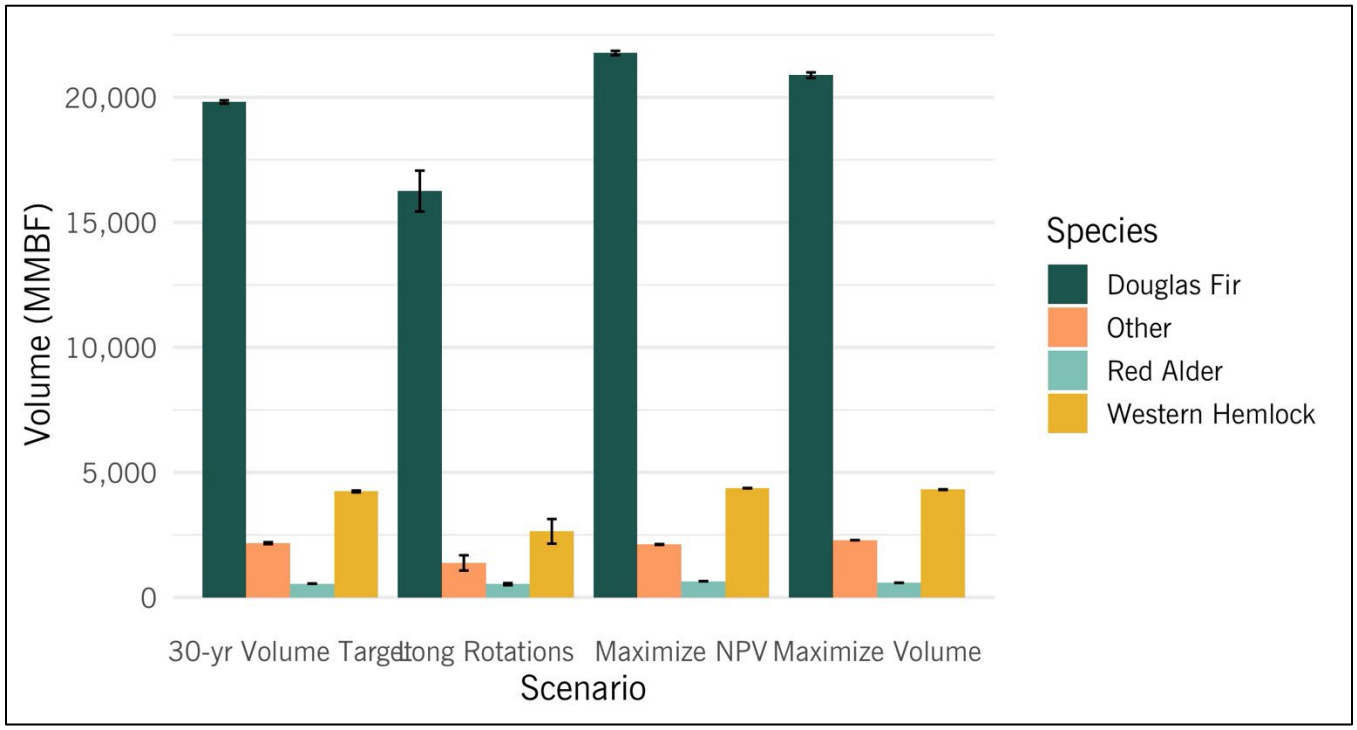
Exhibit 15. Volume of timber harvested on ODF forestlands (in MMBF, 2015-2024)

Source: Oregon Department of Forestry[16][17]

There may be changes in the types of logs harvested under the various scenarios that could pose challenges given existing processing capacity. Across all scenarios, Douglas-fir makes up the highest share of the harvest volume, followed by Western hemlock, Other Species, and finally Red alder (Exhibit 16). Harvests of Douglas-fir are highest in the beginning of the 150-year period, with a steady decline over time under all scenarios. On the other hand, harvests of Western hemlock and other timber species will experience steep declines during the permit term. Harvests of Western hemlock and other species increase substantially in the latter 80 years across all scenarios, but this is a function of planting prescriptions in the model that are subject to change.

[16] Oregon Department of Forestry, *Common School Forest Land Annual Report, Fiscal Year 2024* (Salem, OR: Oregon Department of Forestry, April 2025)
[17] Oregon Department of Forestry, *Council of Forest Trust Land Counties Annual Report, Fiscal Year 2024* (Salem, OR: Oregon Department of Forestry, November 2024)

Exhibit 16. Total Harvest Volume by Species, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Red alder, the primary hardwood species, is harvested intensely under all scenarios in the first few decades, with a steep decline to almost no harvests in the last 80 years (Exhibit 17). High volumes of red alder harvests in the early years are needed to achieve a better balance of hardwood and conifer species that will have greater habitat and carbon sequestration benefits. At present, western Oregon has limited milling capacity to process hardwood logs that are typically lower in value than softwoods. Only five mills in Oregon operated by Northwest Hardwoods and Timber Products Inc. claim to be able to process hardwood.[18] Cascade Hardwoods in Washington occasionally purchases hardwood from ODF either directly through timber sales or through other operators.[19] There are growing opportunities to expand hardwood processing capacity. Recently, the U.S. Forest Service provided a grant to Patrick Lumber Manufacturing to set up a hardwood sawmill in Philomath, Oregon, that is expected to produce approximately 150,000 BF of hardwood lumber per month.[20] The model suggests that any need for processing capacity of hardwoods would be short-lived.

[18] Union Pacific, "Oregon Lumber Mills," accessed March 5, 2025, https://www.up.com/customers/ind-prod/lumber/mills-guide/ore-mill/index.htm.
[19] Mike Wilson, personal communication.
[20] *Timberline Magazine*, "Oregon Company Adding Hardwood Sawmill," January 5, 2024, accessed March 5, 2025, https://timberlinemag.com/2024/01/05/oregon-company-adding-hardwood-sawmill/.

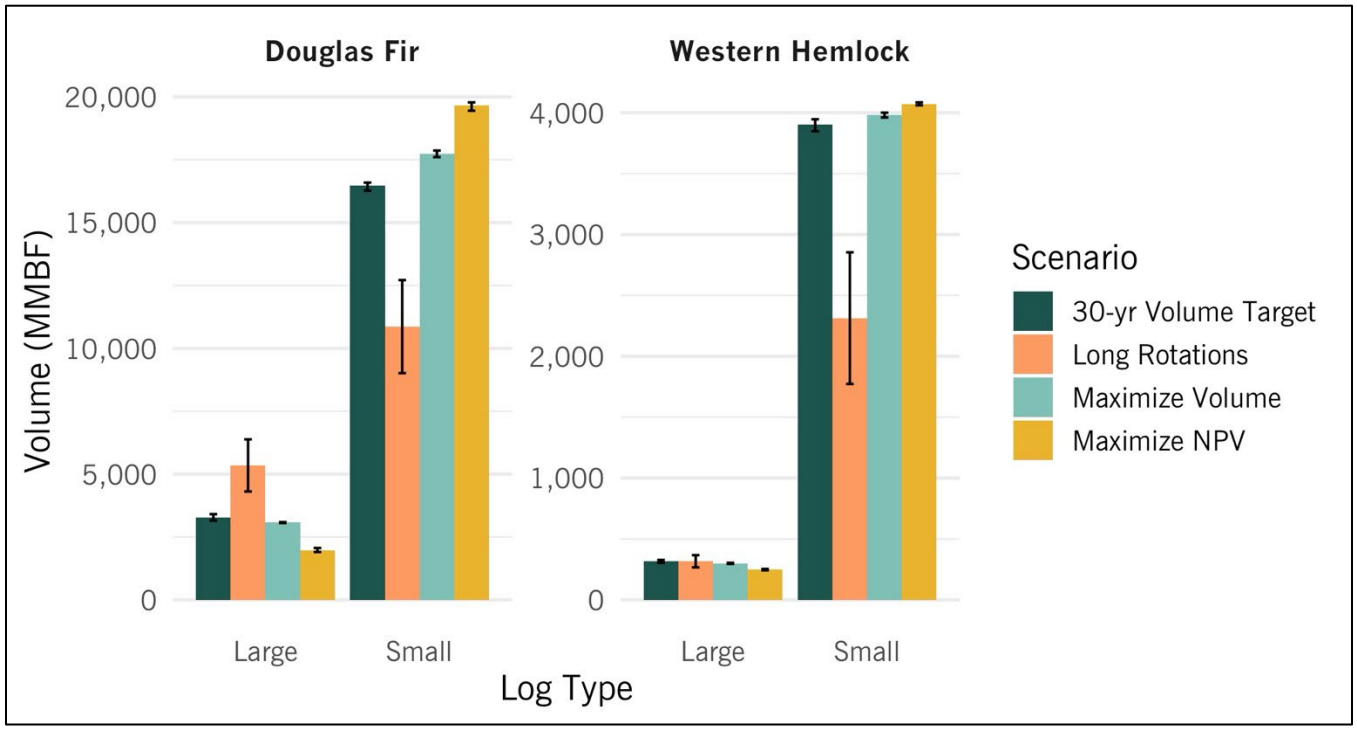
Exhibit 17. Harvest Volume by Species, 150-year period

Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs.

Exhibit 18 shows that, across all scenarios, smaller logs are harvested more than large logs for both Douglas-fir and Western hemlock. The Long Rotations Scenario results in a longer rotation of stands between harvests, resulting in higher harvest of larger logs of both species at the time of harvest. It is unclear whether the current operator pool would be able to accommodate the harvest of larger logs in the short term. It is likely that the current operator pool would incur costs of outfitting their operations to log and process larger logs that require specialized equipment, machinery, and workforce training.

Exhibit 18. Total Harvest Volume by Log Size, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Implications for Timber Imports

Timber imports from other Pacific Northwest states and Canada make up a small percentage of the total timber that is processed in Oregon. In 2017, timber received from outside of Oregon made up only 2.3 percent of the timber processed at Oregon facilities. Timber imports from Washington decreased between 2008 and 2017 as exports surged.[21] Changes in ODF forest management practices are unlikely to directly influence timber imports. Harvests from state forestlands account for less than 10% (7.7% in 2017) of the total timber harvests in Oregon.[22,23] Due to the small share of timber coming from ODF forestlands and the influence of broader economic trends, we would expect that any changes in harvest volumes from ODF forestlands to have a minimal effect on overall timber supply and log prices and thus are unlikely to change the amount of timber being imported from other states.

[21] Ibid.

[22] Eric A. Simmons, Kate C. Marcille, Gary J. Lettman, Todd A. Morgan, Dorian C. Smith, Luke A. Rymniak, and Glenn A. Christensen, Oregon's Forest Products Industry and Timber Harvest 2017 with Trends through 2018, Gen. Tech. Rep. PNW-GTR-997 (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 2021), 63 pp.

[23] ODF's forests make up a share of the total state forestlands.

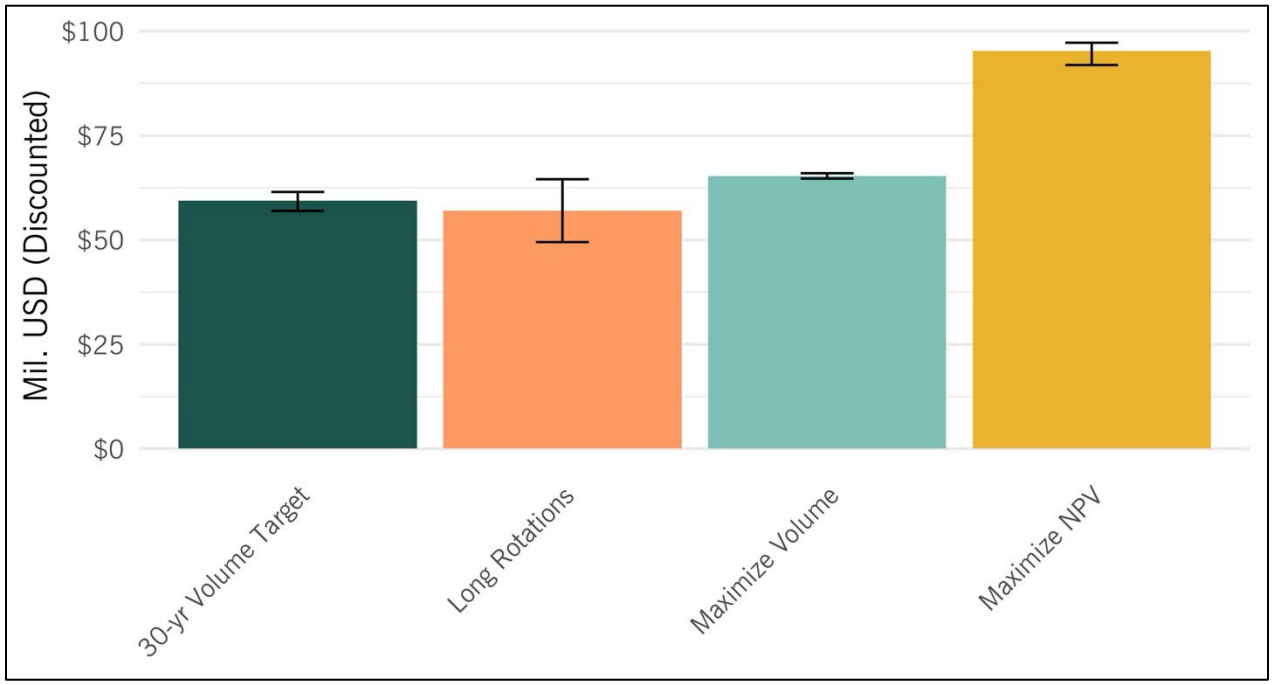
Non-timber harvest forest management activities

In addition to the actual timber harvest, ODF staff and private contractors also engage in a variety of forest management activities, some of which are necessary to prepare stands for harvest.

Harvest of timber requires activities such as road construction and maintenance, property line surveys, stream surveys, threatened and endangered species surveys, and other work to comply with legal requirements and protect sensitive resources. Following harvest, activities like clearing of logging slash, tree planting, and young stand management activities, such as pre-commercial thinning, are required. While ODF engages private contractors for reforestation and pre-commercial thinning, road maintenance is often included as a part of the timber sale and is conducted by the logging company or subcontracted to a third party. These forest management activities together also contribute to jobs, labor income, and economic output in western Oregon. Our analysis assumes that maintenance of roads is included as a part of the timber sale, such that jobs, labor income, and economic output from maintenance of roads are captured by the indirect effects above.

As shown in Exhibit 19, costs of reforestation are highest under the Maximize NPV Scenario ($92–97 million) followed by the Maximize Volume Scenario ($65–66 million), the 30-year Volume Target Scenario ($57–61 million), and the Long Rotations Scenario ($49–65 million). The Maximize NPV scenario results in the highest annual reforestation costs across the 150-year period, but with a significant decline in the first 30 years, followed by fluctuating levels over the remaining period (Exhibit 20). Maximize Volume and Long Rotations scenarios follow a similar trajectory, albeit with lower costs overall.

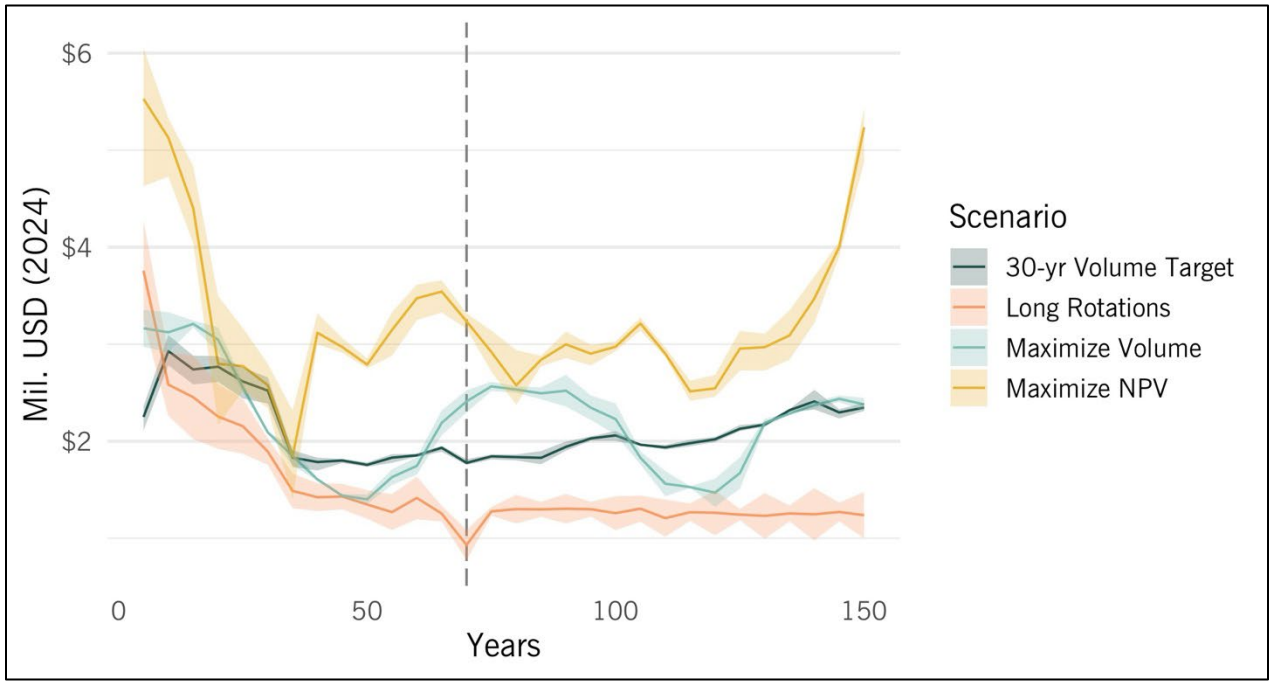
Exhibit 19. Total Reforestation Costs (discounted, 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Exhibit 20. Annual Reforestation Costs (in millions, 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs. Under the Maximize NPV scenario, the steep increase in costs at Year 150 reflects the model's liquidation of ending stand inventory and would not be implemented.

Separate from timber harvests, ODF, through its own employees or contractors, also maintains roads that are used to access sites for forest management, recreation, wildfire response among other purposes. In FY 2024, ODF spent $1.7 million from its share of BOFL timber revenues on its own road crew.[24] Such spending on road construction and maintenance supports direct, indirect, and induced jobs, labor income, and economic output. Scenarios that increase the frequency of timber harvests and associated road construction could reduce the need for ODF to contract out roadwork independently and vice versa. If the overall spending on road work by timber contractors and ODF remains relatively similar across scenarios, the economic contributions of spending on road work are unlikely to vary by scenario.

In advance of planned harvests, a combination of ODF employees and private contractors conduct land surveys, particularly on timber stands adjacent to non-ODF lands. In FY 2024, ODF spent $80,000 from the overall BOFL timber revenues to conduct land surveys through private contractors.[25] To the extent that scenarios differ in the number and acreage of harvested timber stands that are adjacent to non-ODF lands, the scenarios could result in varying levels of effort and spending required for land surveys. Such spending on land surveys would continue to support direct, indirect, and induced jobs, labor income, and economic output.

Finally, ODF staff engage private contractors to survey and monitor for threatened and endangered species on ODF forestlands. Through the draft HCP, ODF proposed multiple monitoring programs that together would result in approximately $2 million of annual spending on ODF staff time, material costs, and external contractors to complete monitoring activities.[26] Such spending on annual monitoring activities would support direct, indirect, and induced jobs, labor income, and economic output, and is unlikely to vary by scenario.

Collection of Special Forest Products

The forest has provided resources to Tribal Nations since time immemorial, including food, medicine, and materials. Today, many people collect special forest products for personal use, often in conjunction with recreational activities. Collection of special forest products is not well accounted for. For some individuals and communities—particularly low-income and minority populations—this collection is vital for survival and supplementing livelihoods. Section 7 attempts to characterize the value of this personal and community use based on available information. This section focuses on the portion of collection that is done exclusively for commercial purposes (defined by ODF based on the volume and type of product being collected) that ODF tracks through commercial permits.

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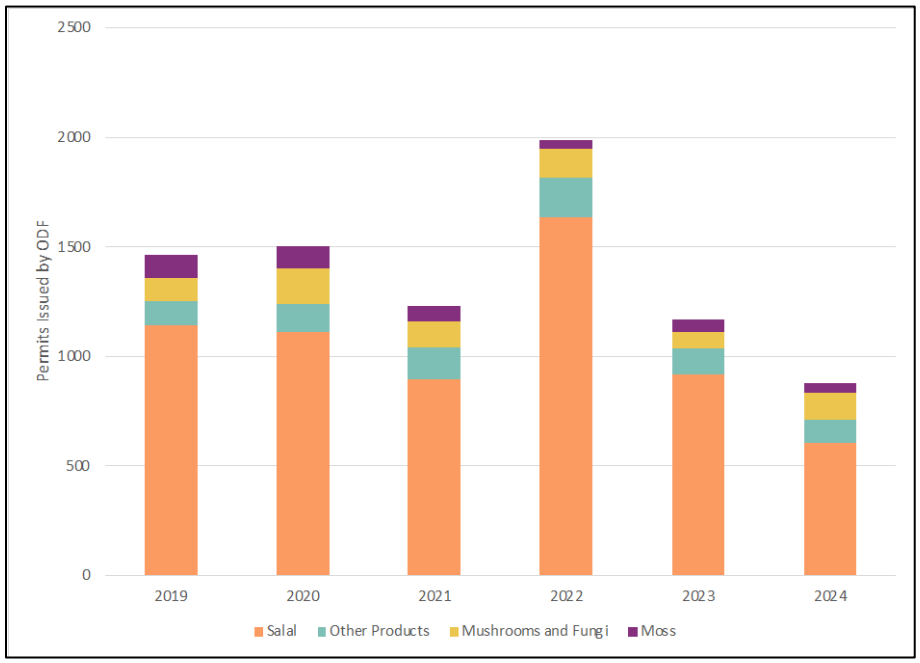
[24] Kevin Boyd, "Socioeconomic Report," email message to ECOnorthwest, October 2, 2024.
[25] Kevin Boyd, "Socioeconomic Report," email message to ECOnorthwest, October 2, 2024.
[26] National Oceanic and Atmospheric Administration (NOAA), "Western Oregon State Forests Habitat Conservation Plan," February 2022, accessed November 19, 2024, https://media.fisheries.noaa.gov/2022-03/wosf-hcp-feb-2022.pdf.

The commercial collection of special forest products generates employment, income, and value. Collection of special forest products can occur throughout the permit area but collection for commercial use requires a permit, which generates revenue for ODF. Permits are issued most for the collection of salal and edible fungi and for collection in Forest Grove, Astoria, and Tillamook districts.

Exhibit 21 shows the number and type of commercial permits issued by ODF for special forest products between 2019 and 2024. Between 2019 and 2024, ODF collected an average of approximately $180,000 annually through permit fees (Exhibit 22).

Exhibit 21. Commercial Special Forest Products Permits Issued for ODF Forestlands by Fiscal Year



Source: ECOnorthwest's analysis of ODF's permit data

Note: Other products include vine maple, beargrass, ferns, huckleberry, truffles, tree boughs, fence posts, and minerals.

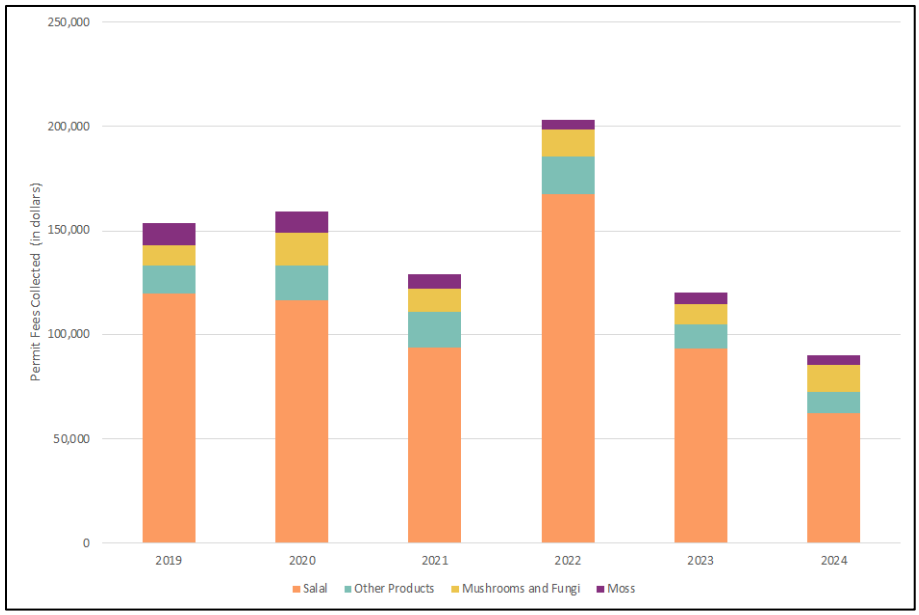
The scenarios can influence forest structures and the kinds of special forest products that may be available for collection. Salal, a shrub used for florist greenery, is found in early-seral to old-growth forests and can increase after timber harvest or thinning.[27] Scenarios with higher levels of harvest like Maximize NPV and Maximize Volume as expected to result in more acres of early-seral stands, potentially supporting a greater supply of salal.[28] Mushrooms and other edible fungi are found in all forest ecosystems but are most commonly associated with late-seral and old-growth forests and may decrease with timber

[27] U.S. Forest Service, "Gaultheria shallon," *Fire Effects Information System*, accessed November 19, 2024, https://www.fs.fed.us/database/feis/plants/shrub/gausha/all.html.

[28] Oregon Department of Forestry, *Forest Management Plan: Scenario Modeled Outcomes* (Salem, OR: Oregon Department of Forestry, May 14, 2025).

harvest.[29] Moss is also more productive in mid- and late-seral forests. The Long Rotations and Maximize Volume scenarios result in the most acreage under the mid- and late-seral stages and could support higher supplies of edible fungi and moss among the scenarios.[30]

Exhibit 22. Fees Collected by ODF for Special Forest Products Permits by Fiscal Year



Source: ECOnorthwest's analysis of ODF's permit data

Note: Other products include vine maple, beargrass, ferns, huckleberry, truffles, tree boughs, fence posts, and minerals.

[29] U.S. Forest Service, "Fungi Functional Types," *DecAID: The Decayed Wood Advisor*, accessed November 19, 2024, https://apps.fs.usda.gov/r6_decaid/views/fungi.html.

[30] Oregon Department of Forestry, *Forest Management Plan: Scenario Modeled Outcomes* (Salem, OR: Oregon Department of Forestry, May 14, 2025).

5. Effects on Government Revenue

ODF forestlands fund state and local governments through timber sales and taxes imposed on timber harvests on public and private forestland. The following section describes the revenue contributions from timber harvests on BOFL and CSFL managed by ODF through gross revenues from timber sales and taxation on the volume of timber harvested.

BOFL Revenue

Oregon Revised Statute (ORS) 530.110-530.115 allocates timber revenues generated on BOFL to counties and then to component taxing districts based on harvest location.[31] This analysis allocated BOFL timber revenues to counties based on the forest models' estimates for the location of timber harvests and the total amount of timber revenue generated under each scenario. As shown in Exhibit 20, total timber harvest revenues generated in each county are divided between the county government (63.75 percent) and ODF (36.25 percent). Typically, ODF distributes timber revenue to counties after accounting for expenses related to project work, such as contracted road maintenance and construction, as well as land surveys.[32,33] Counties distribute timber revenue to their local taxing districts, and therefore, data for taxing districts are not included separately in this report.

Payments to Counties

ORS 530.115 governs the distribution and use of BOFL payments to counties where timber harvests on BOFL occur. Once timber revenues are distributed to the county where the harvest occurred, the statute requires that the county use at least 10 percent of the BOFL revenue to reimburse the county general fund for any expenses incurred in managing BOFL within the county.[34] Of the balance, 25 percent must be distributed to the county school fund, and the remainder distributed to taxing districts where the harvest occurred, prorated by the tax rate of each district relative to the sum of tax rates for all relevant districts.[35]

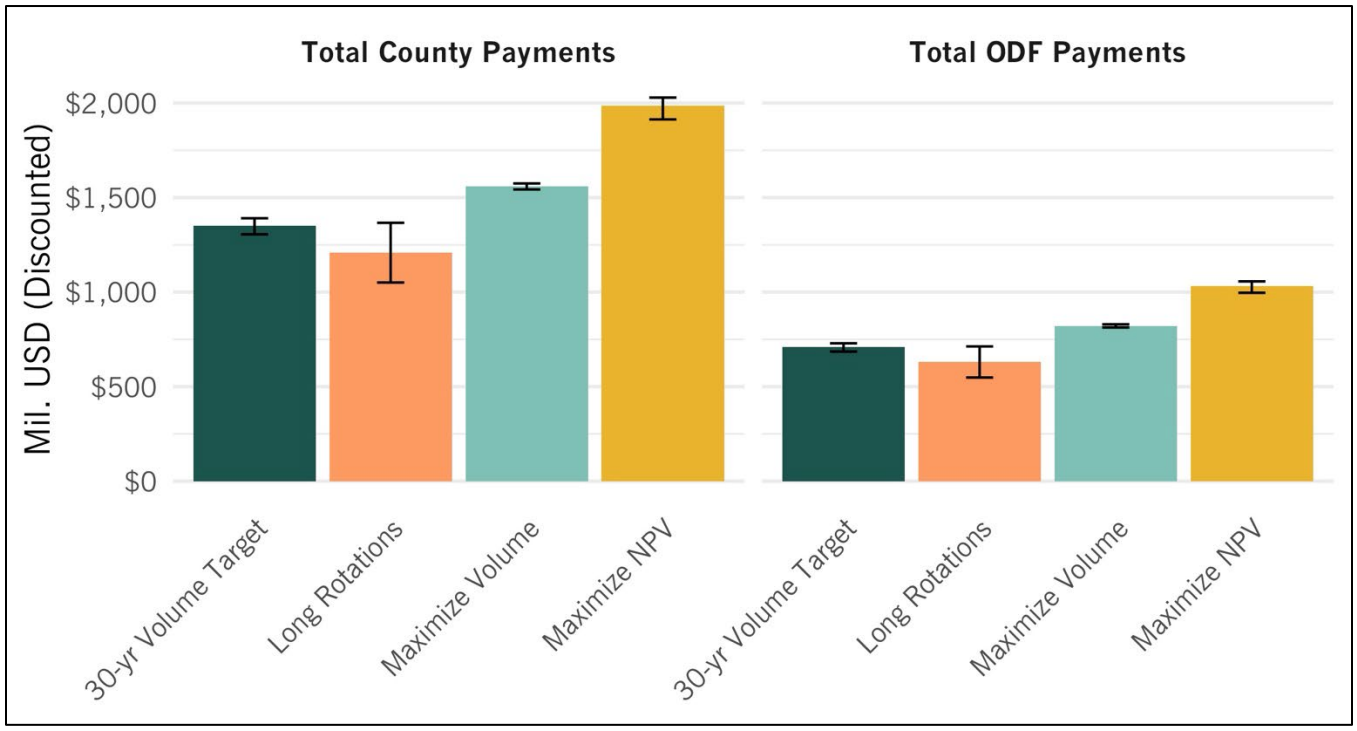
Through these payments to county general funds, county school funds, and other overlapping taxing districts, timber harvests on BOFL support essential special capital

[31] Oregon Legislature, "ORS 530.115 Disposition of Moneys from Lands Acquired Under Former Law," accessed November 19, 2024, https://oregon.public.law/statutes/ors_530.115.
[32] Kevin Boyd, "Socioeconomic Report," email message to ECOnorthwest, October 2, 2024.
[33] Oregon Legislature, "ORS 530.050 Management of land acquired; powers of forester; rules," accessed January 20, 2025, https://oregon.public.law/statutes/ors_530.050.
[34] Oregon Legislature, "ORS 530.115 Disposition of Moneys from Lands Acquired Under Former Law," accessed November 19, 2024, https://oregon.public.law/statutes/ors_530.115.
[35] Oregon Legislature, "ORS 530.115 Disposition of Moneys from Lands Acquired Under Former Law," accessed November 19, 2024, https://oregon.public.law/statutes/ors_530.115.

projects and essential services provided by county governments and taxing districts. For example, timber revenues count towards local funding for school districts and where local funding decreases, state funding must increase to offset losses to the districts.

As shown in Exhibit 23, payments to counties are highest under the Maximize NPV Scenario ($1.9–2.0 billion) followed by the Maximize Volume Scenario ($1.5–1.6 billion), the 30-year Volume Target Scenario ($1.3–1.4 billion), and the Long Rotations Scenario ($1.1–1.4 billion) (in discounted dollars).

Exhibit 23. Total Payments to Counties and to ODF (discounted in 2024 dollars), 150-year period

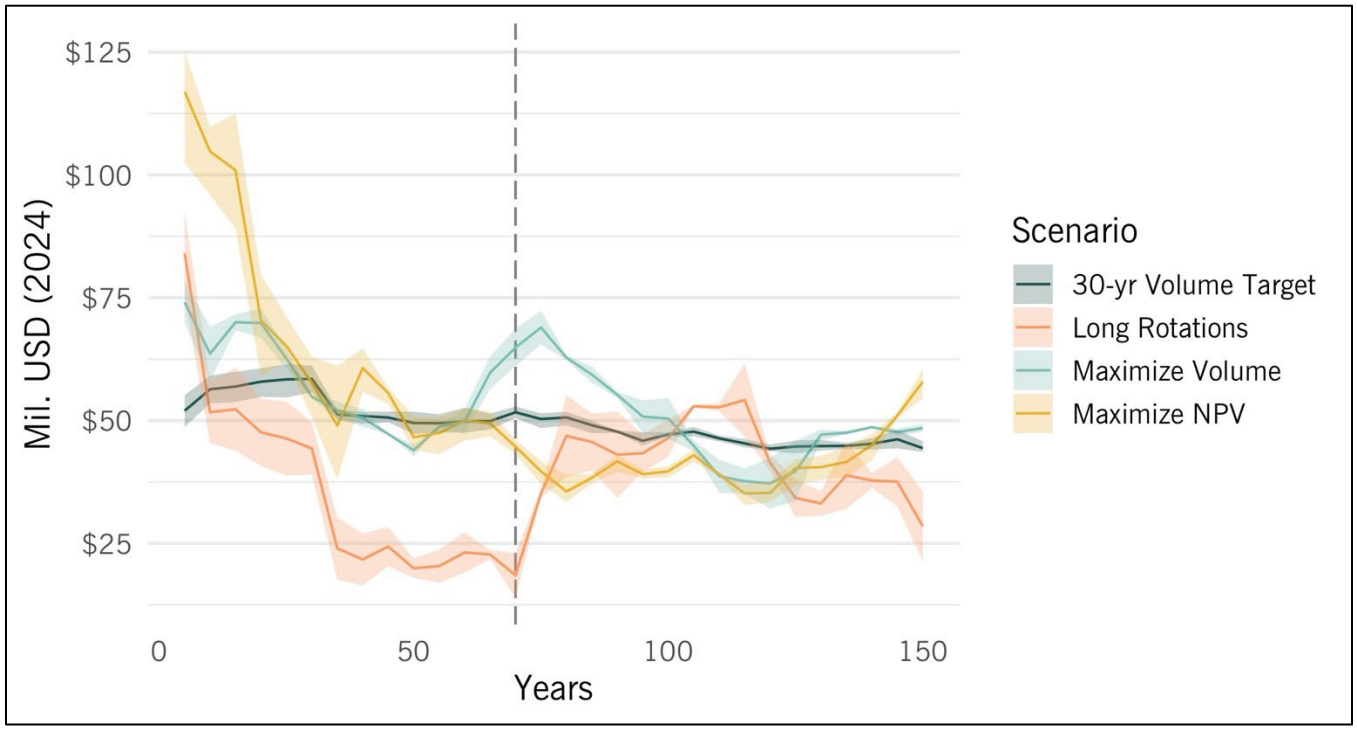


Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Under all scenarios, county payments decline during the first few decades of the 150-year period. Around year 70, payments begin to converge somewhat across all scenarios, with fluctuations continuing beyond that point (Exhibit 24).

Exhibit 24. Annual County Payments (2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs.

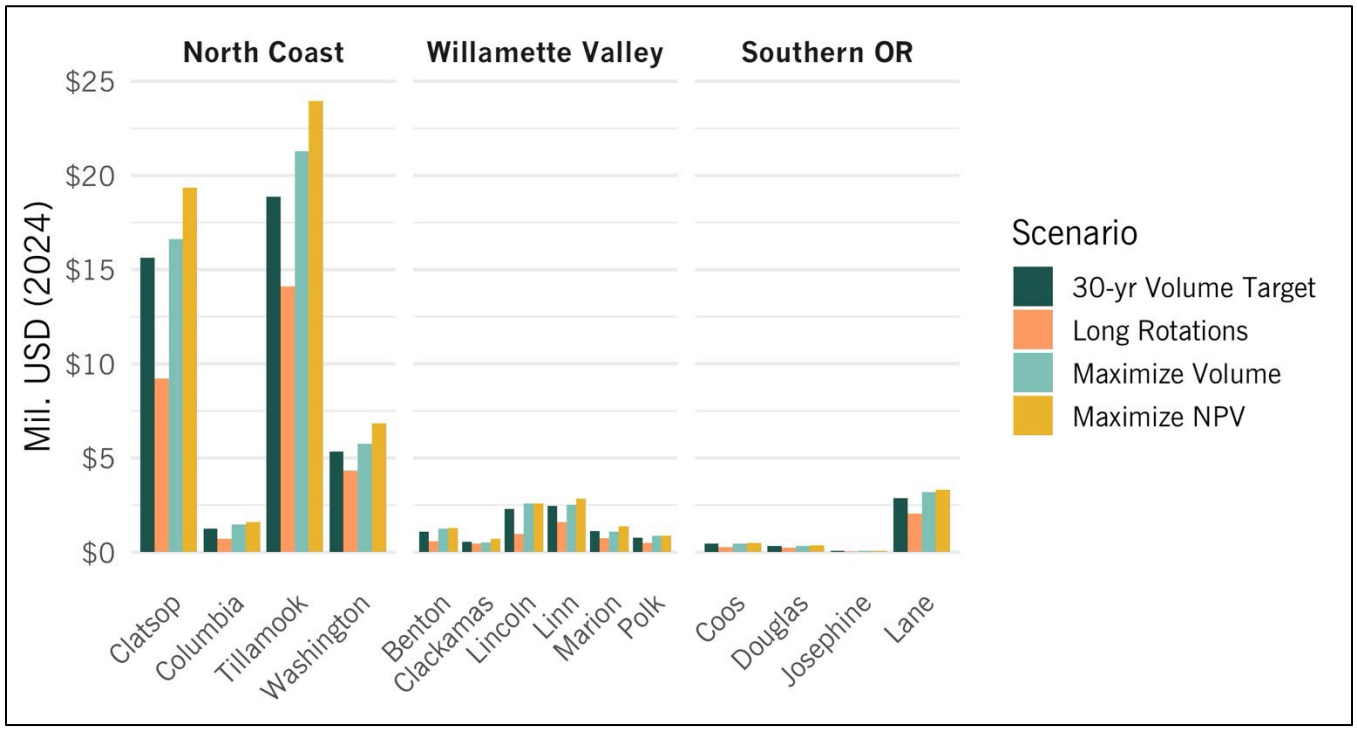
Exhibit 25 shows the average annual payments to individual counties over the 150-year analysis period and Exhibit 27 shows the average annual payments to counties over the 70-year permit term. Over the 150-year modeling period, the Maximize Volume Scenario produces the highest average annual payments for most counties, except three of the North Coast counties (Columbia, Tillamook, and Washington) that receive the highest average annual payments from the Maximize NPV Scenario. Over the 70-year permit term, the Maximize NPV scenario produces the highest average annual payments for most counties, except Polk County where the Maximize Volume scenario produces the highest average annual payments.

County payments are expected to vary the most year over year under the Long Rotations scenario over the entire 150-year modeling period for all counties (Exhibit 27), with Josephine County experiencing significantly larger variation in payments for that scenario. With a few exceptions, the Long Rotations scenario also produces the highest variability in county payments over the 70-year permit term (Exhibit 28). There are a few counties that exhibit a different trend. Particularly, the Maximize NPV scenario produces the largest variability in revenues for Josephine County, whereas the Maximize Volume Scenario has the highest variability in annual revenues for Clackamas and Marion counties.

Exhibit 25. Average Annual County Payments (2024 dollars), 150-year period

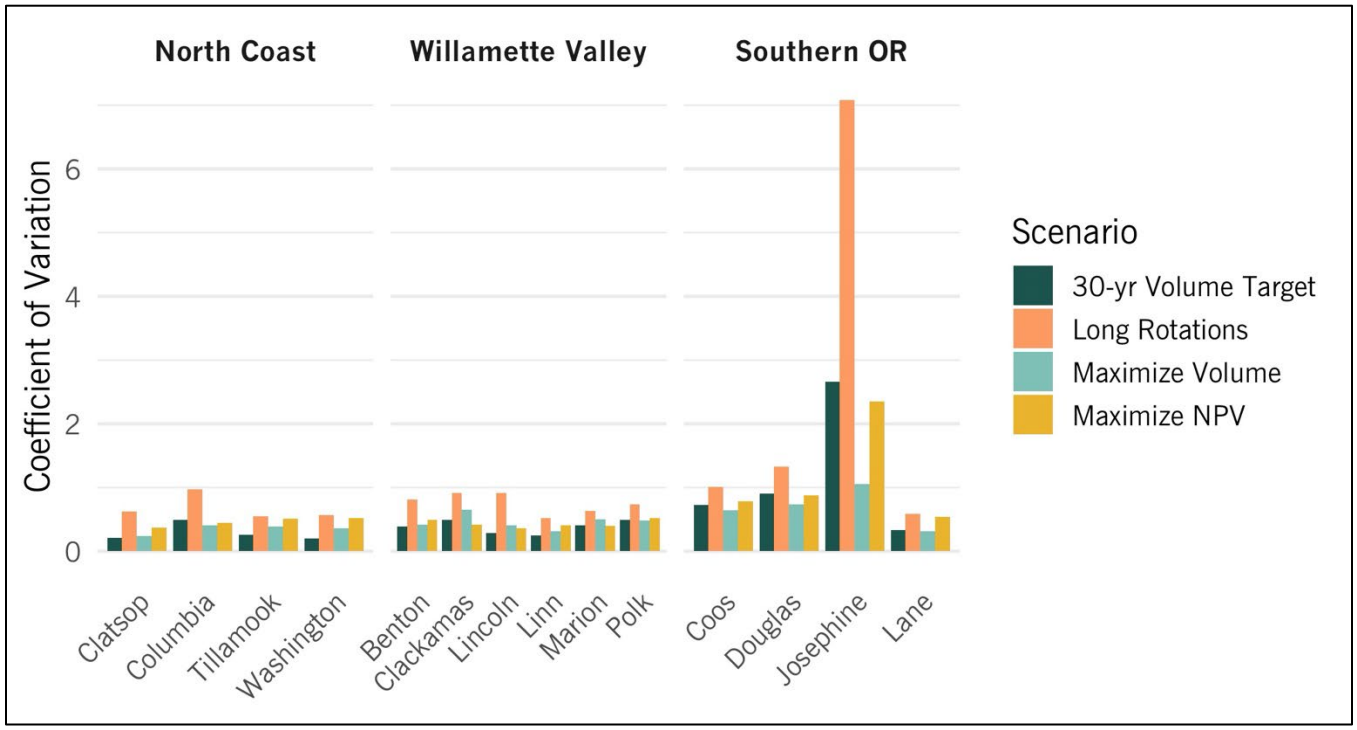
Source: ECOnorthwest's analysis of ODF modeled data
Note: Values are averages across scenarios and runs.

Exhibit 26. Average Annual County Payments (2024 dollars), 70-year period



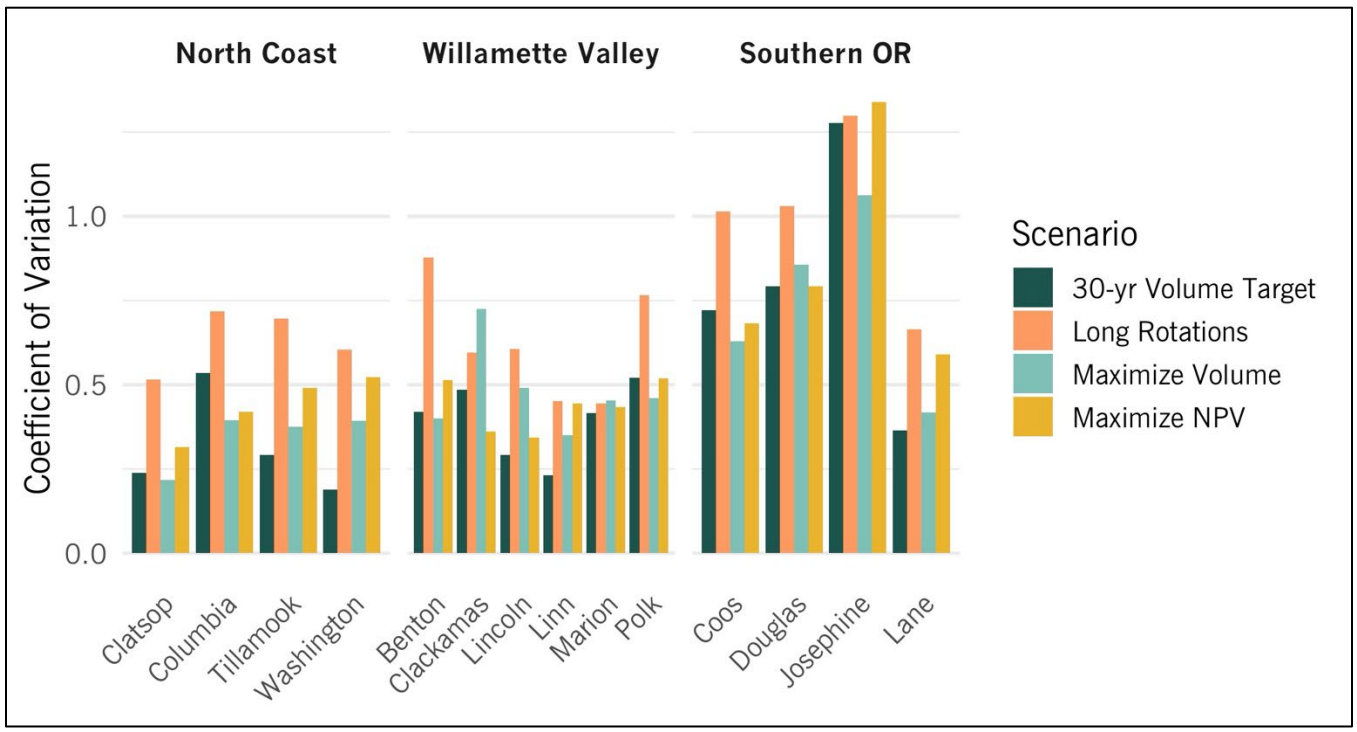
Source: ECOnorthwest's analysis of ODF modeled data
Note: Values are averages across scenarios and runs.

Exhibit 27. Variability in Annual County Payments (2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Exhibit 28. Variability in Annual County Payments (2024 dollars), 70-year period



Source: ECOnorthwest's analysis of ODF modeled data

Payments to ODF

Revenue from timber harvests on BOFL is one of the largest sources of revenue for ODF. ODF expects approximately $94 million from timber harvests on BOFL between 2023 and 2025.[36] Timber revenues are the primary source of revenue for state forest management. ODF relies on revenue from the Forest Products Harvest Taxes, appropriations from Oregon's General Fund and Lottery Fund, and federal programs for other programs such as administration of Forest Practices Act and responding to wildfires on primarily private forestland.

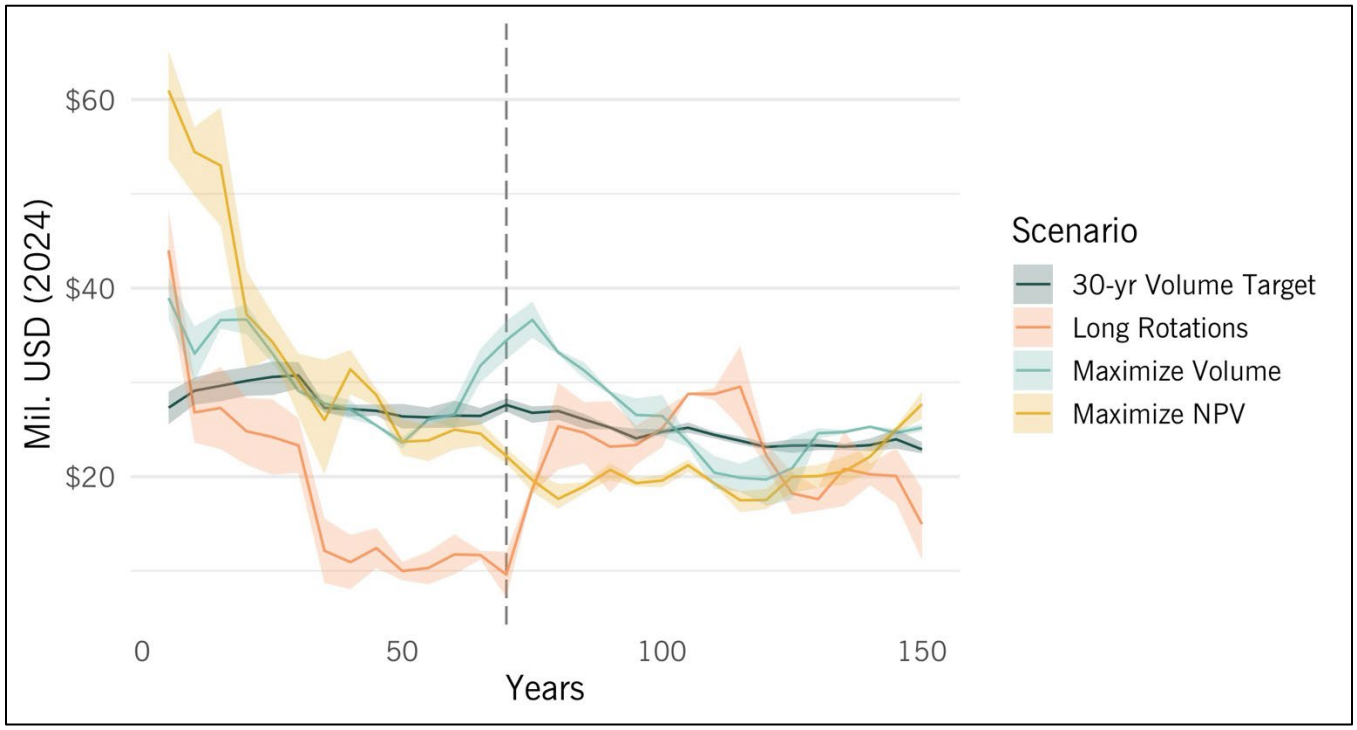
ODF uses its allocated timber revenue to fund a variety of activities such as forest restoration, routine maintenance of road networks, and investments in recreation and education and interpretation infrastructure in the forestlands. These investments maintain healthy forest conditions and support access to and use of the forestlands and their resources, creating economic value for local and non-local visitors.

As shown in Exhibit 23, payments to ODF are highest under the Maximize NPV Scenario ($1.0–1.1 billion) followed by the Maximize Volume Scenario ($0.81–0.83 billion), the 30-year Volume Target Scenario ($0.69–0.73 billion), and the Long Rotations Scenario ($0.55–0.71 billion).

In the early years of the analysis period, payments to ODF vary across scenarios, with particularly sharp fluctuations observed under the Long Rotations and Maximize NPV scenarios. The Maximize NPV scenario generates high early returns before stabilizing at a lower level, while the Long Rotations scenario sees a significant dip between years 30 and 50—likely due to delayed harvesting—followed by sharp spikes in revenue. The vertical dashed line at year 70 appears to mark a key transition point, after which revenues across all scenarios become more stable and converge somewhat. The 30-year Volume Target and Maximize Volume scenarios maintain relatively steady, mid-range revenue throughout the permit term.

[36] Oregon Department of Forestry, "2023-25 Legislatively Adopted Budget Without Special Reports," accessed November 19, 2024, https://www.oregon.gov/odf/aboutodf/Documents/budget/2023-25-odf-legislatively-adopted-budget-wo-special-reports.pdf.

Exhibit 29. Annual Payments to ODF (in millions, 2024 dollars), 150-year period

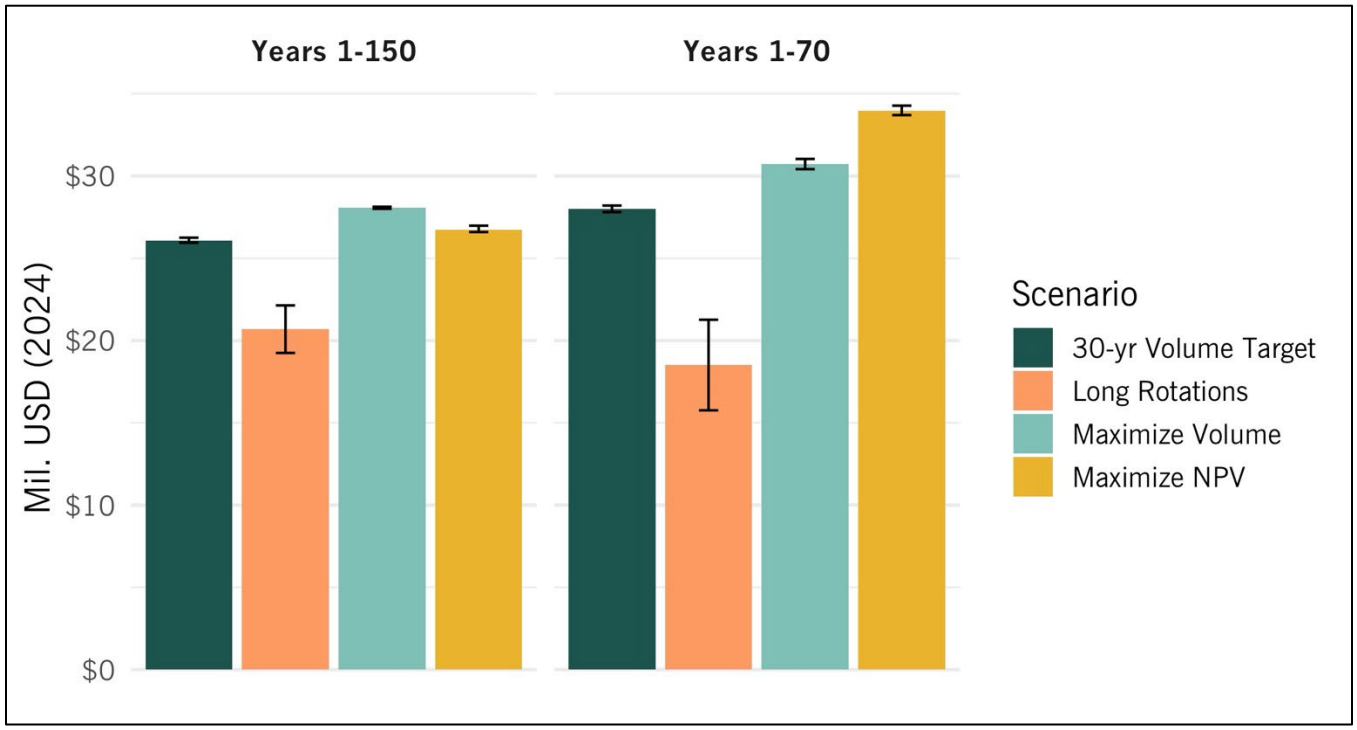


Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs.

The Maximize NPV scenario outperforms the other scenarios during the first 70 years, while the Maximize Volume scenario yields the highest payments to ODF when aggregated over the entire 150-year period (Exhibit 30). All scenarios yield higher annual average payments to ODF during the first 70 years than over the entire 150 years, except the Long Rotations scenario, which results in higher payments after 70 years because of delayed harvests.

Exhibit 30. Average Annual Revenues to ODF (in millions, 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Contributions to the Common School Fund

The revenue generated from timber harvests on CSFL contributes to the Common School Fund (CSF) that was established in 1859 to provide resources to schools in Oregon. The CSF also receives revenue from leases, property sales, gifts, and returns on investment of the fund.[37] ODF currently manages CSFL on behalf of the Oregon Department of State Lands, and the Oregon Department of State Lands pays for the associated operations and management expenses.[38]

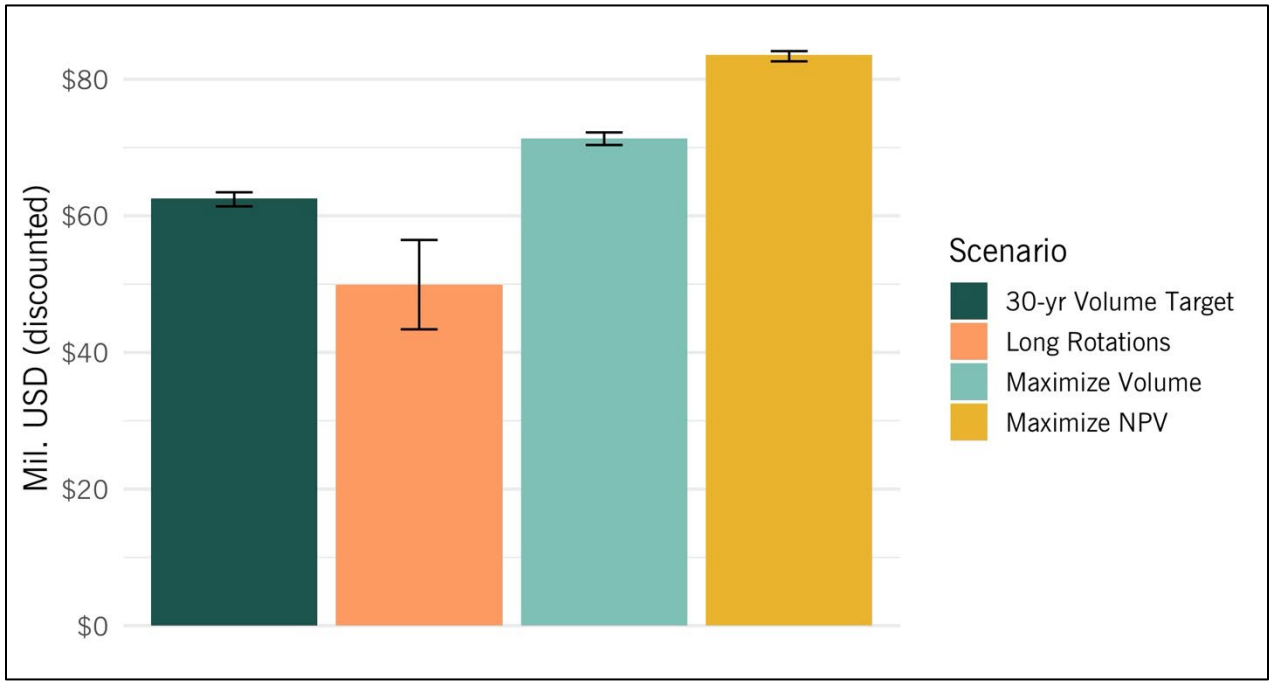
As shown in Exhibit 31, contributions to CSF are highest under the Maximize NPV Scenario ($83–84 million) followed by the Maximize Volume Scenario ($70–72 million), the 30-year Volume Target Scenario ($61–63 million), and the Long Rotations Scenario ($43–56 million). Unlike the trends observed so far, contributions to CSF fluctuate considerably year over year across all modeled scenarios, because CSFL are a small portion of the lands managed by ODF(Exhibit 32). Contributions to CSF are lowest under the Long Rotations

[37] Oregon Legislature, "ORS 327.405 State School Fund; Appropriation and Distribution," accessed November 19, 2024, https://oregon.public.law/statutes/ors_327.405.

[38] Oregon Department of Forestry, "2023-25 Legislatively Adopted Budget Without Special Reports," accessed November 19, 2024, https://www.oregon.gov/odf/aboutodf/Documents/budget/2023-25-odf-legislatively-adopted-budget-wo-special-reports.pdf.

Scenario during the first 70 years but experience a sudden increase during the latter half of the 150-year period.

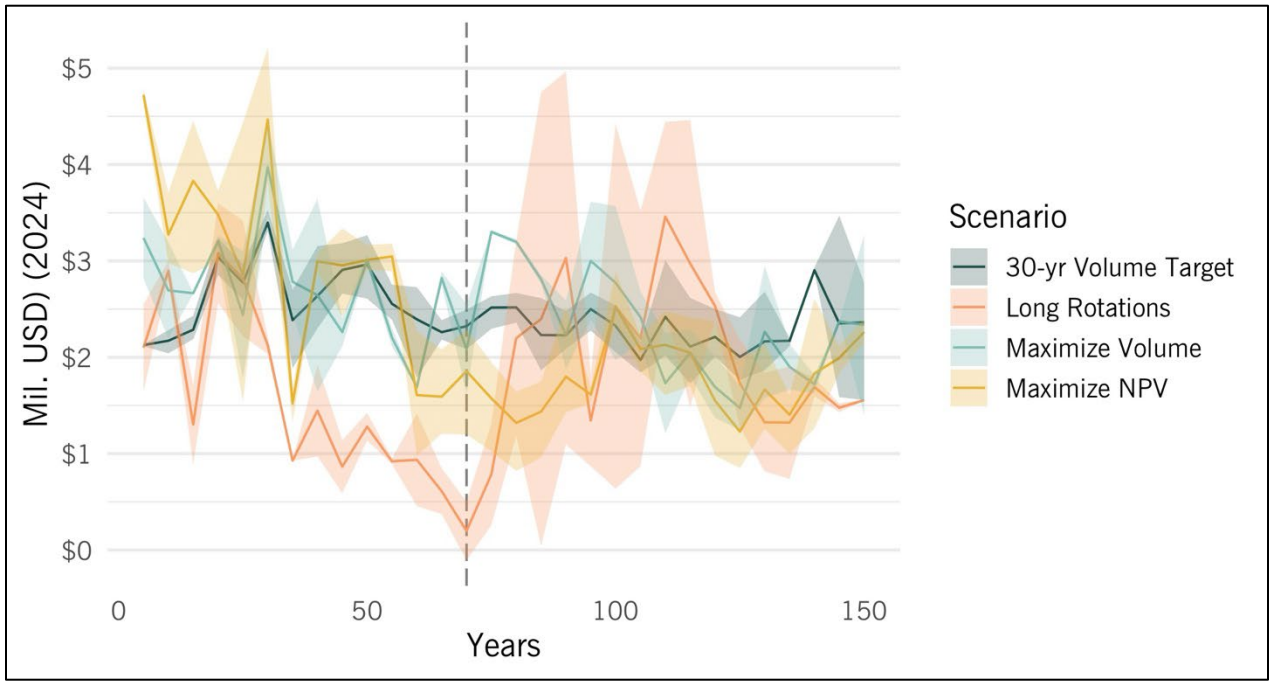
Exhibit 31. Contributions to CSF (in millions, discounted 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Exhibit 32. Annual Contributions to CSF (in millions, 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs.

Forest Products Harvest Tax

Harvests from both public and private forestlands are subject to the Forest Products Harvest Tax. The tax is applied to the volume of timber harvested by each taxpayer in a calendar year.[39] The first 25,000 board feet of the total quantity of timber harvested by each taxpayer is exempt from the tax every calendar year. The tax has five components that fund various state programs. Of the $6.2949 per MBF levied on timber harvests in 2025, 10 percent is dedicated to the Oregon Forest Land Protection Fund, ODF's fund used to fight large fires in Oregon.[40,41] A component (40 percent) of the tax funds ODF's administration of the Forest Practices Act on private forests. Two components (together 18 percent) fund forestry research and education at the Oregon State University (OSU) College of Forestry. The final component (32 percent) funds the Oregon Forest Resources Institute (OFRI). Based on ODF's "logflow" data, between FY 2018 and FY 2024, on average, 52 companies harvested timber on ODF forestland annually. This analysis thus assumes that 1,300 MBF harvested on ODF forestland is exempt from FPHT annually. This assumption likely

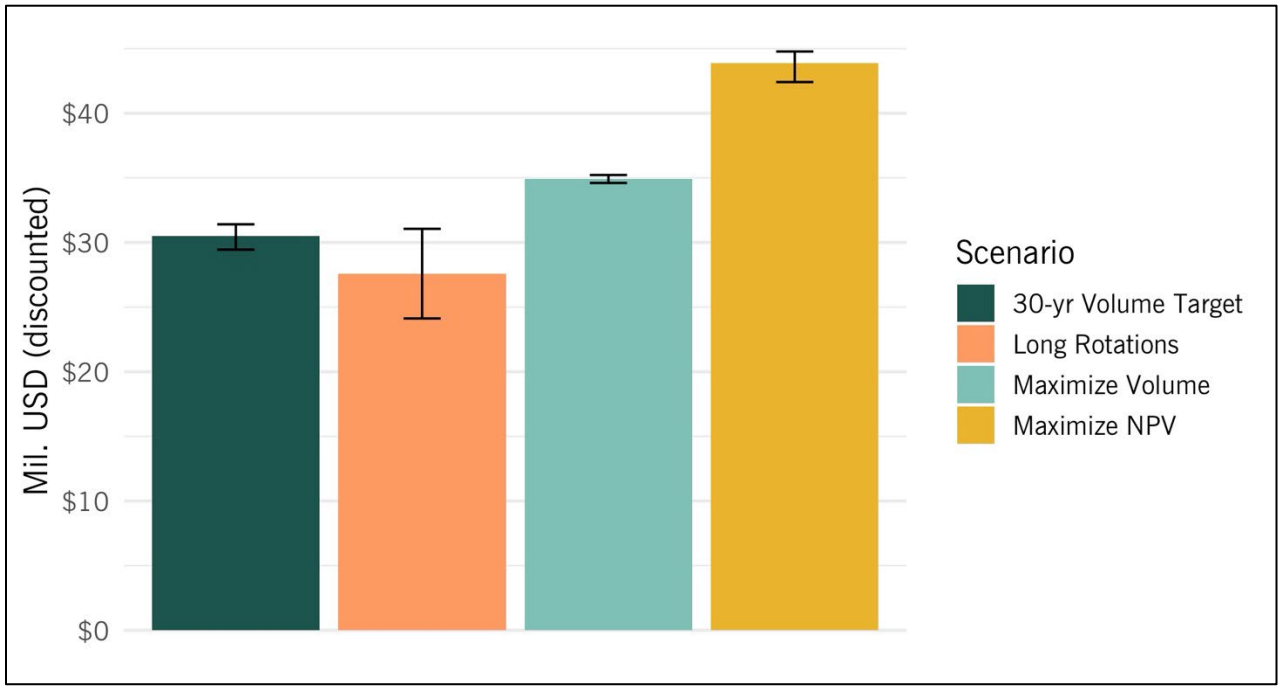
[39] Oregon Legislature, "ORS 321.015 Levy of Taxes for Privilege of Harvesting Merchantable Forest Products," accessed November 19, 2024, https://oregon.public.law/statutes/ors_321.015.
[40] Oregon Legislature, "HB 4133, Regular Session 2024," accessed November 19, 2024, https://olis.oregonlegislature.gov/liz/2024R1/Measures/Overview/HB4133.
[41] Oregon Department of Revenue, "Timber Harvest Taxes," accessed May 28, 2025, https://www.oregon.gov/dor/programs/property/pages/timber-harvest-taxes.aspx?utm_source=DOR&utm_medium=egov_redirect&utm_campaign=https%3A%2F%2Fwww.oregon.gov%2Fdor%2Fprograms%2Fproperty%2Fpages%2Ftimber-forest-harvest.aspx.

underestimates the total amount of FPHT revenue that ODF forests would support since operators and mills that purchase and harvest timber from ODF forests also purchase and harvest timber from other forestlands.

As shown in Exhibit 33, FPHT revenue is highest under the Maximize NPV Scenario ($42–45 million) followed by the Maximize Volume Scenario ($34.6–35.2 million), the 30-year Volume Target Scenario ($29–31 million), and the Long Rotations Scenario ($24–31 million).

Over the 150-year period, FPHT revenue varies the most under the Maximize NPV scenario, closely followed by the Long Rotations scenario (Exhibit 34). However, over the 70-year permit term, the FPHT revenue varies the most under the Long Rotations scenario followed by the Maximize NPV scenario. FPHT revenues vary the least under the 30-year Volume Target scenario for both timeframes.

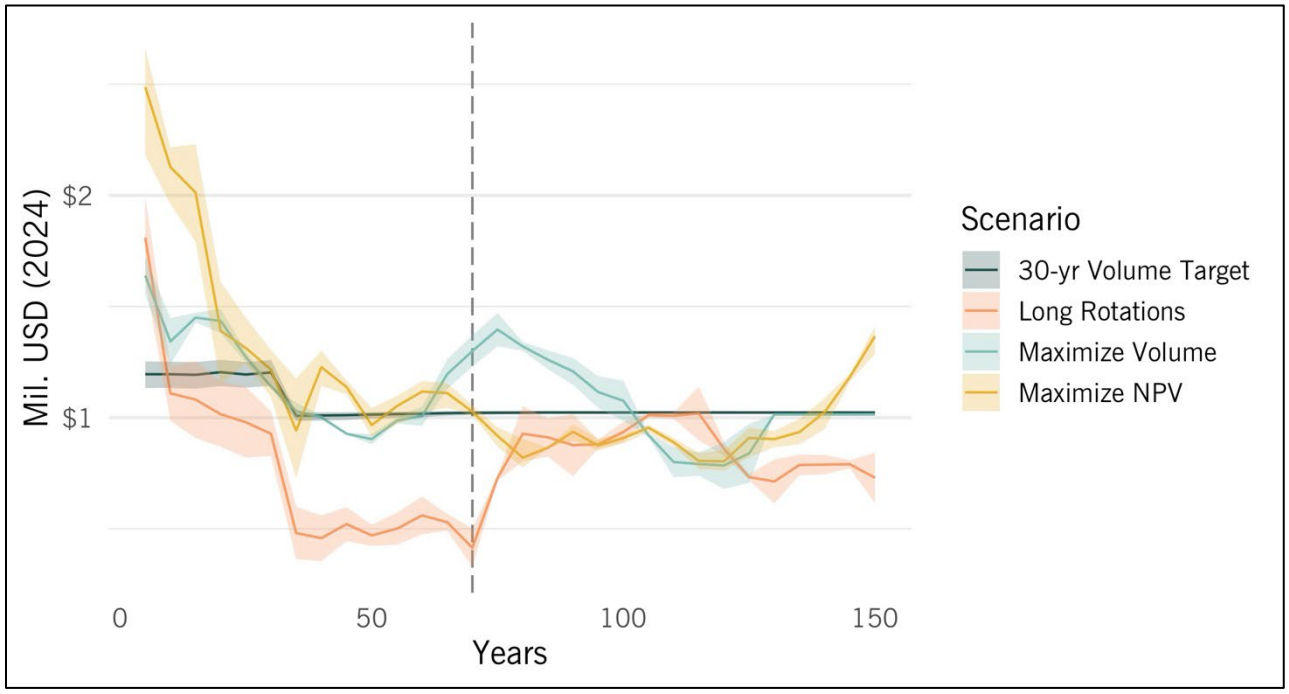
Exhibit 33. Total FPHT Revenue (discounted, 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Bars represent the average, while whiskers represent minimum and maximum values under scenario runs.

Exhibit 34. Annual Forest Products Harvest Tax Revenue, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Note: Solid lines represent the average, while bands represent minimum and maximum values under scenario runs.

6. Effects on the Value of Recreation

Although the FMP does not define different scenarios of recreation development, forest management activities may influence the way people use the forest for recreation. They also influence the amount of revenue potentially available for recreation-related investments. To support the decision process and address the way recreation contributes to the greatest permanent value of ODF-managed forests, this section provides information about the value of recreation on ODF forestlands in western Oregon.

The economic value of recreation derives from the supply of recreation opportunities on ODF forestlands and the demand for outdoor recreation in western Oregon. Using data on outdoor recreation participation from the 2022 Statewide Comprehensive Outdoor Recreation Plan (SCORP) Survey, data on visitation trends to ODF forestlands from Placer.ai, and population growth forecasts, the analysis projects the number of recreation trips on ODF forestlands in western Oregon. It then quantifies and monetizes the value of these recreation trips in two ways: from the perspective of the value a recreation user enjoys from a trip above what they spend to engage in it, and from the economic activity (employment, income, and output) supported by spending on recreation trips.

Supply of Recreation Opportunities

ODF forestlands are popular sites for developed and dispersed recreation. They support a wide variety of recreational activities such as camping, hiking, hunting, fishing, target shooting, OHV (Off-Highway Vehicle) riding, mountain biking, equestrian use, edible fungi picking, sightseeing, wildlife watching, picnicking, boating, and swimming. While several of these activities do not require any infrastructure and occur across all ODF forestlands, ODF does maintain developed recreation infrastructure to support an enhanced recreational experience.

Developed recreation infrastructure varies across each ODF District. Astoria, Tillamook, Forest Grove, and North Cascade Districts have the highest supply of developed infrastructure in the form of campgrounds, motorized and non-motorized trails, OHV staging areas, day-use areas, and other facilities like boat launches, target shooting lanes, and interpretive sites. West Oregon District also features a few primitive campsites and supporting facilities, while Western Lane District does not have any developed recreation sites.

Developed recreation is heaviest in Astoria, Forest Grove, Tillamook, and North Cascade Districts because of their developed infrastructure and proximity to population centers like the Portland Metro region. Recreation is less common and is primarily dispersed in the districts of West Oregon and Western Lane. Although ODF does not collect data on

dispersed recreation use, it is likely to be highest where access and opportunities are most concentrated and in closer proximity to larger population centers.

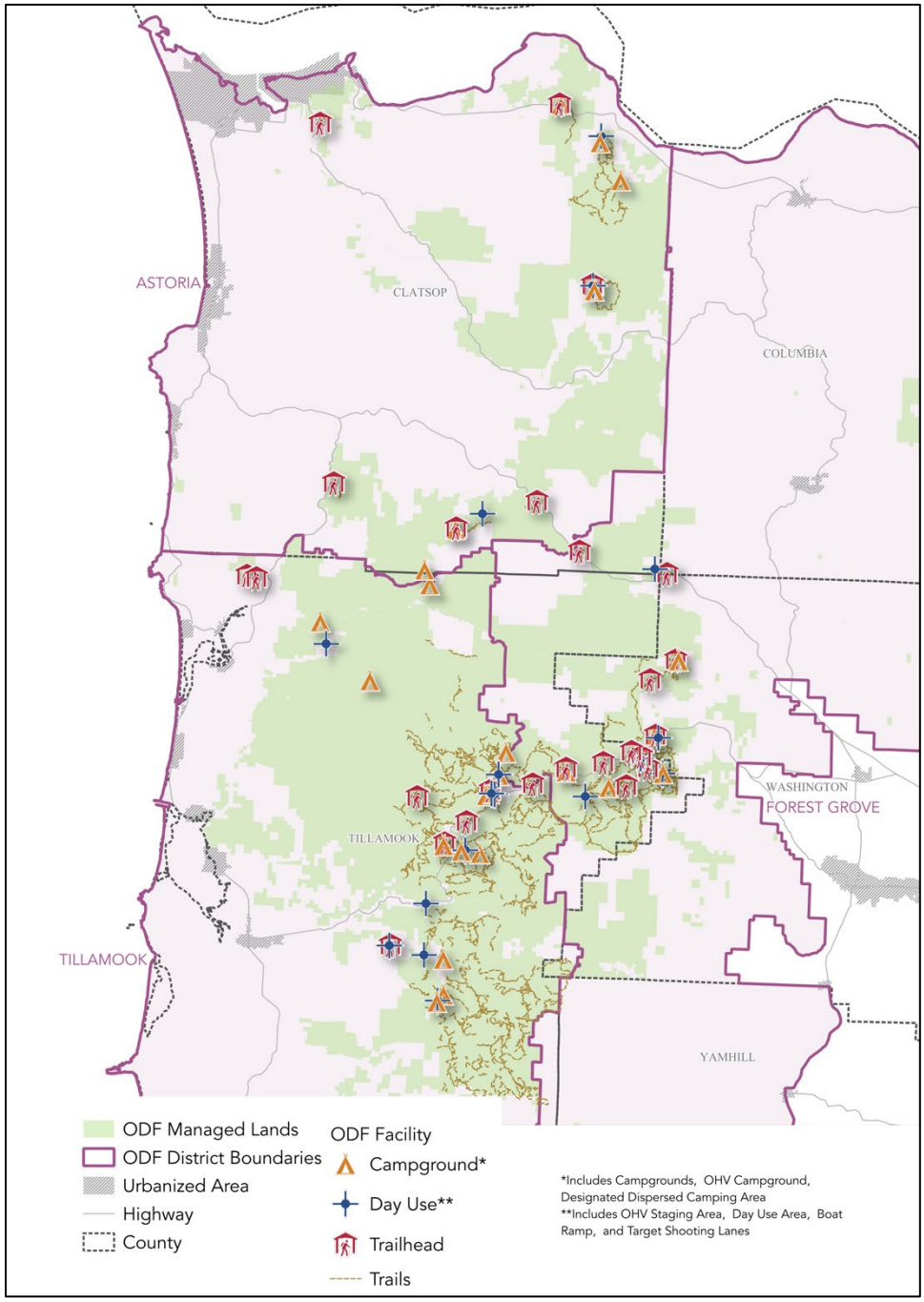
Exhibit 35. ODF Developed Recreation Facilities by District

DISTRICT	FACILITIES	TRAILS
Astoria (Clatsop State Forest) **Northwest Oregon**	5 campgrounds 1 OHV Staging and Day Use Area 6 Designated dispersed campsites 2 interpretive sites 7 Trailheads	30 miles of OHV trails 21 miles of non-motorized trails
Tillamook (Tillamook State Forest) **Northwest Oregon**	6 campgrounds 1 OHV Event Staging Area 1 OHV Staging Area 8 Day-use areas/Trailheads 2 Interpretive Sites 82 designated dispersed campsites 3 boat launch facilities	317 miles of OHV trails 21 miles of non-motorized trails
Forest Grove (Tillamook State Forest) **Northwest Oregon**	5 campgrounds 2 day-use picnic areas 2 highway wayside interpretive sides 14 trailhead facilities 2 target shooting lanes	117 miles of OHV trails 70 miles of non-motorized trails
West Oregon	2 primitive campsites 2 OHV Staging Areas 1 Trailhead Supporting facilities like toilets, info kiosks, trailer sites, parking area	4.2 miles of OHV trails 9.5 miles of non-motorized trails
Western Lane	Dispersed Recreation Only	
North Cascade (Santiam State Forest)	3 campgrounds 1 OHV staging area 7 trailheads and parking areas Dispersed camping and target shooting opportunities	6 miles of OHV trails 26 miles of non-motorized trails

Source: FY 2023 Annual Operations Plans for ODF's Districts[42,43,44,45,46,47,48]

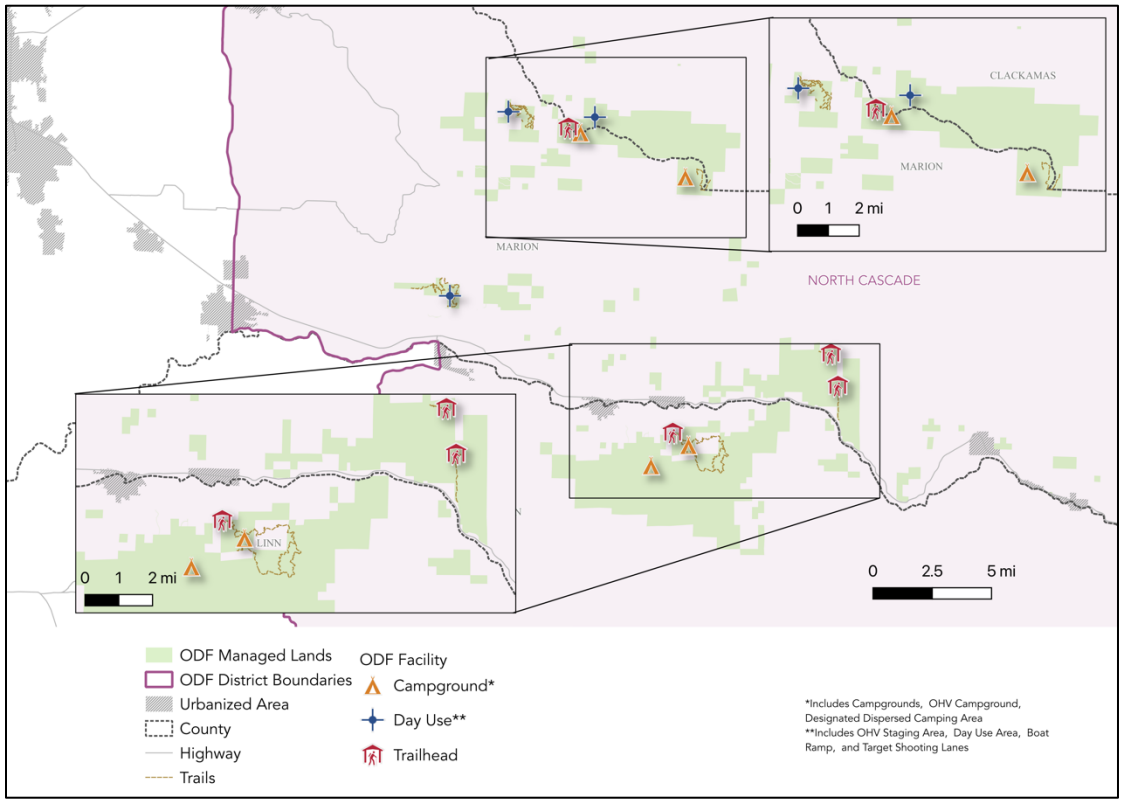
[42] Oregon Department of Forestry, *Astoria District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.
[43] Oregon Department of Forestry, *Forest Grove District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.
[44] Oregon Department of Forestry, *Klamath-Lake District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.
[45] Oregon Department of Forestry, *North Cascade District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.
[46] Oregon Department of Forestry, *Tillamook District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.
[47] Oregon Department of Forestry, *Western Lane District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.
[48] Oregon Department of Forestry, *West Oregon District FY 2023 Annual Operations Plan*, 2022, accessed November 19, 2024, https://www.oregon.gov/odf/pages/reports.aspx.

Exhibit 36 Recreation Infrastructure in the Clatsop and Tillamook State Forests



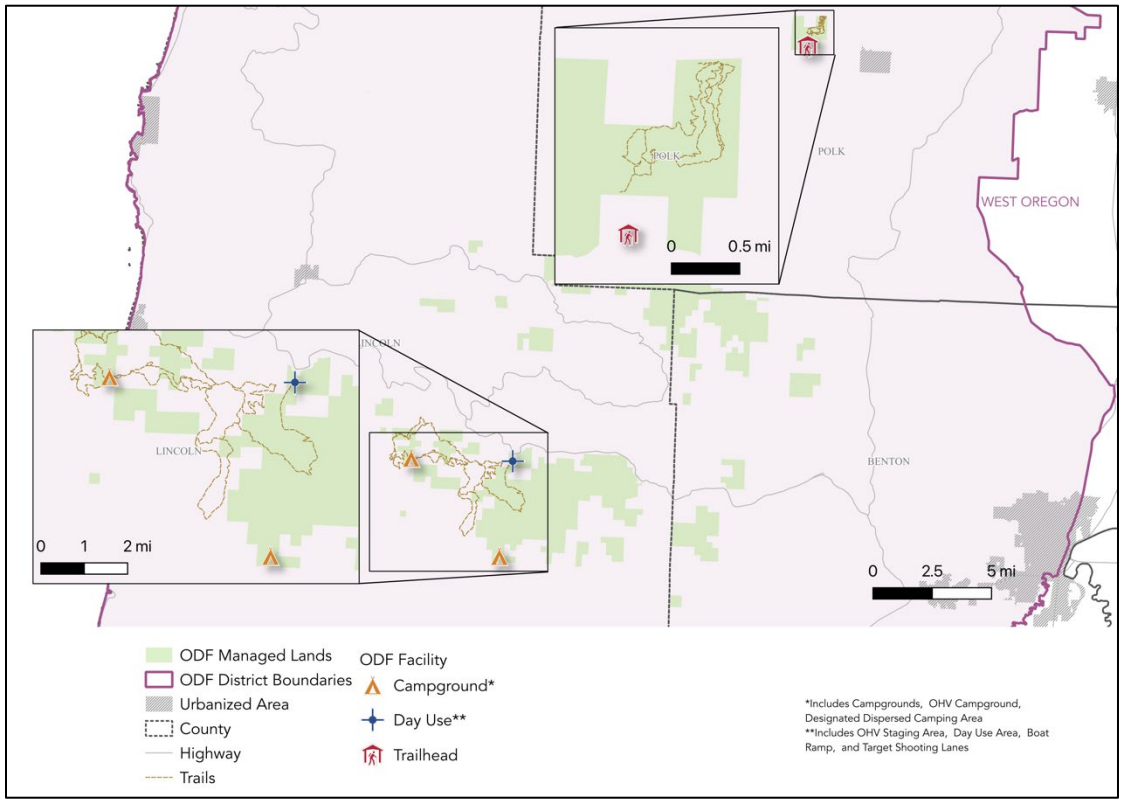
Source: ECONorthwest, using data provided by Oregon Department of Forestry

Exhibit 37 Recreation Infrastructure in the Santiam State Forest



Source: ECONorthwest, using data provided by Oregon Department of Forestry

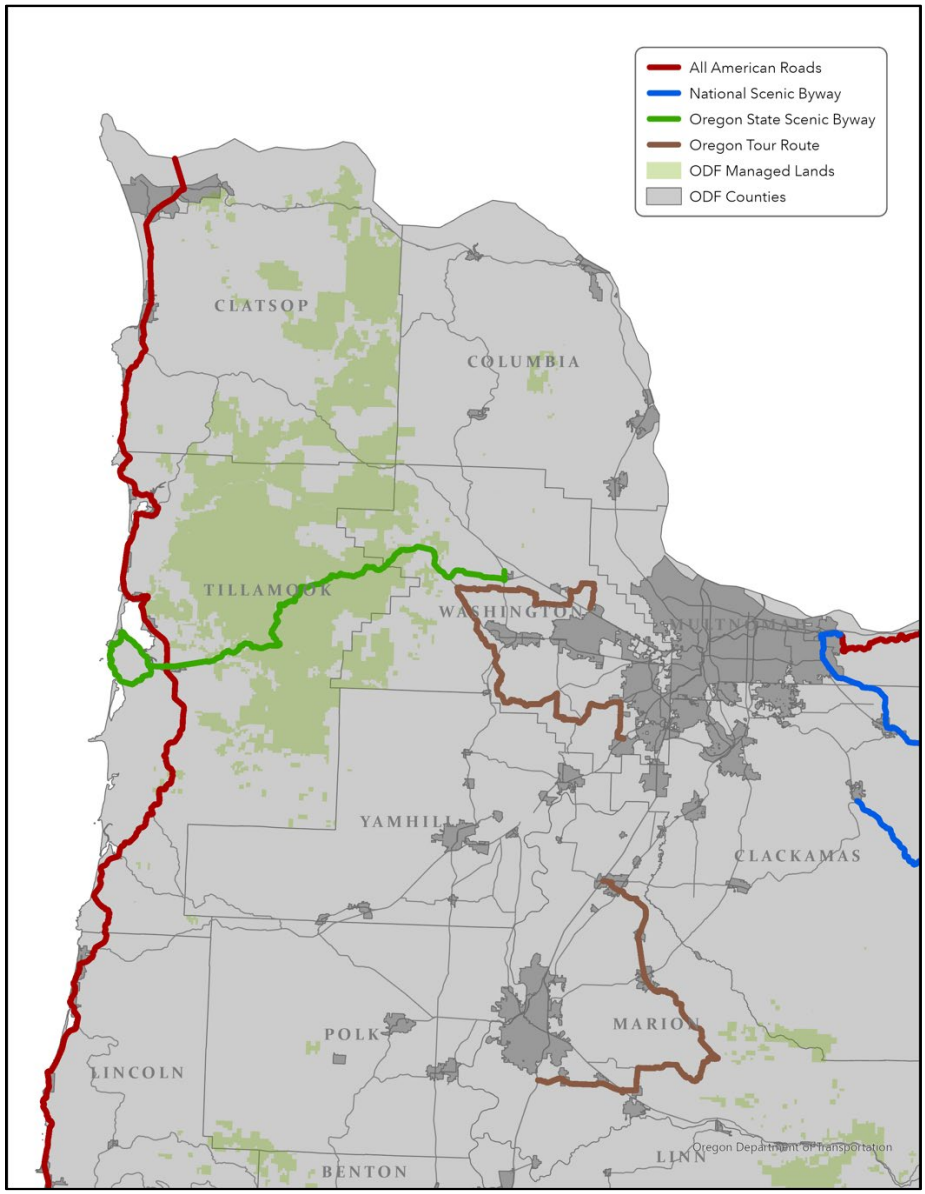
Exhibit 38 Recreation Infrastructure in West Oregon District



Source: ECONorthwest, using data provided by Oregon Department of Forestry

ODF forestlands also support and contribute to a range of scenic driving opportunities that pass through or near the forestlands. All American Roads, prominently located along the coast, offer iconic views and access to state forests in Clatsop and Tillamook Counties (Exhibit 39). Oregon State Scenic Byways traverse areas like the Tillamook State Forest, offering immersive forest experiences, while Oregon Tour Routes provide inland alternatives that connect forested regions across counties such as Washington, Marion, and Linn.

Exhibit 39 Scenic Driving Opportunities in Western Oregon



Source: ECONorthwest, using data provided by Oregon Department of Forestry

Campgrounds

Campgrounds comprise a large share of the developed recreation facilities available on ODF forestlands. The use of campgrounds is generally tracked by ODF through the collection of user fees. ODF forestlands host two types of campgrounds: 1) developed campgrounds that are actively managed by ODF and typically offer amenities like picnic tables and potable water in exchange for an overnight camping fee, and 2) designated campsites that are

signed, numbered, and have a metal fire grate.[49] ODF also allows dispersed camping year-round, where no fees or permits are required, but campers must adhere to certain ODF camping regulations.[50] Visitors pay between $15-20 per night for walk-in or drive-in camp sites. Although most campgrounds are only open between May and October, the few campgrounds that are open year-round may not collect fees past the peak season after October. In addition to collecting fees for the use of a campsite, ODF also collects fees for additional vehicles parked at the site.[51]

Tillamook State Forest receives the highest number of campers and generates the most campground revenue thanks to its 226 campsites. In comparison, Clatsop State Forest has 66 campsites and sees fewer visitors. Campground visitation is lowest in the Santiam State Forest in the North Cascade District. The Beachie Creek Fire of 2020 resulted in a steep drop in visitation and camping in the Santiam State Forest due to campground closures and after-effects of the fire on forest structure and ODF infrastructure. The COVID-19 pandemic that began in the Spring of 2020 resulted in a sudden decline in the use of campgrounds across the four districts, but visitation has increased steadily since then. Exhibit 40 shows the level of use in each of the four districts (encompassing the three state forests) that report statistics on the use of developed recreation sites. ODF also maintains designated campsites in the Western Oregon District but does not track visitation or use at such campsites.

Exhibit 40. ODF Developed Campgrounds and Level of Use, Average of Fiscal Years 2023 and 2024

CAMPING CHARACTERISTICS	TILLAMOOK STATE FOREST		CLATSOP STATE FOREST	SANTIAM STATE FOREST
	FOREST GROVE DISTRICT	TILLAMOOK DISTRICT	ASTORIA DISTRICT	NORTH CASCADE DISTRICT
Number of Campsites	90	136	66	20
Total campers	7,307	10,895	7,266	772
Total visitor nights	14,820	28,972	15,922	2,110

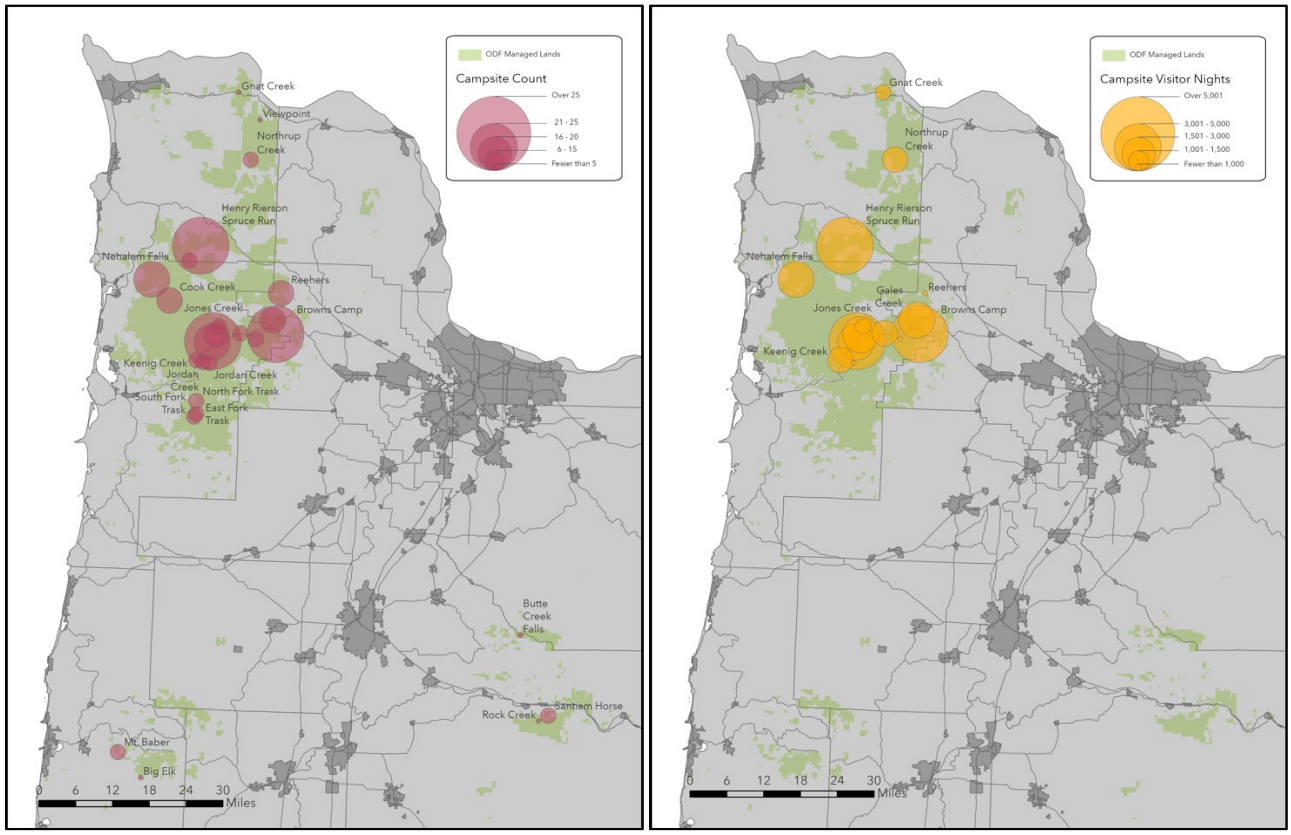
Source: ECONorthwest, using data provided by Oregon Department of Forestry

The majority of ODF campgrounds operate at full capacity during most summer weekends, and at half to three-quarters capacity during summer weekdays. Most users either reside within the western Oregon study area, which includes the urban centers of Portland, Salem, and Eugene, or travel from southwest Washington.[52] (ODF 2022).

[49] Oregon Department of Forestry, "Camping on State Forests," accessed November 19, 2024, https://www.oregon.gov/odf/recreation/pages/camp.aspx.
[50] Oregon Department of Forestry, "Camping on State Forests," accessed November 19, 2024, https://www.oregon.gov/odf/recreation/pages/camp.aspx.
[51] Randy Peterson, email message to ECOnorthwest, January 25, 2023.
[52] ODF District Foresters, questionnaire responses, October 2022.

Campgrounds provide visitors with the opportunity to spend multiple days in the region, allowing visitors to engage in a variety of activities on ODF forestlands, including trail-based activities. In general, campgrounds are most densely concentrated along Oregon Route 6, which runs through Tillamook State Forest in Tillamook and Washington counties, and near Forest Grove and the Portland Metro area (Exhibit 41). Campgrounds are an important complementary resource for trails. They provide a basis for extended trail access, attract people to the forest, and bring them close to trails, potentially helping to create new trail users and expanding the extent and diversity of trail users in the community.

Exhibit 41 Campsite Capacity on ODF forestlands, 2024



Source: ECONorthwest, using data provided by Oregon Department of Forestry

Trails

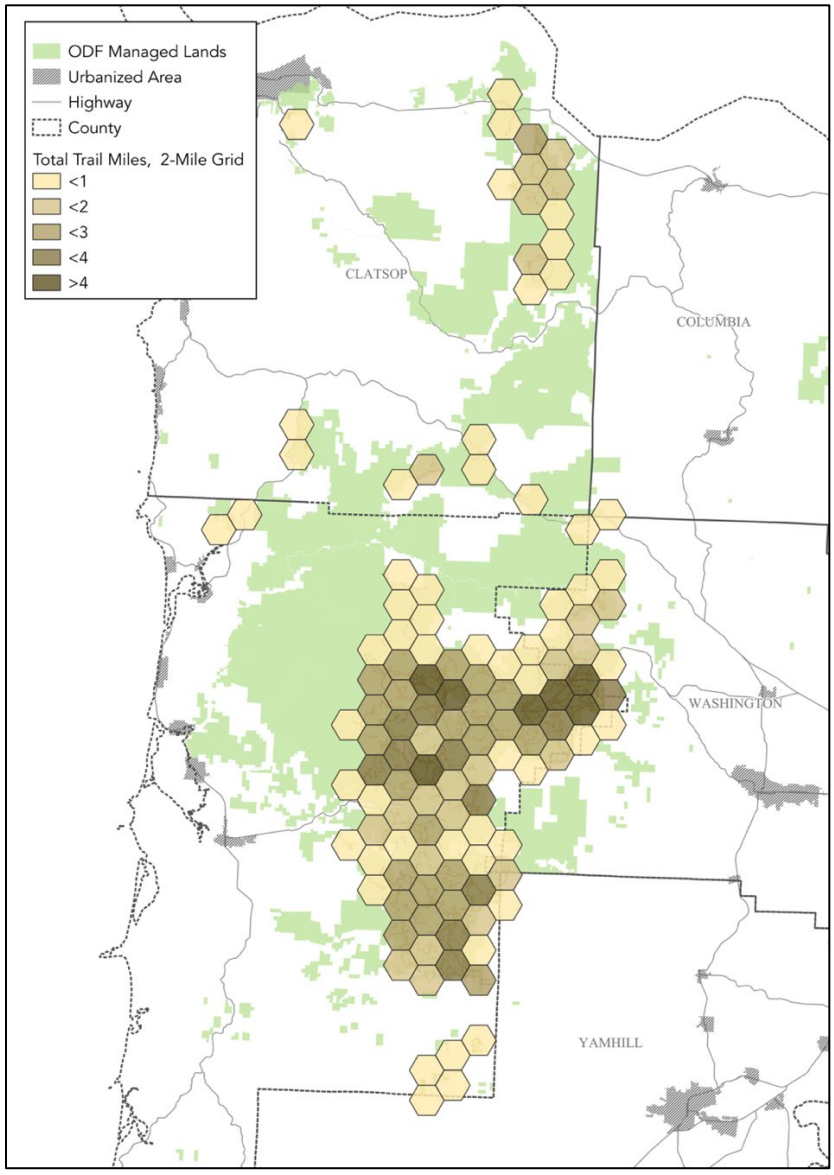
Visitors to ODF forestlands can enjoy motorized and nonmotorized trails that accommodate a variety of uses. There are 497 miles of OHV trails across ODF forests. The trails in Clatsop and Tillamook State Forests can accommodate motorcycle, quad, side-by-side, and four-wheel driving, while the trails in Santiam State Forest and the West Oregon District can accommodate motorcycle and quad driving.[53] OHV trails are open all year round, but the use of OHV trails is highest during the spring and fall. Along with motorized trails, there are approximately 145 miles of non-motorized trails that accommodate activities like hiking,

[53] ODF FMP Chapter 3.

horseback riding, trail running, and mountain biking. Both locals and non-locals (including international tourists) visit the Black Rock Mountain bike area in the West Oregon District for a variety of mountain biking trails.

Trails can be found throughout the ODF forestlands but are concentrated most densely near Oregon Route 6 in Tillamook County, complementing the developed recreation facilities in the same region (Exhibit 42). While day-use data is not collected by ODF, Oregon Parks and Recreation Department collects data on day-use visits to its state parks. In 2023, the department recorded 52.2 million day-use visitors across the state parks.[54]

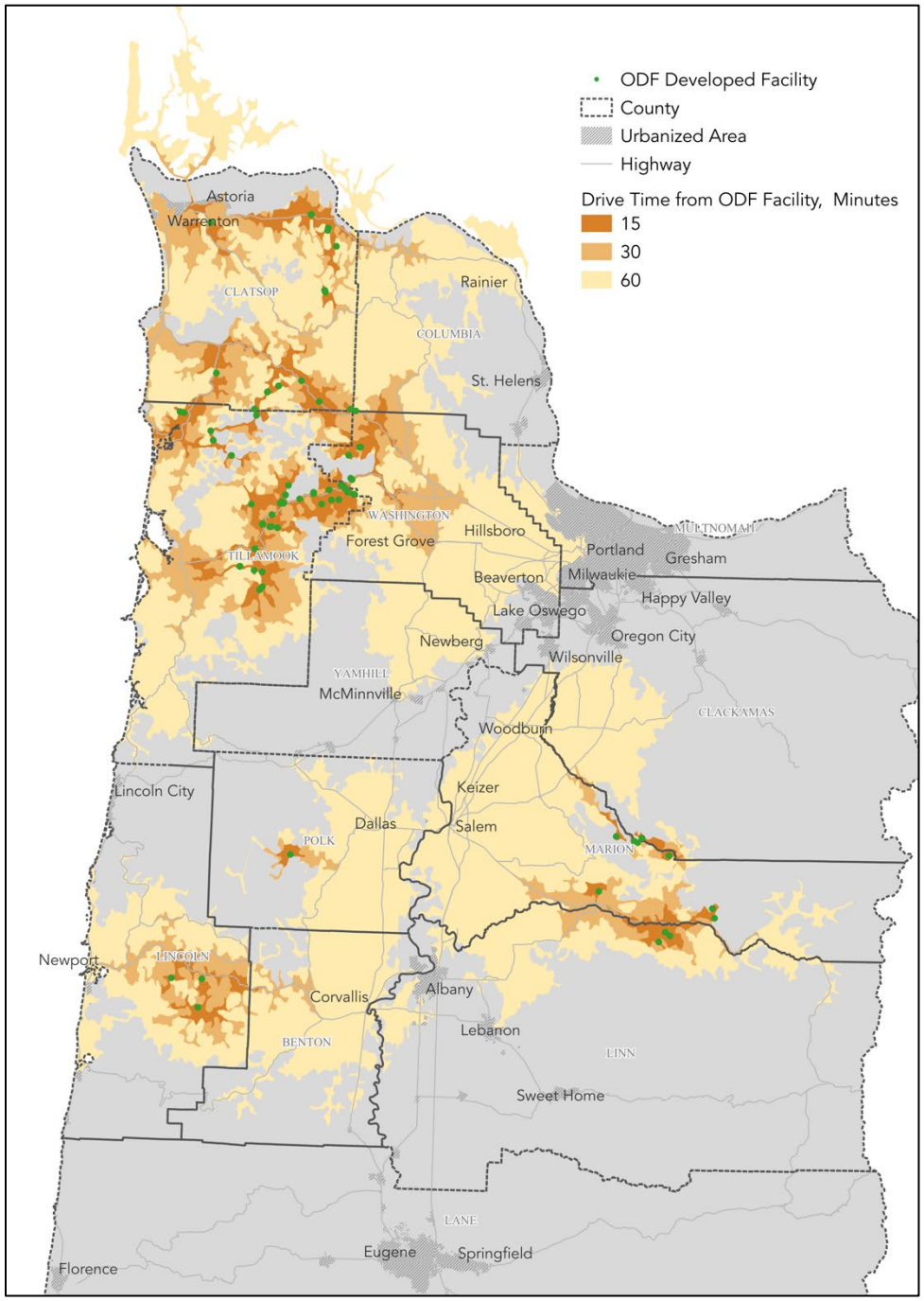
Exhibit 42 Trail Density, ODF



Source: ECONorthwest, using data provided by ODF

[54] McDonald, Rachael, "Oregon State Parks Has Another Year of Record Visitation," *Oregon Public Broadcasting*, March 10, 2024, https://www.opb.org/article/2024/03/10/oregon-state.

Exhibit 43 Area within 15, 30, and 60 minute Drive Times from ODF developed facilities



Source: ECONorthwest, using data provided by Oregon Department of Forestry

The geographic distribution of recreational facilities and their accessibility for various communities is a relevant factor when considering the overall value of the trail network. The forest is relatively accessible from all the surrounding communities by the region's road system in the northern districts (Exhibit 43). For example, most of the recreational facilities are within a 60-minute drive time of nearby population centers like Astoria, Forest Grove, Hillsboro, Beaverton, Salem, etc. In general, in terms of the existing road network and geographical distribution of facilities, no major needs or areas of neglect stand out in terms

of car access. However, there are limited public transportation options for those who do not own a vehicle. For all groups, the availability of close-to-home trails is particularly important, as it encourages frequent trips while helping to reduce vehicle traffic, road congestion, and emissions.

Demand for Recreation Opportunities

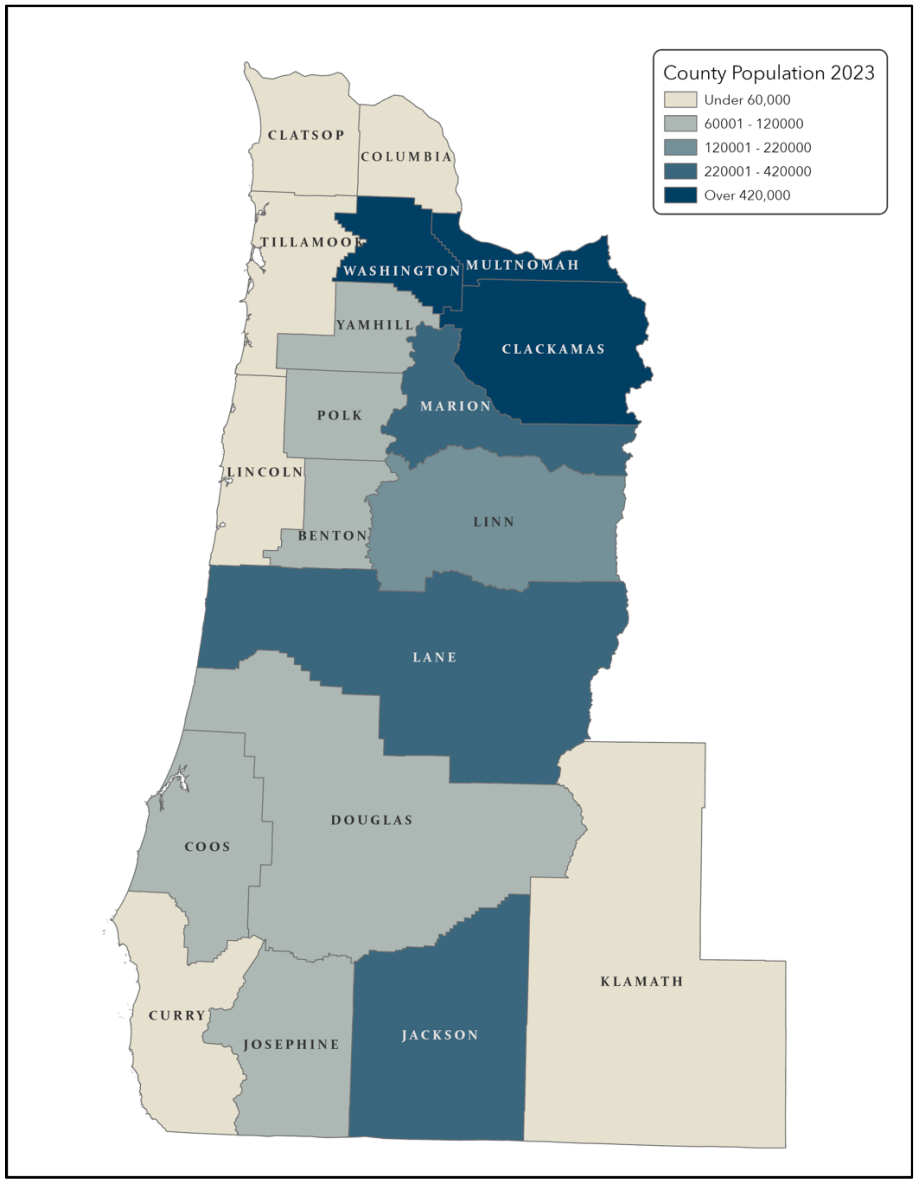
Local User Base

LOCAL POPULATION

Recreational infrastructure on ODF forestlands is used by residents of Western Oregon as well as visitors from across the state of Oregon and beyond. As of 2023, Washington, Clackamas, Lane, and Marion counties make up approximately 50 percent of Western Oregon's population, excluding Multnomah County, and have a considerably larger population than other counties in western Oregon (Exhibit 44). In 2023, the Portland-Vancouver-Hillsboro Metro region that spans Oregon and Washington was the most populated region with approximately 2.5 million residents.[55]

[55] Census Reporter, "Portland-Vancouver-Hillsboro, OR-WA Metro Area," accessed March 5, 2025, https://censusreporter.org/profiles/31000US38900-portland-vancouver-hillsboro-or-wa-metro-area/.

Exhibit 44 Estimated Population by County in 2023



Source: Census ACS 2023 5-year estimates.[56]

The PSU Population Research Center develops population forecasts for Oregon counties on a four-year cycle. According to the most recent forecast developed using county population estimates from 2022, Western Oregon is expected to grow steadily. In 2020, Western Oregon had a population of approximately 2.9 million and it is expected to grow to 3.4 million by 2040, an average rate of 0.8 percent per year (Exhibit 45). The populations in counties such as Polk, Benton, and Washington are expected to grow the most over the next 20 years, with average annual growth rates of 1.8 percent, 1.3 percent, and 1.1 percent, respectively. This forecast does not reflect the recent trend of net emigration from Oregon

[56] U.S. Census Bureau, "American Community Survey 2023 5-Year Estimates, County Populations," accessed March 14, 2025, https://www.census.gov/programs-surveys/acs.

observed in 2022 and 2023.[57] Although domestic immigration has remained stable over time, a surge of domestic emigration in 2022 coupled with Oregon's low birth rate resulted in decline in population.

Exhibit 45. Population Forecast by County and UGB

COUNTY	2020	2030	2040	AVERAGE ANNUAL GROWTH RATE
Benton	95,184	108,881	120,481	1.3%
Clackamas	421,401	459,143	484,850	0.8%
Clatsop	41,072	44,573	45,579	0.5%
Columbia	52,589	55,895	57,857	0.5%
Coos	64,929	65,267	65,046	0.0%
Curry	23,446	24,429	24,881	0.3%
Douglas	111,201	114,291	115,610	0.2%
Jackson	223,259	247,461	264,909	0.9%
Josephine	88,090	93,247	98,044	0.6%
Lane	382,971	412,045	434,846	0.7%
Lincoln	50,395	52,344	53,428	0.3%
Linn	128,610	139,090	146,130	0.7%
Marion	345,920	385,366	407,818	0.9%
Polk	87,433	101,329	119,187	1.8%
Tillamook	27,390	29,420	30,369	0.5%
Washington	600,372	667,025	730,778	1.1%
Yamhill	107,722	118,182	127,477	0.9%
Total	**2,851,984**	**3,117,986**	**3,327,291**	**0.8%**

Source: Population Research Center (2024).[58]

Forecasted Visitation

To estimate the demand for recreational activity on ODF forestlands, we must estimate total visitation to the forests. While the local user base indicates the potential users of the forests, it does not represent actual visitation. We use cellphone location data from 2024, extrapolated by the analytics company Placer.ai, which aggregates data using location-based services on devices (for users who have enabled location sharing), to estimate actual visitation to ODF forestlands in 2025.[59] Placer.ai filters out data for temporary movement

[57] Serra Kirsch and Mark McMullen, "Oregon's Migration Landscape: Evolving Patterns and New Challenges," October 28, 2024, available at: https://www.commonsenseinstituteus.org/oregon/research/housing-and-our-community/domestic-migration-data-2023.
[58] Portland State University Population Research Center, "Population Forecasts," accessed November 19, 2024, https://www.pdx.edu/population-research/population-forecasts.
[59] Placer.ai. 2024. Point of Interest Property Reports. https://www.placer.ai.

through the forest, such as cars driving through ODF forestlands on state or federal highways, but it is unable to distinguish between recreational visits and visits for non-recreational purposes, such as logging and forest management.

Based on data from Placer.ai, total visitation to ODF forestlands was approximately 843,000 trips in 2024. This estimate is likely an underestimate of overall recreational visitation to ODF forestlands. The accuracy of the data relies on consistent cellphone coverage, such that visits to remote locations like ODF forestlands are underestimated. Visits to ODF forestlands in certain counties like Curry, Jackson, and Yamhill were too low for Placer.ai to report visitation estimates.

We coupled the visitation estimate from Placer.ai with estimates of population growth in western Oregon and trends in participation in outdoor recreation from Oregon's Statewide Comprehensive Outdoor Recreation Plan (SCORP) surveys to forecast visitation from 2025 to 2034.[60,61,62] Based on this data, the annual visitation is projected to increase from 843,000 to 891,000 trips by 2034 (Exhibit 46). Across the 10-year timespan, visitors are expected to take over 8.7 million unique trips to ODF forestlands. Based on county-level estimates from Placer.ai and the experience of ODF's recreation staff, Tillamook, Clatsop, and Santiam State Forests draw the highest levels of visitation for outdoor recreation given their proximity to the Portland Metro region and supply of well-developed recreation infrastructure. Several roads branching off Highway 26 pass through the Tillamook State Forest and facilitate dispersed recreation in that region.

Data from the SCORP surveys can provide insights into which recreation activities are expected to become more popular in the future. Statewide trends likely differ somewhat from activity observed and expected in western Oregon on state forests. ODF forestlands are working lands with landscapes that reflect timber harvest activity, differing from other sites of outdoor recreation in Oregon, such as national forests, BLM-managed recreation areas, local and county parks, and others. As such, the differences in landscapes create opportunities for different recreation activities. ODF fills a specific niche in the overall suite of recreation opportunities in western Oregon, particularly concerning proximity to population centers. For example, comparing user occasions for specific recreational activities over time based on the SCORP surveys reveals that activities like biking, collecting forest products, car camping, bird watching, and backpacking have grown in popularity while Off-Highway Vehicle Use (OHV), picnicking, hunting, and fishing have reduced in popularity between 2017 and 2022 at the state level. The same is not true for recreation on ODF forestlands, where, based on ODF staff's experience, participation in Class I through IV OHV use and hunting is growing while participation in bicycling and more passive

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[60] Randall Rosenberger and Kreg Lindberg, *Oregon Resident Outdoor Recreation Demand Analysis: 2013-2017 Oregon Statewide Comprehensive Outdoor Recreation Plan Supporting Documentation*.

[61] Oregon Parks and Recreation Department, *2017 Oregon Resident Outdoor Recreation Survey Report: 2018-2022 Oregon Statewide Comprehensive Outdoor Recreation Plan Supporting Documentation*, accessed February 27, 2025, https://www.oregon.gov/oprd/PRP/Documents/SCORP-2017-Survey-Outdoor-Recreation.pdf.

[62] Oregon Parks and Recreation Department, *2023 Oregon Resident Outdoor Recreation Survey Report*, accessed November 19, 2024, https://www.oregon.gov/oprd/PRP/Documents/SCORP-2023-Oregon-Resident-Outdoor-Recreation-Survey-Report.pdf.

recreation activities like nature observation remains low.[63] There are several camps that cater to OHV and trails popular with mountain and gravel bikers while ODF forestlands lack the paved trails needed for other forms of bicycling.[64] Periods of increased timber harvests under the FMP would likely drive more participation in developed recreation activities.[65]

Exhibit 46. Current and Forecasted Recreation Values on ODF Forestlands

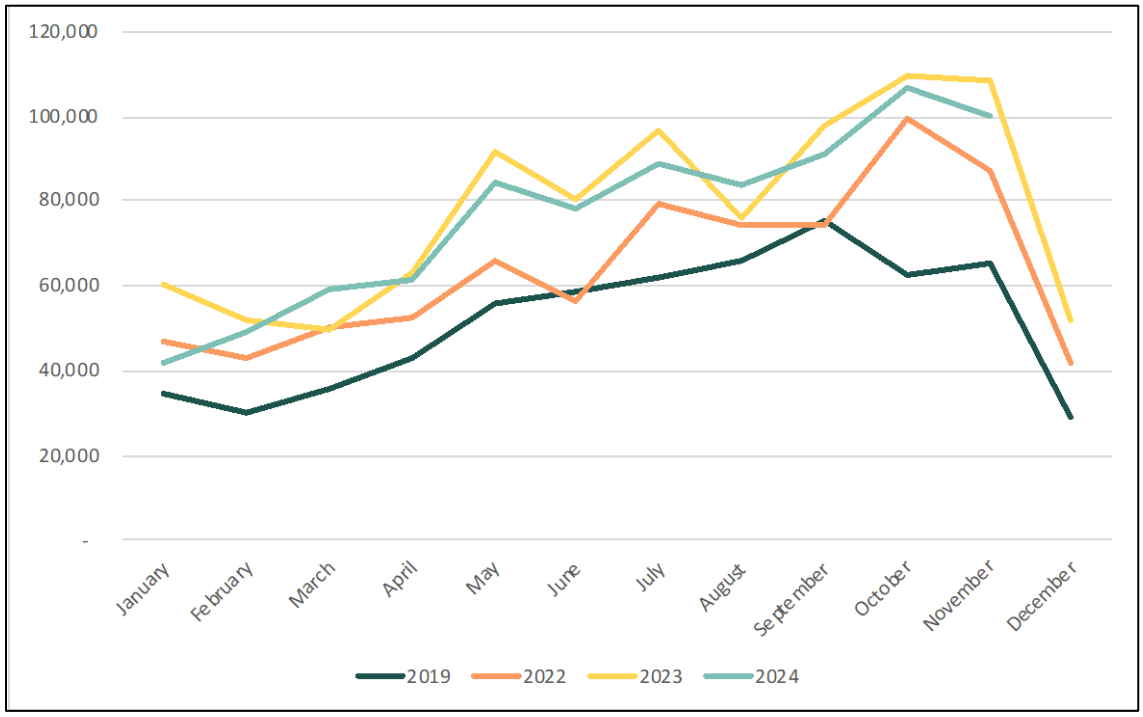
VALUES	2025	2034	2025-2034
Visits	843,000	891,000	8,672,000
Consumer Surplus (in millions)	$91	$96	$934
Spending (in millions)	$80	$85	$825
Economic Contributions			
Jobs	270	285	2,775
Labor Income (in millions)	$12	$13	$128
Value Added (in millions)	$21	$23	$220
Output (in millions)	$35	$37	$358

Source: ECONorthwest analysis

Data from Placer.ai suggests that overall visitation to ODF forestlands is lowest in the winter, grows over the year, and peaks every fall between September and November (Exhibit 47).

[63] Joseph Offer, personal communication, interview on February 6, 2025.
[64] Joseph Offer, personal communication, interview on February 6, 2025.
[65] Joseph Offer, personal communication, interview on February 6, 2025.

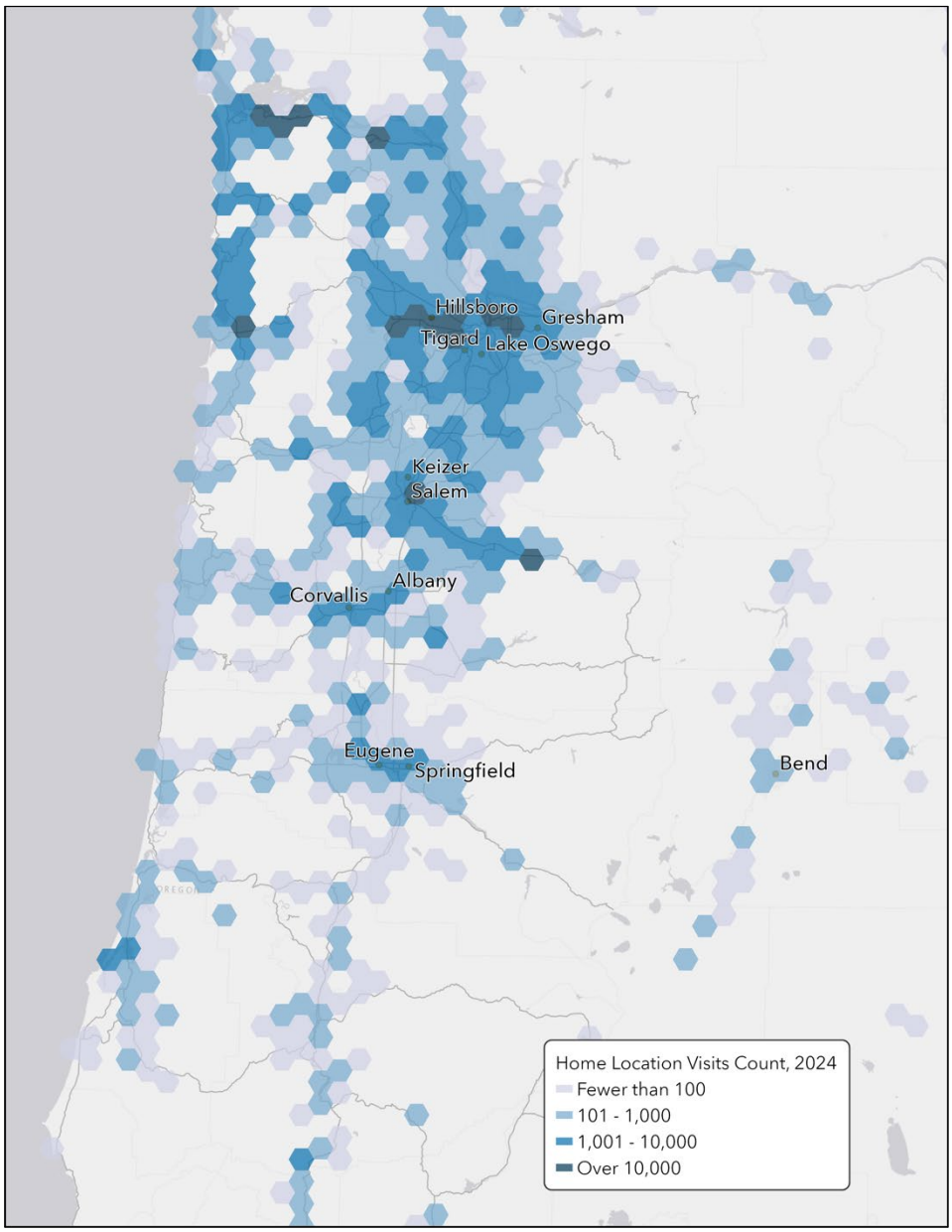
Exhibit 47. Placer Visitation by Month on ODF forestlands in Western Oregon



Source: ECONorthwest's analysis of Placer.ai data

Placer.ai also reports the home locations of visitors and the most common prior-visit destination categories. Using home location data, we find that "Home" is the most common location (ranging from 61 to 78 percent) prior to visiting ODF forestlands in 2024, confirming that locals make up the majority of visitors to these areas. Most visitors to ODF forestlands live in Washington, Clatsop, Marion, Multnomah, Columbia, Tillamook, and Clackamas counties (Exhibit 48). The other most common prior-visit destinations include dining, leisure (e.g. attractions, bars & pubs, natural landmarks, event halls), and shops and services.

Exhibit 48 Home Locations of Visitors to ODF forestlands in 2024



Source: ECONorthwest's analysis of Placer.ai data

Value of Recreation

Recreational trips generate benefit and value for users, as well as spending on trip-related expenses, that have impacts for local businesses. The benefit of a trip to a participant net of the trip expenses is known as consumer surplus. This surplus value is the net value to a visitor. We can estimate the net benefit to trail users per trip by applying average consumer surplus estimates generated by the USFS for outdoor recreation activities applicable to the

Pacific Northwest.[66] These consumer surplus values are based on peer-reviewed studies applying empirical, well-established economic methods to estimate the average value a visitor receives net of travel expenses. This is done by modeling demand based on the level of usage for different visitors experiencing different total trip costs. Actual benefit for any individual trip can vary dramatically, even for the same repeat participant. These methods strive to calculate an average value that is weighted for applicability across the full set of trips.

Based on the analysis completed for the U.S. Forest Service, non-motorized boating, biking, hiking, and hunting are associated with the highest value of consumer surplus per person per day of activity on national forests, while backpacking and developed camping are associated with the lowest values of consumer surplus.[67] For our analysis, we use the weighted average of consumer surplus valued across the recreational activities, approximately $90 per person per day of activity (in 2024 dollars).

The total consumer surplus supported by recreation infrastructure on ODF forestlands is calculated by applying the consumer surplus values to the trip forecasts calculated above. In 2025, these trips are expected to provide approximately $91 million in net benefit to recreational visitors. These net benefits are expected to reach $96 million annually by 2034 in 2024 dollars, not accounting for inflation (or discounting) (Exhibit 46). In total, with growth over time, ODF forestlands are expected to provide $0.9 billion in user net benefits between 2025 and 2034, or $0.8 billion when discounting future values at 3 percent annually relative to 2024 (Exhibit 46). These numbers should be interpreted as order-of-magnitude, rather than in a narrowly precise manner, due to the challenge of fully capturing the values that locals receive from convenient access to the recreation infrastructure on ODF forestlands.

Economic Contributions from Recreation

Spending on Recreational Trips

Recreational trips provide benefits to users, and participants must bear direct expenses to enjoy these trips. The USFS provides trip spending profiles by visitor type and trip type, generated from information compiled in visitor surveys. This spending has economic ripple effects throughout the community and regional economy, which we calculate and discuss later in this report. These spending totals and associated economic impacts do not capture the full spending of visitors to the region who use ODF recreation infrastructure. Specifically, these calculations do not include the spending of residents who, in part,

[66] Randall S. Rosenberger, Eric M. White, Jeffrey D. Kline, and Claire Cvitanovich, *Recreation Economic Values for Estimating Outdoor Recreation Economic Benefits from the National Forest System*, Gen. Tech. Rep. PNW-GTR-957 (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 2017), 33.
[67] Randall S. Rosenberger, et al., *Recreation Economic Values.*

choose to live in the region because of the forests and their recreational opportunities, other than those immediate trip-specific expenditures.

We use IMPLAN and the spending patterns estimated by the U.S. Forest Service for national forests to calculate the spending per party per visit by origin and time of day.[68] These values use 2017 as a base year so we use the Consumer Price Index to convert them to 2024 values. We then join the spending data to the trips data to calculate total spending. To do this we divide the spending per party by the average party size to get spending per person in the trip. That value is then multiplied by the number of trips to get the total spending in 2025.

In total, the application of these methods to the number of trips provides an estimate of $80 million in total spending associated with recreational trips to ODF forestlands annually as of 2025, growing to $85 million by 2034 in 2024 dollars, uninflated and undiscounted (Exhibit 46). Between 2025 and 2034, this spending is forecast to reach $0.7 billion (discounted). Impacts of this spending can then be traced based on the specific ways these dollars are spent and the geographies in which they are spent, as well as the associated businesses and jobs that are affected. Note that this does not include the spending or impacts associated with the development and maintenance of recreational infrastructure on ODF forestlands. It also does not include spending by locals separate from individual trip-specific expenditures.

Economic Contributions

Using information on the economic impacts of recreational spending by local and non-local visitors in national forests, we can estimate the impacts of spending on recreational trips expected to occur between 2025 and 2034. IMPLAN is a static model that examines the economy at a single point in time, focusing on the short term, as it cannot account for how the local economy is likely to change in the future. Because of these considerations, we limit the analysis of economic contributions to the 10-year period from 2025 to 2034. It is also important to remember that these are gross, rather than net, impact estimates. A net analysis would require estimating and modeling how a dollar would be spent if these recreational opportunities did not exist on ODF forestlands and measuring the incremental differences in local impact between the two cases. Since it is likely that spending would still occur in the region even without the recreational opportunities provided by ODF, gross estimates are likely to be higher than net estimates.

The forests' economic contributions to employment include jobs in sectors like outdoor recreation that are directly impacted by spending on outdoor recreation (direct effect), jobs in sectors that provide materials and labor to the directly affected sectors (indirect effect), and jobs in sectors like the service industry where employees of the directly and indirectly affected sectors spend their wages. Output refers to the total value of production in the

[68] Eric M. White, *Spending Patterns of Outdoor Recreation Visitors to National Forests*, Gen. Tech. Rep. PNW-GTR-961 (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 2017), 70.

sectors chosen for analysis for a specific year. Value Added refers to the sectors' contribution to the GDP, calculated by removing the value of intermediate inputs from the Output.

In total, the forecasted recreational trips on ODF forestlands would support 2,775 jobs and $128 million in labor income (in 2024 dollars, without inflation or discounting) between 2025 and 2034 (Exhibit 46). ODF forestlands primarily serve county residents and residents of western Oregon, unlike national forests that attract non-local, out-of-state visitation as well. Since local visitors spend less on recreational visits than non-local visitors, ODF forestlands do not generate the same level of local economic activity as national forests. If patterns at least maintain their current trajectories, recreational trips to ODF lands could contribute to gross economic output of over $314 million (discounted) over the 10-year period.

These estimates do not account for economic activity generated through the construction, operations, and maintenance of the recreation infrastructure on ODF forestlands. In FY 2024, ODF spent a collective $3 million on its recreation program across its forestlands, with 70 percent of this spending funded by timber harvests on BOFL and the remaining covered by funds from the Oregon Parks and Recreation Department. In addition to the estimates described above, this spending also supports direct, indirect, and induced jobs, labor income, and economic output in western Oregon.

In an aggregate sense, it is difficult to fully identify and quantify the job creation and regional economic output generated by residents of western Oregon that can be attributed to recreational infrastructure on ODF forestlands. The extent, variety, accessibility, and quality of the trails and non-trail-based recreational facilities can attract skilled, well-educated workers, business owners, and executives. Not only do the forests create value for residents who live near recreational infrastructure, but they also create value for businesses involved in the construction and real estate industries. This analysis does not explicitly address event-related spending and impacts. Events that utilize recreational infrastructure can also attract large numbers of non-locals and generate high rates of spending, dollars that would not likely have been spent locally otherwise.

7. Other Ecosystem Services

Ecosystem services refer to the types of benefits that functional ecosystems provide to people. Forest ecosystems produce many ecosystem services that people value, including food and fiber from plants and wildlife, a setting for recreation and spiritual experiences, clean water and air, carbon sequestration, and flood control. Ultimately, people value specific goods or services, which are usually the product of complex biophysical processes. Some services are valued as an endpoint (e.g., flood regulation and avoided flood damage) while others represent necessary intermediate processes in the production of a good or service that people ultimately care about (e.g., soil formation that leads to plant growth and food production). This analysis focuses on seven categories of goods and services that ODF forestlands produce and people value: (1) climate regulation through carbon sequestration; (2) special forest products (plants used for food and materials) and hunting and fishing for subsistence; (3) water quality regulation; (4) habitat for threatened and endangered species; (5) educational services; (6) research services; and (7) cultural and tribal services.

Climate Regulation

Oregon Executive Order 20-04 directs state agencies to prioritize reducing greenhouse gas emissions by 45% by 2035 and by 80% by 2050. In 2021, the Oregon Global Warming Commission (OGWC) set further goals to sequester an additional 5 million Metric Tonnes (MT) of CO_2 by 2030 and 9.5 million MT of CO_2 by 2050, recognizing that much of this additional sequestration would need to happen through the forest sector. [69] ODF's forestlands are critical for Oregon's climate mitigation goals as they sequester more carbon per acre than most forests in the world.[70]

The trees and soils within ODF forestlands play a significant role as carbon sinks by capturing carbon in their aboveground structures and root systems throughout their life cycle. However, disturbances to forests can release this stored carbon back into the atmosphere.[71] The release of greenhouse gases like CO_2 drives climate change, which can result in negative health impacts, heightened risks of natural disasters (e.g., floods), reduced agricultural output, and other negative economic consequences both locally and

[69] Oregon Department of Forestry, *Climate Change and Carbon Plan: Draft for Public Review* (Salem, OR: Oregon Department of Forestry, 2023), accessed April 3, 2025, https://www.oregon.gov/odf/forestbenefits/Documents/odf-climate-change-and-carbon-plan-draft.pdf.

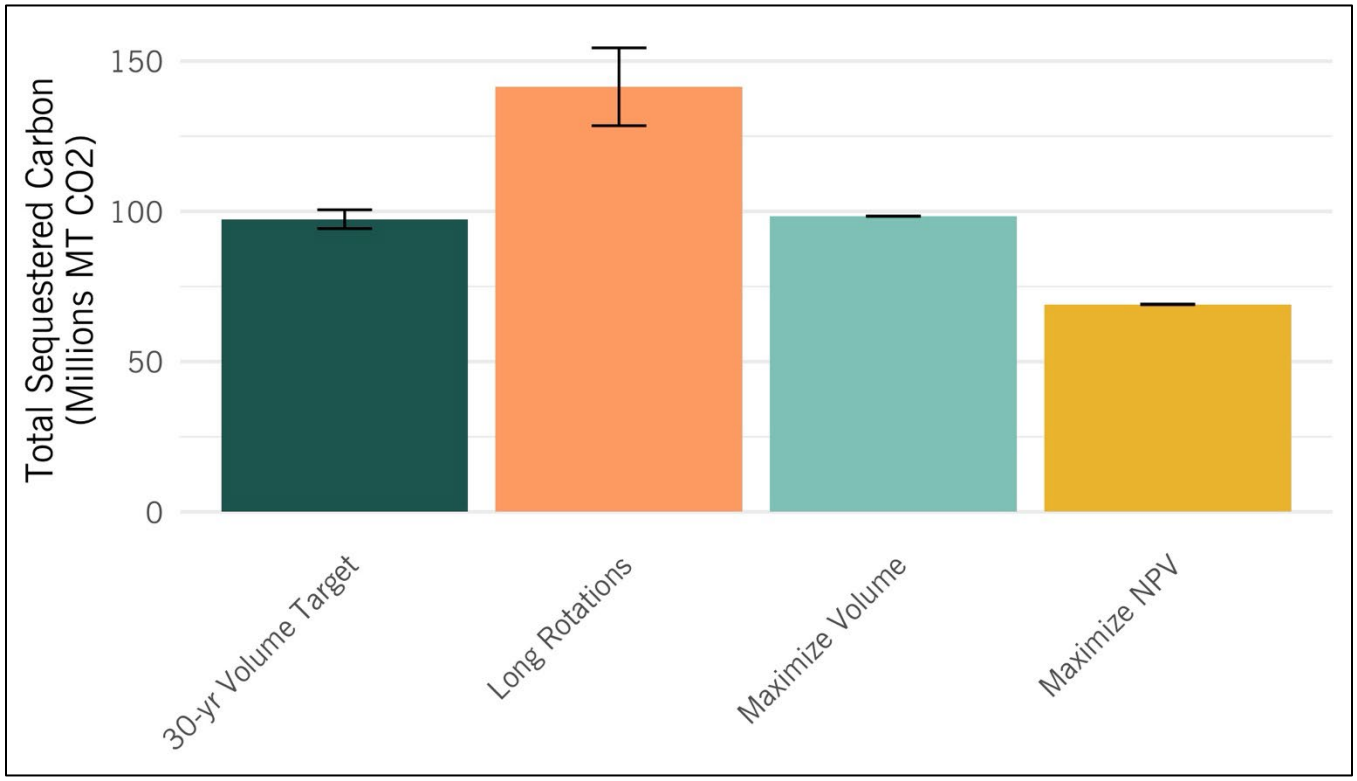
[70] Oregon Global Warming Commission (OGWC), *Natural and Working Lands Proposal* (September 2021), accessed April 3, 2025, https://static1.squarespace.com/static/59c554e0f09ca40655ea6eb0/t/6148a9d36431174181e05c7c/1632152029009/2021+OGWC+Natural+and+Working+Lands+Proposal.pdf.

[71] D. Binkley and R.F. Fisher, *Ecology and Management of Forest Soils* (Hoboken, NJ: John Wiley & Sons, 2019).

globally.[72] As a result, the management of ODF forestlands for carbon sequestration is important for meeting Oregon's climate mitigation goals and for protecting the benefits local communities derive from the forests such as timber revenue, recreation opportunities and more.

As shown in Exhibit 49, carbon sequestration is highest under the Long Rotations Scenario (129–154 million MT CO_2) followed by the 30-yr Volume Target Scenario (94–101 million MT CO_2), Maximize Volume Scenario (98 million MT CO_2), and the Maximize NPV Scenario (69 million MT CO_2). Volume of sequestered carbon differs across runs for the Long Rotations and 30-year Volume Target Scenarios but does not differ substantially across runs for the Maximize Volume and Maximize NPV scenarios. These carbon sequestration values account for aboveground carbon, belowground carbon, and carbon in harvested wood products over the analysis period.

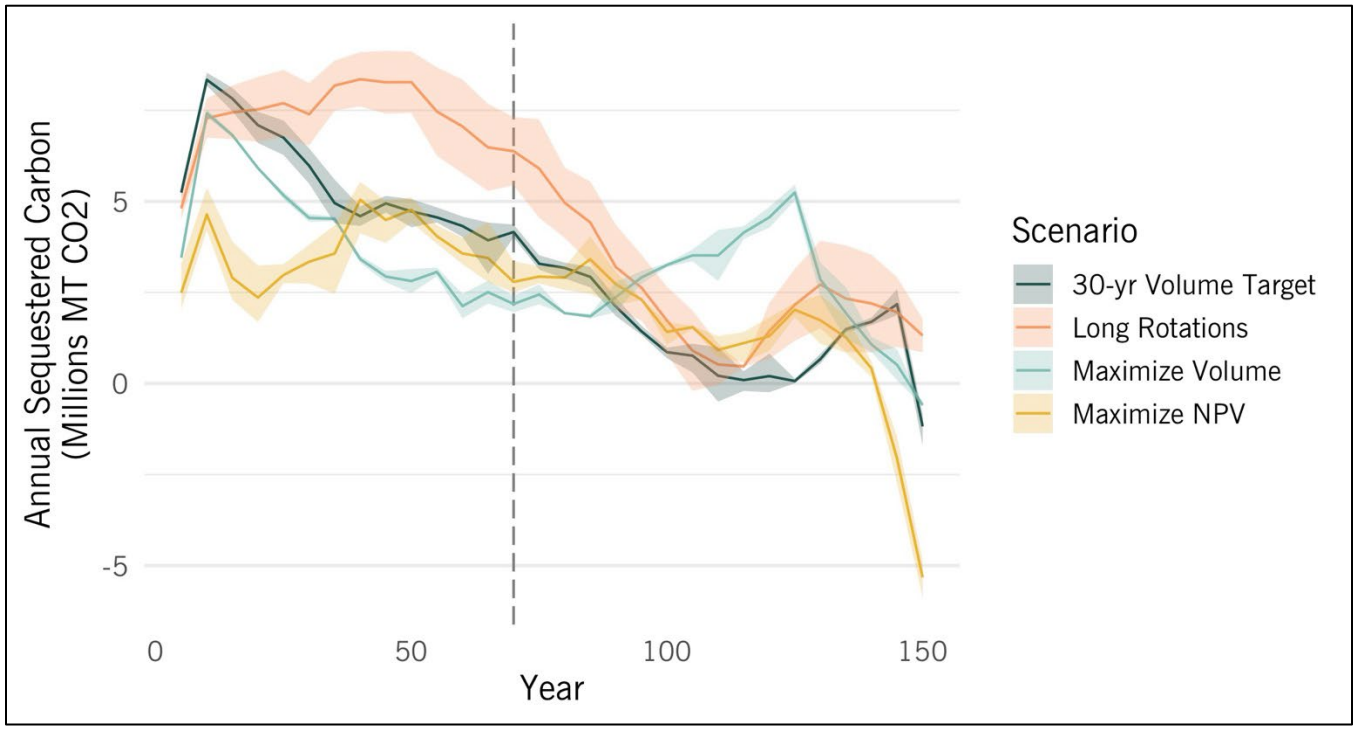
Exhibit 49. Total Carbon Sequestration under the Scenarios, 150-year period



Source: ECOnorthwest's analysis of ODF's modeled output

[72] H.-O. Pörtner et al., "Technical Summary," in *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. H.-O. Pörtner et al. (Cambridge: Cambridge University Press, 2022), 37-118, https://doi.org/10.1017/9781009325844.002.

Exhibit 50. Average Annual Carbon Sequestration under the Scenarios, 150-year period



Source: ECOnorthwest's analysis of ODF modeled data

Economists calculate the social impact of carbon emissions or sequestration through the social cost of carbon (SCC), a method that assesses the impact on human systems of adding an extra ton of carbon to the atmosphere. The SCC also represents the savings from carbon sequestration.

Over the past decade, the science behind estimating the Social Cost of Carbon (SCC) has improved significantly. The U.S. government previously used an estimate of $76 per ton of CO_2 (at a 2.5% discount rate), but the EPA's most recent update in 2023 raised that estimate to $193 per ton (using a 2% discount rate).[73,74] This increase reflects updated models and data, as well as guidance from the National Academies of Sciences, Engineering, and Medicine (NASEM). In 2017, NASEM recommended a four-step, modular approach to SCC estimation: (1) projecting socio-economic and emissions scenarios, (2) translating emissions into climate outcomes, (3) linking climate outcomes to economic damages, and (4) discounting future damages to present values.[75] Resources for the Future (RFF), with UC Berkeley, has also developed the GIVE model, which estimated the SCC at

[73] Interagency Working Group on Social Cost of Greenhouse Gases, United States Government. *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide – Interim Estimates under Executive Order 13990*. Washington, DC: U.S. Environmental Protection Agency, February 2021. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

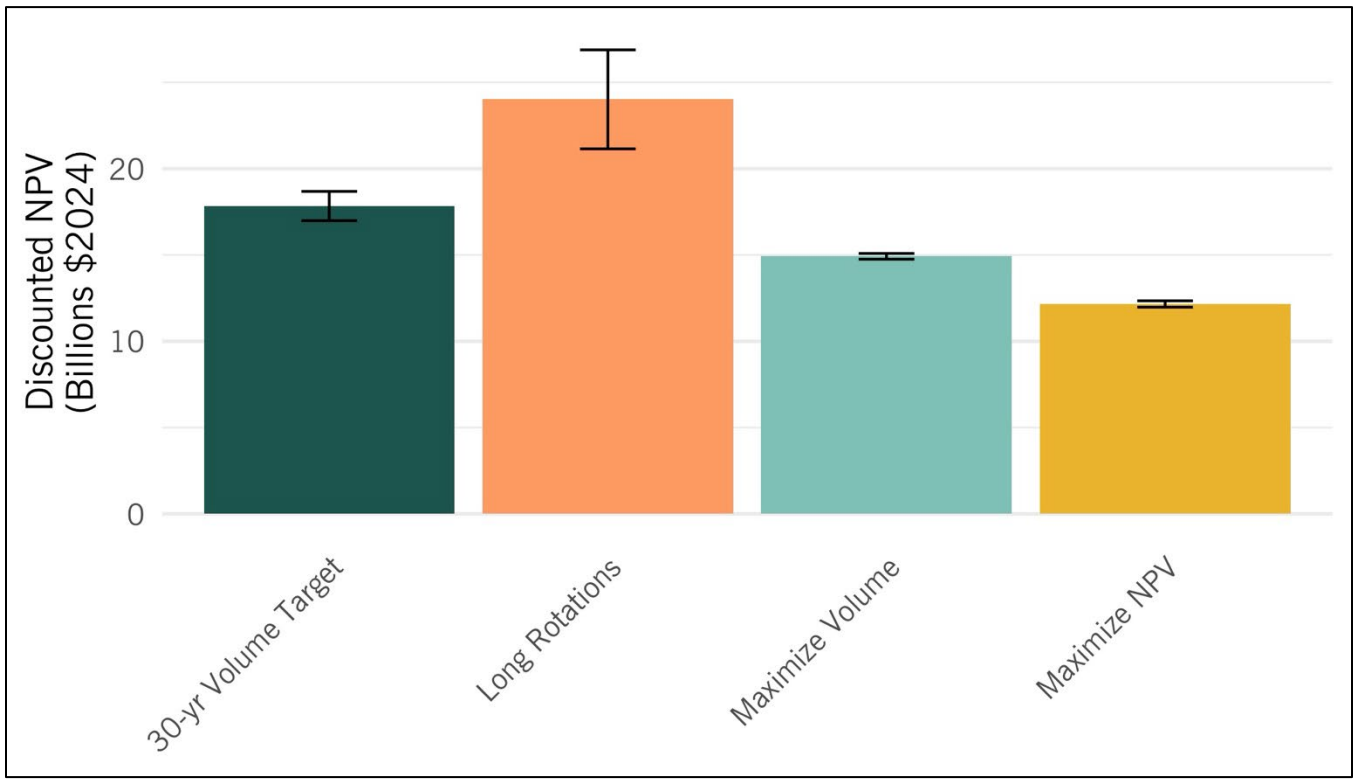
[74] U.S. Environmental Protection Agency. *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*. Washington, DC: EPA, November 2023. https://www.epa.gov/system/files/documents/2023-11/epa_2023_scc_update.pdf.

[75] EPA, *Report on the Social Cost of Greenhouse Gases*, 2023.

$185 per ton (using a 2% discount rate), closely aligning with the EPA's updated figure.[76] SCC estimates can vary considerably with the discount rate: lower rates give more weight to future damages and result in higher SCC estimates. For instance, changing RFF's discount rate from 2.5% to 1.5% increases the SCC from $118 to $308 per ton.[77] While the science and modeling have moved forward, recent executive actions have created uncertainty by removing requirements to include SCC in federal regulatory analysis, reducing the role of SCC in guiding climate-related policy decisions.

Using the estimate produced by RFF, the social value of carbon sequestered by ODF forestlands ranges from $12.0 billion (Maximize NPV) to $26.9 billion (Long Rotations).

Exhibit 51. Total Social Value of Carbon Sequestration (Discounted, Billions 2024 dollars), 150-year period



Source: ECOnorthwest's analysis of ODF's modeled output.

Note: Values calculated using RFF Social Cost of Carbon (2% Ramsey discount rate and an average SCC of $185)

[76] Resources for the Future (RFF), "Social Cost of Carbon Explorer," accessed April 3, 2025, https://www.rff.org/publications/data-tools/scc-explorer/.
[77] Resources for the Future (RFF), "Social Cost of Carbon Explorer," accessed April 3, 2025, https://www.rff.org/publications/data-tools/scc-explorer/.

Exhibit 52. Total Social Value of Carbon Sequestration (Discounted, in Billions 2024 dollars), 150-year period

SCENARIO	SEQUESTERED CARBON (MILLIONS MT CO_2)	DISCOUNTED VALUE (BILLIONS $2024)		
		EPA 2021	EPA 2023	RFF 2024
30-year Volume Target Scenario				
Run a: 185 MMBF	101	$17.9	$6.2	$18.7
Run b: 195 MMBF	97	$17.1	$5.9	$17.9
Run c: 205 MMBF	94	$16.3	$5.6	$17.0
Long Rotations Scenario				
Run a: 120 years	129	$19.9	$6.7	$21.1
Run b: 150 years	154	$25.2	$8.4	$26.9
Maximize Volume Scenario				
Run a: Unconstrained	98	$14.1	$4.8	$14.8
Run b: 10% periodic limit	98	$14.4	$4.9	$15.1
Maximize NPV Scenario				
Run a: Unconstrained	69	$11.1	$3.6	$12.0
Run b: 10% periodic limit	69	$11.6	$3.9	$12.3
Run c: 30% periodic limit	69	$11.3	$3.7	$12.1

Source: ECOnorthwest's analysis of ODF's modeled output.
Note: EPA 2024 uses a 2% Ramsey discount rate and average SCC of $193. EPA 2021 uses a 2.5% Ramsey discount rate and average SCC of $76. RFF 2024 uses a 2% Ramsey discount rate and an average SCC of $185.

In addition to the carbon sequestration on ODF lands, the use of timber in industries like construction also has implications for climate change. New timber products, such as cross-laminated timber, are becoming viable substitutes for steel and concrete in larger buildings. Compared to steel and concrete, timber is thought to be a less carbon-intensive building material, though new studies highlight how this may not always be the case. Carbon losses during harvest, processing, and decomposition of unused biomass can substantially reduce the climate benefits of using timber as a substitute for steel and concrete.[78] Only under specific conditions—a fast-growing plantation and with a higher recovery and use rates for construction—can timber provide significant emission reductions.

Despite the ongoing debate about the net effects of using timber in construction, the market for cross-laminated timber is growing as processing facilities have opened across the Pacific Northwest and Canada, and Washington and Oregon have both updated building

[78] Tim Searchinger, Liging Peng, Richard Waite, and Jessica Ziontz, "Wood Is Not the Climate-friendly Building Material Some Claim It to Be," World Resources Institute, 2023, https://www.wri.org/insights/mass-timber-wood-construction-climate-change.

codes to allow for the use of cross-laminated timber in taller buildings. This could lead to an overall increase in demand for timber in the coming decades.[79,80] Since ODF forestlands comprise a small market share of timber production and supply in Oregon, changes in timber supply from ODF forestlands under the harvest scenarios are unlikely to have a substantial influence on the demand for timber versus steel and concrete, particularly in the face of larger economic and market forces.

Special Forest Products, Hunting, and Fishing

Residents and visitors in western Oregon rely on ODF forestlands not only for recreation and commerce but also for subsistence needs. Collecting special forest products can foster social connections, support community subsistence, and offer financial security during times of economic hardship. It also plays a key role in the rural lifestyle.[81] According to the 2023 SCORP, there were approximately 8,139,052 user occasions for those who traveled outside their community to collect or forage for rocks, plants, edible fungi, or berries, or approximately 16.5% of the population in 2022.[82] The average household traveled 4.78 times per year for collecting or foraging.

Special forest products are gathered throughout ODF forestlands. ODF only issues permits for the personal collection of firewood. In 2024, ODF issued approximately 1,527 permits for the collection of approximately 3,054 cords. While no data exist for personal collection of non-firewood products, as permits are not usually required, commercial permits give insight into the other products people collect for personal and subsistence use. These include basket-weaving materials (like spruce roots and hazel sprouts), cedar, food items (like nuts, berries, and marine plants), and medicinal plants, all of which are culturally significant to Tribal Nations. These are just a few examples of the products that Tribes harvest, with further details provided in the section on Cultural Services.

Forest conditions affect the availability of foraged products. Salal, used for food and in floral arrangements, thrives in diverse forests, especially after timber harvesting.[83] Mushrooms, including matsutake, chanterelles, and white truffles, are common in old-growth and second-growth forests, with some species preferring areas affected by logging.[84] Chanterelle

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[79] Olli-Pekka Kuusela, et al., The 2019 Forest Report.
[80] David Haim, Timber Trends (Portland, OR: Campbell Global Research, 2018), https://faculty.lsu.edu/vlosky/listserv/2018/20180527-campbell-global-timber-trends-april-2018.pdf.
[81] R.J. McLain, S. Alexander, and E.T. Jones, *Incorporating Understanding of Informal Economic Activity in Natural Resource and Economic Development Policy*, USDA Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-755 (2008), 53, accessed November 19, 2024, https://www.arlis.org/docs/vol1/237002619.pdf.
[82] Oregon Parks and Recreation Department, *2023 Oregon Resident Outdoor Recreation Survey Report*, accessed November 19, 2024, https://www.oregon.gov/oprd/PRP/Documents/SCORP-2023-Oregon-Resident-Outdoor-Recreation-Survey-Report.pdf.
[83] U.S. Forest Service, "Gaultheria shallon," *Fire Effects Information System*, accessed November 19, 2024, https://www.fs.fed.us/database/feis/plants/shrub/gausha/all.html.
[84] J.W. Van Wagtendonk, *The Effect of Fire on Nutrient Cycling in a Douglas-fir Forest*, 2006, accessed November 19, 2024, https://andrewsforest.oregonstate.edu/sites/default/files/lter/pubs/pdf/pub2487.pdf.

mushrooms, for example, rebound after thinning in young forests.[85,86] The High Cascades, including the Crescent Lake and Chemult Ranger Districts, are key areas for matsutake collection. [87] Berries like huckleberries and blackberries are most productive in mid-seral stages and most abundant in the Western Cascades.[88] Moss thrives in mid- to late-seral forests, and huckleberries, important for subsistence and recreation, are most productive in mid-seral stages. Fall, winter, and early spring are ideal for mushrooms, while spring through early fall is best for berries and greens.

Fishing and hunting are also vital activities, providing essential protein sources for households, particularly in rural regions with limited access to affordable food. Both activities are allowed in much of ODF forestlands with proper licenses from the Oregon Department of Fish and Wildlife.

Exhibit 53. Commercial Special Forest Products Permits Issued and Quantity in ODF Forestlands by District in 2024

DISTRICTS	NUMBER OF PERMITS	QUANTITY IN CORDS
Astoria	592	1,184
Forest Grove	522	1,044
North Cascade	47	94
Tillamook	347	694
West Oregon	19	38
Total	**1,527**	**3,054**

Source: ECOnorthwest's analysis of ODF's permit data

Note: Other products include vine maple, beargrass, ferns, huckleberry, truffles, tree boughs, fence posts, and minerals. Southwest Oregon District did not issue permits for commercial collection of special forest products.

Water Quality Regulation

Forests play a vital role in maintaining water quality by filtering rainwater, reducing sedimentation, and regulating water flows, which helps manage water temperature. The natural vegetation in forests helps shade and cool water, stabilize soils, reduce erosion, and capture rainfall, allowing water to slowly seep into aquifers or rivers rather than rapidly running off, which can cause flooding or water quality degradation. This natural filtration

[85] J.W. Van Wagtendonk, *The Effect of Fire on Nutrient Cycling in a Douglas-fir Forest*, 2006, accessed November 19, 2024, https://andrewsforest.oregonstate.edu/sites/default/files/lter/pubs/pdf/pub2487.pdf.
[86] U.S. Forest Service, "Fungi Functional Types," *DecAID: The Decayed Wood Advisor*, accessed November 19, 2024, https://apps.fs.usda.gov/r6_decaid/views/fungi.html.
[87] David Pilz, Jerry Smith, Michael P. Amaranthus, Susan Alexander, Randy Molina, and Daniel Luoma, *Ecology and Management of Commercially Harvested Chanterelle Mushrooms*, USDA Forest Service, Pacific Northwest Research Station, accessed November 19, 2024, https://www.fs.usda.gov/pnw/pubs/journals/pilz-mushroom.pdf.
[88] Kevin A. Simonin, "Vaccinium membranaceum," in Fire Effects Information System, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer), 2000, accessed September 14, 2021, www.fs.fed.us/database/feis/plants/shrub/vacmem/all.html.

minimizes the need for expensive water treatment infrastructure, providing an ecosystem service that is crucial to public health and well-being.[89,90]

Less than 1 percent of Oregon's surface drinking water sources areas overlap with ODF forestlands.[91] However, over 45 percent of the source areas for three Public Water Systems—Timber Water Association, Hillsboro-Cherry Grove, and Jewell School District #8—overlap with ODF forestlands.[92] In addition, there are eight municipal or quasi-municipal points of diversion and 125 private or domestic points of diversion for drinking water on ODF forestlands.[93]

Activities on forestlands, such as timber production and road construction, can increase erosion and runoff into water bodies. This increased erosion can increase levels of sediment and contaminants in water sources that supply drinking water. Although regulations like the Safe Drinking Water Act and Clean Water Act work to ensure that sources of drinking water meet water quality standards and communities receive safe drinking waters, sedimentation in surface water can result in increased costs for water treatment and distribution, while changes in runoff can affect the supply of surface water delivered in drinking water source areas. For example, Warziniack et al. show that every 1 percent increase in turbidity leads to a 0.19 percent increase in water treatment costs.[94]

For the public drinking water source areas that overlap ODF forestlands, less than 10 percent of ODF forests are less than 10 years old during any modeled 5-year period under all runs of the 30-year Volume Target and Long Rotations scenarios, and only exceed 10 percent (11%) for one area of overlap under the Maximize Volume scenario. Under all runs of the Maximize NPV scenario, 9 of 13 areas of overlap exceed 10 percent. The overlap of drinking water sources with ODF forestlands highlights the importance of thoughtful management to ensure both ecological and human needs are met, helping reduce the need for water system filtration upgrades and safeguarding water supplies for future generations.

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[89] Organization for Sustainable Improvement, *LPIA Learnings Report* (Washington, DC: Organization for Sustainable Improvement, 2024), https://s3.us-east-1.amazonaws.com/osi-craft/pdfs/LPIA-Learnings-Report-Final.pdf.

[90] U.S. Department of Agriculture, Forest Service, *The Role of Fire in Forest Management: A Review of the Literature* (Washington, DC: U.S. Department of Agriculture, Forest Service, 2012), https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/GTR-WO-100.pdf.

[91] Oregon Department of Forestry, *Western Oregon State Forests Management Plan* (draft, July 2023), accessed November 19, 2024, https://www.oregon.gov/odf/board/documents/fmp-hcp/western-oregon-state-forests-management-plan-draft-july2023.pdf.

[92] Oregon's Drinking Water Protection Program defines public water systems as systems that serve more than three homes or connections.

[93] Oregon Department of Forestry, *Western Oregon State Forests Management Plan* (draft, July 2023), accessed November 19, 2024, https://www.oregon.gov/odf/board/documents/fmp-hcp/western-oregon-state-forests-management-plan-draft-july2023.pdf.

[94] T. Warziniack, C.H. Sham, R. Morgan, and Y. Feferholtz, "Effect of Forest Cover on Water Treatment Costs," *Water Economics and Policy* 3, no. 4 (2017): 1750006, accessed November 19, 2024, https://www.worldscientific.com/doi/abs/10.1142/s2382624x17500060.

Threatened and Endangered Species Habitat Protection

ODF forestlands provide a range of habitats shaped by tree age classes, management history, and natural factors for threatened and endangered species. Young stands, enhanced by harvest practices, create complex early-seral habitats that support diverse wildlife, including pollinators, insect-eating birds, and hunting raptors.[95] Mid-seral habitats offer foraging and dispersal opportunities, and also maintain landscape connectivity. Late-seral habitats provide mature, dense forests that minimize edge effects when connected to other patches. ODF forests currently provide essential habitat for two amphibian species that are state-listed sensitive species, along with nine fish species and two bird species that are listed as threatened or endangered under state or federal ESA protection laws.

Through the provision, maintenance, and restoration of habitat essential for these threatened and endangered species, ODF forests create economic value for those who value the continued existence of threatened and endangered species, even species that they have never or will never see or interact with. People can place a substantial value on protecting these species today and into the future. Many are willing to invest in efforts to protect these species for future generations. For instance, research shows that households would pay $124 annually to protect salmon and steelhead, and $99 per year to conserve endangered owl populations (adjusted to 2023 dollars).[96] These figures don't necessarily reflect the value of specific management strategies, but actions that greatly reduce extinction risks tend to be most valued. This research highlights that people are willing to pay for efforts focused solely on safeguarding at-risk species.

Educational Services

ODF forestlands provide educational benefits to all who visit and interact with them. The Tillamook Forest Center (TFC), situated in the heart of the Tillamook State Forest, plays a vital role in this process.

TFC creates substantial value for the local community by offering educational programs, interactive exhibits, interpretive programs, certification opportunities, and facility rentals. It offers interactive exhibits detailing the history of the Tillamook Burn, wildfire prevention, sustainable forest management, and the future of Oregon's forests.[97] Interpretive programs have covered topics such as forest ecology, wildlife, and the cultural history of the area. TFC has offered certification programs for interpretive guides, supporting local job training and expertise.[98] TFC provides facilities, including a 2,000-square-foot shelter, meeting rooms,

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[95] Oregon Department of Forestry, *Western Oregon State Forests Management Plan* (draft, July 2023), accessed November 19, 2024, https://www.oregon.gov/odf/board/documents/fmp-hcp/western-oregon-state-forests-management-plan-draft-july2023.pdf.

[96] L. Richardson and J. Loomis, "The Total Economic Value of Threatened, Endangered and Rare Species: An Updated Meta-Analysis," *Ecological Economics* 68, no. 5 (2009): 1535–1548.

[97] Laura Fredrickson, personal communication, email on July 3, 2023.

[98] Laura Fredrickson, personal communication, email on July 3, 2023.

themed trails, and a demonstration forest, making it an attractive venue for both education and community events.[99]

After a three-year closure, TFC reopened in 2023 and continues its mission to educate and connect people with the surrounding forest ecosystem. In FY 2024, TFC received just over 60,000 visitors, the highest visitation since it opened in 2006, with 2,000 to 3,000 visitors participating in the educational and interpretive programming.[100]

Through its educational, recreational, and community-focused initiatives, the TFC promotes conservation while enhancing the connection between the forest and the people who depend on it.

Research Services

ODF forestlands provide opportunities for research on forest management practices, endangered or threatened species conservation, and resource sustainability. Researchers from various government institutions, universities, research cooperatives, and non-profits regularly conduct studies that include ODF forestlands.[101] Most of the research has been related to tree growth and response to silvicultural treatments, forest health and pathogens, climate effects, and use of forest habitat by various species.[102] Under the draft HCP, ODF will be undertaking an adaptive management approach to maintaining forest conditions and habitat for covered species that would require monitoring of specific habitat characteristics.[103] Monitoring under the FMP can be used to assess the efficacy of forest management practices and advance research in forestry that may then be applied to other forests. Currently, ODF's forest inventory program spends approximately $45,000 annually to measure forest plots through the U.S. Forest Service's Forest Inventory and Analysis program.[104] Furthermore, ODF forestlands have been used as locations for educational workshops and demonstrations to communicate and train stakeholders on forest management practices. These activities are part of broader efforts to ensure that forestlands remain resilient, support biodiversity, and continue providing essential ecosystem services.

Cultural and Historic Resources

Cultural and historic 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.

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[99] Laura Fredrickson, personal communication, email on July 3, 2023.
[100] Joseph Offer, personal communication, email on October 28, 2024.
[101] Tyson Wepprich, personal communication, email on February 7, 2025.
[102] Tyson Wepprich, personal communication, email on February 7, 2025.
[103] Oregon Department of Forestry, *Western Oregon State Forests Management Plan* (draft, July 2023), accessed November 19, 2024, https://www.oregon.gov/odf/board/documents/fmp-hcp/western-oregon-state-forests-management-plan-draft-july2023.pdf.
[104] Tyson Wepprich, personal communication, email on February 7, 2025.

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 through 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.

Tribal cultural resources encompass the deep, spiritual, and identity-based connections that Indigenous and Tribal communities have with their environments. These resources include traditional cultural, social, and spiritual practices that reflect and uphold community identity.[105,106] Resources like forests, rivers, and specific species hold profound meaning, contributing to cultural preservation and social cohesion.[107] ODF is committed to integrating Tribal cultural stewardship practices and Indigenous Traditional Ecological and Cultural Knowledge[108] 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.

Chapter 3 of ODF's Forest Management Plan (FMP) details the different Tribal uses and values associated with ODF forestlands. Red cedar (*Thuja plicata*), or canoe cedar, is deeply valued by many Tribal Nations for its cultural and practical uses. Beyond its symbolic importance, it provides materials for items like baskets, canoes, and tools. Similarly, yew (*Taxus*) and ash (*Fraxinus*) trees are essential for making bows, while hazel, oceanspray, and vine maple are used for arrows and handles. Sitka spruce (*Picea sitchensis*) has versatile uses in basketry, fishing tools, and containers. These trees are carefully managed, sometimes through fire, to promote the growth of plants like service berries (*Amelanchier alnifolia*), which serve food, medicinal, and tool-making purposes. Plants such as bear grass, bulrush, hazel, and fireweed also benefit from fire management, which creates habitats for animals like elk and deer. These animals are vital not only for sustenance but for cultural practices involving clothing, tools, and spirituality. Species like ravens, owls, and eagles are symbolic, and the feathers of the northern flicker (*Colaptes auratus*) represent healing. This relationship between natural resources and cultural heritage highlights the interconnectedness of ecosystems and Tribal traditions. The proposed FMP emphasizes collaboration with Tribal Nations to protect cultural resources and manage the forest for culturally significant species. This includes developing climate-adaptive

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[105] K. M. A. Chan et al., "Cultural Ecosystem Services," Ecosystem Services 2, no. 4 (2012): 224-227.
[106] M. C. Gavin et al., "The Role of Traditional Ecological Knowledge in Resource Management," Nature Sustainability 5, no. 3 (2015): 107-115.
[107] M. C. Gavin et al., "The Role of Traditional Ecological Knowledge in Resource Management," Nature Sustainability 5, no. 3 (2015): 107-115.
[108] Indigenous Traditional Ecological and Cultural Knowledge (ITECK) is grounded in social, spiritual, cultural, and natural systems that are frequently intertwined and inseparable, offering a holistic perspective. ITECK 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.

ethnobotanical strategies, using native seeds to foster resilient plant communities, and utilizing fire-adapted plants to prevent erosion. ODF also aims to diversify tree species in reforestation to support the growth of traditional plants.

In addition to cultural resources, ODF forestlands also contain sites that document early interactions between Tribal Nations and European settlers, as well as the contributions of Chinese, Black, and other immigrant communities who shaped the region despite facing exclusion and discrimination. By preserving historic buildings, artifacts, and culturally significant places, ODF helps tell the story of Oregon's settlement, labor history, and cultural resilience.

8. Appendix A

Income and Employment: Timber Harvest Activities

Methodology

DIRECT JOBS

Jobs directly affected by a change in harvest levels serve as inputs into IMPLAN to calculate the jobs that would be supported downstream by initial harvest (i.e., secondary effects). These secondary effects are often referred to as indirect (supply chain) and induced (consumption) effects. Together, the direct and secondary effects represent the total effects on income and employment under each alternative. Only income and employment effects resulting from changes in harvest levels are quantitatively analyzed using input-output modeling.

Direct employment is defined as all employees associated with the following five private-sector North American Industry Classification System (NAICS) codes.

113310: Commercial Logging

321113: Sawmills

321211: Hardwood veneer and plywood mills

321212: Softwood veneer and plywood mills

3221: Pulp, paper, and paperboard mills

Direct employment is defined for only these five industry sectors because these industries purchase harvests from ODF. Employment and income associated with other industries, like wood residuals processing, are also affected by the amount of timber harvests on ODF forestlands and are included by OFRI and OED to estimate direct economic contributions. However, our analysis considers these secondary, not direct, effects since they do not comprise a large share of direct timber purchasers in western Oregon. The analysis removes direct sectors from the spending pattern of indirect and induced sectors to minimize double-counting of jobs and incomes.

Direct jobs multiplier is calculated using BLS data on statewide employment for selected NAICS codes and University of Montana data on statewide timber harvests. The historical BLS data also provides information about the proportion of employment in the logging industry (NAICS 113310) compared to the milling industry (NAICS 321113, 321211, 321212, and 3221).

To perform the analysis for each county in the permit area it is necessary to identify where the direct employment is located. For this analysis, logging jobs (NAICS 113310) are assumed to occur in the county where the harvest occurs. Milling jobs (NAICS 321113, 321211, 321212, and 3221) are assumed to occur in the location of the mill. ODF's "logflow" model proportionally describes where timber harvested from ODF lands in a county goes. Milling jobs that are outside study area counties are excluded as direct jobs because they are outside of the study area (e.g., Cowlitz County, Washington).

DIRECT EMPLOYEE COMPENSATION AND LABOR INCOME

The average weekly wage information from the U.S. Bureau of Labor Statistics is used to define direct employee compensation for the analysis. To be modeled in IMPLAN, these wage levels need to be adjusted to account for total employee compensation, which encompasses wages plus benefits. The average ratio of total compensation to wages in the Pacific western United States is 1.43.[109]

Labor income, as defined by IMPLAN, is the sum of employee compensation and proprietor income. Employee compensation as a function of changes in one MBF of timber harvests is calculated as described above. Proprietor income is available from IMPLAN for the western Oregon counties. In 2023, the ratio of proprietor income to employee compensation was 0.23 in the sawmill industry for this region.[110] This analysis uses this ratio to estimate the total proprietor income and labor income generated in western Oregon.

DIRECT OUTPUT AND VALUE ADDED

Direct value added and output are necessary for calculating secondary effects. They are calculated in IMPLAN.

Calculating output for the five NAICS industries requires mapping the industries to the following IMPLAN industry categories.

- Forestry and Logging (NAICS 113310) is mapped to IMPLAN industry 16, Commercial Logging.
- Sawmills (NAICS 321113) is mapped to IMPLAN industry 132, Sawmills.
- Hardwood (NAICS 321211) and softwood (NAICS 321212) veneer and plywood mills (NAICS 3212) are mapped to IMPLAN industry 134, Veneer and plywood manufacturing
- Pulp, paper, and paperboard mills (NAICS 3221) has multiple IMPLAN category mappings: 144, Pulp Mills; 145, Paper Mills; and 146, Paperboard Mills.

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[109] U.S. Bureau of Labor Statistics, "Employer Costs for Employee Compensation—Regions," accessed November 19, 2024, https://www.bls.gov/regions/southwest/news-release/employercostsforemployeecompensation_regions.htm.

[110] Employee compensation comprised 81.33% and proprietor income comprised 18.67% of total labor income in NAICS sector 321113, Sawmills, in IMPLAN 2023 model.

IMPLAN is used to estimate output and value added. Logs are an intermediate input into the milling industry. Because it is unclear what portion of ODF timber harvest flows to each mill type, this analysis uses only sawmills (IMPLAN Industry 132) to calculate value added, output, and corresponding secondary effects.

ODF provides estimates of the cut and haul costs, which are equivalent to the difference between pond value and stumpage value. If the logging company is the purchaser on an ODF timber sale, stumpage value is the price they pay to ODF to harvest the timber. Pond value is the price at which the logging company sells the timber to the mill. Pond value is generally higher than stumpage value, and the difference between the two represents the gross return to the logging company.

This analysis divides intermediate demand by assuming that cut and haul costs are the intermediate demand that flows to the logging industry and the remainder is the intermediate demand for the milling industry.

Valued added is calculated as the sum of stumpage value and labor income. Output is the sum of intermediate demand and value added.

INDIRECT AND INDUCED EFFECTS

Indirect and induced effects are derived from the IMPLAN model. Proper inputs must be determined to model the relevant economic impacts on the industries. Double counting can occur in the analysis of secondary effects because the industries rely on each other for inputs. To avoid double counting, indirect and induced effects are calculated in IMPLAN using the following three models.

- 2023 Industry Spending Pattern for Logging. The default spending pattern from IMPLAN is used for the analysis. This input is equivalent to the intermediate demand for logging, assumed to be equal to cut and haul costs.
- 2023 Industry Spending Pattern for Sawmills. This input is equivalent to the intermediate demand for mills which is what remains when you remove the logging intermediate demand from the total intermediate demand. The total intermediate demand is scaled up such that cut and haul costs are 20.78 percent of intermediate demand. This spending pattern is adjusted to remove all spending on logs to avoid double-counting, since intermediate demand for the logging industry is modeled separately. This spending pattern is used to model the spending of all mill types, including pulp, paper, and paperboard mills.
- Employee Compensation Labor Income Change. The value of the input to this type of impact is employee compensation, which includes both employee wages and benefits.