Forest Lands in Oregon and Washington

Forestland ownership, timber, and mills

Spring 2019

Part of year three of

The Forest Service and Communities:
The Relationships Between Land and People in the Pacific Northwest Region

Ecosystem Workforce Program

University of Oregon

Forest Service U.S. Department of Agriculture

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About this project

This is a joint project between the US Forest Service Pacific Northwest Region and the University of Oregon Ecosystem Workforce Program. This project aims to help the Forest Service and its partners better understand and communicate the social and economic contexts in which the Forest Service operates and document Forest Service impacts in advancing sustainable natural resources-based economies. We designed this project as a collaborative learning process in which we would experiment with new ways to use, integrate, and represent data, with a focus on application of Forest Service data.

Acknowledgments

The support of the Regional Forester and the Regional Office Director Teams for this project has been instrumental to our ability to fulfill the project objectives, especially our learning process. We appreciate their leadership and willingness to try something new, to allow for learning, and to support many of their staff in continuing to coordinate with us in the third and final year of this project.

We greatly appreciate the work of **Emily Jane Davis**, EWP Associate Director and Oregon State University lead, and **Cassandra Moseley**, EWP Director and this project's principal investigator, for their work in the initial stages of this project as well as their continued engagement.

We also appreciate the contributions and data support that the following individuals provided:
Heather Zissler, **Nick Goldstein**, and **Brenna White**, Pacific Northwest Region Office of Communications and Community Engagement
Dana Croll, Pacific Northwest Region, Natural Resources.

All photos courtesy of US Forest Service Pacific Northwest Region (https://www.flickr.com/photos/forestservicenw/). This document is one of three products created for this third year of the project, which are collectively classified as EWP Working Paper #95; all may be downloaded at: http://ewp.uoregon.edu/publications/working, or at the project page at: http://ewp.uoregon.edu/USFScommunities.

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Introduction

The forested landscape of the Pacific Northwest is integral to the economy of the region. In this document, we show the prevalence of federal forestland across Washington and Oregon, and how both state's forest industry and related economies have changed over the years, with a focus on current conditions.

The following pages illustrate connections between landscapes and people from both the Pacific Northwest region and state-specific perspectives. We first summarize the amount of national forest land at the county level alongside county population, giving important context for understanding usage of forestlands. We then report on the forestland ownership for each state and the volume of timber harvested by different land owners. We connect timber harvested to forest product mills and jobs for Washington and Oregon communities over time, using the same time series to illustrate both the total number and type of mills and where the mills are located. Finally, we report on the employment trends in the forest products industries from 2004-2014 along with a current summary of the forest-related jobs in both states. Returning to the regional perspective, we show haul distance to mills across both states. We then demonstrate the relative availability of milling infrastructure to ranger districts on national forests.

The information in this booklet is a synthesis of existing data that come from federal, state, and non-profit sources. As a consequence, although the information between Washington and Oregon is similar and tells parallel stories, the exact years and metrics reported vary, reflecting data source's original methods and authors. Due to data availability, we selected three snapshots in time for each state as our frame of reference, beginning in 1998 to 2014 to show changes in recent decades. All data sources and methods are reported in the appendix of this document.

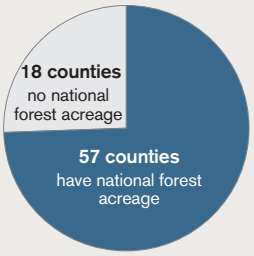
Region summary

25 million acres of Forest Service land

WA: 9.3M acres

OR: 15.7M acres

75% of counties have Forest Service land



WA: 26 of 39 counties

OR: 31 of 36 counties

2.34 acres of national forest per person

WA: 1.26 acres/ person

OR: 3.79 acres/ person

285 forest products mills (2014)

WA: 97 mills

OR: 188 mills

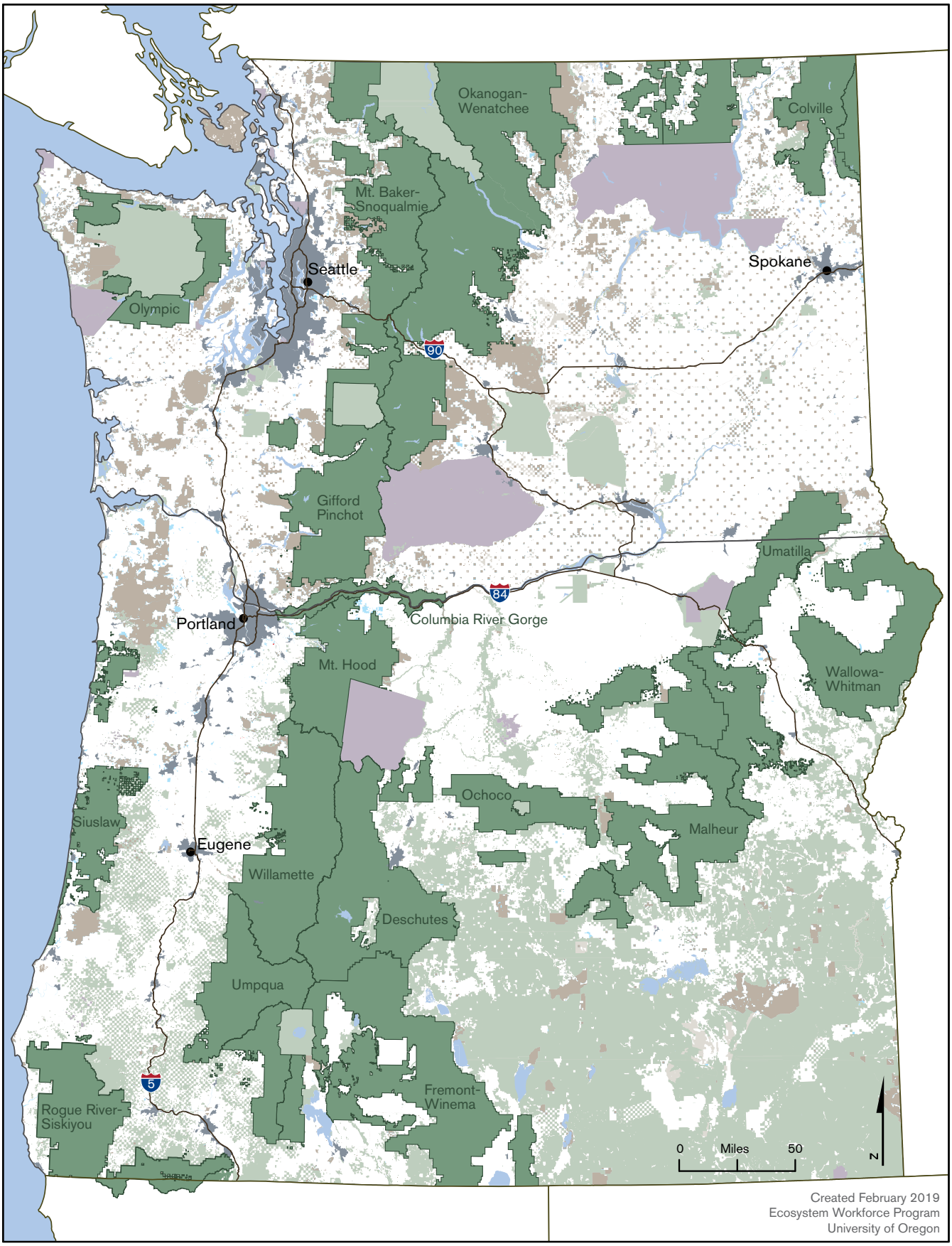
101,370 jobs in forest products industries

WA: 40,360 (2017)

OR: 61,010 (2015)

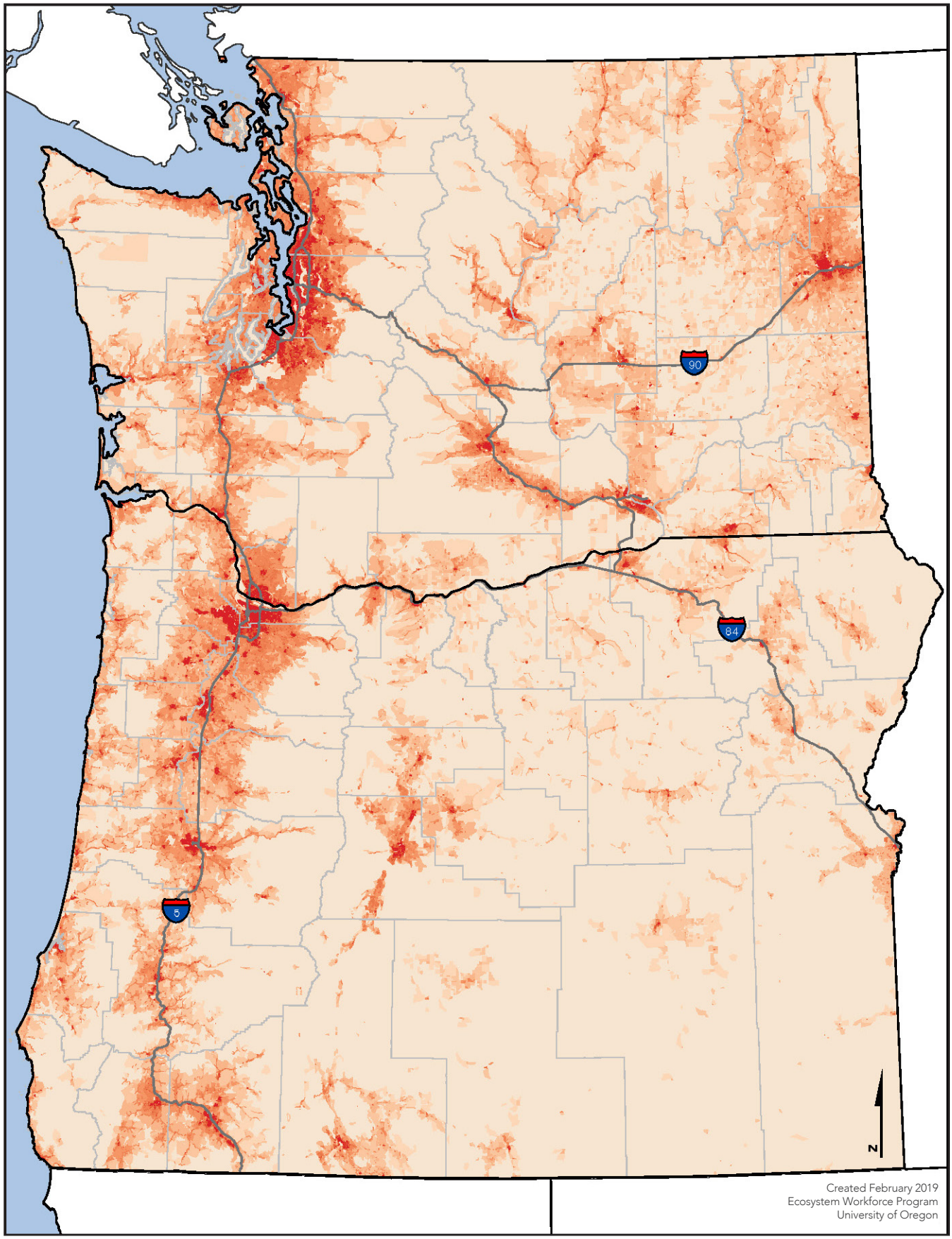
Washington and Oregon land ownership

National forest units and other land ownerships



Washington and Oregon population density, 2010 census

Counties, interstate highways, and population density



Washington State land ownership: The Forest Service at a county level

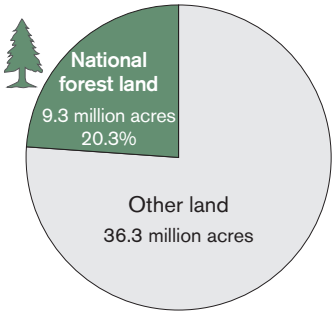
Land from six national forests and one national scenic area covers one fifth of Washington. Most of the state's population lives in the 26 (of 39) counties that contain national forest land. Counties with national forest land have both large and small populations, covering both rural and urban areas. County-level information provides important context for national forests and county governments on how people use, and what they may expect from, the forests that are a part of the landscape. Here we present national forest land area and population estimates at the county level in Washington.

Washington State contains:

7 national forest units -covering- **9.3 million acres** -in- **26 counties**

Washington State area and population:

Area:
(45.6 million acres total)

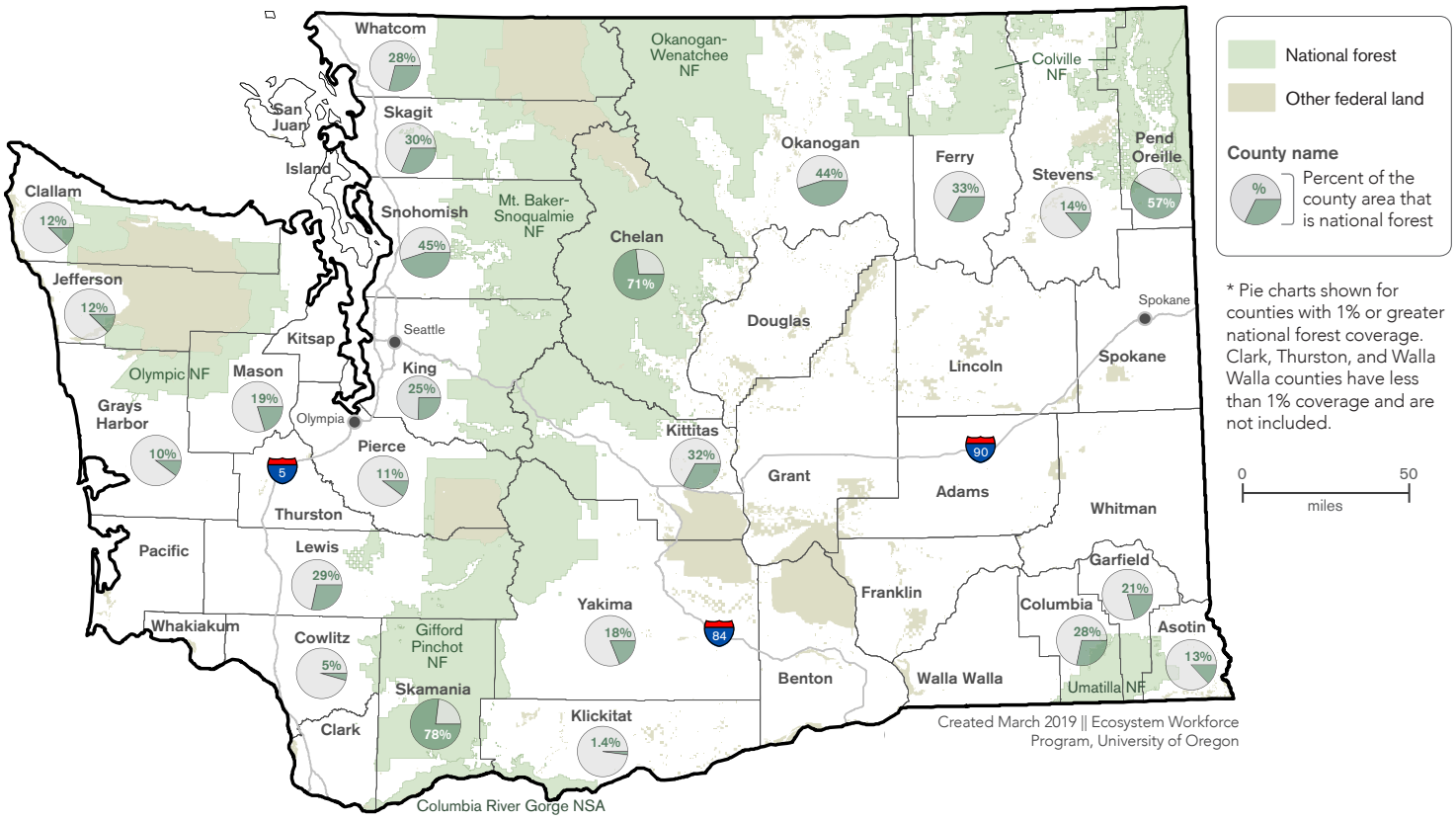


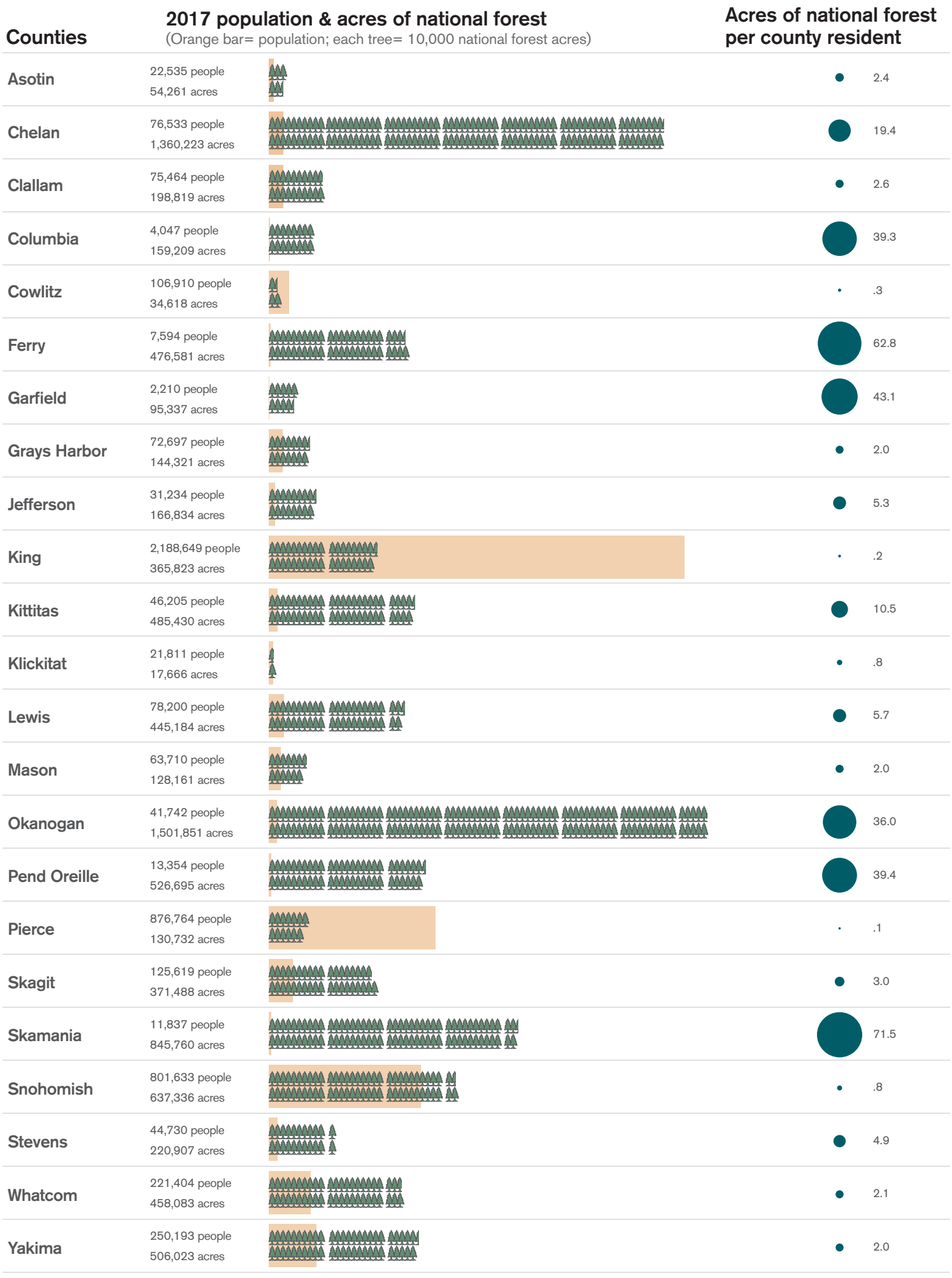
Population:
(7.4 million people total, 2017)

Population in counties with some national forest land
6,000,883 people (81%)

Population in counties without national forest land
1,404,860 people (19%)

National forest land in Washington State counties*

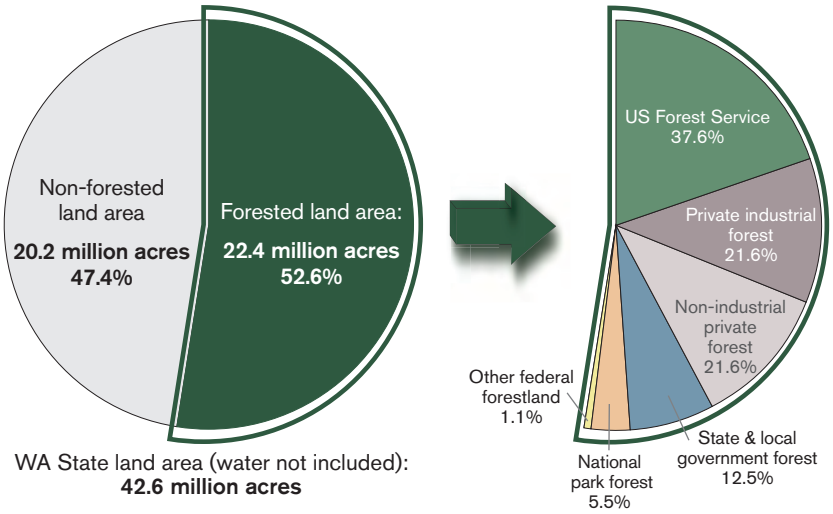



Counties
2017 population & acres of national forest
(Orange bar= population; each tree= 10,000 national forest acres)
Acres of national forest per county resident
Asotin
22,535 people
54,261 acres
2.4
Chelan
76,533 people
1,360,223 acres
19.4
Clallam
75,464 people
198,819 acres
2.6
Columbia
4,047 people
159,209 acres
39.3
Cowlitz
106,910 people
34,618 acres
.3
Ferry
7,594 people
476,581 acres
62.8
Garfield
2,210 people
95,337 acres
43.1
Grays Harbor
72,697 people
144,321 acres
2.0
Jefferson
31,234 people
166,834 acres
5.3
King
2,188,649 people
365,823 acres
.2
Kittitas
46,205 people
485,430 acres
10.5
Klickitat
21,811 people
17,666 acres
.8
Lewis
78,200 people
445,184 acres
5.7
Mason
63,710 people
128,161 acres
2.0
Okanogan
41,742 people
1,501,851 acres
36.0
Pend Oreille
13,354 people
526,695 acres
39.4
Pierce
876,764 people
130,732 acres
.1
Skagit
125,619 people
371,488 acres
3.0
Skamania
11,837 people
845,760 acres
71.5
Snohomish
801,633 people
637,336 acres
.8
Stevens
44,730 people
220,907 acres
4.9
Whatcom
221,404 people
458,083 acres
2.1
Yakima
250,193 people
506,023 acres
2.0

Forest lands and processed timber in Washington State

More than half of Washington State is forested. Landownership varies across the state's forest lands, as do the management objectives of different landowners. Overall, more than a third of Washington's forest land is managed by the Forest Service. One way that forest lands contribute to the state's economy is through timber production and harvesting that supports industries like cabinet, plywood, paper, veneer and other forest product manufacturing. All Washington national forests, like other forest lands across the state, contribute timber to these industries.

Washington State forest land and landowners

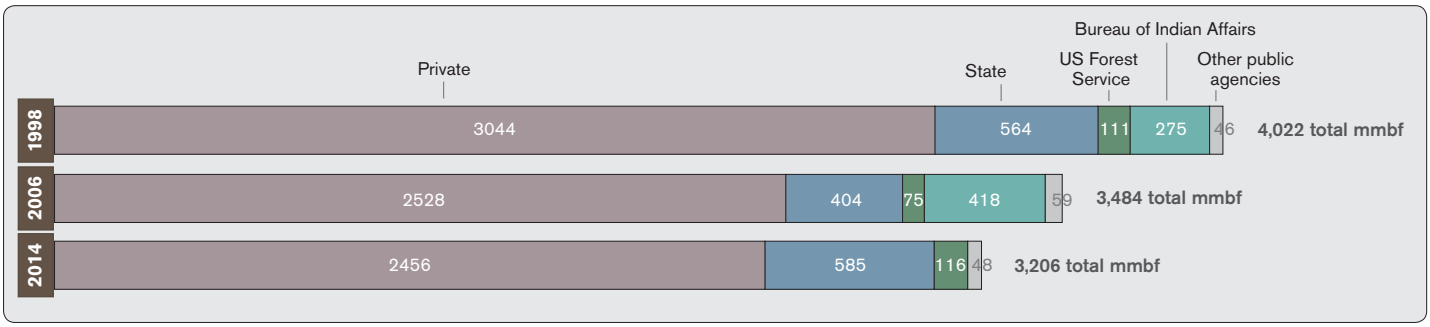


WA State land area (water not included): **42.6 million acres**

Forest land benefits:

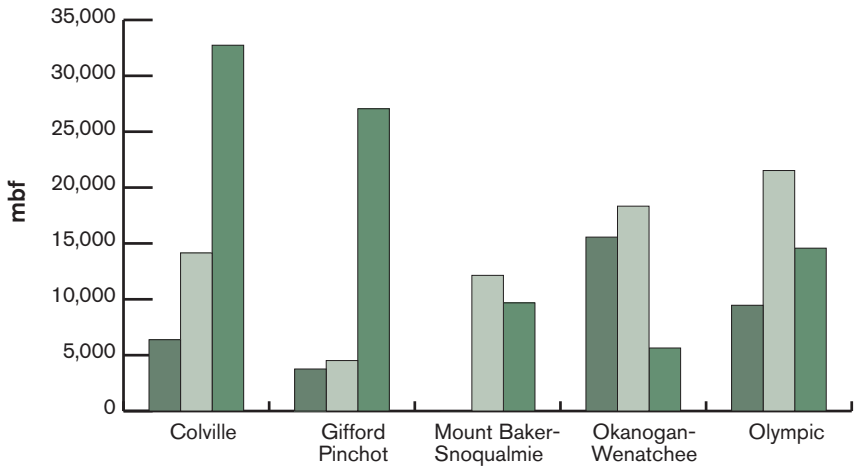
Forest land in Washington State contributes more than 3 billion board feet a year to forest products industries, in addition to other assets like recreation, habitat, and ecosystem services.

Timber harvested from Washington forest lands by landowner (million board feet (mmbf))[1]



Timber harvested from Washington national forests* and milled in-state (thousand board feet (mbf))[1]

**Umatilla National Forest harvest volume is reported in Oregon data*



Years shown in chart:
1998
2006
2014

2017 timber harvest:

128 mmbf of timber was harvested from Washington national forests in FY 2017, an increase from the previous years shown here.

[1] These charts show reported timber harvest volume, not volume sold. Timber sales are not necessarily harvested in the year they are sold.

Jobs and wages from forest lands in Washington State

Jobs in forest products industries in Washington employ tens of thousands of people in the state. In addition to understanding these types of jobs and how they factor in the state's economy today, it can also be useful to understand recent industry trends. The data presented on this page consider only direct jobs in the forest products industry. Indirect jobs (e.g., those supported through spending by the forest products industry on materials and support services) employ tens of thousands more people, and have an additional impact on the state economy. Although direct forest products industry jobs account for only 1.3 percent of all jobs in the state, their impacts can be experienced differently in urban and rural areas. Multiple sources synthesize economic data for these industries, resulting in different levels of detail displayed in the figures below.

The Washington forest products industry in 2017 provided an estimated:

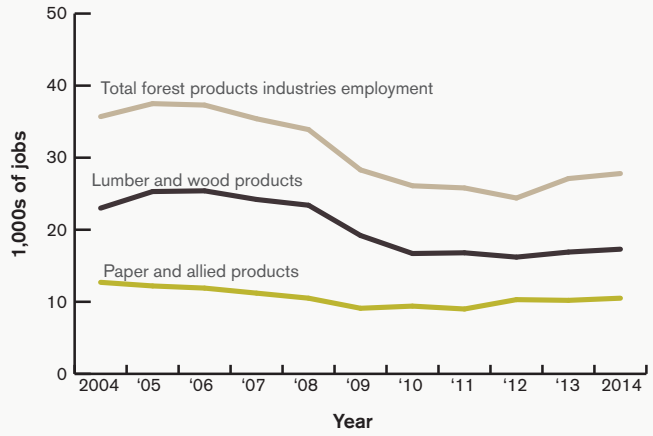
40,360 direct jobs -with- **$60,800** average salary -accounting for- **$2.5 billion** in direct wages

Statewide estimate of direct jobs from working forests in Washington, 2017

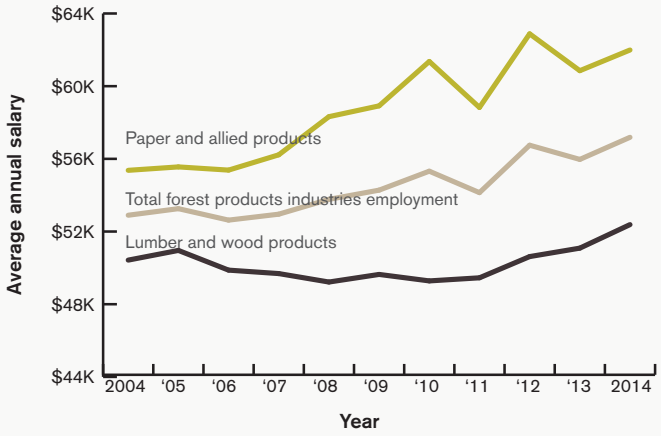
Approximately 3,186,610 total jobs in Washington State

Recent trends: Forest products industries employment and salary, 2004–2014

Employment, direct jobs



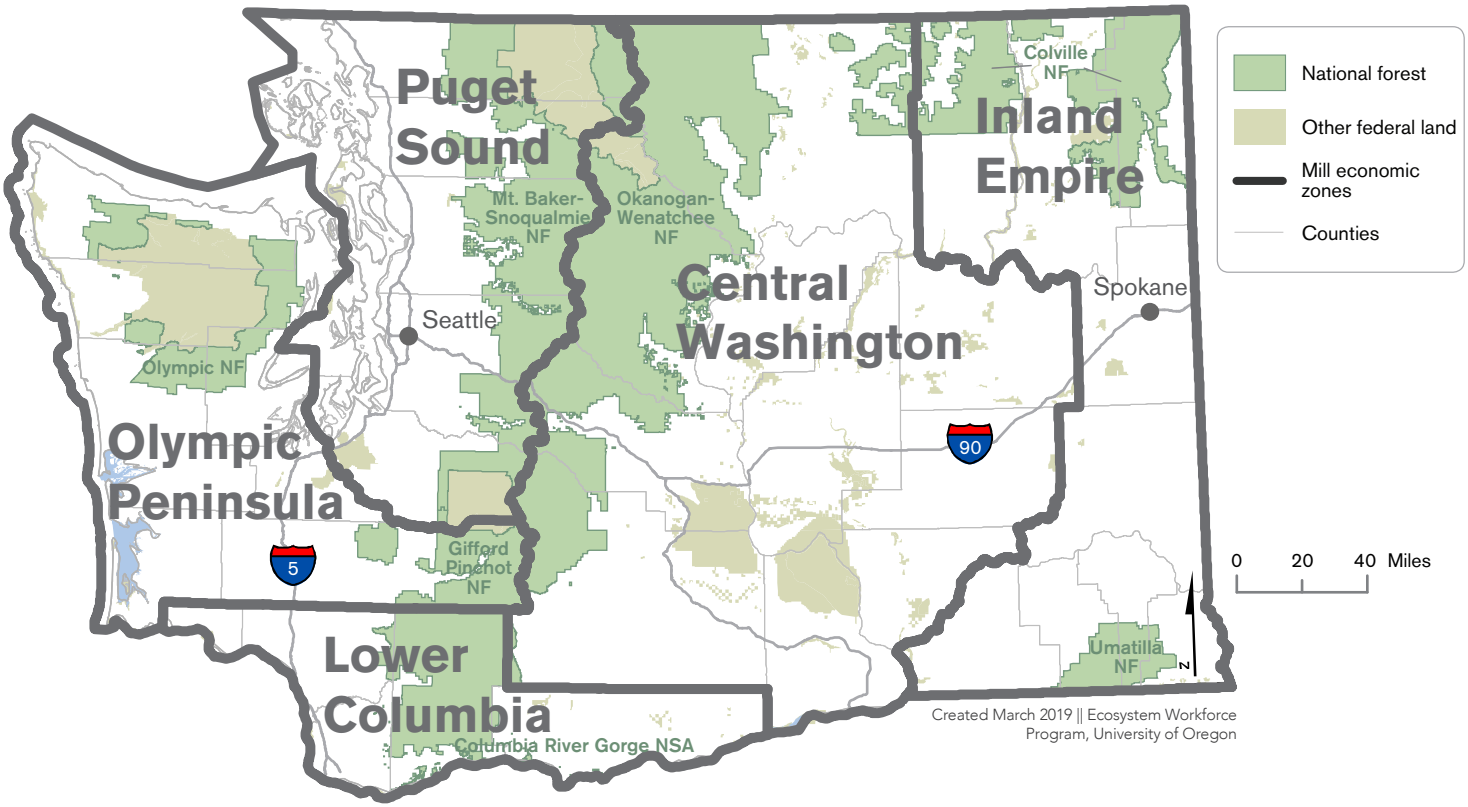
Average annual salary, adjusted to 2018 dollars



Washington Mill Economic Zones and mill numbers

Changes in mill numbers over time show how access to markets and potential impacts to forest products industries have shifted in the past two decades. On the following pages, we show the results of three recent survey efforts by the state of Washington to identify operating mills. Mills are tallied by "Mill Economic Zone," as shown on the map and in the table below. Zones are defined by the Washington State Department of Natural Resources. Zones follow county lines but often cross forest boundaries. The maps on the following page show these data in greater detail, with the number of reporting mills in each county, as well as the types of mills during each survey year. These snapshots are useful for showing trends in mill types and numbers over time, however because they are based on voluntary surveys and response rates, data for any given year may not be exact.

Washington Mill Economic Zones



Number of mills in Washington per Mill Economic Zone by year

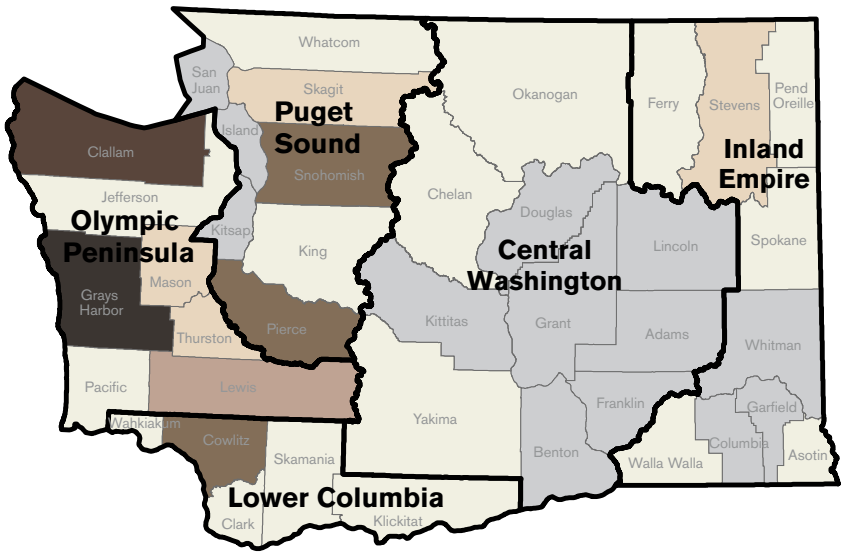
Economic Zones and counties	1998	2006	2014
Olympic Peninsula Economic Zone **Counties in zone:** Clallam, Jefferson, Grays Harbor, Mason, Thurston, Lewis, Pacific **National forests in zone:** Olympic, Gifford Pinchot	10	9	5
Puget Sound Economic Zone **Counties in zone:** Whatcom, Skagit, Snohomish, King, Pierce, Kitsap, Island, San Juan **National forests in zone:** Mt. Baker-Snoqualmie, Okanogan-Wenatchee, Gifford Pinchot	94	58	47
Lower Columbia Economic Zone **Counties in zone:** Wahkiakum, Cowlitz, Clark, Skamania, Klickitat **National forests in zone:** Gifford Pinchot, Columbia River Gorge National Scenic Area	29	21	16
Central Washington Economic Zone **Counties in zone:** Okanogan, Chelan, Douglas, Lincoln, Adams, Franklin, Grant, Benton, Kittitas, Yakima **National forests in zone:** Okanogan-Wenatchee, Gifford Pinchot	50	33	14
Inland Empire Economic Zone **Counties in zone:** Ferry, Stevens, Pend Oreille, Spokane, Whitman, Garfield, Columbia, Walla Walla, Asotin **National forests in zone:** Colville, Umatilla	20	15	8
	203 mills	**137 mills**	**97 mills**

Mills in Washington: Snapshots over time

1998

203 mills

- Lumber (76)
- Veneer and plywood (15)
- Pulp and board (18)
- Shake and shingle (39)
- Log export (31)
- Post, pole and piling (10)
- Roundwood chipping (14)



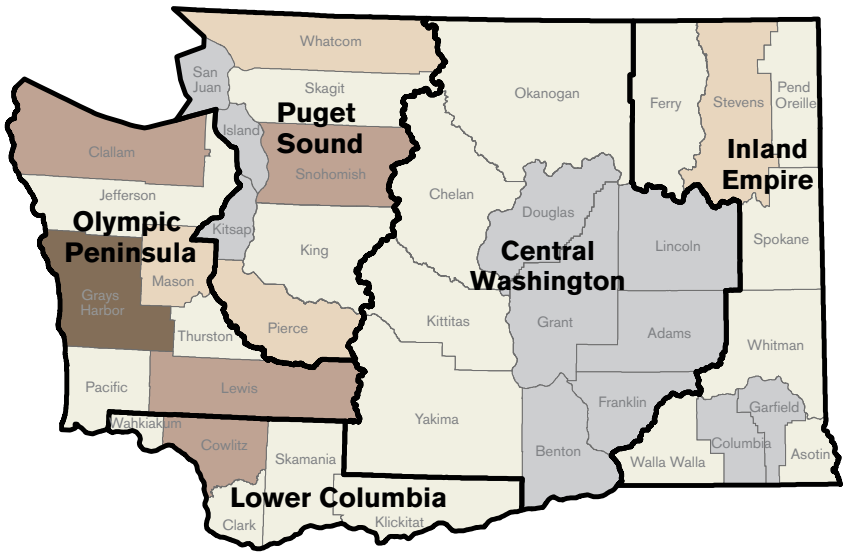
Mills in each county

- No mills (13 counties)
- 1-5 (16 counties)
- 6-10 (4 counties)
- 11-15 (1 county)
- 16-20 (3 counties)
- 21-25 (1 county)

2006

137 mills

- Lumber (68)
- Veneer and plywood (11)
- Pulp and board (12)
- Shake and shingle (16)
- Log export (11)
- Post, pole and piling (6)
- Roundwood chipping (13)



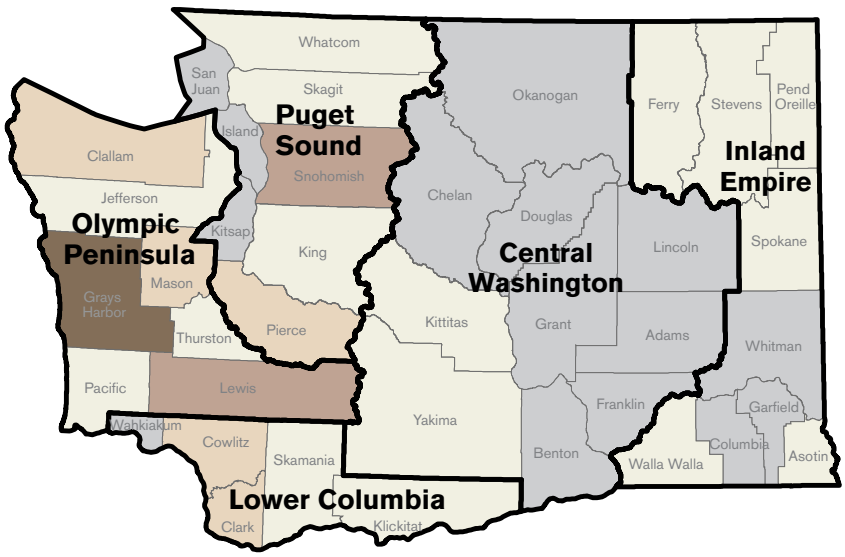
Mills in each county

- No mills (11 counties)
- 1-5 (19 counties)
- 6-10 (4 counties)
- 11-15 (4 counties)
- 16-20 (1 county)
- 21-25 (0 counties)

2014

97 mills

- Lumber (40)
- Veneer and plywood (8)
- Pulp and board (11)
- Shake and shingle (8)
- Log export (15)
- Post, pole and piling (5)
- Roundwood chipping (10)



Mills in each county

- No mills (15 counties)
- 1-5 (16 counties)
- 6-10 (5 counties)
- 11-15 (2 counties)
- 16-20 (1 county)
- 21-25 (0 counties)

Oregon State land ownership: The Forest Service at a county level

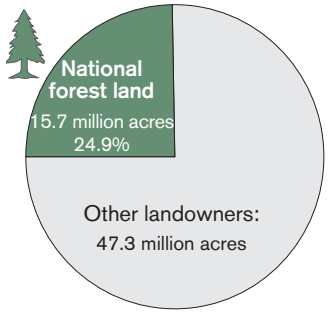
Land from eleven national forests and one national scenic area covers one quarter of Oregon. Most of the state's population lives in the 31 (of 36) counties that contain national forest land. Counties with national forest land have both large and small populations, covering both rural and urban areas. County-level information provides important context for national forests and county governments on how people use and what they may expect from the forests that are a part of the landscape. Here we present national forest land area and population estimates at the county level in Oregon.

Oregon State contains:

12 national forest units -covering- **15.7 million acres** -in- **31 counties**

Oregon state area and population:

Area:
(63 million acres total)

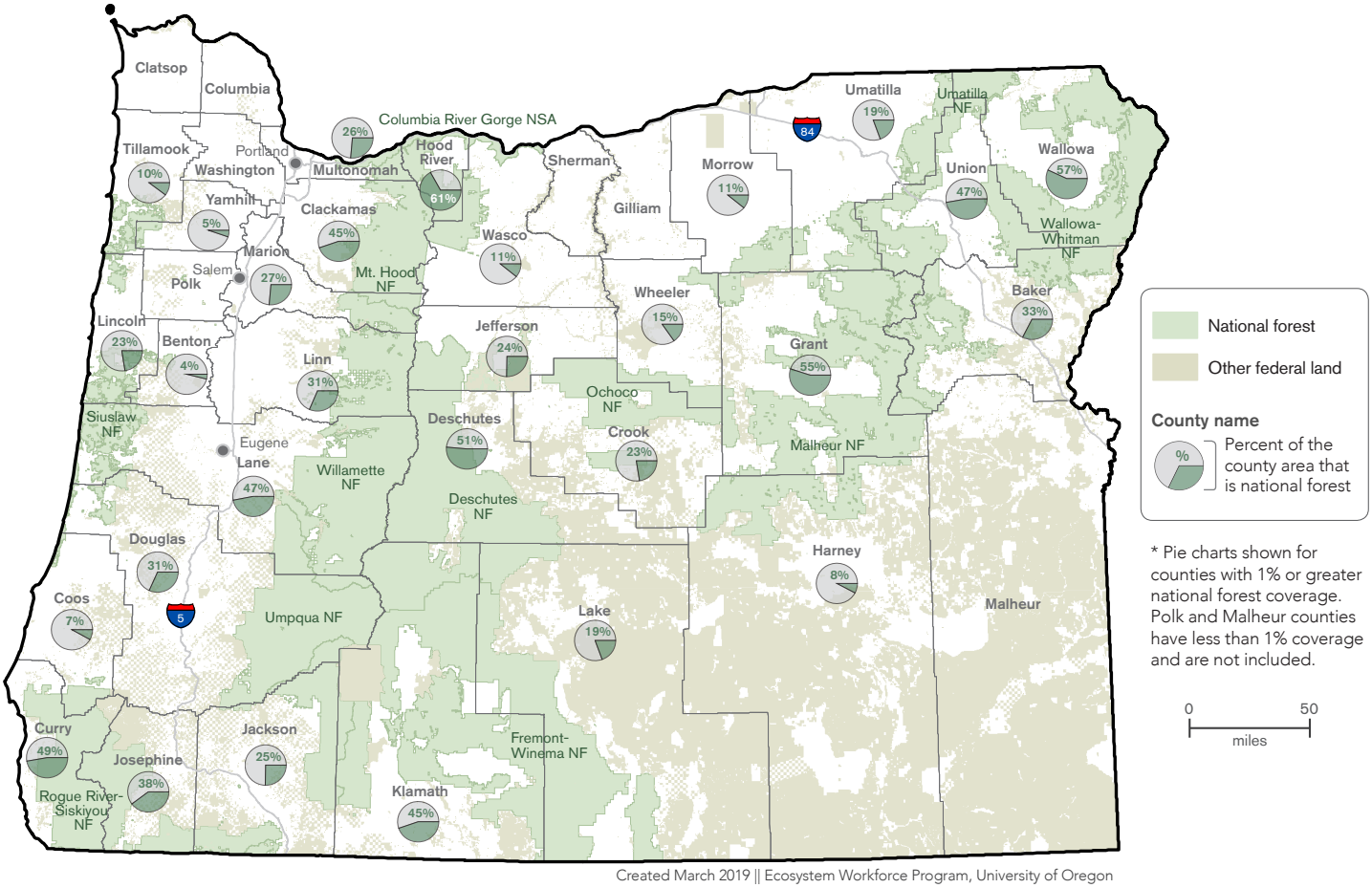


Population:
(4.14 million people total, 2017)

Population in counties with some national forest land
3,459,242 (86%)

Population in counties without national forest land
683,534 people (14%)

National forest land in Oregon State counties*



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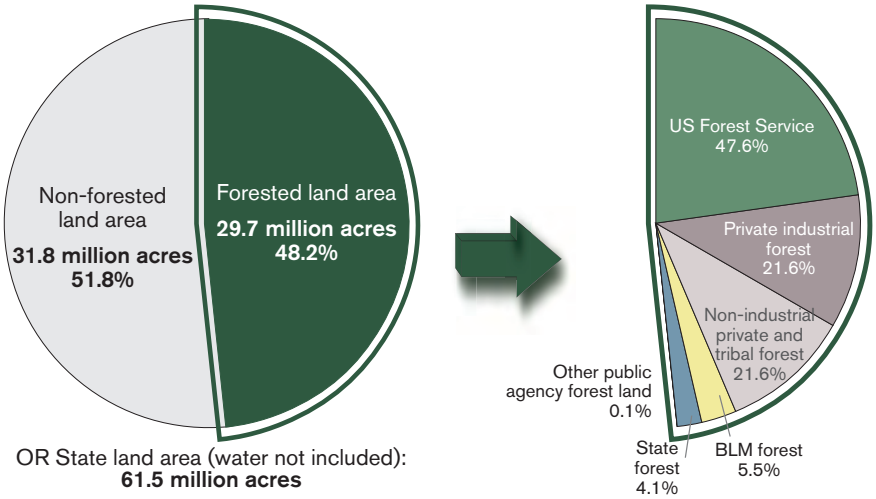
Counties	2017 population & acres of national forest (Orange bar= population; each tree= 10,000 national forest acres)	Acres of national forest per county resident
Baker	16,054 people 647,308 acres	40.3
Benton	90,951 people 17,779 acres	0.2
Clackamas	412,672 people 537,834 acres	1.3
Coos	63,888 people 80,213 acres	1.3
Crook	23,123 people 435,597 acres	18.8
Curry	22,669 people 619,324 acres	27.3
Deschutes	186,875 people 989,444 acres	5.3
Douglas	109,405 people 1,007,066 acres	9.2
Grant	7,190 people 1,593,123 acres	221.6
Harney	7,289 people 523,079 acres	71.8
Hood River	23,377 people 209,199 acres	8.9
Jackson	217,479 people 451,976 acres	2.1
Jefferson	23,758 people 278,253 acres	11.7
Josephine	86,352 people 401,635 acres	4.7
Klamath	66,935 people 1,755,409 acres	26.2
Lake	7,863 people 1,026,226 acres	130.5
Lane	374,748 people 1,423,276 acres	3.8
Lincoln	48,920 people 174,119 acres	3.6
Linn	125,047 people 464,141 acres	3.7
Marion	341,286 people 203,930 acres	0.6
Morrow	11,166 people 144,196 acres	12.9
Multnomah	807,555 people 78,766 acres	0.1
Tillamook	26,690 people 88,793 acres	3.3
Umatilla	76,985 people 403,048 acres	5.2
Union	26,222 people 617,283 acres	23.5
Wallowa	7,051 people 1,151,779 acres	163.3
Wasco	26,437 people 175,266 acres	6.6
Wheeler	1,357 people 169,154 acres	124.7
Yamhill	105,722 people 24,941 acres	0.2

Forest lands and processed timber in Oregon State

Nearly half of Oregon State is forested. Landownership varies across the state's forest lands, as do the management objectives of different landowners. Overall, almost half of Oregon's forest land is managed by the Forest Service. One way that forest lands contribute to the state's economy is through timber production and harvesting that supports industries like cabinet, plywood, paper, veneer and other forest product manufacturing. All Oregon national forests, like other forest lands across the state, contribute timber to these industries.

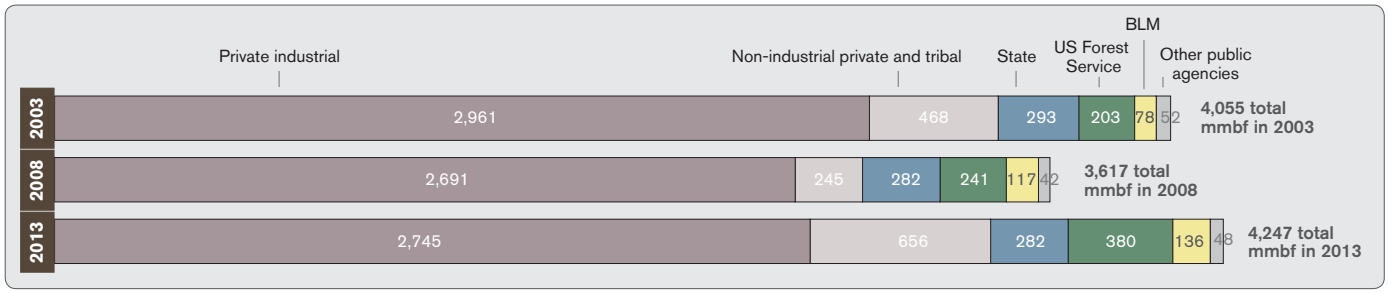
Oregon State forest land and landowners



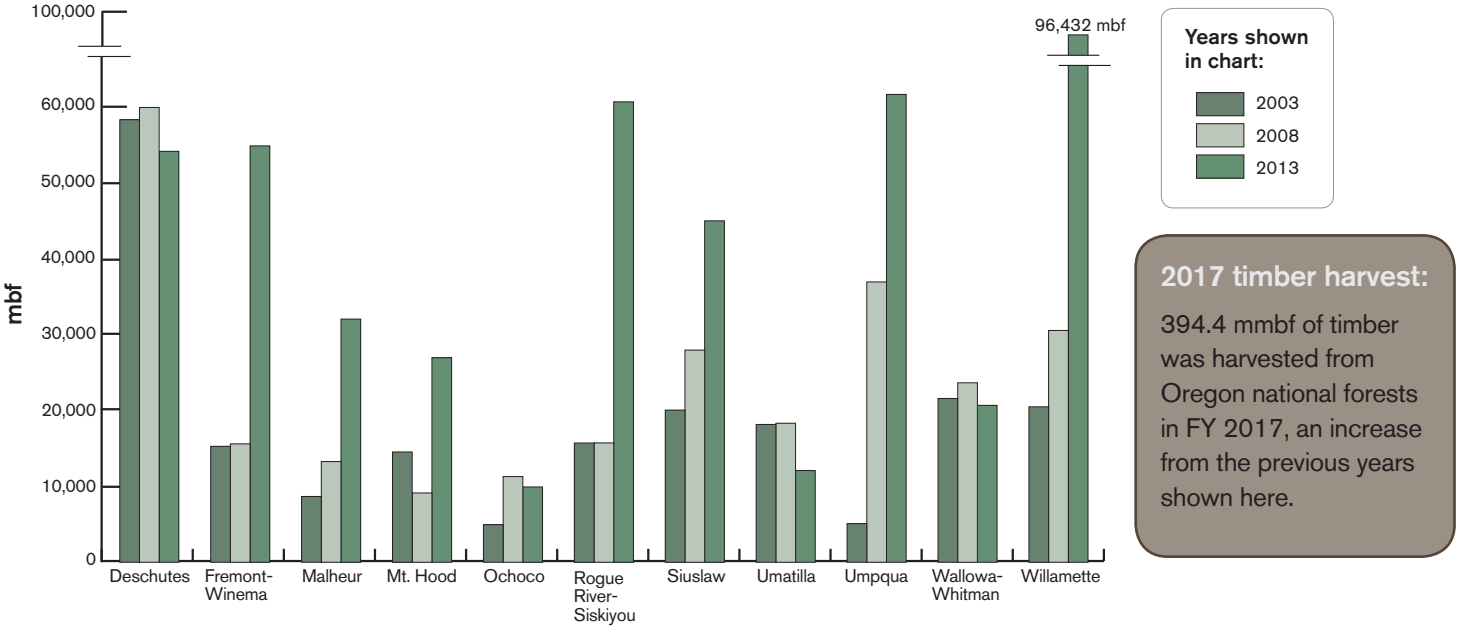
Forest land benefits:

Forest land in Oregon contributes more than 3.5 billion board feet a year to forest products industries, in addition to other assets like recreation, habitat, and ecosystem services.

Timber harvested from Oregon forest lands by landowner (million board feet (mmbf))[1]



Timber harvested from national forests in Oregon and milled in-state (thousand board feet (mbf))[1]



2017 timber harvest:

394.4 mmbf of timber was harvested from Oregon national forests in FY 2017, an increase from the previous years shown here.

[1] *These charts show reported timber harvest volume, not volume sold. Timber sales are not necessarily harvested in the year they are sold.*

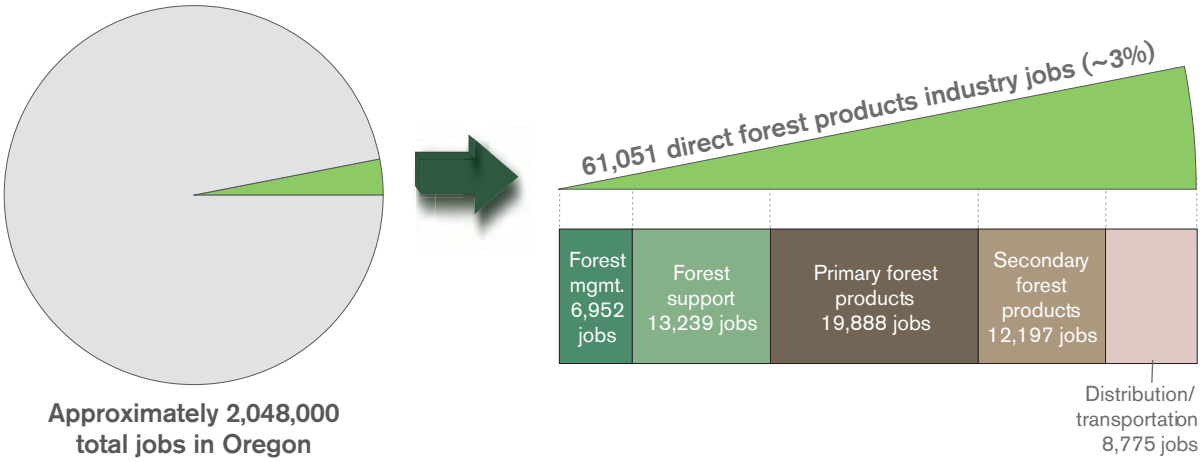
Jobs and wages from forest lands in Oregon State

Jobs in forest products industries in Oregon employ tens of thousands of people in the state. In addition to understanding these types of jobs and how they factor in the state's economy today, it can also be useful to understand recent industry trends. The data presented on this page consider only direct jobs in the forest products industry. Indirect jobs (e.g., those supported through spending by the forest products industry on materials and support services) employ tens of thousands more people, and have an additional impact on the state economy. Although direct forest products industry jobs account for only three percent of all jobs in the state, their impacts can be experienced differently in urban and rural areas. Multiple sources synthesize economic data for these industries, resulting in different levels of detail displayed in the figures below.

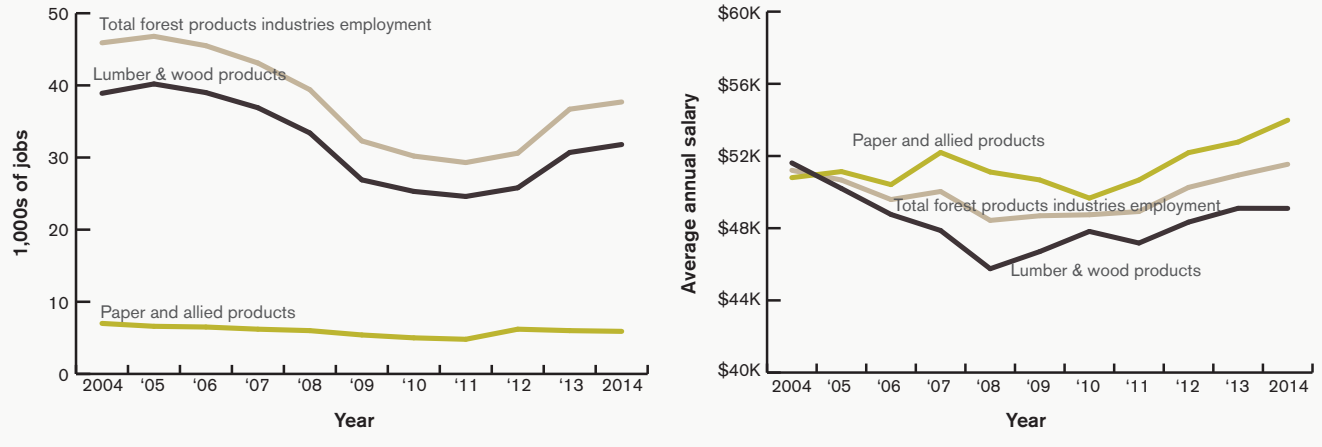
The OR forest products industry in 2017 provided an estimated:

61,051 direct jobs -with- **$54,200** average salary -accounting for- **$3.3 billion** in direct wages

Statewide estimate of direct jobs from working forests in Oregon, 2017



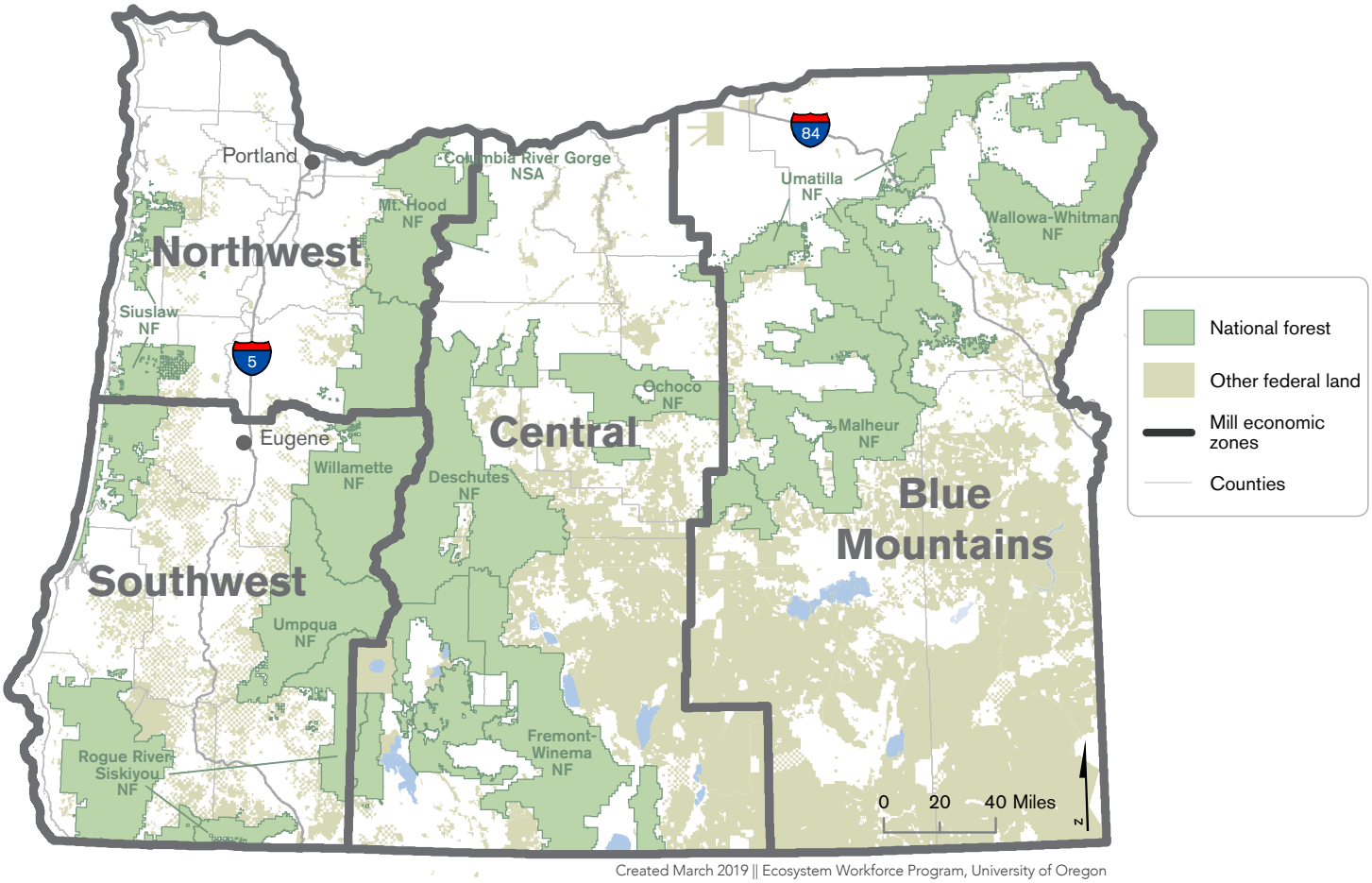
Recent trends: OR forest products industries employment and salary, 2004–2014



Oregon Mill Economic Zones and mill numbers

Changes in mill numbers over time show how access to markets and potential impacts to forest products industries have shifted in the past two decades. On the following pages, we show the results of three recent survey efforts to identify operating mills in Oregon. Mills are tallied by "Mill Economic Zone," as shown on the map and in the table below. Zones in Oregon are defined by the Forest Service Forestry Inventory Analysis Program. Zones follow county lines but often cross national forest boundaries. The maps on the following page show these data in greater detail, with the number of reporting mills in each county, as well as the types of mills during each survey year. These snapshots are useful for showing trends in mill types and numbers over time, however because they are based on voluntary surveys and response rates, data for any given year may not be exact.

Oregon Mill Economic Zones



Created March 2019 || Ecosystem Workforce Program, University of Oregon

Number of mills in Oregon per Mill Economic Zone in each snapshot year

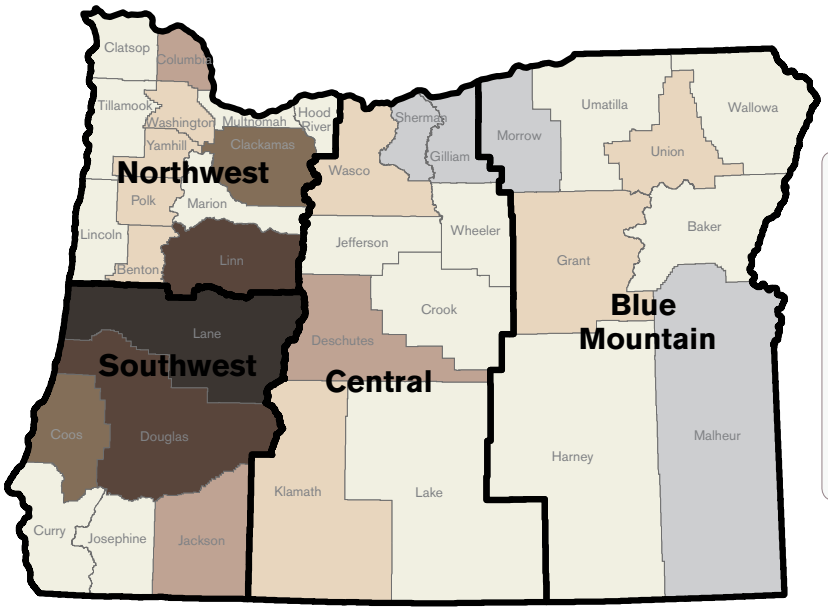
Economic Zones and counties	2003	2008	2013
Northwest Mill Economic Zone **Counties in zone:** Yamhill, Washington, Multnomah, Hood River, Clackamas, Marion, Linn, Polk, Benton, Columbia, Tillamook, Lincoln, Clatsop **National forests in zone:** Siuslaw, Mt. Hood, Willamette, Columbia River Gorge NSA	96	83	69
Southwest Mill Economic Zone **Counties in zone:** Lane, Douglas, Coos, Jackson, Josephine, Curry **National forests in zone:** Willamette, Rogue River-Siskiyou, Umpqua	37	28	22
Central Mill Economic Zone **Counties in zone:** Lake, Klamath, Deschutes, Crook, Jefferson, Wheeler, Wasco, Sherman, Gilliam **National forests in zone:** Mt. Hood, Deschutes, Fremont-Winema, Ochoco, Rogue River-Siskiyou, Columbia River Gorge NSA	96	91	75
Blue Mountains Mill Economic Zone **Counties in zone:** Harney, Malheur, Grant, Baker, Wallowa, Union, Umatilla, Morrow **National forests in zone:** Umatilla, Wallowa-Whitman, Malheur, Ochoco	25	19	22
	249 mills	**221 mills**	**188 mills**

Mills in Oregon: Snapshots over time

2003

249 mills

- Lumber (126)
- Veneer & plywood (33)
- Pulp & board (23)
- Cedar products (2)
- Export facilities (2)
- Post, poles, utilities (12)
- Chipping (9)
- Log homes (25)
- Log furniture (6)
- Other facilities (11)



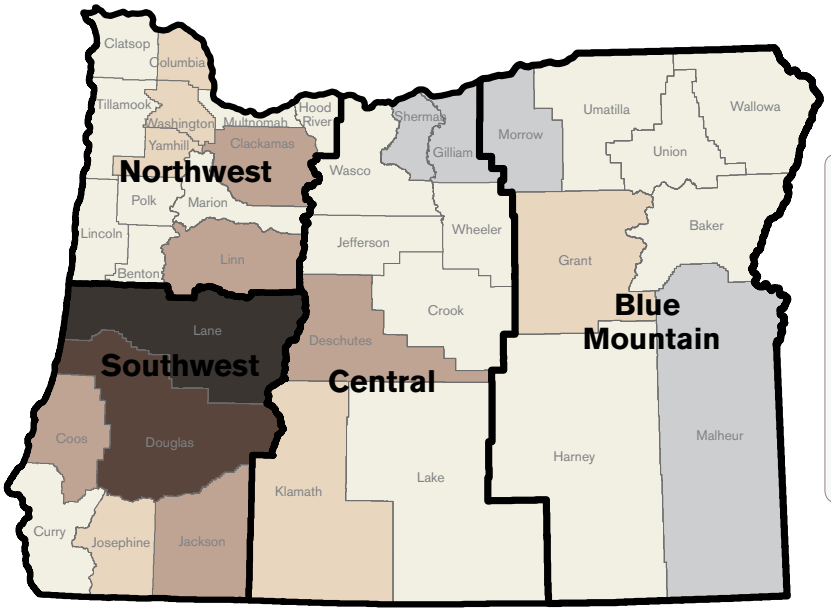
Mills in each county

- No mills (4 counties)
- 1-5 (16 counties)
- 6-10 (8 counties)
- 11-15 (3 counties)
- 16-20 (2 counties)
- 21-25 (2 counties)
- 26-36 (1 county)

2008

221 mills

- Lumber (116)
- Veneer & plywood (28)
- Pulp & board (20)
- Cedar products (2)
- Export facilities (0)
- Post, poles, utilities (10)
- Chipping (8)
- Log homes (22)
- Log furniture (4)
- Other facilities (11)



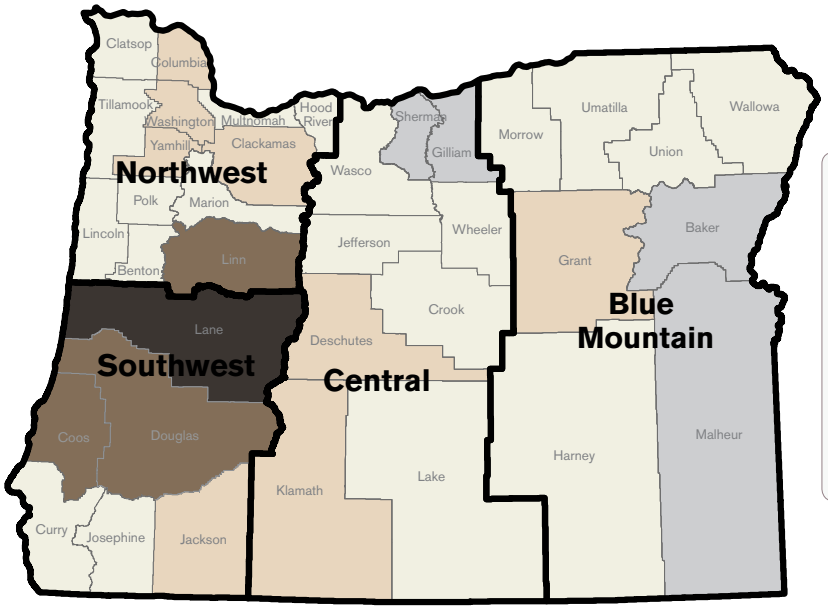
Mills in each county

- No mills (4 counties)
- 1-5 (19 counties)
- 6-10 (6 counties)
- 11-15 (5 counties)
- 16-20 (0 counties)
- 21-25 (1 county)
- 26-36 (1 county)

2013

188 mills

- Lumber (90)
- Veneer & plywood (26)
- Pulp & board (19)
- Cedar products (0)
- Export facilities (4)
- Post, poles, utilities (9)
- Chipping (11)
- Log homes (12)
- Log furniture (3)
- Other facilities (14)



Mills in each county

- No mills (4 counties)
- 1-5 (20 counties)
- 6-10 (8 counties)
- 11-15 (0 counties)
- 16-20 (3 counties)
- 21-25 (0 counties)
- 26-36 (1 county)

Business capacity for accomplishing Forest Service work

Companies engaging in timber sales, restoration, fire management services, and biomass utilization offer key business capacity for national forest management and contribute an important economic engine in rural communities. Here we present data that show business capacity in the region, including restoration-related service contracts and timber sales.

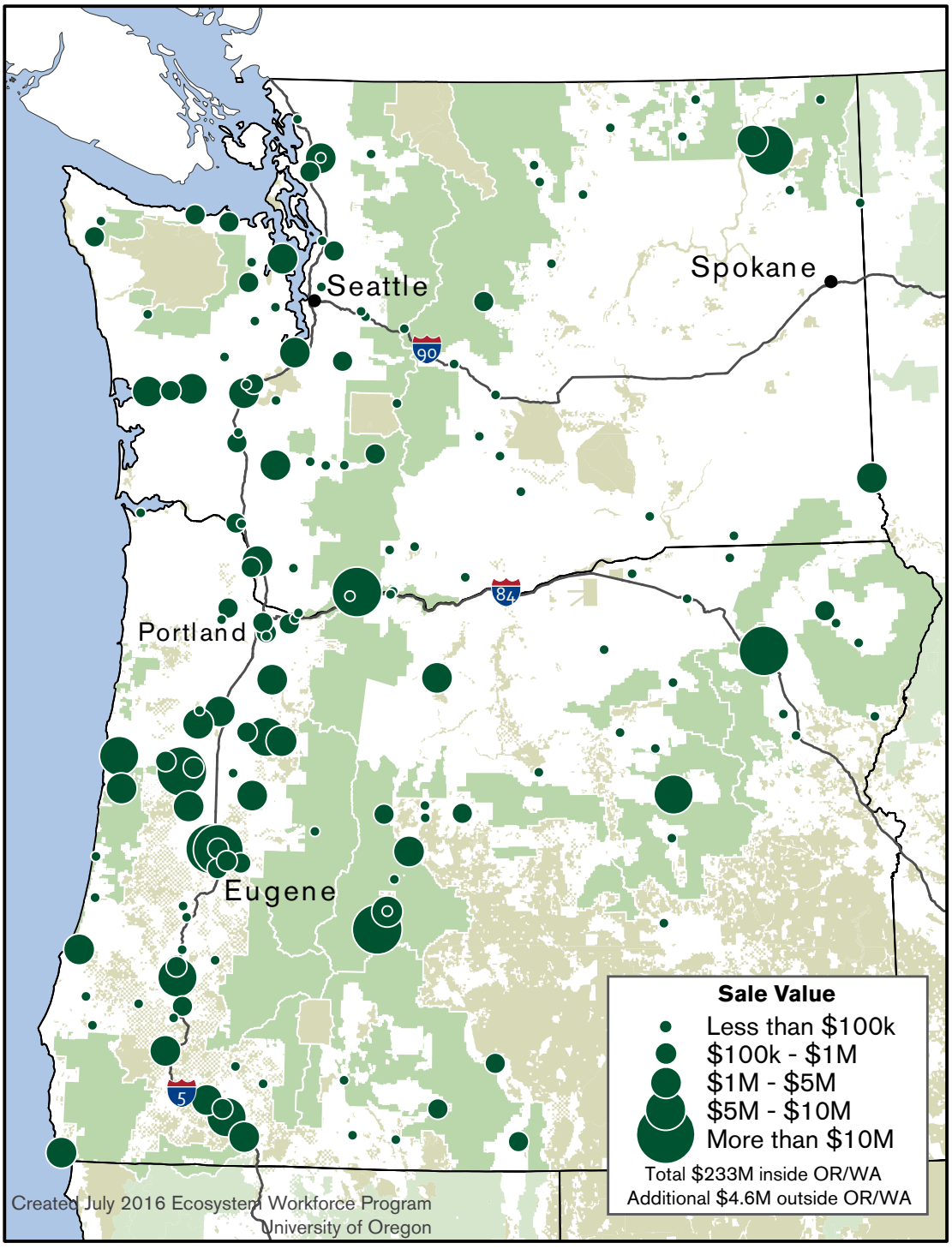
The Forest Service and communities alike depend on timber sales: the agency depends on contractors to purchase timber sales on national forest lands, and local communities have historically benefited from those sales through mill supply and related direct and secondary jobs. The map below shows timber purchasers who have purchased timber from a national forest in Oregon or Washington from FY 2011–15. In those five years, timber sales on forests in the region went to contractors primarily within the region (comprising 97 percent of sale value).

Timber purchasers, FY 2011–2015

Region Totals

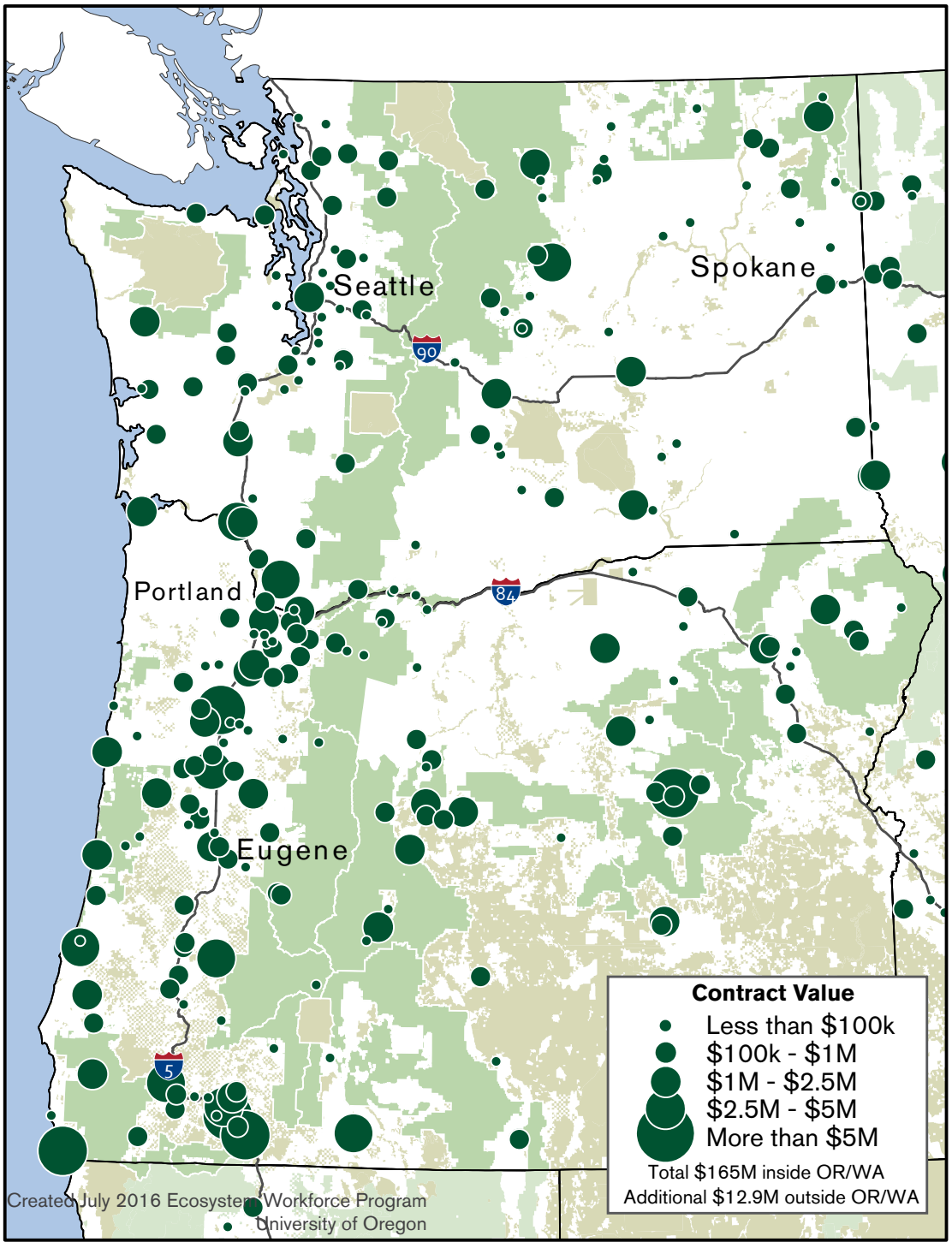
Timber purchasers
3,165

Value of sales
$238 million



Restoration-related service contractors are the businesses that have contracted with the Forest Service for restoration services and forest-related management activities, such as reforestation, thinning, road and stream restoration, and other practices aimed at improving or restoring the health of the forest. These activities can support a variety of purposes, from forest and watershed restoration to timber management and wildfire mitigation. Contractors receiving restoration service contracts from forests in the region (FY 2011-2015) were located primarily in the region (68 percent), with 32 percent outside Oregon and Washington (see map, below).

Restoration-related service contractors, FY 2011–2015



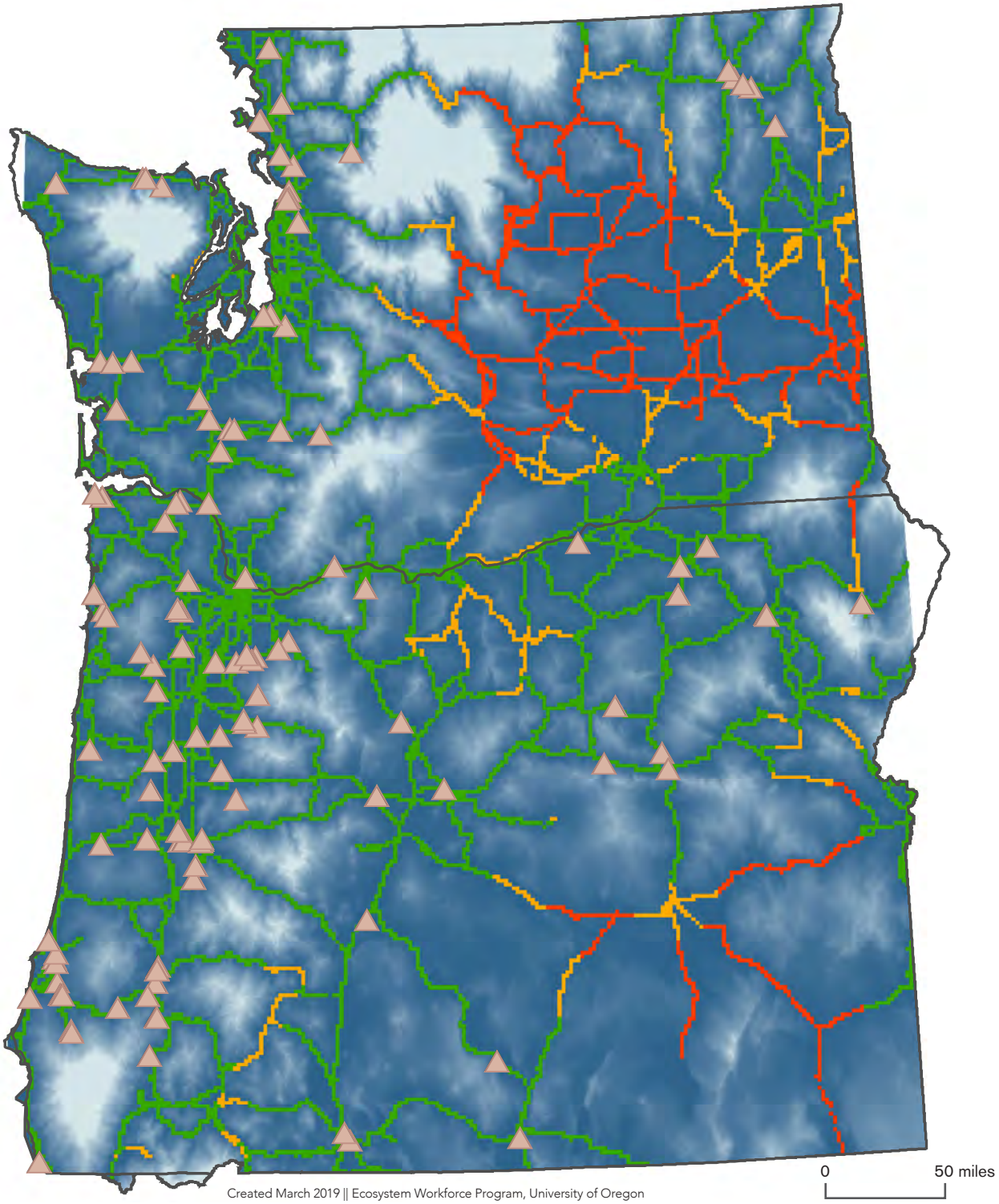
Region Totals

Service contractors
2,378

Contract value
$178 million

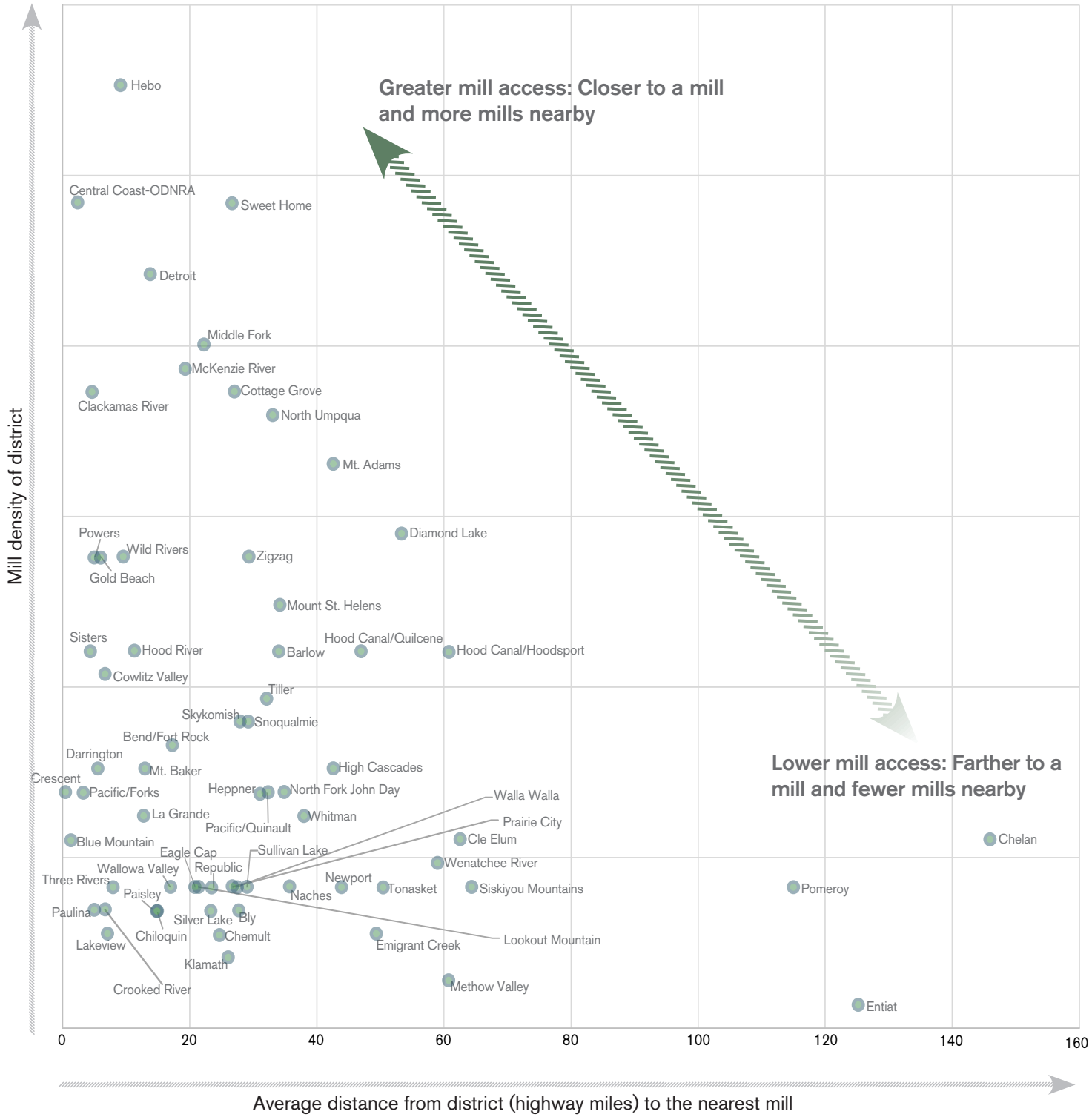
Mills and highway access in Washington and Oregon

This map represents relative transport costs from forests to mills with two different layers. The background layer displays the hauling cost based on slope and distance from any point in Washington and Oregon to a major highway. The lighter areas on the map are higher cost because they are farther from a highway, are more steeply sloped, or are both. The darker areas are lower cost because they are closer to a highway, less steeply sloped, or are both. The colored lines represent highway distance to the nearest sawmill.



Mill access for ranger districts in Washington and Oregon

Access to mills can vary across national forests and even within ranger districts. The chart below shows the relative availability of milling infrastructure to every national forest ranger district in Washington and Oregon. The majority of ranger districts have access to some sort of mill within 40 highway miles, but the number and types of processing of the mills differs. Some ranger districts have relatively more mills nearby while others have relatively fewer mills nearby.



Appendix: Data sources and methods

Page	Figure name (s)	Data source	Metrics, methods, and notes
1	**Region summary graphics**	See relevant pages with detailed information on each topic area in this packet.	
2	**Map: Washington and Oregon land ownership**	**Landownership shapefiles used:** USFS lands, Federal lands, Bureau of Indian Affairs lands, State owned lands, Oregon Urban Growth Boundaries, Washington Urban Growth Areas, Interstates. **Sources**: USGS, State of Oregon, State of Washington, Tigerline Files, dates. **Date**: Source data dated from 2010–2015.	Used shapefiles for map creation.
3	**Map: Washington and Oregon population density, 2010 census**	**Shapefiles:** Washington and Oregon 2010 census population density, Washington and Oregon counties, Washington and Oregon Interstates.	Used shapefiles for map creation.
4	**1. Summary bar** **2. Fig.: Washington State area and population** **3. Map: Forest Service land in Washington State counties**	All figures on page used the following data: Washington State population estimate from the US Census Bureau, 2017. Forest Service acreage data (Washington State and county-level) from Table 6 (pp. 57–131) of USDA Forest Service, 2018. The total area of each county was retrieved from US Census Geography Program (https://www.census.gov/programs-surveys/geography.html). Washington State area equals the sum of all Washington State county areas. **Map shapefiles used:** State of Washington and County shapefiles were retrieved from the Washington State Geospatial Portal (http://geo.wa.gov).	1. Summary bar data excerpted from other figures presented on page. 2. We showed the portion of WA State total area covered with national forest. We separated counties in the state that contain national forest land from those do not, and reported the total population for each group of counties. 3. We used "NFS acres" as the metric from Table 6 [in USDA Forest Service, 2018] to identify # of national forest acres / county. We calculated the percentage of national forest land coverage for each county in WA State. We used shapefiles for map creation. For visualization on the map, we created pie charts to show the portion of the county area covered by national forest, including only counties that had greater than 1% of their total area as national forest land.
5	**Fig.: Washington State landownership: the Forest Service at a county level, cont'd.**	WA State county-level population estimates from: U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. Downloaded Oct. 17, 2018 *(https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html).* Forest Service acreage data at the county level from Table 6 (pp. 57–131) of USDA Forest Service, 2018.	We used county-level population estimates for WA, current as of March 2018. We divided the number of national forest acres in each county by the population estimate for each county to determine "Acres of national forest per county resident."
6	**1. Fig.: Washington State forest land and landowners** **2. Fig.: Timber harvested from WA forest lands by landowner, million board feet (mmbf)** **3. Fig.: Timber harvested from national forests in WA and milled in WA (thousand board feet (mbf))**	1. US Census 2017, Campbell et al. 2010. 2. Warren 2000, Zhou 2018. 3. Timber from National Forests – Cut and Sold Reports 1998, 2006, 2014, 2017.	1. Washington State land area estimate from US Census data on state lands; data on WA forest land ownership from Fig. 16 of Campbell et al. 2010. 2. We extracted values from Table 16 for each ownership class in Warren (2000) for 1998 values, and extracted values from Table 15 for each ownership class in Zhou (2018) for 2006 and 2014 values. 3. Forest Service Cut and Sold reports were reviewed and per forest volume harvested totals were extracted from Q4 reports.
7	**1. Summary bar: WA forest products industry in 2017** **2. Fig.: Statewide estimate of direct jobs from working forests in Washington, 2017** **3. Fig.: Recent trends: Forest products industries employment and salary, 2004–2014**	1. MB&G Consulting 2018 (Table 5, p. 8). 2. All WA jobs: Bureau of Labor Statistics, "May 2017 State Occupational Employment and Wage Estimates" for Washington State, all occupations (https://www.bls.gov/oes/2017/may/oes_wa.htm). Direct jobs from working forests: MB&G Consulting 2018 (Table 5, p. 8). 3. MB&G Consulting 2018, Zhou 2018.	1. Direct jobs and direct wages excerpted from data source; average wage determined by dividing total direct wages by the number of total direct jobs. 2. We show the direct jobs from working forests in WA as a portion of the total estimated jobs in the state in 2017, and the breakdown of direct jobs by industry sector. Detailed methodology on direct job employment from working forests estimates are presented in source report. 3. Values for historical employment numbers were taken from Table 20 and state-wide estimates for weekly wages were taken from Table 24 in Zhou 2018. Weekly wage estimates were converted to annual salaries using online calculator (https://www.omnicalculator.com/business/salary-to-hourly). We then used Oregon's Employment Dept.'s inflation calculator to account for the change in salary over time (https://www.qualityinfo.org/ed-icalc/?at=1&t1=1~2018~2018).

Page	Figure name (s)	Data source	Metrics, methods, and notes
8	**1. Map: WA Mill Economic Zones;** **2. Table: Number of mills in Washington per Mill Economic Zone by year**	1. State of Washington and County shapefiles used, described for map on p.4. 2. WA Department of Natural Resources Mill Reports: Larsen 1998, Smith 2006, and Smith 2014.	1. We used the same state map as described from p. 4, Mill Economic Zone boundaries follow county lines and were created in ArcGIS. 2. We identified the counties and national forests that overlapped (fully or partially) with Mill Economic Zone boundaries and grouped mill abundances by economic zones during snapshot years using ArcGIS.
9	**Fig.: Mills in Washington: Snapshots over time**	See p. 8 sources	We show the number of mills in each county according to bins for three distinct snapshot years. We extracted mill number, type and county location from Table 1 in DNR reports.
10	**1. Summary bar** **2. Fig.: Oregon State area and population** **3. Map: Forest Service land in Oregon State counties**	All figures on page used the following data: Oregon State population estimate from the US Census Bureau, 2017. Forest Service acreage data (Oregon State and county-level) from Table 6 (pp. 57–131) of USDA Forest Service, 2018. The total area of each county was retrieved from US Census Geography Program (https://www.census.gov/programs-surveys/geography.html).	1. Summary bar data excerpted from other figures presented on page. 2. We showed the portion of OR State total area covered with national forest. We separated counties in the state that contain national forest land from those do not, and reported the total population for each group of counties. 3. We used "NFS acres" as the metric from Table 6 [in USDA Forest Service, 2018] to identify # of national forest acres / county. We calculated the percentage of national forest land coverage for each county in OR State. We used shapefiles for map creation. For visualization on the map, we created pie charts to show the portion of the county area covered by national forest, including only counties that had greater than 1% of their total area as national forest land.
11	**Fig: Oregon State landownership: the Forest Service at a county level, cont'd.**	OR State county-level population estimates from: U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2018. Downloaded Oct. 17, 2018 *(https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html).* Forest Service acreage data at the county level from Table 6 (pp. 57–131) of USDA Forest Service, 2018.	We used county-level population estimates for OR, current as of March 2018. We divided the number of national forest acres in each county by the population estimate for each county to determine "Acres of national forest per county resident."
12	**1. Fig.: Oregon State forest land and landowners** **2. Fig.: Timber harvested from OR forest lands by landowner, million board feet (mmbf)** **3. Fig. Timber harvested from national forests in OR and milled in OR (thousand board feet (mbf))**	1. OFRI 2019, Donnegan et al. 2008. 2. PNW-GTR-681 (2003), PNW-GTR-868 (2008), PNW-GTR-942 (2013). 3. US Forest Service Cut and Sold Reports for Fourth Quarter for 2003, 2008, 2013, 2017. Region 6. (https://www.fs.fed.us/forestmanagement/products/cut-sold/index.shtml).	1. Oregon State land area estimate from OFRI 2019; data on OR forest land ownership from Fig. 16 of Donnegan et al. 2010. 2. We used timber harvested (mmbf) in Oregon by ownership class from each of the 3 GTR reports (Table 3 in GTR-681, Table 7 in GTR-868, and Table 2 in GTR-942). 3. We extracted mbf from each forest from the Q4 Cut & Sold reports for 2003, 2008 and 2013. 2017 estimates of total harvest came from same sources.
13	**1. Summary bar: OR forest products industry in 2017** **2. Fig.: Statewide estimate of direct jobs from working forests in OR, 2017** **3. Fig.: Recent trends: Forest products industries employment and salary, 2004–2014**	1. OFRI 2019. 2. OFRI 2019. 3. Oregon Forest Resource Institute. Oregon Forest Facts 2017-2018 edition: Employment. (http://oregonforestfacts.org/#employment), Zhou 2018.	1. We used summarized information from the OFRI current employment and wage data. These data were collected in partnership with ODF and OED. 2. We show the direct jobs from working forests in OR as a portion of the total estimated jobs in the state in 2017, and the breakdown of direct jobs by industry sector as presented in report. 3. Historical values for employment numbers were taken from Table 20 from Zhou et al. 2018 from Table 24. Weekly wage estimates were converted to annual salaries using online calculator (https://www.omnicalculator.com/business/salary-to-hourly). We then used Oregon's Employment Dept.'s inflation calculator to account for the change in salary over time (https://www.qualityinfo.org/ed-ical-c/?at=1&t1=1~2018~2018).
14	**1. Map: OR Mill Economic Zones** **2. Table: Number of mills in Oregon per Mill Economic Zone by year**	1. State of Oregon and County shapefiles. Mill Economic Zones were delineated by US Forest Service FIA and used in the reports noted below. 2. Mill totals, type, and location were extracted from the following reports: PNW-GTR-681 (2003), PNW-GTR-868 (2008), PNW-GTR-942 (2013).	1. Mill Economic Zone boundaries follow county lines and were created in ArcGIS. 2. We identified the counties and national forests that overlapped (fully or partially) with Mill Economic Zone boundaries and grouped mill abundances by economic zones during snapshot years using ArcGIS.

Page	Figure name (s)	Data source	Metrics, methods, and notes
15	**Fig.: Mills in Oregon: Snapshots over time**	Mill totals, type, and location were extracted from the following reports: PNW-GTR-681 (2003), PNW-GTR-868 (2008), PNW-GTR-942 (2013).	We extracted mill number, type and county location from GTR reports, specifically Table 12 in 2003, Table 15 in 2008, Table 18 in 2013. Economic zones were delineated by US Forest Service FIA and used in all the reports.
16	**Map: Timber purchasers, FY 2011–2015**	Timber Information System (TIM) data, 2011-2015.	Mapped all businesses with at least one timber sale purchase by business location.
17	**Map: Restoration-related service contractors, FY 2011–2015**	Federal Procurement Data System (FPDS), 2011-2015.	Mapped all businesses with at least one restoration related service contract by business location.
18	**Map: Washington and Oregon mills and highway access**	▪ Database of mill location was provided by University of Montana's Bureau of Business and Economic Research (based on reports from 2013). ▪ DEM: A 1/3 arc-second DEM was downloaded from the USGS TNM Download site (https://viewer.nationalmap.gov/basic/) on 10/11/2018. ▪ Roads data was downloaded from US Census geospatial porta, Sept. 2016.	▪ All data was clipped to the Region 6 Administrative Boundary ▪ Highway polylines were converted to 100 x 100m cell raster format, with non-road cells set to NoData. Cell values were converted to miles (0.0062). ▪ Mill points were filtered using the criteria "sawmill" in the Mill_Descr column of the attribute data. Selected sawmill points were then snapped to the nearest highway raster location. ▪ Highway Cost Distance layer: A cost distance analysis was conducted using the Cost Distance tool in the ArcGIS 10.2, ArcToolbox. The analysis used the sawmill point layer as the feature source data and the Highway raster layer as the cost raster. ▪ Slope-weighted Cost Distance background layer: A second cost distance analysis was conducted using the Highway raster cell locations as the source data and the DEM was used as the cost raster.
19	**Fig.: Mill availability for Washington and Oregon ranger districts**	Same sources as for p.18 above.	Mill density (per ranger district) and average distance via highway to nearest mill were plotted on the same graph.

Methods literature citations:

Brandt, Jason P.; Morgan, Todd A.; Dillon, Thale; Lettman, Gary J.; Keegan, Charles E.; Azuma, David L. 2006. Oregon's forest products industry and timber harvest, 2003. Gen. Tech. Rep. PNW-GTR-681. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 53 p.

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Donnegan, Joseph; Campbell, Sally; Azuma, Dave, tech. eds. 2008. Oregon's forest resources, 2001–2005: five-year Forest Inventory and Analysis report. Gen. Tech. Rep. PNW-GTR-765. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station. 186 p

Gale, Charles B.; Keegan, Charles E., III; Berg, Erik C.; Daniels, Jean; Christensen, Glenn A.; Sorenson, Colin B.; Morgan, Todd A.; Polzin, Paul. 2012. Oregon's forest products industry and timber harvest, 2008: industry trends and impacts of the Great Recession through 2010. Gen. Tech. Rep. PNW-GTR-868. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 55 p.

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Smith, D. Washington Mill Survey 2014 Series Report #23. December 2015. https://www.dnr.wa.gov/publications/em_obe_2014_mill_survey_dec29_2015_nc.pdf?hyh0hr

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Warren, Debra D. 2000. Production, prices, employment, and trade in Northwest forest industries, all quarters of 1998. Resour. Bull. PNW-RB-231. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 171 p.

Zhou, Xiaoping; Daniels, Jean M. 2018. Production, prices, employment, and trade in Northwest forest industries, all quarters 2014. Resour. Bull. PNW-RB-267. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 162 p.