

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	<p>Landownership shapefiles used: USFS lands, Federal lands, Bureau of Indian Affairs lands, State owned lands, Oregon Urban Growth Boundaries, Washington Urban Growth Areas, Interstates.</p> <p>Sources: USGS, State of Oregon, State of Washington, Tigerline Files, dates.</p> <p>Date: Source data dated from 2010–2015.</p>	Used shapefiles for map creation.
3	Map: Washington and Oregon population density, 2010 census	<p>Shapefiles: Washington and Oregon 2010 census population density, Washington and Oregon counties, Washington and Oregon Interstates.</p>	Used shapefiles for map creation.
4	<p>1. Summary bar</p> <p>2. Fig.: Washington State area and population</p> <p>3. Map: Forest Service land in Washington State counties</p>	<p><u>All figures on page used the following data:</u></p> <p>Washington State population estimate from the US Census Bureau, 2017.</p> <p>Forest Service acreage data (Washington State and county-level) from Table 6 (pp. 57–131) of USDA Forest Service, 2018.</p> <p>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.</p> <p>Map shapefiles used: State of Washington and County shapefiles were retrieved from the Washington State Geospatial Portal (http://geo.wa.gov).</p>	<p>1. Summary bar data excerpted from other figures presented on page.</p> <p>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.</p> <p>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.</p>
5	Fig.: Washington State landownership: the Forest Service at a county level, cont'd.	<p>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/demol/popest/2010s-counties-total.html).</p> <p>Forest Service acreage data at the county level from Table 6 (pp. 57–131) of USDA Forest Service, 2018.</p>	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	<p>1. Fig.: Washington State forest land and landowners</p> <p>2. Fig.: Timber harvested from WA forest lands by landowner, million board feet (mmbf)</p> <p>3. Fig.: Timber harvested from national forests in WA and milled in WA (thousand board feet (mbf))</p>	<p>1. US Census 2017, Campbell et al. 2010.</p> <p>2. Warren 2000, Zhou 2018.</p> <p>3. Timber from National Forests – Cut and Sold Reports 1998, 2006, 2014, 2017.</p>	<p>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.</p> <p>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.</p> <p>3. Forest Service Cut and Sold reports were reviewed and per forest volume harvested totals were extracted from Q4 reports.</p>
7	<p>1. Summary bar: WA forest products industry in 2017</p> <p>2. Fig.: Statewide estimate of direct jobs from working forests in Washington, 2017</p> <p>3. Fig.: Recent trends: Forest products industries employment and salary, 2004–2014</p>	<p>1. MB&G Consulting 2018 (Table 5, p. 8).</p> <p>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).</p> <p>Direct jobs from working forests: MB&G Consulting 2018 (Table 5, p. 8).</p> <p>3. MB&G Consulting 2018, Zhou 2018.</p>	<p>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.</p> <p>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.</p> <p>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).</p>

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8	<p>1. Map: WA Mill Economic Zones;</p> <p>2. Table: Number of mills in Washington per Mill Economic Zone by year</p>	<p>1. State of Washington and County shapefiles used, described for map on p.4.</p> <p>2. WA Department of Natural Resources Mill Reports: Larsen 1998, Smith 2006, and Smith 2014.</p>	<p>1. We used the same state map as described from p. 4, Mill Economic Zone boundaries follow county lines and were created in ArcGIS.</p> <p>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.</p>
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	<p>1. Summary bar</p> <p>2. Fig.: Oregon State area and population</p> <p>3. Map: Forest Service land in Oregon State counties</p>	<p><u>All figures on page used the following data:</u></p> <p>Oregon State population estimate from the US Census Bureau, 2017.</p> <p>Forest Service acreage data (Oregon State and county-level) from Table 6 (pp. 57–131) of USDA Forest Service, 2018.</p> <p>The total area of each county was retrieved from US Census Geography Program (https://www.census.gov/programs-surveys/geography.html).</p>	<p>1. Summary bar data excerpted from other figures presented on page.</p> <p>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.</p> <p>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.</p>
11	Fig: Oregon State landownership: the Forest Service at a county level, cont'd.	<p>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/demol/popest/2010s-counties-total.html).</p> <p>Forest Service acreage data at the county level from Table 6 (pp. 57–131) of USDA Forest Service, 2018.</p>	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	<p>1. Fig.: Oregon State forest land and landowners</p> <p>2. Fig.: Timber harvested from OR forest lands by landowner, million board feet (mmbf)</p> <p>3. Fig. Timber harvested from national forests in OR and milled in OR (thousand board feet (mbf))</p>	<p>1. OFRI 2019, Donnegan et al. 2008.</p> <p>2. PNW-GTR-681 (2003), PNW-GTR-868 (2008), PNW-GTR-942 (2013).</p> <p>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).</p>	<p>1. Oregon State land area estimate from OFRI 2019; data on OR forest land ownership from Fig. 16 of Donnegan et al. 2010.</p> <p>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).</p> <p>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.</p>
13	<p>1. Summary bar: OR forest products industry in 2017</p> <p>2. Fig.: Statewide estimate of direct jobs from working forests in OR, 2017</p> <p>3. Fig.: Recent trends: Forest products industries employment and salary, 2004–2014</p>	<p>1. OFRI 2019.</p> <p>2. OFRI 2019.</p> <p>3. Oregon Forest Resource Institute. Oregon Forest Facts 2017-2018 edition: Employment. (http://oregonforestfacts.org/#employment), Zhou 2018.</p>	<p>1. We used summarized information from the OFRI current employment and wage data. These data were collected in partnership with ODF and OED.</p> <p>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.</p> <p>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).</p>
14	<p>1. Map: OR Mill Economic Zones</p> <p>2. Table: Number of mills in Oregon per Mill Economic Zone by year</p>	<p>1. State of Oregon and County shapefiles. Mill Economic Zones were delineated by US Forest Service FIA and used in the reports noted below.</p> <p>2. Mill totals, type, and location were extracted from the following reports: PNW-GTR-681 (2003), PNW-GTR-868 (2008), PNW-GTR-942 (2013).</p>	<p>1. Mill Economic Zone boundaries follow county lines and were created in ArcGIS.</p> <p>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.</p>

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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	<ul style="list-style-type: none"> ▪ 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. 	<ul style="list-style-type: none"> ▪ 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:

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