IMPACT THROUGH INSIGHT

PREPARED FOR The Oregon Higher Education Coordinating Commission

Oregon Forest Operations and Management Workforce Study

JUNE 2025

FINAL REPORT

Acknowledgments

ECOnorthwest prepared this report for the Oregon Higher Education Coordinating Commission (HECC) under the direction of the Forestry Workforce Steering Committee (FWSC), a subcommittee of the Oregon Workforce and Talent Development Board (WTDB). The authors wish to thank the FWSC members for their guidance, involvement, and assistance. We also thank the HECC Office of Research and Data for providing data for the pathways analysis.

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ECOnorthwest is responsible for the content of this report. Any statements nonfactual in nature constitute the authors' current opinions, which may change as more information becomes available.

Forestry Workforce Steering Committee (Member – Organization):

- Craig Pope, Co-Chair – Polk County
- Harris Reibach, Co-Chair – Confederated Tribes of Grand Ronde
- Mindy Crandall – Oregon State University, College of Forestry
- Chris Edwards – Oregon Forest Industries Council
- Courtney Griesel – Sierra Pacific Industries
- Marcus Kauffman – Oregon Department of Forestry
- Dave Kunert – Hampton Lumber
- Jim Paul – Oregon Forest Resources Institute
- Nick Smith – American Forest Resource Council
- Amanda Sullivan-Astor – Associated Oregon Loggers, Inc.
- Brett Talbot – Oregon Department of Forestry
- Josh Wampler – Paul & Robert Wampler Inc.
- John Whiteley – SOWIB Manufacturing Sector Partnership
- Julie Woodward – Oregon Forest Resources Institute

Research Team Leads:

- Andrew Dyke, Ph.D., ECOnorthwest, Project Director
- Melissa Rowe, ECOnorthwest, Project Manager
- Jade Aguilar, Ph.D., ECOnorthwest, Engagement Lead
- Sarah Reich, ECOnorthwest, Project Advisor
- Richard Haynes, Ph.D., Independent Consultant, Senior Project Advisor

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Executive Summary

Study Background, Purpose, and Context

In 2024, the Oregon Legislature passed Senate Bill 1552, which requires the Oregon Higher Education Coordinating Commission (HECC) to conduct a forestry workforce study "to assist its commission in understanding and addressing challenges in Oregon's forestry workforce."[1] HECC formed the Forestry Workforce Steering Committee (FWSC), a subcommittee of the Workforce and Talent Development Board (WTDB), to oversee the study, and contracted with ECOnorthwest to complete the study.

During the course of the study the FWSC determined the need for a study focused specifically on forest operations and management in Oregon—from the woods to the gates of the mills—rather than on the broader forestry sector that includes forest and wood products manufacturing.

The study included literature and policy review; quantitative analysis of a wide variety of data sources; and quantitative and qualitative analysis of the study's engagement activities (a survey of forestry employers and self-employed individuals and interviews and focus groups with employers, agency staff, training program leaders, workforce board representatives, and others).

Community Benefits of Forest Operations and Management

Better understanding challenges in Oregon's forest operations and management workforce is a first step toward ensuring the sector can remain robust and resilient in the face of evolving market and policy dynamics. Oregon's forests and forest stewards have long generated benefits for all Oregonians—the workforce plays a central role in ensuring these benefits continue to flow for generations to come.

Forest operations and management provide a wide range of community benefits. Statewide timber harvest revenues fund public education. In many rural areas of Oregon, timber harvest revenues are also a substantial revenue source for essential public safety services and infrastructure. Communities also benefit from forest-based recreation and non-timber forest products, with activities like camping, biking, hunting, and foraging supporting local businesses, cultural practices, and subsistence needs.

The sector also helps support forest ecosystem services that benefit nearby communities and make them resilient to environmental disturbance. Forest operations such as thinning and prescribed burns reduce wildfire risks; multi-objective forest management protects water quality and enhances biodiversity that supports nutrient cycling, climate regulation, sediment retention, and myriad other functions of productive ecosystems. These functions

[1] SB 1552, https://olis.oregonlegislature.gov/liz/2024R1/Downloads/MeasureDocument/SB1552/Enrolled

help stabilize property values and reduce costs for public utilities and private landowners. In addition, forestry businesses and nonprofits partner with schools and youth programs to offer hands-on training, educational outreach, and career exposure. These initiatives, supported by the forest products harvest tax and philanthropic investment, prepare the next generation for forestry careers while fostering a deeper connection to place and community.

Forest Operations and Management Workforce Overview

Oregon's Northwest and Southwest regions account for most of the state's timber harvest, with private lands—both corporate and noncorporate—serving as the primary source of timber and related employment in logging and hauling. Public lands rely on a mix of private contractors and public employees to manage forests for timber production, fuels treatment, habitat conservation, and recreation, cultural, and educational benefit. Oregon stands out nationally for awarding a high share of forestry contracts to in-state businesses, underscoring the importance of labor-intensive forestry in the state and its dependence on H-2B visa workers. Compared to the more mechanized and uniform operations in the U.S. Southeast, Oregon's varied terrain and timber types require more-manual labor. Variations in weather further shape work patterns, prompting many forestry workers to adopt migratory, multi-role, multi-industry, or on-call employment strategies. Finally, technological advancements, anticipated policy shifts such as Oregon's 20-Year Landscape Resiliency Strategy, and other factors identified throughout this report highlight the importance of responsive workforce development and continuing education systems that keep pace with change in supporting workers to adapt within the field and advance their careers.

Forest Operations and Management in Oregon

Oregon's forest operations and management sector includes a diverse mix of public and private forest owners, industrial timber companies, small businesses and self-employed contractors, nonprofits, and public agencies like the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and Oregon Department of Forestry (ODF). Five subsectors are important to highlight:

- **Forest Operations:** Critical services such as logging, timber cruising, firefighting, fuels reduction, reforestation, trail maintenance, rights-of-way clearing, equipment maintenance, and pest control.
- **Forest Management:** Includes landowners, agencies, governments, business associations, and foresters involved in silviculture, conservation, habitat management, recreation management, land use, policy implementation, and other management activities

- **Forest Transportation:** Includes general and specialized trucking (hauling timber, fire equipment, crews, supplies), air services (e.g., firefighting support, seeding, inventory), road services (e.g., grading, snow plowing, product shipment by truck, rail, or water).
- **Forest Roads and Aggregate Production:** Road construction and materials sourcing; includes quarrying stone, gravel, and riprap for forest road building, and heavy construction services such as bridge building, grading, and trail development.
- **Forest Technical Services:** Specialized engineering, environmental consulting, surveying, and R&D firms providing essential support to forestry projects; services include feasibility studies, ecological restoration, regulatory compliance, and mapping.

The 106 responses to the survey administered as part of this study suggest a dynamic and adaptive labor force that cannot be easily segmented into siloed categories. The survey asked forestry employers and self-employed individuals about the type of work they do. Most respondents selected work types across multiple industries, including transportation/trucking, forest operations/contracting, forestry management and forestry (forest landowners), and technical or other contracted services.

Workforce Size Estimate

Exhibit ES-1 presents an estimate of the size of the forest operations and management sector. Two NAICS-based industries are included in their entirety (forestry and logging and support activities for forestry), while many others are included partially.[2] The total adds to the NAICS employee counts an estimate of the non-employer workforce based on non-employer establishment counts multiplied by an assumed average workforce size derived from this study's survey responses. The number of truck drivers not included elsewhere in the table (5,873) is estimated using USDOT data sorted by cargo type and business type. The report appendices provide industry employment for roads and aggregate production as well as technical services, industries for which forest-related employers and employment have not yet been identified. Exhibit ES-2 shows the distribution of employment and non-employer workers across the available subsectors.

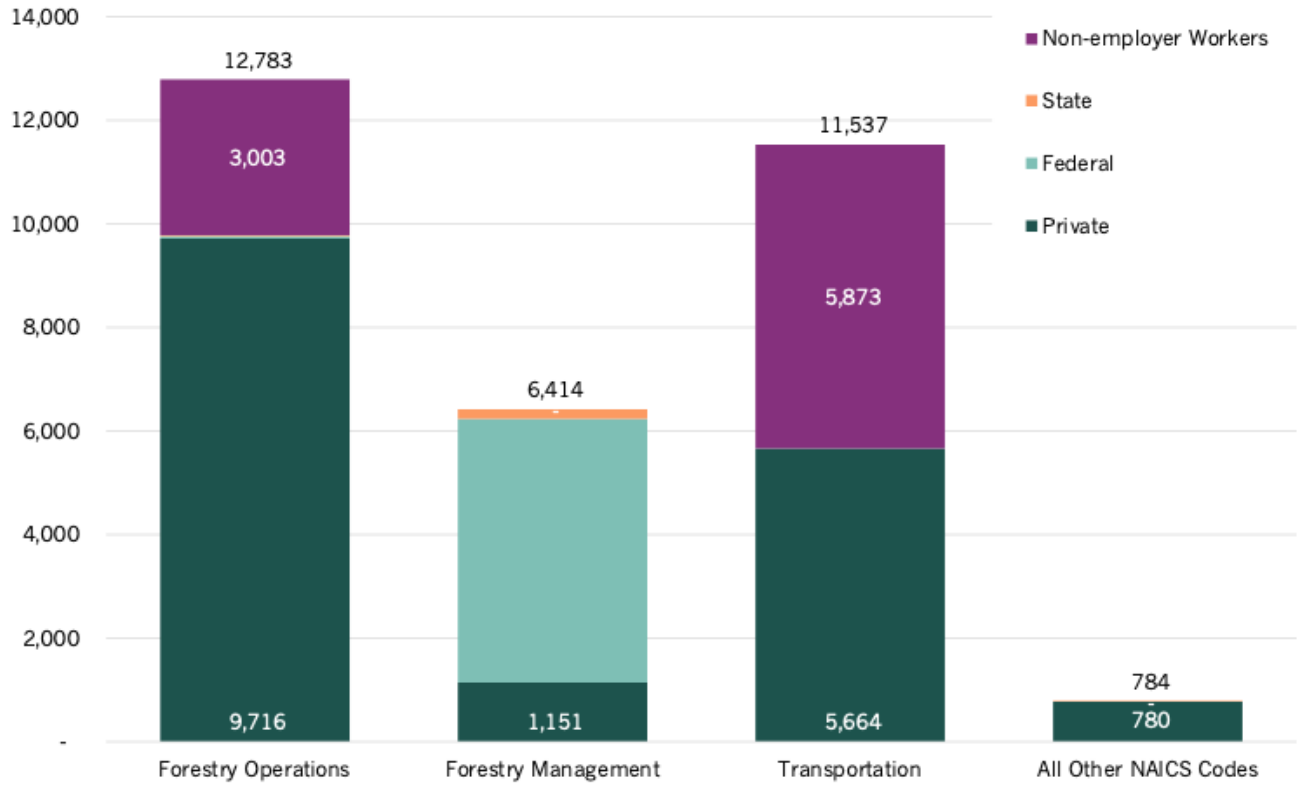
[2] NAICS = North American Industry Classification System

Exhibit ES-1. Estimated Forest Operations and Management Workforce

SUBSECTOR	INDUSTRY EMPLOYMENT	NON-EMPLOYER-BASED ESTIMATE OF WORKERS	TOTAL
Forest Operations	9,780	2,998	12,778
Forest Management	6,414*	-	6,414
Transportation	5,664*	5,873	11,537
Other OED-Identified Firms	784*	-	784
Roads and Aggregate	See report appendix	-	-
Technical Services	See report appendix	-	-
Total	**22,642**	**8,871**	**31,513**

*Includes QCEW and other individually identified employers. Data sources: Oregon Employment Department (OED), Quarterly Census of Employment and Wages (QCEW), 2023. U.S. Census Bureau, Nonemployer Statistics, 1-year estimates 2022. Forestry Workforce Study Survey 2025. USDOT MCMIS Company Census File 2025.

Exhibit ES-2. Forest Operations and Management Workforce by Subsector, Oregon, 2023



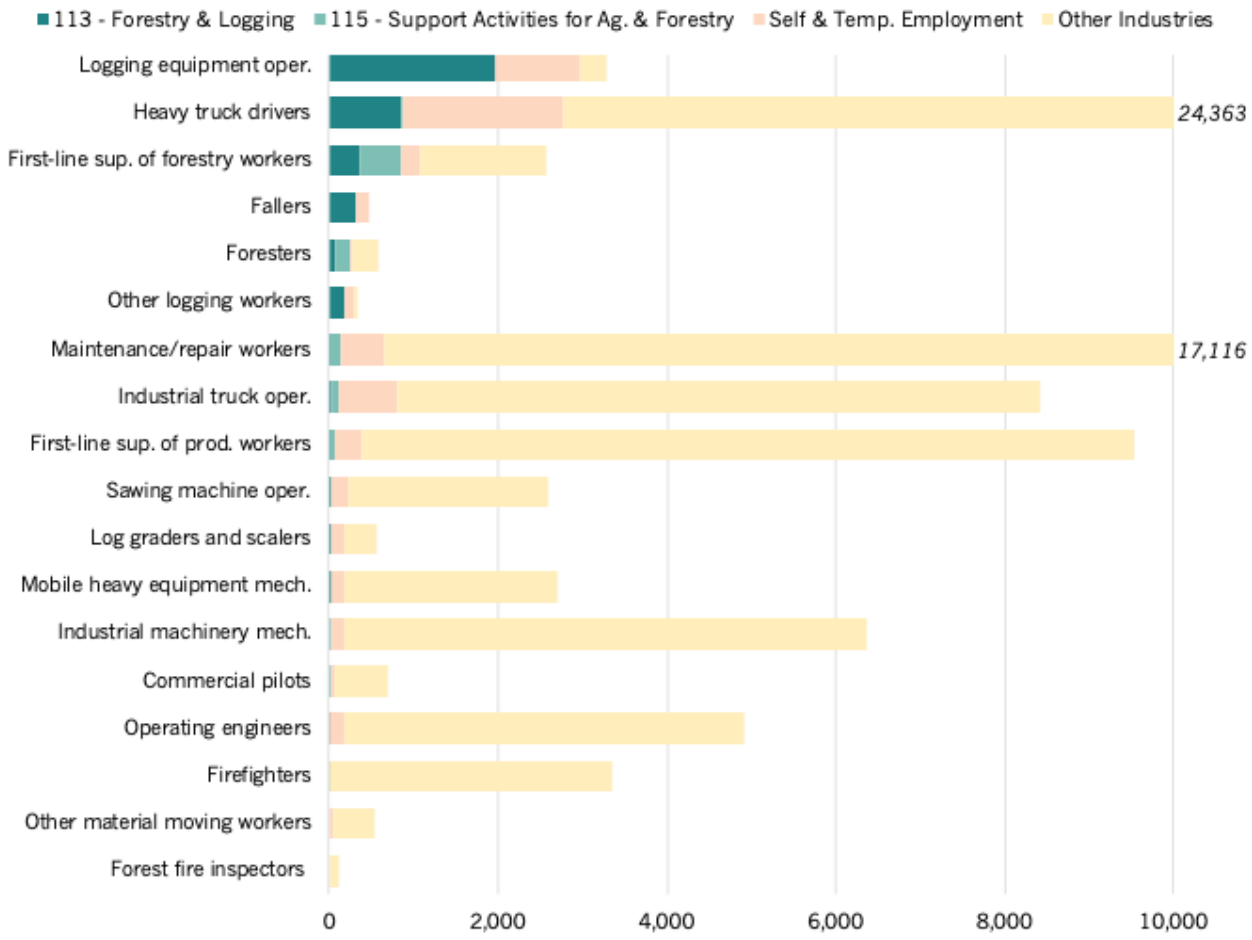
Data sources: Oregon Employment Department, QCEW, 2023; U.S. Census Bureau, Nonemployer Statistics, 1-year estimates 2022.

Workforce Analysis

Occupation Analysis

Forest operations and management require a broad range of skills and occupations. Based on analysis of the sector's key industries and input from key parties, the study analysis focuses on 18 occupations that are represented in available data sources.[3] Many require highly industry-specific skillsets while others require skills applicable to many industries. Exhibit ES-3 shows the share of occupational employment in key forest operations and management industries versus other industries. The exhibit also highlights the sector's reliance on self-employed individuals.

Exhibit ES-3. Employment in Forest Operations and Management Focal Occupations, Oregon, 2023



Note: A large share of foresters who work in other industries work in government. Employment is capped at 10,000 for visualization purposes. Data sources: Oregon Employment Department, Industry-Occupation Matrix, 2023; OEWS, 2023; Bureau of Labor Statistics, Industry-Occupation Matrix, 2023.

[3] These occupation titles may not align with job titles used by employers or employees.

Wages in these occupations generally increase as specialized skill level increases. Of the 18 focal occupations, 14 earn a median wage above the overall Oregon median. At the region level, forest operations and management-related occupations also generally offer wages above the regional median, especially in Rogue Valley, Northwest Oregon, and Southwestern Oregon.

Occupational Projections

Many occupations important to forest operations and management are expected to expand more rapidly than employment overall, driven in part by growth in other industries that rely on similar skillsets, indicating potential competition for these workers. Occupations specific to the sector, such as foresters, fallers, and logging workers, are expected to exhibit very slow growth or slow declines in number.

Even as the sector employs fewer total workers in some occupations, retirements and other job turnover mean that the sector will require a robust flow of newly trained workers for the foreseeable future. For example, OED projects average annual openings of logging workers and fallers equal to about 13 percent of 2023 employment levels. In other words, the sector will need to replace at least one in eight workers in these positions every year. Changes in harvest levels from the baseline assumed by OED would also clearly affect the sector's workforce demand.

Using OED's projections, our estimates of the sector's size, and other data, we estimate the forest operations and management sector, as defined in this report, will grow by 0.2 percent per year, from 31,513 circa 2023 to 32,030 in 2033. Due to retirements and other job turnover, we estimate the sector will need an average of 3,400 new workers every year—more than 10 percent of the workforce size estimate for 2023.

Workforce Characteristics

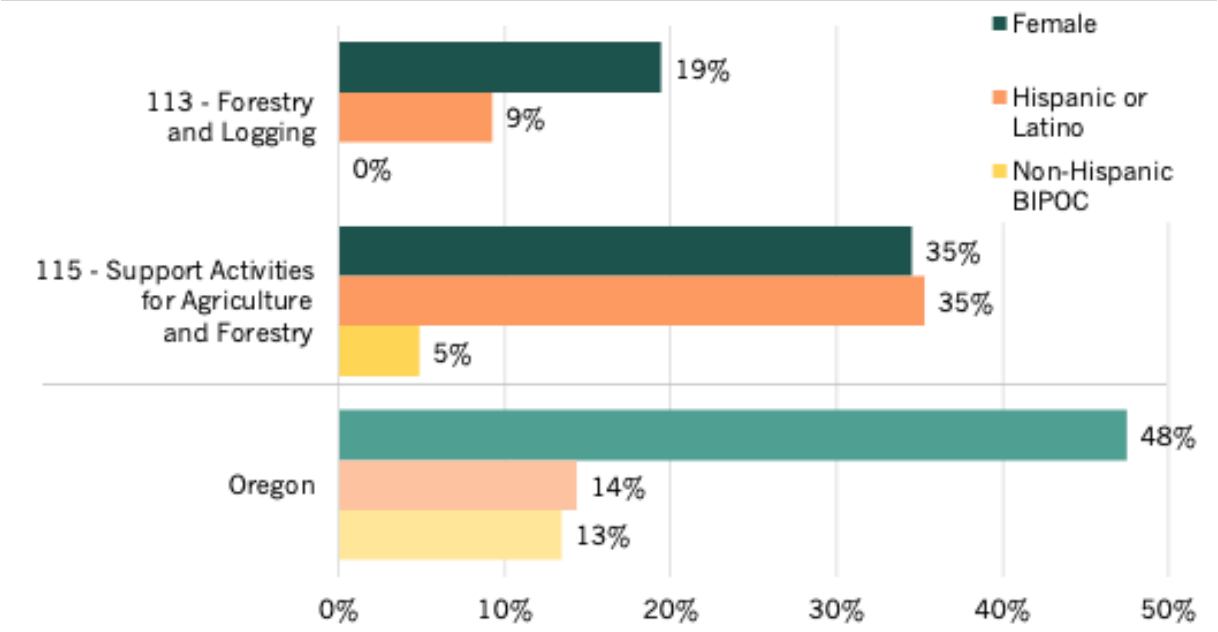
Forest operations and management employees appear to be a bit older, on average, than the overall Oregon workforce. Like other sectors, forestry is experiencing a demographic shift as the workforce ages and will require proactive workforce development efforts.

The sector's workforce has relatively low shares of women workers, especially in forestry and logging (see Exhibit ES-4). Non-Hispanic Black, Indigenous, and People of Color (BIPOC) populations remain underrepresented in forest operations and management when compared to 13 percent of Oregon's overall workforce. Hispanic or Latino employees make up 9 percent of forestry and logging and 35 percent of support activities, compared to 14 percent of Oregon's workforce overall. These shares do not include Hispanic H-2B visa workers, who make up a sizable portion of the workforce in these industries.

Just over half of forest operations and management employees have some college experience or a postsecondary degree, compared to 71 percent of the overall Oregon workforce. The sector instead relies heavily on hands-on experience and occupational skills,

with workers able to enter stable, well-paying jobs through CTE, certificate programs, apprenticeships, or on-the-job training, making the sector more accessible than others.

Exhibit ES-4. Employee Gender and Race/Ethnicity in Forest Operations and Management, Oregon



Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates

Business, Hiring, and Retention Challenges

Half of the survey's self-employed respondents indicated that they worked about the amount they wanted over the past 12 months. The most cited challenge to maintaining the desired level of work was "not enough work available," followed by policies and regulations, workforce/subcontractor availability, timber supply, and labor costs. Among employers, the most frequently cited business challenge was policies and regulations, followed by workforce availability and costs (business, labor, and equipment) (Exhibit ES-5).

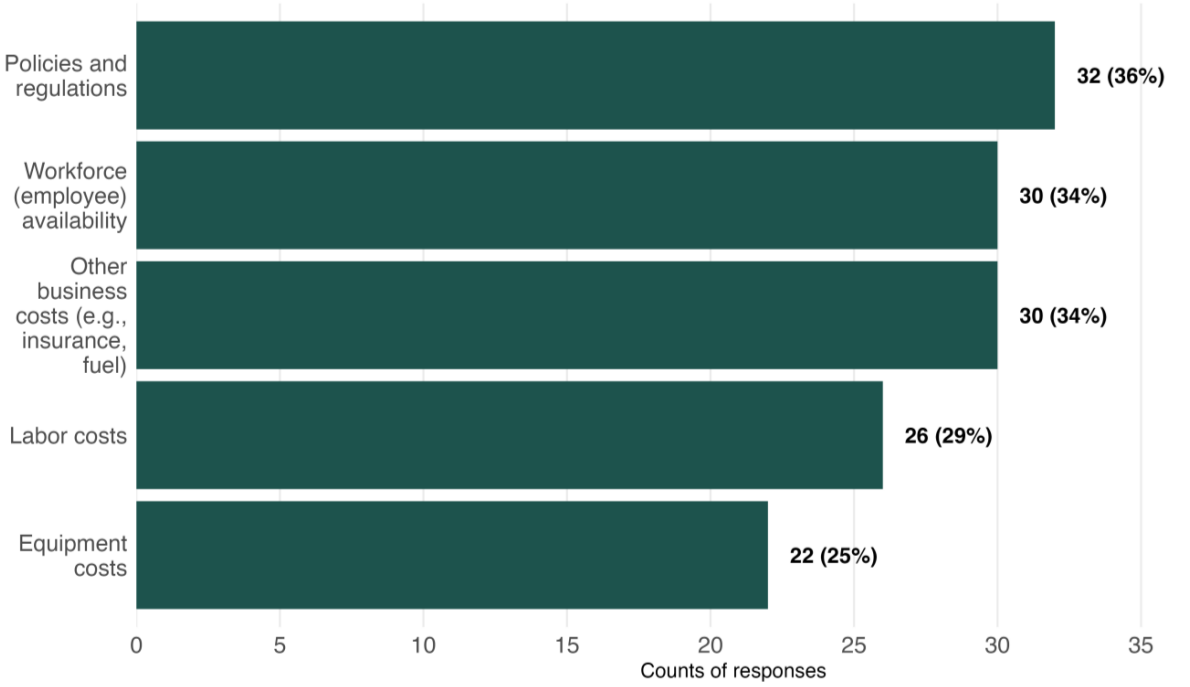
Employers report the most difficulty finding truck drivers and heavy equipment operators. They also face hiring challenges for entry-level woods workers like choker setters, highlighting the need to support both skilled and entry-level workforce development.

Three quarters of survey respondents agree or strongly agree that attracting or hiring workers over the past 12 months has been a significant challenge. Of these, 62 percent said they struggled to compete with higher pay in other industries. Just over half reported there are not enough candidates with the skills needed to perform the work and that other industries have less-demanding work. Forty percent reported retiring workers as a challenge.

Nearly half of employers agree that retaining workers over the past 12 months has been a significant challenge. The most cited challenges were competition from other industries

(both in pay and type of work), attendance, level of work available, and competition across other states.

Exhibit ES-5. Employer respondents' top business challenges in the past 12 months



Interview and Focus Group Findings

The study engaged 62 individuals through 28 in-depth interviews and five facilitated focus group sessions. Several findings described a workforce in transition, highlighting shared opportunities and pressures:

- Employers face challenges attracting and retaining workers due to remote locations, housing shortages, and wage competition, prompting some to adopt creative strategies like transportation support and attendance bonuses to remain competitive.
- Several employers emphasized the advantages of recruiting from rural communities, given increased familiarity with forestry-related work and better employee retention.
- Employers are adapting to generational shifts and evolving workforce expectations by offering more-flexible schedules and adopting inclusive practices, such as bilingual training.

Participants reported interconnected yet distinct experiences and challenges across work-types. Logging and transportation subsector representatives described recruitment and retention challenges due to physically demanding work, early hours, and limited training pathways like CDL programs. Wildfire mitigation and restoration roles range from entry-level to highly specialized positions and offer increasing appeal to younger people seeking purpose-driven work, though they remain under-resourced. And public sector forestry jobs

provide stability and advancement but often require degrees and involve complex hiring processes that can deter potential job candidates.

Programs and Pathways Analysis

Training Pathways and Survey Results

Workforce development in forest operations and management follows pathways that move individuals from early exposure to advanced expertise. K–12 education introduces students to forestry concepts and basic skills, supported largely by the Oregon Forest Resources Institute (OFRI), the state agency dedicated to advancing public understanding of Oregon's forests and forest management. Career and Technical Education (CTE) builds on that foundation by providing direct experience and training. Pre-apprenticeship programs prepare participants for the structure and expectations of registered apprenticeships, where they receive paid, hands-on training alongside classroom instruction. Apprenticeships equip workers with skills needed for technical roles in the field. Workers also enter forest operations and management after postsecondary training, including certificates, certifications, and degrees. Each step in these pathways—and different configurations thereof—can support industry entry, professional growth, and skill specialization, ensuring the sector has a steady supply of trained workers across a range of roles.

Nearly all self-employed survey respondents and three quarters of employers indicated that on-the-job training and/or industry experience is the most useful or reliable type of training or education for forestry-related work. Self-employed respondents also cited continuing education seminars and online courses as especially useful, and employers cited word of mouth and friends/family. Relationships and networks play a crucial role within the forestry workforce. Smaller shares selected university-level education, professional certification programs, CTE programs, and apprenticeship training as most useful/reliable.

CTE and Apprenticeship Programs

In the 2024-25 school year, 44 high schools across Oregon offered Natural Resource / Forestry CTE Programs of Study. About 70 additional high schools with Agriculture Science and Technology CTE Programs of Study include forestry courses and forestry-related career development events. These programs provide students with hands-on experiences and technical knowledge, preparing them for various post-high school opportunities such as direct employment, apprenticeships, and further education at two-year or four-year institutions.

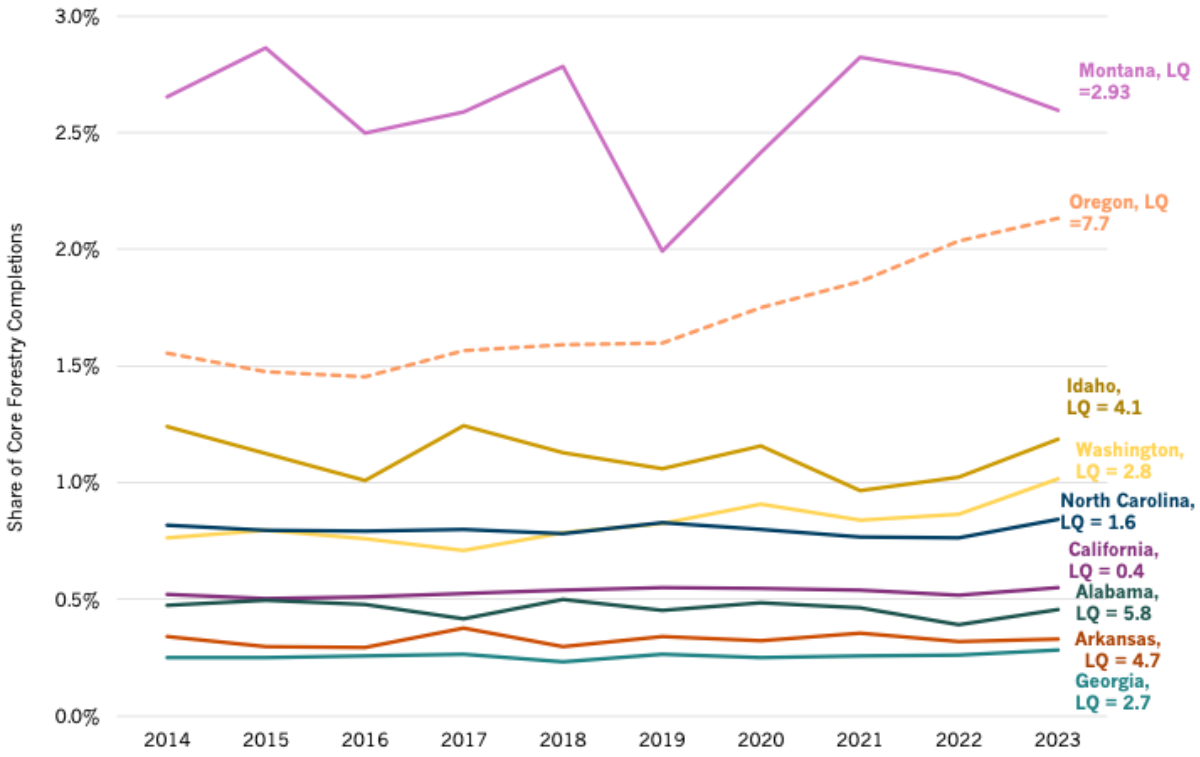
Analysis of apprenticeship and pre-apprenticeship programs relevant to forest operations and management was limited by data availability and inability to isolate programs specific to forestry. The report provides information about the five program types most closely aligned with forestry-related roles: firefighters, operating engineers, heavy truck drivers, maintenance/repair workers, and industrial machinery mechanics.

Postsecondary Credential Programs

The study's analysis of postsecondary programs focused on a set of core programs across four categories: natural resources/environmental, forestry, engineering, and firefighting, across which Oregon has about 1,000 completions per year. While most of these are bachelor's or graduate degrees, the forestry category has a concentration of certificates and associate degrees. Completions in these programs at four-year institutions have increased slowly over the past decade while community college completions have remained relatively constant. In recent years, forestry completions increased the fastest among the four categories, with an average annual growth rate of 6 percent. Engineering programs increased at an average annual rate of 4 percent.

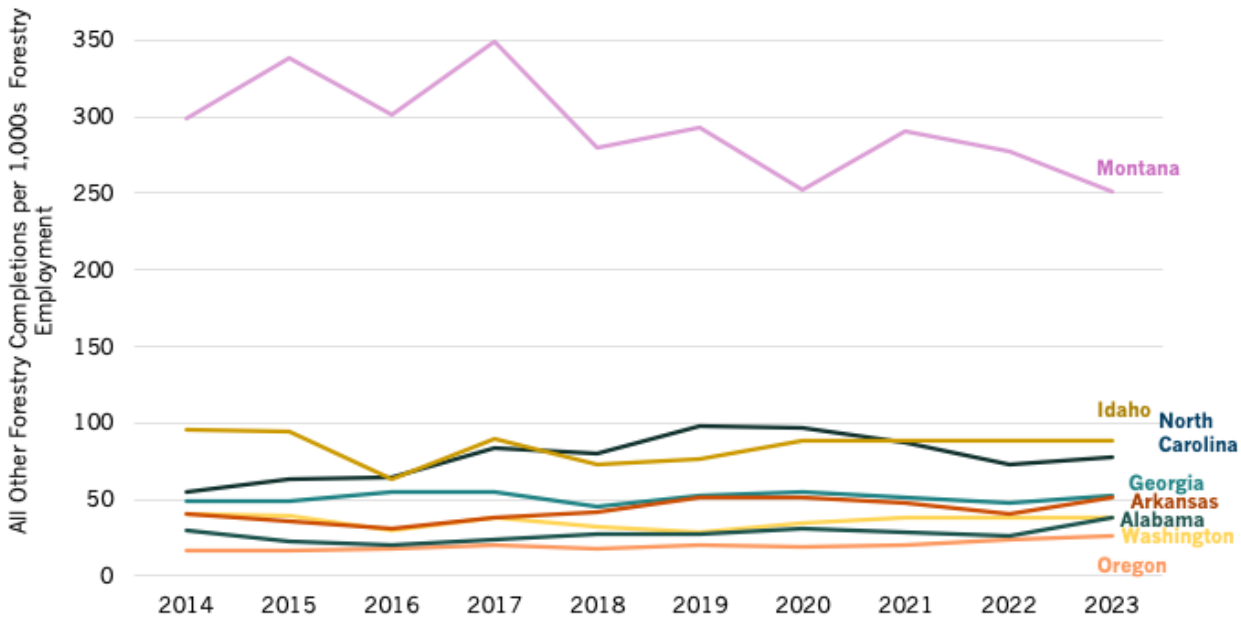
Compared to other states with sizeable softwood timber sectors, Oregon has both a high concentration of forestry and logging and a high share of core completions as a share of total completions (Exhibit ES-6). The ratio of core completions to forestry employment provides another metric for assessing the extent to which a state's postsecondary pathways support the industry's scale in the state. By this metric, Oregon's postsecondary forestry pathways appear relatively small compared to comparison states (Exhibit ES-7). This reflects to some extent Oregon's large forestry and logging industry relative to the size of the state's economy and a need to rely on skilled workers trained in other states and could also indicate opportunities to expand programs to better support the industry.

Exhibit ES-6. Core Forestry-Related Completions as a Share of Total Completions



Note: LQ=location quotient, for private ownership Forestry and Logging (NAICS 113), representing the concentration of employment in the industry relative to the national average. Data sources: BLS, IPEDS.

Exhibit ES-7. Core Forestry, Engineering, and Firefighting Completions as a Share of Forestry and Logging Employment



Note: Employment is for Forestry and Logging (NAICS 113). Data source: IPEDS.

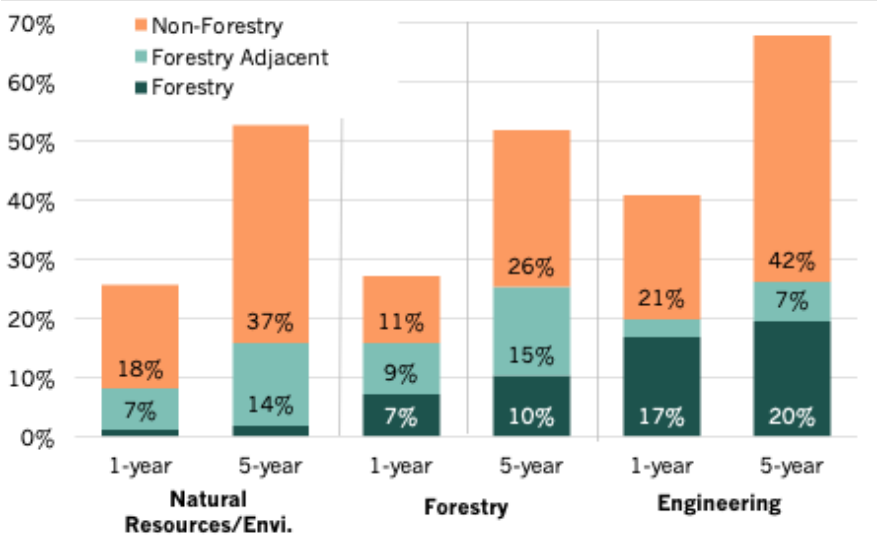
Public Postsecondary Programs in Oregon: Outcomes Analysis

HECC's Office of Research and Data provided data for the study that allow analysis of program and employment outcomes for public postsecondary programs in Oregon. This provides a valuable starting point for quantitatively assessing the adequacy and effectiveness of Oregon pathways (the extent to which selected pathways support the forest operations and management workforce). Similar analyses of apprenticeship and other program data, if and when available, would provide a more complete picture, adding significantly to an understanding of relevant pathways.

Among students who received a credential between 2012-13 and 2018-19, Exhibits ES-8 and ES-9 show employment and wage outcomes at one year and five years post-completion. Students not identified as employed in this analysis may in fact be employed in Oregon's forestry sector through self-employment or may be employed in another state (information not available in the dataset).

Engineering and forestry graduates were the most likely to work in forest operations and management roles over time, while firefighting and natural resources graduates showed higher levels of employment in unrelated industries (Exhibit ES-8). Firefighting graduates showed limited change across the timeframes; the share employed in adjacent industries was 9 percent for one year and five years post-completion.

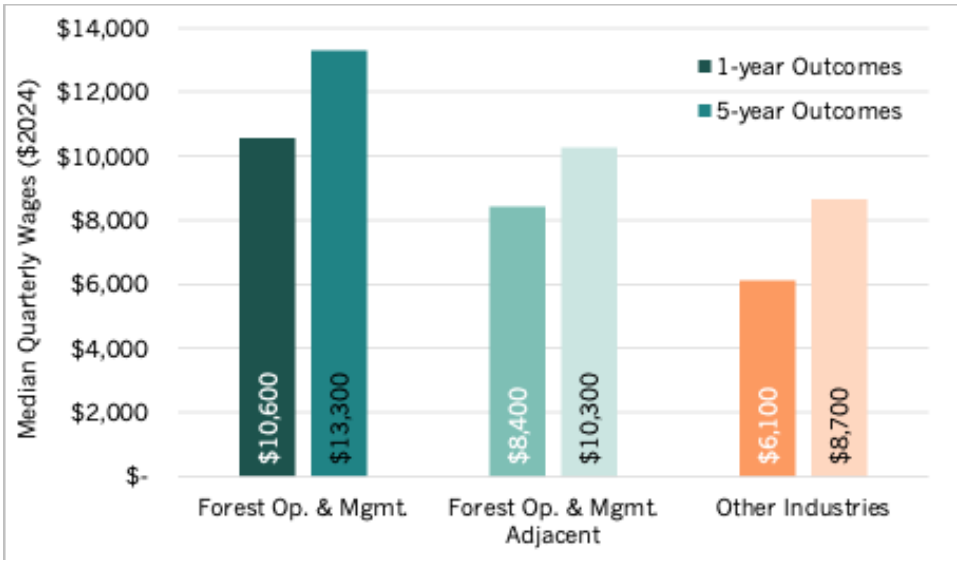
Exhibit ES-8. Post-Completion Employment Outcomes (1-year and 5-year) for Core Program Completers, by Program Group



Notes: Firefighting is omitted due to confidentiality. See report for definition of Forestry Adjacent. Data source: Oregon Higher Education Coordinating Commission.

Overall, core completers working in forest operations and management earn more than those working in adjacent and all other industries within both one year and five years post-completion (Exhibit ES-9). Employment in forest operations and management also appears to offer a wage premium across credential levels, with the exception of post-baccalaureate certificate completers. Employment in forestry-adjacent industries appears to offer a similar wage premium for certificate, associate, and bachelor's degree completers.

Exhibit ES-9. Median Quarterly Wages for Core Program Completers



Data sources: Oregon Higher Education Coordinating Commission. CPI.

Conclusions and Recommendations

Workforce Needs

In coming years, the forest operations and management sector will require many new workers to fill open positions due to retirements and turnover. Despite Oregon's strong specialization in forestry education, the scale of the sector likely means that training needs exceed current training capacity. This suggests the importance of understanding Oregon's comparative advantages in training the future forestry workforce, where the State and sector can rely on formal postsecondary programs, and where a reliance on less formal pathways or out-of-state training is appropriate. It also reinforces the need for Oregon to improve data collection to provide a better understanding of current and future mismatches between the sector's workforce needs and workforce capacity, as best as can be projected.

Recommendations Surfaced by Engagement Participants

From the survey:

- *Recommendations on how the State could better support the forestry sector's workforce*: The top categories of responses were expand training infrastructure; regulatory reform; increase harvesting; reduce taxes; and increase industry awareness.
- *Solutions that have helped or may help address businesses' workforce and/or operational challenges:* The top categories of responses were recruitment and talent pathways development; retention through compensation and job quality; strategic business response; upskilling, training, and safety; and operational efficiency and technological innovation.
- *Additional thoughts or concerns about Oregon's forestry workforce:* The top categories of responses were the need to improve public policy and public perception; forestry education needs to align with industry; need for sustainable harvesting; concern over people not wanting to work; and industry consolidation and structural stress.

From the interviews and focus groups:

- *Public perception and storytelling:* To better engage young people, State and industry leaders should highlight how the sector supports climate resilience, community impact, and sustainable land management. The focus should be on broadening visibility, representation, and relevance by showcasing the full range of job and career opportunities, including those centered on restoration and stewardship.
- *Insights to inform future action:* Oregon needs to expand support for the range of training and career pathways and increase sector engagement in workforce planning. Private employers need more visibility in youth workforce programs and can improve retention through inclusive practices such as bilingual training. Forestry should be represented distinctly—rather than as a subset of manufacturing—at the local workforce area level.

Study Recommendations

The recommendations below need consideration in the context of broader forest management changes and systemic challenges such as housing and transportation access, especially in rural areas. Efforts to consider and address these should continue simultaneous with the workforce development strategies below.

- *Next steps should begin with one or more scenario analyses, based on specific policies (e.g., Oregon's 20-Year Landscape Resiliency Strategy) likely to significantly affect the sector's workforce:* The data collection and analysis necessary to do so will highlight additional, specific data gaps that, if filled, would support similar and more comprehensive gap analyses going forward.
- *Ultimately, the state should seek a sector-wide gap analysis, based on the best available information on future workforce capacity verses workforce needs*: Without such an analysis, the state and other industry partners could continue to struggle to identify and prioritize the workforce investments that will best support the sector. Implementation of the data recommendations below could considerably improve the analysis.
- *Promote the sector and reduce the size of awareness gaps:* Highlighting sustainable practices, economic and environmental benefits, and the benefits of careers in forest operations and management can help shift public perception and attract a diverse, skilled workforce.
- *Encourage collaboration among training programs and employers:* Effective talent development depends on strong, role-specific collaboration between educators and employers to align training with industry needs.
- *Support early and ongoing development of a skilled, diverse workforce:* Key activities are early exposure through K–12 integration, hands-on learning, accessible career pathways—including apprenticeships, short-term certificates, and degree programs—and continuing education/training, supported by partnerships between schools, state agencies, and industry.
- *Review forest-related policies, plans, and regulations that forestry businesses experience as barriers:* The study raised perspectives about costs and other barriers associated with regulations, workforce compliance, and insurance; these should be reviewed through coordinated effort between industry and government.
- *Continue to improve data collection about industry structure, composition, and industry-associated training and education pathways:* Standard classifications inadequately capture the complexity and scale of the sector, particularly its small, multifaceted operators; data gaps need to be filled through extended classification efforts and targeted surveys.
- *Continue efforts to link and analyze CTE, apprenticeship, postsecondary, and employment data: S*ignificant gaps remain in these data systems, particularly around

apprenticeships and CTE, which limits the ability to evaluate how well forestry-related training pathways support the workforce.

Next Steps

Scenario analyses, a sector-wide gap analysis, and other needs outlined above are key to understanding the future needs of the sector's workforce. Building on existing public-private partnerships or creating a new coordinating body is recommended to guide continued research, program development, and policy alignment. The structure should be grounded in collaboration among industry, training/education, and state and federal government. Focus areas or teams could include workforce entry, ongoing skill development, and policy review.

1. Forest Operations and Management in Oregon

Study Context and Refocus

In 2024, the Oregon Legislature passed Senate Bill 1552, which requires the Oregon Higher Education Coordinating Commission (HECC) to conduct a forestry workforce study "to assist its commission in understanding and addressing challenges in Oregon's forestry workforce."[4] HECC formed a subcommittee of the Workforce and Talent Development Board (WTDB), the Forestry Workforce Steering Committee (FWSC), to oversee the study, and contracted with ECOnorthwest to complete the study.

The study began with a broad definition of the forestry sector, encompassing public and private entities engaged in "logging, forestation, wildland fire prevention and suppression, construction and maintenance of roads required for forestry, aggregate production of forestry products, trucking related to forestry, tree services, technical and professional services required for forestry, forest surveying, fuel mitigation efforts related to forestry, forestry habitat restoration, watershed improvement, crop tree release and stand improvement, forest tract management, tree nurseries, mechanical services for forestry, provision of forestry products, training resources for the forestry workforce, educational resources for the forestry workforce, human resources for the forestry workforce and other in-forest or forest-affiliated services" (SB 1552, Section 40(a)). The FWSC, via the request for proposals for the study, also required that the study include forest and wood products manufacturing.

ECOnorthwest conducted the early phases of the project using this definition, aligning with the definition of the forestry sector used by the Oregon Employment Department (OED) (see below), and provided the FWSC with draft report chapters and analysis. Following review of these materials, the FWSC determined the need for a study focused on the forest operations and management workforce in Oregon—including owners, proprietors, partners, and employees of relevant companies and organizations working in the woods and up to the gates of the mills—rather than a broader forestry sector study that included forest and wood products manufacturing. The resulting refocused study is presented in this report.

Study Components and Report Organization

The study consisted of multiple phases and components, each with the purpose of collecting and analyzing information about conditions, challenges, and opportunities in

[4] SB 1552, https://olis.oregonlegislature.gov/liz/2024R1/Downloads/MeasureDocument/SB1552/Enrolled

Oregon's forest operations and management workforce and training pathways. The report details the findings of the study in four chapters:

1. Forest Operations and Management in Oregon
2. Workforce Analysis
3. Programs and Pathways Analysis
4. Conclusions and Recommendations

Each chapter includes the results of qualitative and quantitative analysis of a wide variety of data sources, including the study's engagement activities, which included a survey of forestry employers and self-employed individuals and interviews and focus groups with employers, agency staff, training program leaders, workforce board representatives, and others. See the Study Methodology section for more information about the study components.

The remainder of this chapter provides context for workforce conditions and trends, sector definitions, a workforce size estimate, and sector characteristics.

Context of Workforce Trends in Forest Operations and Management

Forest operations and management underpin both the state's economy and the health of its diverse landscapes, communities, and ecosystems. Forestry professionals work across a wide range of disciplines to manage forests for resources, recreation, conservation, wildfire mitigation, land restoration, and watershed health. This work includes both the administration of operations and management and the required physical labor, with workers skilled in practices such as harvesting, thinning, brush clearing, tree planting, wildfire suppression, truck driving, road construction, and heavy equipment operation. Different forestry subsectors produce, rely on, and support timber in Oregon. Understanding the sector's workforce conditions and needs is essential for the health of the state's economy and forests. Following this brief overview of historical and forward-looking context, this section describes (1) the benefits communities experience because of forest operations and management, (2) the high-level forest policy context, and (3) literature review findings,

Forestry activity levels vary across the state, driven by differences in forest composition, ownership, and policy. While timber-rich forests in some areas, such as the Coast Range and western Cascades, support sustainable forest management, other regions support a broad network of industries involved in transportation, distribution, and equipment support, providing essential jobs across the state. Federal land ownership plays a major role in regional industry dynamics and federal policy decisions have had long-term economic, employment, and community impacts. The sector's workforce reflects these geographic and industrial differences. Many workers are employed in roles such as harvesting or

processing, while others are trained in forest conservation, ecological research, or firefighting.

Since the 1990s, forest operators and managers in Oregon have experienced reduced timber harvests, global competition and market shifts, and technological advancements that have made many tasks less labor intensive. Between 1990 and 2020, employment in logging fell considerably.[5] At the same time, the role of forests in Oregon has diversified beyond timber production. Today, a wide range of professionals are engaged in managing Oregon's forests as resilient ecosystems. The industry continues to provide a robust set of goods and services that Oregonians value, described in the following section. Fuels reduction and wildfire suppression have also become core components of forestry work as climate change intensifies fire risk across the state. This work requires hands-on labor that cannot be fully automated, ensuring that physically demanding forestry work remains a critical part of the sector's future. In 2024 alone, over 1.9 million acres in Oregon were affected by wildfire, damaging forest ecosystems and upland watersheds.[6] This reflects a broader trend of increasing acres burned annually, a pattern projected to continue.

Seasonal employment patterns, especially in wildfire suppression, tree planting, logging, and land management, result in a dynamic and mobile workforce. The industry relies on a mix of permanent and migrant labor, with many workers traveling across the western U.S., including a large contingent of H-2B visa workers, necessary to meet seasonal demands.[7] These employment dynamics create both opportunities and challenges for workforce development and long-term industry sustainability.

Preparing forests and forest-adjacent communities for a changing climate and rising wildfire risk demands expanded skills, new areas of specialization, and continued investment in a well-trained and resilient workforce.

Community Benefits of Forest Operations and Management

Healthy, well-managed forests provide a range of goods and services that benefit Oregon's communities. Timber harvests in public forests (federal, state, and locally owned) generate revenue that funds public services, from roads and police to schools and libraries. For many rural communities, timber harvest revenue is the primary source of support for these critical local services. The businesses that engage in forest management are also pillars of

[5] Rooney, Brian. "Oregon's Forestry and Logging Industry: From Planting to Harvest." State of Oregon Employment Department, June 7, 2023. https://www.qualityinfo.org/-/oregon-s-forestry-and-logging-industry-from-planting-to-harvest-1

[6] "State of Oregon Advancing Wildfire Protection." Office of Governor Tina Kotek, September 2024. https://www.oregon.gov/gov/Documents/Wildfire%20Program%20Report%2017_Sept_2024.pdf

[7] "The H-2B program allows U.S. employers or U.S. agents who meet specific regulatory requirements to bring foreign nationals to the United States to fill temporary nonagricultural jobs. The employment must be of a temporary nature for a limited time, such as a one-time occurrence, seasonal, peak load need, or intermittent need. There is a statutory numerical limit, or 'cap,' on the number of foreign workers who may receive an H-2B visa, or otherwise be granted H-2B status, during a fiscal year." See the H-2B Employer Data Hub at https://www.uscis.gov/tools/reports-and-studies/h-2b-employer-data-hub

many smaller communities, contributing value through monetary donations and investments of time and expertise in local organizations.

Well-managed forests provide goods and services beyond timber that benefit communities. Forests provide non-timber products like salal, mushrooms, firewood, greenery, and berries that many people enjoy for personal recreational or subsistence use. People from across the state treasure Oregon's forests for recreational use, from camping and off-road vehicle use to backpacking and mountain biking. Like timber harvest, these forest-based activities support commercial businesses that attract people from urban areas and generate economic activity in local communities.

Well-managed forests also provide communities with ecosystem services such as drinking water protection, wildfire risk reduction, erosion control, and scenic views that protect and support property values; they can also reduce the cost of providing some public services like water filtration. Reducing wildfire risk is an increasingly urgent concern across Oregon and forest operators and contractors play a key role in the state's emergency management system.

Finally, forests also contribute to community identity, cultural meaning, and educational and scientific inquiry. Many forestry employers participate in school partnerships, youth workforce training programs, and public outreach, helping to build awareness of and access to forest careers. Forest landscapes are deeply tied to community identity and cultural meaning, especially in rural areas where forestry work has spanned generations, and continue to serve as spaces for learning.

Economic Contributions of Timber Harvests

Forest operations and management contribute to Oregon's economy, supporting direct and indirect income, jobs, and tax revenues.. In 2017, for example, every million board feet harvested in Oregon added about 11.5 jobs and $706,000 in labor income to the state economy.[8] In addition to the direct employment described elsewhere in this report, the forestry sector stimulates broader economic activity through supply chains, further indirectly supporting employment and income across multiple sectors.[9]

Revenue generated from timber harvest on public and private forestlands provides funding for public services delivered statewide and by local governments, especially in counties with large areas of federal or state-owned forests. Historically, 25 percent of timber revenue from federal timber receipts went to local governments to support schools, fire departments, taxing districts, and general fund projects.[10] Receipts from state land are also

[8] Simmons, Eric A., 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. General Technical Report PNW-GTR-997. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station (October 2021).

[9] Simmons, Eric, and Kate Marcille. *Oregon Forest Products Industry and Timber Harvest, 2017: Highlights and Summary Data Tables*. Bureau of Business and Economic Research, University of Montana (February 27, 2020).

[10] "Administrative Final Environmental Impact Statement for the Western Oregon State Forests Habitat Conservation Plan." National Marine Fisheries Service, October 2022.

shared with counties. Declining harvest levels on public land arising from forest management policies and dynamic market conditions have led to losses in revenue available to fund public services at all levels of government. This, compounded with declining forest-sector employment and income, has disproportionately affected the economic and social fabric of many communities in rural Oregon. A 10-year socioeconomic study of the NWFP found that forest-dependent communities were more likely to experience declines in socioeconomic well-being compared to others. Although some communities have shifted to leverage economic benefits from other uses of the forest, like recreation, the jobs, incomes, and revenues generated from this economic activity in most places falls significantly short of the historical contributions of timber harvest.[11]

To help offset the economic losses from reduced harvesting, Congress passed the Secure Rural Schools and Community Self-Determination Act of 2000 (SRS). The act provides federal payments to counties, helping sustain local government and school budgets. Under the SRS, counties can elect to receive SRS payments or the traditional 25 percent timber revenue-sharing system based on actual federal timber receipts. In 2024, federal timber sales in Oregon generated more than $26 million.[12] If all counties were to elect the 25 percent option, they would collectively receive more than $8 million.[13] Instead, eligible counties typically chose SRS payments, which totaled more than $47 million in 2023.[14]

While SRS funding did not fully replace lost timber revenues—especially in counties with limited alternative revenue sources and high dependence on logging—it provides critical financial support that helps sustain essential services. However, Congress must routinely reauthorize this support and has failed to do so, most recently in 2024, leaving communities with uncertainty around revenue planning and service delivery.[15]

Revenue from harvest on state lands also supports Oregon's communities. Board of Forestry lands, Oregon's state-owned forests, operate under a revenue-sharing model in which 63.75 percent of net timber revenue is transferred to counties and local taxing districts where harvesting occurs.[16] In 2024, this share totaled more than $68 million, benefiting 13 counties and supporting essential public services such as education, public safety, and infrastructure.[17] In addition, Common School Fund lands are owned by Department of State lands but managed by the Oregon Department of Forestry (ODF). Revenues from timber harvests on these lands are deposited into the Common School

[11] Charnley, Susan, Ellen M. Donoghue, and Cassandra Moseley. "Forest Management Policy and Community Well-Being in the Pacific Northwest." Journal of Forestry 106, no. 8 (December 1, 2008): 440–47. https://doi.org/10.1093/jof/106.8.440

[12] "All Services Receipts (ASR): Final National Forest Statement of Receipts (ASR-13-2)." U.S. Forest Service, September 30, 2024. https://www.fs.usda.gov/sites/default/files/2024-asr-13-2-report.pdf

[13] "All Services Receipts (ASR): Final Payment Detail Report PNF (ASR-10-03)." U.S. Forest Service, September 30, 2024. https://www.fs.usda.gov/payments/asr/2024/10-3-report.html

[14] "All Services Receipts (ASR): Final Title I, II, and III Report PNF (ASR-18-01)." U.S. Forest Service, September 30, 2023. https://www.fs.usda.gov/sites/default/files/final-2023-18-01-report.pdf

[15] Congress.gov. "Text - H.R.3684 - 117th Congress (2021-2022): Infrastructure Investment and Jobs Act." November 15, 2021. https://www.congress.gov/bill/117th-congress/house-bill/3684/text

[16] "2025-27 Budget Review – Department of Forestry." Oregon Legislative Fiscal Office, n.d. https://olis.oregonlegislature.gov/liz/2025R1/Downloads/CommitteeMeetingDocument/293635

[17] "Council of Forest Trust Land Counties Annual Report." Oregon Department of Forestry, 2024. https://www.oregon.gov/odf/Documents/forestresources/cftlc-annual-report-2024.pdf

Fund, along with revenues from leases, property sales, gifts, and returns on investment of the fund. This revenue is distributed to school districts across Oregon twice a year.

Forest-Related Recreation Benefits and Non-Timber Products

Oregon's forests provide considerable value to people who use the forest for recreation. Some of this value—especially for non-local travelers—translates into economic activity (jobs, income, and tax revenue) for local businesses and governments, as visitors spend money on fees, supplies, food, and gas on recreational trips.[18] Average per-person trip spending (on items such as fuel, food, and supplies) ranges from approximately $14 for backpacking to $40 for hunting, in 2024 dollars.[19] Research by economists reveals that the value—expressed in dollars—that people ascribe to their recreational experiences is often significantly more than the amount they spend to participate in an activity. Economists who have measured this value among recreational visitors in Oregon have found that this value per trip ranges from about $28 to $160, with backpacking at the lower end and mountain biking and nonmotorized boating generating the highest added value.[20]

Oregon's state forestlands contain approximately 85 developed recreation sites (e.g., campgrounds and day-use areas) and 561 motorized and 140 nonmotorized trail miles.[21] In 2024, ODF generated more than $300,000 in recreation revenue from issuing campground permits on state-managed lands and maintained more than 70 miles of trails, supported by more than 15,000 volunteer hours.[22]

Beyond timber and recreation, Oregon's public forests provide access to culturally and economically important resources such as mushrooms, berries, medicinal plants, and firewood. Rural and Tribal communities have long relied on these resources for subsistence and cultural purposes, while there is increasing demand for these resources both privately and commercially from a broad spectrum of Oregonians and visitors. These materials are essential not only for household sustenance but also for maintaining cultural practices, intergenerational knowledge, and community resilience. In 2022, approximately 16 percent of Oregon residents participated in foraging activities.[23] Additionally, ODF issued more than 1,500 firewood permits in 2024, underscoring the continued importance of state forestlands for heating and home use.[24] Hunting and fishing also remain key subsistence activities on these lands, contributing significantly to food security for many households.

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[18] White, E. "Spending Patterns of Outdoor Recreation Visitors to National Forests." U.S. Forest Service, 2017. https://www.fs.fed.us/pnw/pubs/pnw_gtr961.pdf
[19] Ibid.
[20] Rosenberger, R.S. "Total Net Economic Value"
[21] ODF Recreation Facilities and Trails Data. Oregon Department of Forestry, 2024.
[22] "Board of Forestry Recreation Accomplishments (FY 2024)." Board of Forestry, Oregon Department of Forestry, n.d. https://www.oregon.gov/odf/Documents/workingforests/bof-recreation-accomplishments-fy24.pdf
[23] "2023 Oregon Resident Outdoor Recreation Survey Report." Oregon Parks and Recreation Department, 2024. https://www.oregon.gov/oprd/PRP/Documents/SCORP-2023-Oregon-Resident-Outdoor-Recreation-Survey-Report.pdf
[24] "Commercial Collection of Special Forest Products Permit Data." Oregon Department of Forestry.

Recognizing and supporting these diverse forest values is essential to equitable and inclusive land stewardship.

Ecosystem Services

Oregon's forest operations and management workforce plays a vital role in protecting communities and ecosystems through proactive, science-based land stewardship and essential service/resource provision. Key activities such as fuels reduction, ecological thinning, and prescribed burning are central to reducing wildfire severity and protecting lives, infrastructure, and watersheds. These interventions lower fuel loads in fire-prone forests, help reintroduce natural fire regimes, and improve the ability of landscapes to recover after disturbance. Forest operators also build and maintain roads that provide or enhance emergency services access, and they provide firefighting and emergency response resources—including equipment and crews—through contracts with ODF, USFS, and BLM (for example, Virtual Incident Procurement [VIPR] and Incident Resource Agreement [IRA] contracts).

Beyond immediate fire risk mitigation, forest restoration projects enhance long-term ecosystem health by promoting native vegetation, improving wildlife habitat, stabilizing soil, and safeguarding clean water sources. In doing so, the workforce contributes to climate resilience by supporting carbon storage and reducing the likelihood of high-emissions wildfire events. These environmental and safety benefits reflect the sector's evolving role—not only as a producer of timber, but as a key partner in ensuring the health, safety, and sustainability of Oregon's forests.

Education, Youth, and Community Partnerships

Forest operations and management businesses contribute to communities through volunteerism, partnerships, and donations. Employer-supported programs such as school forestry days, classroom visits, and field site tours expand opportunities for youth to learn about forestry industries.[25] Together with public and non-profit partners, Roseburg Forest Products facilitated the pilot launch of a pre-apprenticeship program, offering high school students early exposure to forestry-related skills and equipment.[26] Companies also often donate employee time, equipment, and funds to enhance forestry education and career exposure, with one educator from a focus group explaining, "They tend to be pretty supportive.... We recently had someone steal our equipment; local timber companies donated $15,000 to help buy that back."

The Oregon Forest Resources Institute (OFRI) plays a central role in strengthening programming, collaboration, and partnerships across the state. Established by the Oregon Legislature in 1991, OFRI is a state agency dedicated to advancing public understanding of

[25] Stimson Lumber. "Community." https://stimsonlumber.com/company/community/
[26] Coleman, Gloria. "New program gives both school and work credit to Days Creek students." *The News Review*, February 9, 2024. https://www.nrtoday.com/news/education/new-program-gives-both-school-and-work-credit-to-days-creek-students/article_5581e52e-c528-11ee-a4f8-efa89d1a30e0.html

Oregon's forests and forest management.[27] It provides educational programs and materials for K-12 teachers and students, forest landowners, and the public. Nonprofit and philanthropic organizations also amplify these efforts. For example, the Ford Family Foundation, Oregon Community Foundation, and Portland General Electric have contributed funding and strategic support to initiatives that expand scholarships, enhance training infrastructure, and promote long-term educational pathways into natural resource careers.[28]

Programs run by community-based nonprofits such as Lomakatsi Restoration Project, AntFarm, and the Community Services Consortium offer hands-on forestry training while fostering a sense of community and responsibility. These programs combine conservation work with mentorship and life skills development, particularly for those disengaged from traditional education. "When we expose our local youth through education, a lot of them love going outdoors. Even troubled youth get renewed by working outside," explained one nonprofit educator. These programs not only help fill workforce gaps but also build a sense of purpose and connection between young people and their communities.

These efforts are further described in Chapter 3 (Insights from Literature, Interviews, & Focus Groups; Training Pathways sections on education and training from early grades into adulthood).

Forest Policy

Forest policy shapes the legal and operational environment in which Oregon's forest operations and management workforce operates. It determines not only what types of work are permitted, but also where, when, and how that work occurs. Long-term planning documents, regulatory frameworks, and shifts in federal or state priorities all influence labor demand, training needs, and the stability of the forestry workforce.

Recent proposed and enacted changes to federal, state, and private forest land policy illustrate the evolving context. Federal, state, tribal, and private landowners have experienced devastating impacts from wildfires in recent years, leading to a call from all corners (including local, state, and federal officials, insurance vendors, utilities, and landowners) for significant public investment in forest management that advances forest resilience and protects local communities from catastrophic wildfires. Recent executive orders direct federal agencies, which manage more than half of Oregon's forestland, to increase domestic timber production, streamline permitting processes, and implement emergency wildfire reduction strategies.[29] Simultaneously, Oregon's proposed Habitat Conservation Plan (HCP) and Forest Management Plan (FMP) are under development to

[27] "About the Oregon Forest Resources Institute." Oregon Forest Resources Institute. https://oregonforests.org/about-ofri

[28] The Ford Family Foundation. "Education." https://www.tfff.org/strategy/education/; Oregon Community Foundation. "Amid a Changing Climate, OCF's Focus on Resilience for People and Place Persists." https://oregoncf.org/community-impact/community-stories/amid-a-changing-climate-ocfs-focus-on-resilience-for-people-and-place-persists; Portland General Electric. "Rooted in Safety: Growing the next generation of wildfire prevention arborists." https://portlandgeneral.com/news/2025-04-rooted-in-safety-growing-the-next-generation-of-wildfire-prevention

[29] OFRI, "Who Owns the Forests?" https://oregonforests.org/forest-ownership-map

improve the efficiency of managing state lands for federal endangered species liabilities. This would affect forest management on more than 640,000 acres of state-managed lands.[30] For private lands, 2022 legislation stemming from the Private Forest Accord resulted in many changes to the Oregon Forest Practices Act, affecting timber harvest activities on more than 10 million acres of private and non-federal forests in the state; a statewide HCP covering private forestlands is under development.[31]

These shifts signal a forestry policy environment that increasingly attempts to balance industrial and environmental interests. As landowners, contractors, employers, and agencies adapt to evolving environmental conditions and regulatory frameworks, workforce demands and skills requirements may also change.

Literature Review Findings

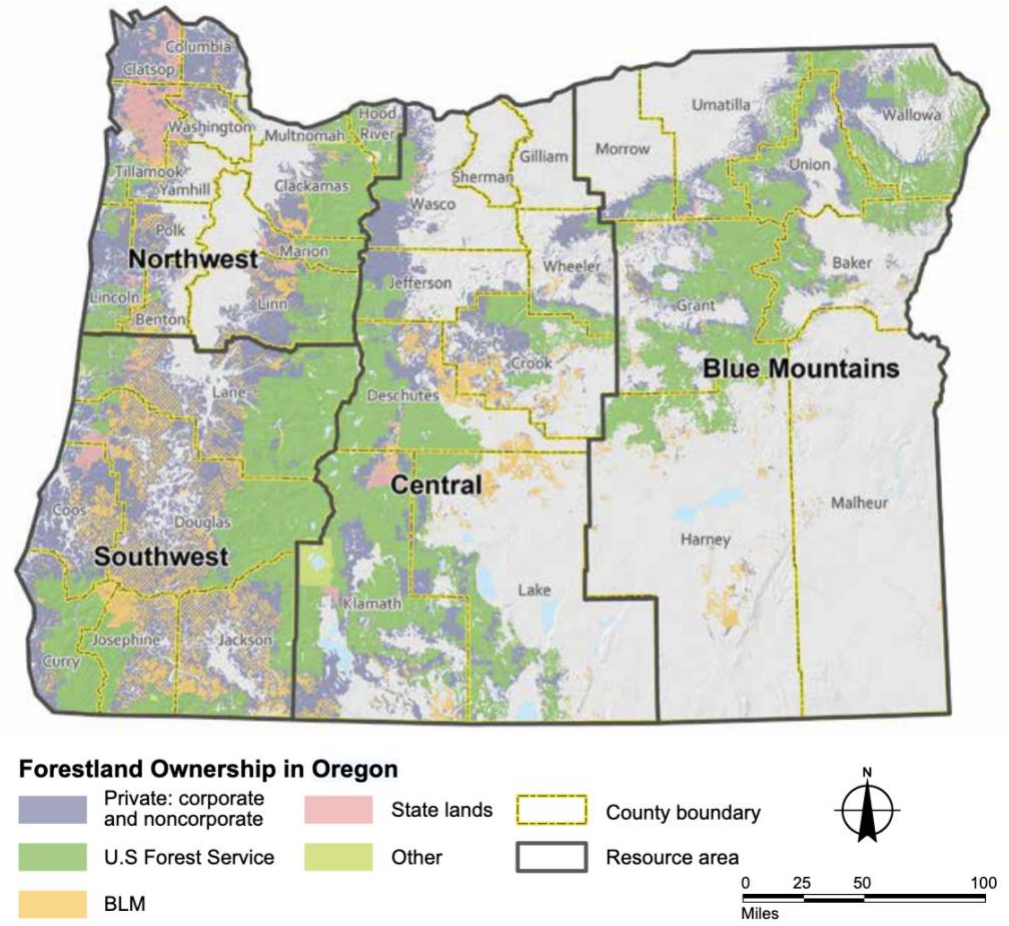
Oregon's Forestry Regions and Timber Production

Oregon has traditionally been divided into two major forestry regions: The Western Region, or Westside, contains all counties lying west of the crest of the Cascade Range. The Eastern Region, or Eastside, consists of all the remaining counties. A U.S. Forest Service (USFS) report further classifies them into four resource areas (Exhibit 1): Northwest, Southwest, Central Region, and Blue Mountains. In recent years the Western Region supplied almost 91 percent of Oregon's timber harvest, with a relatively even split between the Northwest (48.8 percent) and Southwest (42.1 percent) resource areas. Douglas, Lane, Linn, and Clatsop counties produced nearly half of the Western Region's harvest and 45 percent of the state's harvest. Within the Eastern Region, the Central Region consistently provides more timber than the Blue Mountains, with Klamath County leading the Eastern Region's timber harvest.[32]

Since the early 1990s, the decline in harvests on federal lands has affected annual timber harvests for both regions; Oregon's Eastern Region has experienced the largest decline because 70 percent of the region's forest land is under federal ownership.

[30] ODF, Forest Management Plan, https://www.oregon.gov/odf/aboutodf/pages/stateforestsfmp.aspx
[31] ODF, *2023 Annual Legislative Report: Senate Bills 1501 & 1502 Private Forest Accord Implementation Update*. https://www.oregon.gov/odf/aboutodf/Documents/2023-odf-sb-1501-and1502-report.pdf
OFRI, Private Forest Accord, https://oregonforests.org/private-forest-accord
[32] Simmons et al. Oregon's Forest Products Industry

Exhibit 1. Oregon Forestry Regions



Source: Simmons et al. (2021)

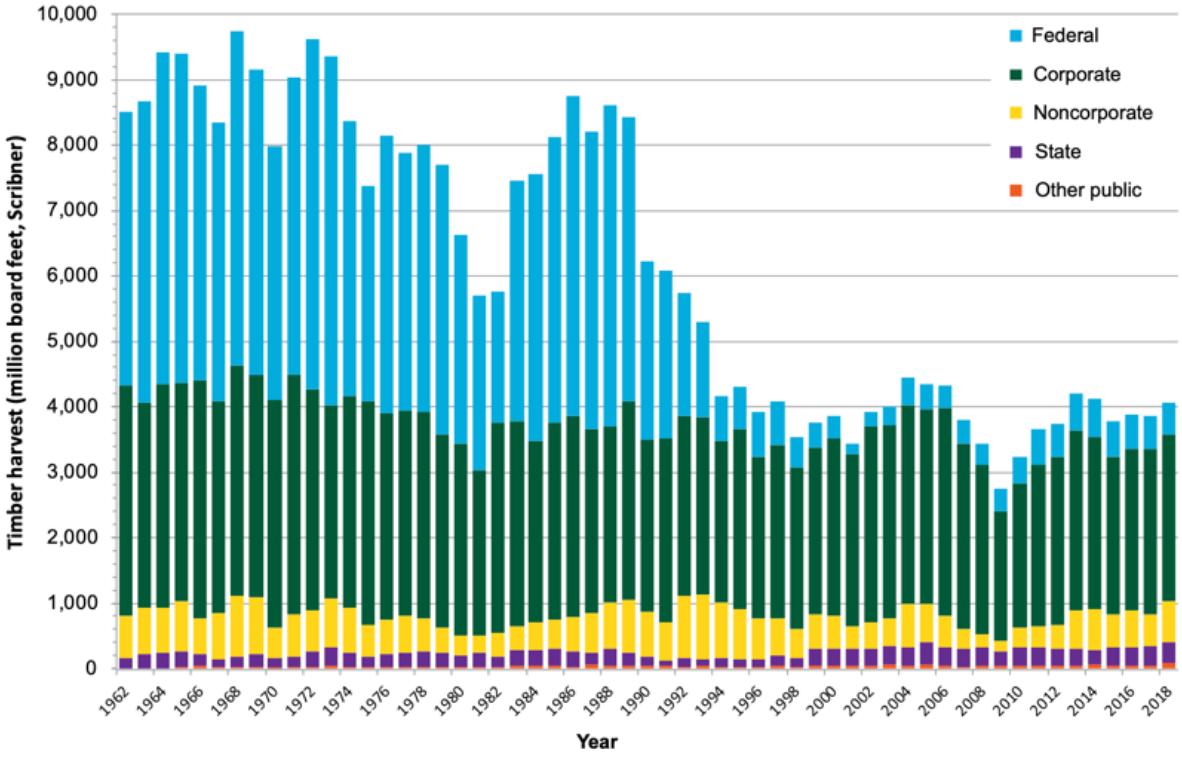
Timber Harvest by Land Ownership Type

Timber harvest in Oregon is heavily influenced by land ownership and regulatory context. Private lands, both corporate and noncorporate holdings, are the primary source of timber harvest and associated employment in logging and hauling. Public lands harvest much less and play a significant role in ecosystem management, fuels treatment, and habitat conservation. These activities increasingly contribute to the overall workload of forest operations and management firms across the state.

In 2017, total timber harvest in Oregon was 3,918 million board feet (MMBF). Most of this (65 percent) came from corporate private timberlands. Noncorporate timberlands such as family forestlands contributed another 13 percent. National forests provided 9 percent of the total harvests while State lands contributed 8 percent and Bureau of Land Management (BLM) and other public lands 5 percent.[33] Exhibit 2 illustrates the long-term trend of reduced federal harvests following the NWFP in the 1990s.

[33] Simmons et al. Oregon's Forest Products Industry

Exhibit 2. Oregon Timber Harvest



Source: Simmons et al. (2021), ODF 2019

Contracting in Oregon

Contracting plays a critical role in forest operations and management across Oregon. Public land agencies such as USFS and ODF frequently work with private businesses to carry out essential forest management activities. A national study of labor-intensive forestry contracts on National Forest System lands from 2001 and 2020 found that Oregon was the state with the largest number of businesses performing labor-intensive forestry work—1,334 businesses, accounting for 16.9 percent of all businesses contracted nationwide.[34]

Oregon also demonstrates strong local contract capture: In 2020, 79 percent of the 16,909 federal forestry contracts performed in Oregon were awarded to businesses based within the state. Over the 20-year period, Oregon contractors secured 34,413 federal contracts worth more than $3.5 billion, including over $1.2 billion specifically in labor-intensive forestry work. These contracts covered a wide range of forest management services, including fire suppression, tree thinning, planting, land treatment, wildlife management, fire rehabilitation, and recreation maintenance.

[34] Deak, Alison, Heidi Huber-Stearns, Mindy Crandall, Kamana Poudel, Emily Jane Davis, Michael R Coughlan, and Carl Wilmsen. "Documenting Twenty Years of the Contracted Labor-Intensive Forestry Workforce on National Forest System Lands in the United States." *Journal of Forestry* 121, no. 5–6 (November 15, 2023): 457–69. https://doi.org/10.1093/jofore/fvad026

ODF also engages private businesses for forest management services on state-managed lands. In fiscal year 2024, ODF allocated $80,000 for contractor-led land surveys in preparation for timber harvests. The agency also supports road infrastructure that enables both forest management and public access, maintaining its own road crew with a $1.7 million budget in 2024.[35] Together, these investments reflect how State forest operations channel public funds into Oregon's broader forestry sector, reinforcing contracting as a key way through which forest operations, management, and economic development intersect.

Location and Season of Work in Forests

In the U.S., the average distance between a business's headquarters and the location where its forestry contract work is performed increased from 158 km to 1,051 km between 2001 and 2020.[36] Many states are reliant on out-of-state businesses to perform labor-intensive forestry work occurring within their boundaries, and businesses have traveled increasingly longer distances to perform this work over time. However, Oregon may not be following this pattern, as 79 percent of the state's 16,909 contracts awarded to businesses were located within the state in 2020.[37] If Oregon continues to draw on its internal workforce it will demonstrate the state's role as a leading hub of businesses for labor-intensive forestry work.

The type and timing of seasonal fluctuations of forest work vary between regions based on the local climate. In Oregon, forestry and logging work is most active in late winter, spring, and fall, with slower time in the summer when fire danger is high. Winter and early spring is the time for tree planting and thinning. Fire season in the Pacific Northwest is from June to September when there is little rainfall and low humidity. During July, August, and September, restrictions limit the running of chainsaws or other equipment with engines in the woods in Oregon because of risk of starting a fire. Wildfire suppression is a common activity during these months.[38]

Hispanic or Latino workers make up a significant portion of the labor-intensive forestry workforce, including many workers with H-2B visas. A study of working conditions in labor-intensive forestry jobs in Oregon found that workers in these jobs construct their work life to deal with seasonality in three major ways:

- One set of workers performed a wide variety of jobs in the woods as the seasons changed. They might do wildfire suppression during the summer months and then tree planting and seedling maintenance in a different area before returning to Mexico in November.

[35] Kevin Boyd, "Socioeconomic Report," email message to ECOnorthwest, October 2, 2024.
[36] The kilometer increase translates to an increase from 98 miles to 653 miles. See Deak et al. "Documenting Twenty Years"
[37] Deak et al. "Documenting Twenty Years"
[38] Moseley, Cassandra. "Working Conditions in Labor-Intensive Forestry Jobs in Oregon." Ecosystem Workforce Program, University of Oregon, 2006. https://scholarsbank.uoregon.edu/server/api/core/bitstreams/aed04379-2537-4b07-9822-9219c18a6dff/content

- A second set of workers were in the woods for a few months of the year but also had periods when they worked in other industries, took care of their families, were students, or were unemployed. They might plant trees in Oregon and California from January to June, then work at a juice-making company during the fire season, and then do tree thinning work in Oregon and Idaho for the rest of the year.
- Additionally, many workers were "on call"; they were signed up with an employer but not guaranteed work. This was particularly prevalent for wildfire suppression activities. The workers might go to Klamath Falls and then Sacramento, California, in July, and then not work another fire until September at Roseburg.[39]

Aging Workforce

Like other sectors, forest operations and management is experiencing a demographic shift as the workforce ages. According to U.S. Bureau of Labor Statistics, 25 percent of workers in the logging sector were 55 years or older as of 2021.[40] This trend is also reflected in Oregon. As of 2023, approximately 33 percent of employees in the combined agriculture, forestry, fishing, and hunting sector were aged 55 years or older, compared to 24 percent across all industries in the state.[41] This trend suggests a substantial segment of the forestry workforce is nearing retirement, highlighting the need for proactive workforce development efforts. Recruiting and training younger workers will be essential to ensure continuity and resilience in forest operations and management.

Technology in Forest Operations and Management

Oregon's forest operations and management workforce continues to evolve alongside emergent technologies such as mechanized harvesters and aerial drones.[42] These tools require new skills, with employers seeking professionals who have technical skills and training in operating advanced machinery.[43] Between 1990 and 2020, logging employment in Oregon decreased but per-worker productivity increased, in part due to greater operational efficiency through mechanization.[44]

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[39] Ibid.
[40] Korhonen, Jaana, Rajat Panwar, Jesse Henderson, Kathryn Fernholz, Zakiya Leggett, Eliza Meyer, and Arvind A.R. Bhuta. "Gaps in Diversity Representation and Data Insufficiencies in the U.S. Forest Sector Workforce Analysis." *Trees, Forests and People* 15 (March 2024): 100486. https://doi.org/10.1016/j.tfp.2023.100486.
[41] O'Connor, Pat. "Oregon's Agriculture Sector." Oregon Employment Department. September 5, 2024. https://www.qualityinfo.org/-/oregon-s-agriculture-sector
[42] Aerial drones are increasingly used to map and survey large, forested areas or plant seedlings. See Wallace, Dave, Chris Dula, Randy Smith, Alan Hardcastle, James Richard McCall, and Thom Allen. *Outdoor-Industry Jobs: A Ground Level Look at Opportunities in the Agriculture, Natural Resources, Environment, and Outdoor Recreation Sectors*. (Olympia, WA: Washington Workforce Training and Education Coordinating Board, November 2018).
[43] SRI International. *Oregon 2024 Talent Assessment*. Prepared for the State of Oregon Workforce and Talent Development Board and Higher Education Coordinating Commission (May 10, 2024).
[44] Rooney, Brian. "Oregon's Forestry and Logging Industry: From Planting to Harvest." State of Oregon Employment Department, June 7, 2023. https://qualityinfo.org/-/oregon-s-forestry-and-logging-industry-from-planting-to-harvest

Forestry businesses and workers have also adopted technologies to improve safety outcomes. Research on steep slope harvesting, which is common in the Pacific Northwest, shows that mechanized systems reduce exposure to high-risk incidents in traditional hand felling such as slips, falls, and being struck by trees or overhead hazards.[45] In mechanized systems, workers are typically enclosed in protected cabins rather than exposed on the terrain. While the use of large, heavy equipment introduces new safety considerations and training needs, it represents a meaningful shift toward safer forestry operations.

These changes highlight the importance of responsive workforce development and continuing education systems that keep pace with technological change both in supporting workers to adapt within the field and advance their careers.

Regional Comparison: U.S. Southeast

The U.S. Southeast accounts for 63 percent of the nation's annual harvest volume, making the region a valuable point of comparison for forest operations and management in Oregon.[46] While the workforces in the Southeast and Pacific Northwest have each adapted in response to mechanization, geography significantly influences how these changes unfold. In the Southeast, mechanized harvesting is more widespread and efficient due to long operating seasons, high volumes of homogenous timber, and tree plantations. Researchers estimate that logging operations in the Southeast require eight to nine workers per million cubic feet of timber harvested compared to eleven to twelve workers per million cubic feet in the Pacific Northwest, with its steeper terrain, diverse timber, and need for more manual logging.[47]

Both regions share a reliance on migrant labor, particularly through the H-2B visa program. In the Southeast, an estimated 50 to 84 percent of the forestry workforce consists of H-2B guest workers.[48] The Pacific Northwest has seen similar trends and a 650 percent increase in H-2B workers between 2011 to 2021, from 664 to 4,134.[49]

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[45] Garland, John, Francisca Belart, Robert Crawford, Woodam Chung, Tamara Cushing, Stephen Fitzgerald, Preston Green, et al. "Safety in Steep Slope Logging Operations." Journal of Agromedicine 24, no. 2 (April 3, 2019): 138–45. https://doi.org/10.1080/1059924X.2019.1581115

[46] Smidt, Mathew, Jason Cooper, Yaoqi Zhang, and Carlos Diniz. "Logging Crew Attributes by Region in the Southeast USA." *Croatian Journal of Forest Engineering* 44, no. 2 (July 14, 2023): 431–39. https://doi.org/10.5552/crojfe.2023.2250

[47] Sorenson, Colin B., Charles E. Keegan, Todd A. Morgan, Chelsea P. McIver, and Michael J. Niccolucci. "Employment and Wage Impacts of Timber Harvesting and Processing in the United States." *Journal of Forestry* 114, no. 4 (July 3, 2016): 474–82. https://doi.org/10.5849/jof.14-082
1 MMCF translates roughly to 6.7 to 8.3 million board feet (MMBF)

[48] Brodbeck, Arnold, Conner Bailey, and Wayde Morse. "Seasonal Migrant Labor in the Forest Industry of the Southeastern United States: The Impact of H-2B Employment on Guatemalan Livelihoods." *Society & Natural Resources* 31, no. 9 (September 2, 2018): 1012–29. https://doi.org/10.1080/08941920.2018.1482038

[49] Davis, Emily Jane, Carl Wilmsen, Manuel A. Machado, and Gianna M. Alessi. "Multiple Stories, Multiple Marginalities: The Labor-Intensive Forest and Fire Stewardship Workforce in Oregon." *Fire* 6, no. 7 (July 6, 2023): 268. https://doi.org/10.3390/fire6070268

Study Methodology

Research Design

This study is a mixed-methods study consisting of a document and literature review (summarized above), analysis of public and confidential industry and workforce data, and engagement activities—a statewide survey, interviews, and focus groups—designed to collect supplementary data and represent diverse perspectives from across the state. These methods were best suited to answer the study research questions, given the project timeline and resources.[50] Each section of the report describes the analytical techniques and approaches used to inform that section.

Data Collection Methods and Sources

The study followed quantitative and qualitative data collection plans described in Appendix 4. The quantitative data came from a variety of public sources, some readily available and others requiring confidential data requests and agreements regarding use.

The study included a survey of businesses involved in forest operations and management to assess current workforce characteristics and challenges within Oregon's forestry sector. The survey was structured to ask a different but related set of questions of self-employed individuals and employers because of differences in how the two types of entities operate. The survey provided both quantitative and qualitative data for the study. Just over 100 business representatives responded to the survey.

Other qualitative data collection methods included a robust set of interviews and focus groups, described in Appendix 4. ECOnorthwest recruited 147 individuals and ultimately engaged 62 through a combination of 28 in-depth interviews and 5 facilitated focus group sessions. Participants included employers, agency staff, training program leaders, workforce board representatives, and others. FWSC members provided referrals and the study team conducted additional targeted outreach to capture a wide range of perspectives, roles, and experiences.

Forest Sector Definitions

OED maintains a detailed analysis of forest sector-related employment, collaborating with OFRI and other partners to quantify forest-related employment. OED reports this employment in seven categories: primary forest products; secondary forest products; forest management; forestry support; transportation, and forestry-dependent industries. Under this definition, the forest sector employed approximately 62,300 workers in 2023,

[50] The study research questions are listed in Appendix 1, Chapter 1.

accounting for about 3 percent of the state's employment (6 percent of rural Oregon's employment), and had an average annual wage of $71,900.[51]

This study's focus on the forest operations and management workforce necessitates the use of an overlapping but different industry-based definition than OED's. Exhibit 3 shows the subsectors included in this study's definition compared to OED's.

Exhibit 3. Sector Definitions

SUBSECTOR	FOREST OPERATIONS & MANAGEMENT SECTOR DEFINITION	OED FOREST SECTOR DEFINITION
Forest Operations	x	x (Forestry Support)
Forest Management	x	x
Forest Transportation	x	x
Forest Roads and Aggregate	x	
Forest Technical Services	x	
Primary Forest Products		x
Secondary Forest Products		x
Forestry-Dependent Industries		x

While forest and wood products manufacturing industries are not included in this study, they remain essential to Oregon's larger forest sector and economy, especially in rural areas. Wood product manufacturing remains the state's third largest manufacturing industry, with 22,400 employees in 2024.[52] Appendix 1 includes descriptions of the manufacturing-related subsectors included in OED's forest sector definition.

Study Limitations

The scope of this study was limited by the available timeline and resources. For example, the number of interviews and focus groups the study could include, and the level of analysis possible with each available dataset. Moreover, two main types of data limitations affected the analyses.

[51] Johnson, Anna. "Oregon's Forest Sector Employment Totaled 62,300 in 2023." Oregon Employment Department, December12, 2024. https://www.qualityinfo.org/-/oregon-s-forest-sector-employment-totaled-62-300-in-2023

OFRI's Forest Report series uses OED's sector analysis as a primary data source. The 2019 report describes the state of the forest resource base, Oregon's forest products industry, the economic contributions of the sector, risks and threats to the resource base, and non-traditional forest products and emerging market opportunities https://oregonforests.org/publication-library/2019-forest-report

[52] Rooney, Brian. "Oregon's Wood Product Manufacturing Industry is Still Important, Especially in Rural Areas." Oregon Employment Department, April 18, 2025. https://qualityinfo.org/web/guest/-/oregon-s-wood-product-manufacturing-industry-is-still-important-especially-in-rural-areas

First, available data regarding industry structure and composition proved inadequate to capture the full complexity of the sector and worker roles, particularly its small, multifaceted operators. The study's survey was an attempt to collect primary data about the operator workforce. Second, the State's education and employment data systems, particularly around career and technical education (CTE) and apprenticeships, are not sufficiently linked to allow evaluation of how well forestry-related training pathways support the workforce. The study recommendations include additional detail about these limitations and possible steps to overcome them.

Forest Operations and Management Subsectors

Oregon's forest operations and management sector is a complex and multifaceted collection of industries, roles, and types of work that are critical to both the state's economy and its forests' health. The sector is characterized by a mix of public and private forest owners, large industrial timber companies, family-owned businesses, independent owners/operators, nonprofit organizations involved in restoration and conservation, tribal governments, and public agencies such as USFS, ODF, BLM, the U.S. Fish and Wildlife Service, NOAA Fisheries, the Natural Resources Conservation Service, the Oregon Watershed Enhancement Board, and the Oregon Department of Fish and Wildlife. The following five subsectors or categories together make up the forest operations and management sector as defined for this study.[53]

Forest Operations

Forest operations include essential services such as logging, cruising timber, timber appraisal, wildland firefighting, wildfire mitigation, fuels reduction, prescribed fire, reforestation, restoration, aerial forest seeding, forest nurseries, forest product gathering, thinning, landscape services (e.g., arborist services; tree and brush trimming; rights-of-ways clearing/maintenance along forest utilities, roads, highways), commercial/industrial machinery/equipment repair/maintenance, pest/rodent control, and trail maintenance. Nearly all of the employment in this subsector is with private employers; non-employer establishments are also common, as the subsector includes many proprietors, partners, families, and landowners (with no employees) who work as independent contractors to provide harvesting, roading, hauling, or forestry services to other private and public forestland owners, businesses, and manufacturers. This subsector is sometimes referred to as forestry support in other studies.

[53] Associated Oregon Loggers provided industry-specific information about the subsectors described in this section.

Forest Management

Forest management includes landowners, agencies, governments, business/industry associations, and foresters involved in silviculture, conservation, habitat management, recreation management, land use, policy implementation, and other management activities.[54] Employers include USFS; BLM, ODF, OFRI, and other state agencies; county and city governments; colleges, universities, community colleges, and professional schools; and corporate, subsidiary, and regional managing offices of private industrial employers. The subsector also includes many family forestland owners, owning 10 to 5,000 acres each, who plant, tend, manage, protect, access, and harvest their ownership.

Forest Transportation

Transportation subsectors represent a large portion of the forest operations and management workforce and serve a key role in the forest sector supply chain. General and specialized freight trucking represent the largest industries in the subsector; other industries include air transportation, transportation support activities, and freight transportation arrangements. Trucking encompasses hauling of timber, forestry products, supplies, equipment, or road construction materials. Specialized forestry trucking employers haul fuel, water, fire engines, wire rope, tree seedlings, mechanical service equipment, work crews, over-dimensional equipment. Air transport services include helicopter and UAV for specialized forestry applications such as spraying, rigging, inventory, engineering, reconnaissance, seeding, heavy lifting, and firefighting. Forestry road transportation services include grading, drain cleaning, snow plowing, dispatching and intermodal transport of forest products by truck, rail, and water. These industries include many proprietors and partners who work as independent contractors (with no employees) to provide services for other private and public forestland businesses, owners, and manufacturers.

Forest Roads and Aggregate Production

Forest road construction and maintenance and aggregate production are essential to the forest operations and management sector. Portions of various industries are part of the sector: mining and quarrying; highway, street, and bridge construction; and other heavy and civil engineering construction. Forest-related establishments in mining and quarrying develop sites, grind and pulverize stone, and mine/quarry bituminous limestone and sandstone, construction rock, and riprap used in forest access road construction and reconstruction. Construction sand and gravel establishments mine and quarry commercial gravel and rock used in forest access road construction and reconstruction. Mining and quarrying of nonmetallic minerals (except fuel) provide support activities for mining and quarry of gravel and rock production, used in landowner forest access road construction

[54] In OED's definition, a NAICS industry called Timber Tract Operations makes up more than half of the forest management subsector, consisting mostly of federal jobs but also state and private establishments "primarily engaged in the operation of timber tracts for the purpose of selling standing timber." See https://www.naics.com/naics-code-description/?v=2022&code=113110

and reconstruction, and support activities for forestry mining and construction employers, such as drilling and blasting.

Forest-related highway, street, and bridge construction includes bridge construction, construction management, culverts, logging and forest-access road construction/maintenance, road repair, surfacing, resurfacing, rock hauling, and grading roads. Heavy and civil engineering construction includes specialty forestry construction employers who conduct riprap installation; avalanche, rockslide, mudslide, or roadside protection construction; trail construction; recreation area, and open space construction; gabion and retaining wall construction; and sediment control system construction. These industries include many proprietors and partners (with no employees) who work as independent contractors to provide the services above to private and public forestland businesses, owners, and manufacturers.

Forest Technical Services

Professional, scientific, and technical service subsectors are critical to forest operations and management, providing specialized expertise that supports a wide range of forestry activities. Forestry-tailored engineering services firms play a major role in designing and overseeing forestry infrastructure, equipment, and systems, including civil, environmental, and mechanical engineering tasks like feasibility studies, site planning, technical support during construction, and project evaluation. Similarly, surveying and mapping services provide essential land data through surveys used in land use planning and boundary delineation.

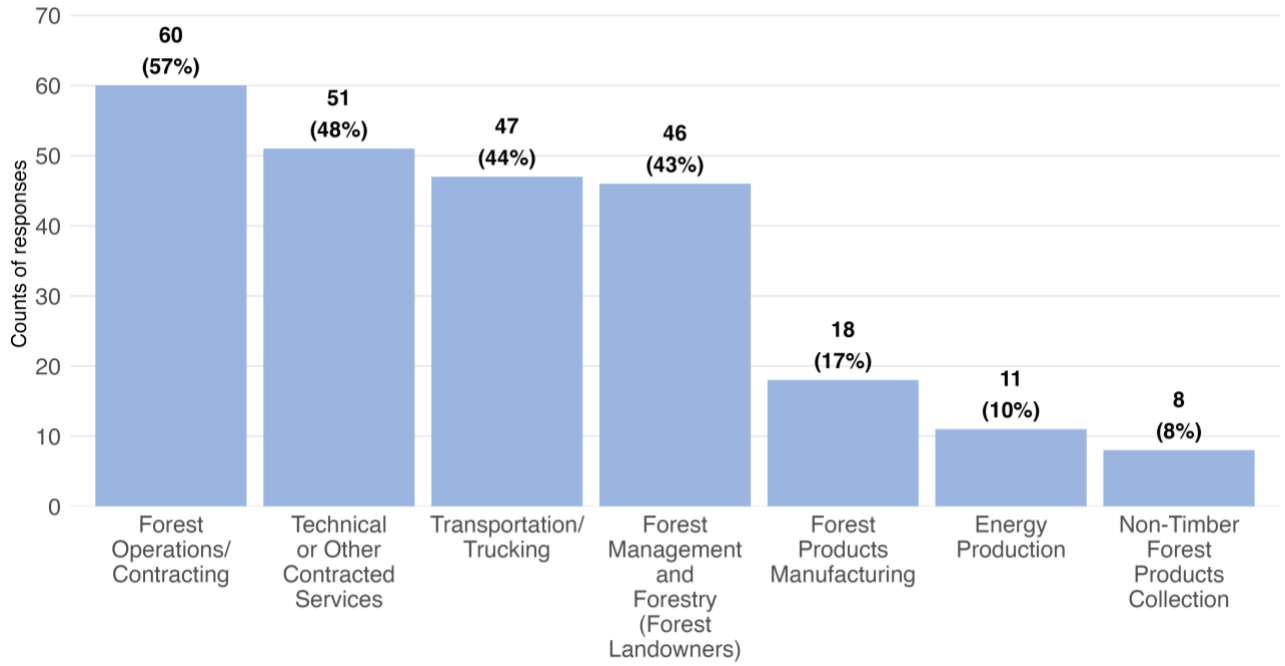
Environmental and technical consulting firms contribute additional capacity to manage forest-related work, including forestry-tailored environmental remediation/consulting, ecological restoration, regulatory compliance, and biological consulting services. Research and development and other specialty firms provide forestry-tailored research and development and technical services. Each of these industries includes independent contractors—proprietors, partners, and family-run businesses—who lack employees and provide services to private and public forestland businesses, owners, and manufacturers.

Survey Respondents' Type of Work

The survey administered as part of this study asked respondents about the type of work they do, listing types of work within seven industries. The responses provide a look at the interconnected and dynamic nature of the work conducted by forestry employers and contractors. The survey responses further reinforce that the forestry workforce cannot be easily segmented into siloed categories. The numerous combinations of skills and work-types suggested by respondents, especially among respondents working in areas like firefighting or road maintenance, suggests a dynamic and adaptive labor force.

On average, respondents selected two different industries that best described the type of work their business conducts (Exhibit 4).

Exhibit 4. Respondents' Industries, by Type-of-Work Selection



Source: Oregon Forestry Workforce Survey, 2025

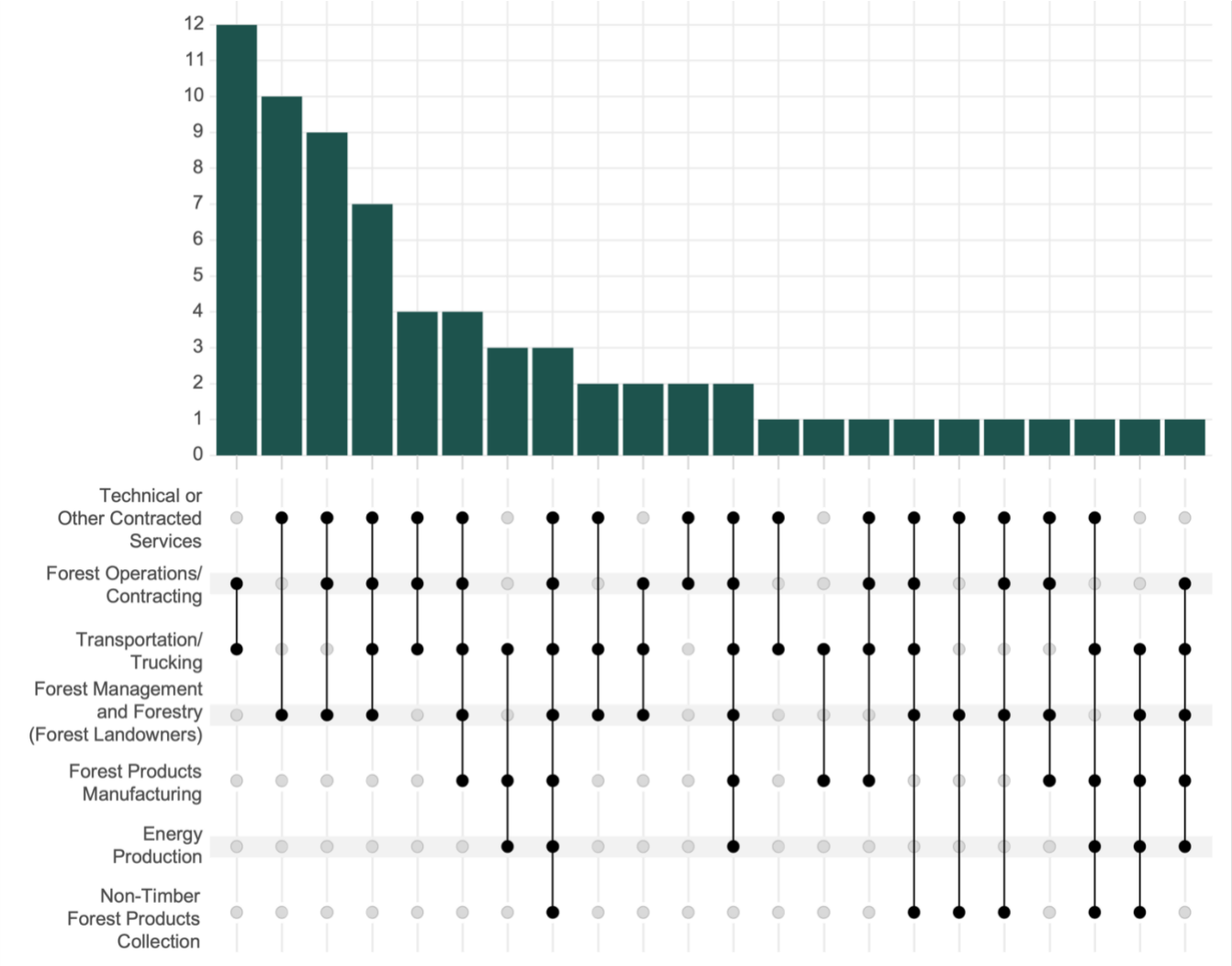
Exhibit 5 shows the detail of responses identifying multiple types of work. Of the 78 responses across all industries, 12 respondents indicated that they worked in both transportation/trucking and forest operations/contracting, 10 respondents said they worked in both forestry management and forestry (forest landowners) and technical or other contracted services, and 9 respondents selected forest management and forestry (forest landowners), forest operations contracting, and technical or other contracted services. Three respondents selected all seven work types.

Within each industry, respondents were asked to select specific types of work. On average, respondents selected 7 to 8 types. Of the 60 respondents who work in forest operations/contracting, 39 selected logging; 34 selected road construction, reconstruction and maintenance; 29 selected falling; and 29 selected firefighting. The appendix displays full response counts for each type of work.

The 29 respondents who work in firefighting selected, on average, more work types than did those who do not work in firefighting (11 types compared to 8, respectively). Other work types for the 29 firefighting respondents included fuels reduction (21 responses), road construction (19 responses), logging (18 responses), and falling (15 responses). Outside of forest operations/contracting, firefighting respondents frequently selected lowboy equipment transportation (within trucking/transportation) and forest planning (within forest management and forestry), with 16 responses and 15 responses, respectively.

Respondents working in transportation/trucking are often also part of logging and fuels reduction crews, while technical service providers may also be involved in planning and restoration.

Exhibit 5. Industry cross-over, by combination of industry responses



Note: Five respondents that selected only one industry are not included in this chart. Source: Oregon Forestry Workforce Survey, 2025.

Workforce Size Estimate

In its forest sector analysis, OED provides employment counts for each defined forestry subsector by industry and ownership (federal, state, and local government; private establishments covered by unemployment insurance; and non-employer establishments) (Exhibit 74). The present study provides employment and establishment counts in these same categories and then extends the analysis to include an additional data source for transportation non-employers and an estimate of the number of workers associated with non-employer establishments.

Exhibit 6 presents the total estimated workforce size for forest operations and management using the three data sources described below the exhibit. The Occupational Projections section in the next chapter provides an estimate of baseline annual need through 2033 relative to this total.

Exhibit 6. Estimated Forest Operations and Management Workforce

SUBSECTOR	INDUSTRY EMPLOYMENT	NON-EMPLOYER-BASED ESTIMATE OF WORKERS	TOTAL
Forest Operations	9,780	2,998	12,778
Forest Management	6,414*	-	6,414
Transportation	5,664*	5,873	11,537
Other OED-Identified Firms	784*	-	784
Roads and Aggregate	See appendix	-	-
Technical Services	See appendix	-	-
Total	**22,642**	**8,871**	**31,513**

*Includes QCEW and other individually identified employers. Data sources: Oregon Employment Department, Quarterly Census of Employment and Wages (QCEW), 2023. U.S. Census Bureau, Nonemployer Statistics, 1-year estimates 2022. Forestry Workforce Study Survey 2025. USDOT MCMIS Company Census File 2025.

QCEW Employment

Quarterly Census of Employment and Wages (QCEW) data provide information on the number of establishments, monthly employment, and quarterly wages by industry for workers covered by OED law and by the program of Unemployment Compensation for Federal Employees (UCFE). Workers who have H-2B visas—temporary visas for non-agricultural foreign workers—and who meet these criteria are included in QCEW data. (QCEW data do not distinguish employees by visa status.) In Oregon in 2024, just over 4,000 H-2B beneficiaries were approved on behalf of dozens of forestry employers (petitioners).[55]

OED provided ECOnorthwest with establishment-level QCEW data for the purposes of this study.

- **Full NAICS Industry**: Forest operations and management encompass two whole NAICS industries (forestry and logging and support activities for forestry), represented in the first two rows of the table.[56]
- **Partial NAICS Industry**: Other parts of forest operations and management are represented by portions of NAICS industries, represented in each row of the table except the first row. Exhibit 75 lists the NAICS codes represented by the full and partial industry counts.

[55] The H-2B Employer Data Hub provides counts by state, industry, and occupation: https://www.uscis.gov/tools/reports-and-studies/h-2b-employer-data-hub
[56] NAICS = North American Industry Classification System

- **Forestry Management**: OED and OFRI quantified employment at individually identified firms and organizations in the forestry management category. This employment is in six categories: Administration of conservation programs; Corporate, subsidiary, and regional managing offices; Colleges, universities, community colleges, and professional schools; Business associations; County and city government foresters, forestry technician, and forestry support staff; and Additional private certified foresters/consultants.
- **Transportation**: To identify forestry-related transportation employment, ODE identified employers that have a log and chip truck registration with ODOT and identifiable, covered employment but are not included in other categories of the analysis (to avoid double counting).
- **Other OED-Identified Industries**: OED and OFRI collaborated to identify and manually quantify employment at firms doing forest operations and management work that is not already included in other categories. Industry categories represented in this count include nursery and tree production, air/rail/marine transportation, professional and consulting services, and environmental/civic/social organizations.
- **Roads and Aggregate and Technical Services**: As noted above, these industries are key to forest operations and management, however, specific forest-related employers and employment have not yet been identified, and the scope of this study did not allow for such identification. Total industry employment is provided in Exhibit 76.

U.S. Census Nonemployer Statistics

For the NAICS industries included in their entirety in the definition, we provide establishment counts from the U.S. Census Bureau's Nonemployer Statistics (NES). The NES counts include sole proprietors, freelancers, and independent contractors who generate revenue but do not have payroll staff and are not included in QCEW employment counts.[57] The NES only counts establishments even though the operations may involve multiple workers.[58] To account for this and estimate workforce size, we multiply the number of non-employer establishments (1,922) by a multiplier (1.56) based on responses by self-employed individuals to the survey's question about the number of individuals working for the business ("About how many partners/unpaid family members did your business have working at its highest work period(s) over the past 12 months?"). The average of these responses was 1.56, resulting in an estimated non-employer workforce of 2,998.[59]

[57] U.S. Census Bureau. "About this Program: Nonemployer Statistics." U.S. Census Bureau, https://www.census.gov/programs-surveys/nonemployer-statistics/about.html

[58] For example, a family-run business in which multiple family members are working would count as one establishment.

[59] Of the 1,922 non-employer establishments, 1,415 are in Logging (NAICS 1133) and 507 are in Support activities for forestry (NAICS 1153) (NES 2022).

USDOT Company Census File

As trucking NAICS codes are not granular enough to identify forest-related trucking activity, the NAICS-based NES are not well-suited for identifying self-employed truckers and family-owned trucking businesses working in forest operations and management. Rather, we used the U.S. Department of Transportation's Motor Carrier Management Information System (MCMIS) Company Census data to estimate the number of trucking corporations, individuals, and partnerships that may not be captured in the NAICS-based sources above (see below and Exhibit 5 for additional detail).[60] The Company Census File contains records for active entities registered with the Federal Motor Carrier Safety Administration (FMCSA).

Exhibit 7 displays the detail of the 5,873 workforce size estimate in Exhibit 6. Counts of CDL and non-CDL drivers are shown by cargo type and business type. Companies with 16 or more drivers are excluded to reduce the number of employers captured in the analysis (transportation employers' workforce is quantified in Exhibit 6). Nonetheless, some drivers in the corporations and partnerships columns are likely included in the QCEW data displayed in Exhibit 6. Assuming accurate MCMIS data, the lower bound estimate for truck drivers not counted in Exhibit 6 is 882 ("Individual" total).

Cargo types are organized into three categories:

- Logs, Poles, Beams, Lumber only
- Logs, Poles, Beams, Lumber in combination with one or more other cargo types

Other relevant cargo types (aggregate, bark, dirt, gravel, machinery / large objects, nursery, rock, sand, stone, or wood). Exhibit 7 presents counts of drivers by business and cargo type. Driver counts for businesses that transport anything other than logs, poles, beams, or lumber are adjusted downward because the USDOT data identify cargo types a trucking business can transport but do not indicate what share of a company's drivers, trucks, or shipping volume are dedicated to specific cargo types.[61]

[60] The FMCSA maintains the Motor Carrier Management Information System (MCMIS). MCMIS contains information on the safety fitness of commercial motor carriers (truck and bus) and hazardous material shippers subject to the Federal Motor Carrier Safety Regulations (FMCSRs) and the Hazardous Materials Regulations (HMRs). To identify each entity, FMCSA assigns a unique number to each entity record. This number is referred to as the USDOT number. Each Census record contains entity identifying data, business operations data, equipment and driver data, and carrier review data. This information is available to the general public through the MCMIS Data Dissemination Program: https://www.fmcsa.dot.gov/registration/fmcsa-data-dissemination-program

[61] Lacking any other information about a business's activity, the adjustment is based on the number of cargo types. For example, if a company can transport two forestry-related categories of cargo (e.g., logs and aggregate) and three other types of cargo we assume 40 percent (two out of five) of the company's drivers are associated with forestry. Any or all of the counts in the table may over or understate the actual number of individual drivers associated with forest operations and management.

Exhibit 7. Estimated Non-Employer Transportation Workforce Doing Forest-Related Work, 2025

	BUSINESS ORGANIZATION TYPE				
	INDIVIDUAL	CORPORATION	PARTNERSHIP	UNKNOWN	TOTAL
Cargo: Logs, Poles, Beams, Lumber only					
CDL drivers	386	297	84	985	1,752
Non-CDL drivers	46	49	10	189	294
Total	**432**	**346**	**94**	**1,174**	**2,046**
Cargo: Logs, Poles, Beams, Lumber in combination with other cargo					
CDL drivers	412	753	67	1,732	2,963
Non-CDL drivers	38	133	8	684	864
Total	**450**	**886**	**75**	**2,416**	**3,827**
Cargo: Logs, Poles, Beams, Lumber only or in combination with other cargo					
CDL drivers	*798*	*1,050*	*151*	*2,717*	*4,715*
Non-CDL drivers	*84*	*182*	*18*	*873*	*1,158*
Total	***882***	***1,232***	***169***	***3,590***	***5,873***
Cargo: Other types for which share specific to forest operations and management is unknown: Aggregate, bark, dirt, gravel, machinery / large objects, nursery, rock, sand, stone, wood					
CDL drivers	902	1,460	120	2,610	5,092
Non-CDL drivers	135	371	31	1,233	1,770
Total	**1,037**	**1,831**	**151**	**3,843**	**6,862**

Data source: USDOT MCMIS Company Census File

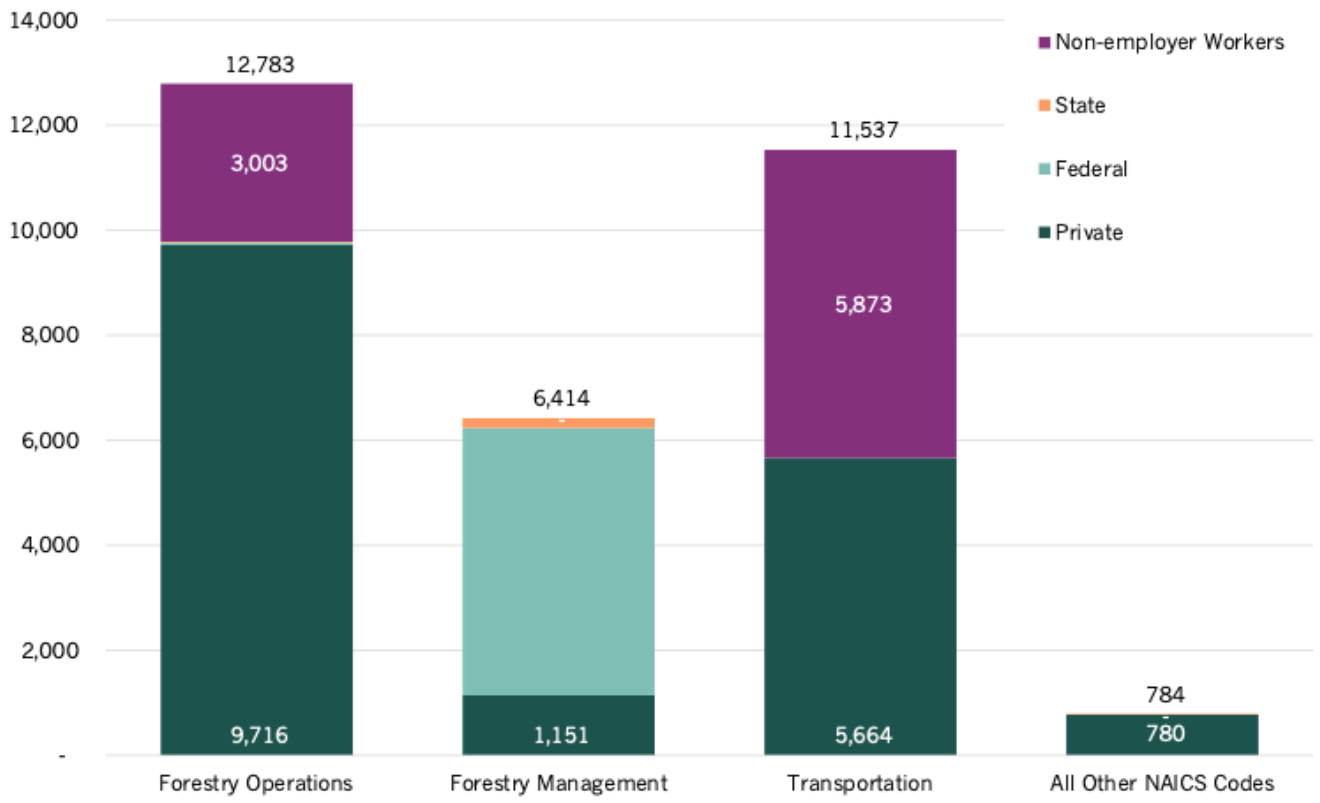
Characteristics of Forest Operations and Management

In 2023, forest operations and management in Oregon encompassed 22,642 covered employees and 8,871 non-employer workers.[62] Exhibit 8 shows the distribution of employment and non-employer workers across the forestry subsectors defined above. Private businesses account for the majority of employment (55 percent) followed by federal employment (16 percent) and non-employer workers (28 percent). Federal employment

[62] Based on the most recent non-employer statistics available at the time of the study. Non-employer statistics represent businesses in 2022. This is adjusted by 1.56, an estimate from the survey, to account for the number of workers at each establishment (see discussion under U.S. Census Nonemployer Statistics in previous section).

composes most of the forestry management subsector due to significant employment by federal agencies engaged in natural resource management on federally owned forestlands.

Exhibit 8. Forest Operations and Management Workforce by Subsector, Oregon, 2023



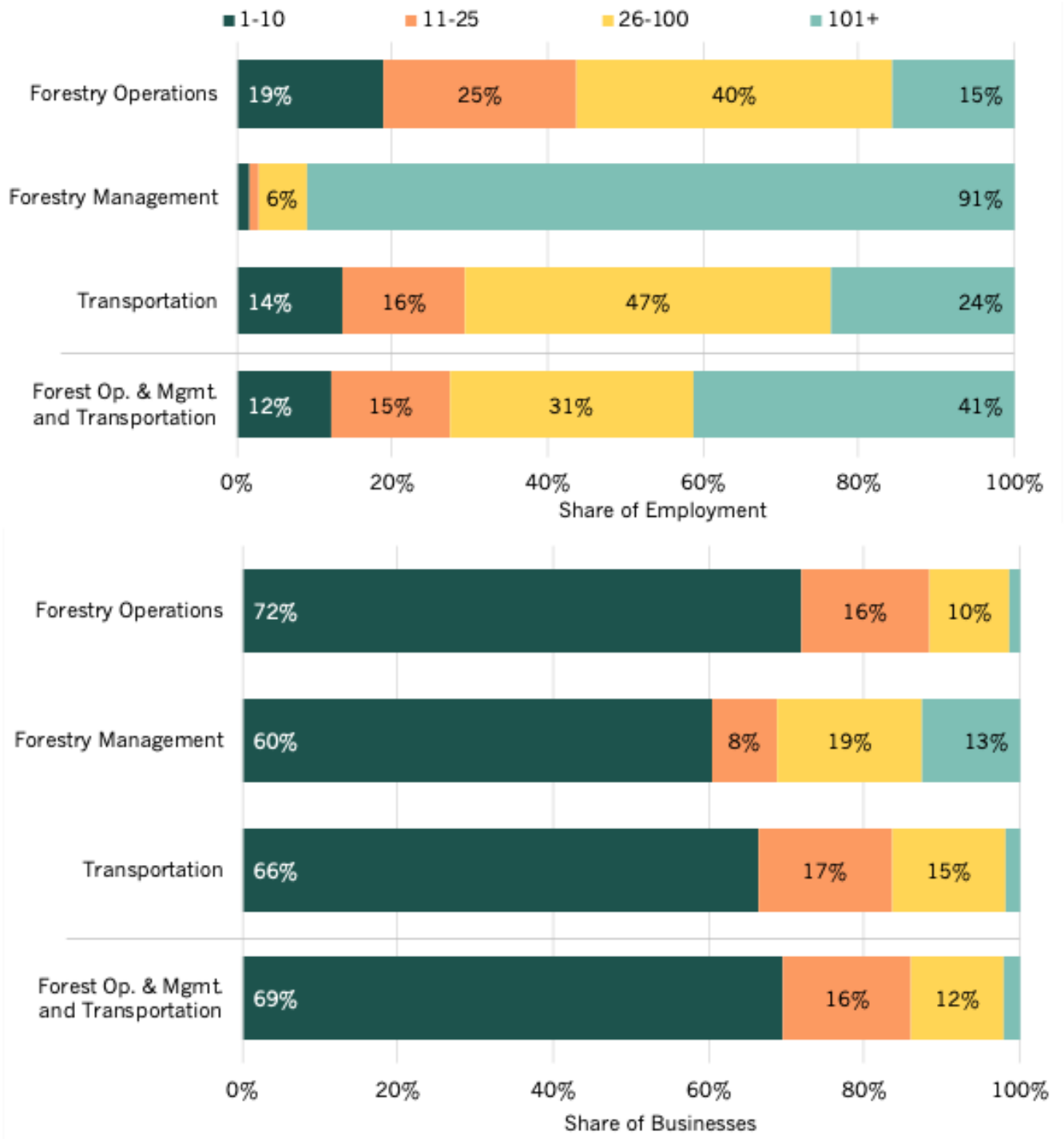
Data sources: Oregon Employment Department, QCEW, 2023; U.S. Census Bureau, Nonemployer Statistics, 1-year estimates 2022.

The largest share (41 percent) of forest operations and management employees work in businesses with more than 100 employees (see Exhibit 9), but most businesses in forest operations and management are relatively small—69 percent of employers have 10 or fewer employees—and within forestry operations and transportation, most employees work for businesses with 100 or fewer employees.[63]

On average, forest operations and management in Oregon grew by approximately 2 percent (about 200 employees) over the past decade. Logging employment has seen a 29 percent decrease while forest nurseries (60 percent), support activities for forestry (37 percent), and forestry management (15 percent) have increased over the past decade (see Exhibit 10). However, overall employment in Oregon grew at a faster rate (14 percent). In addition, non-employer forest operations workers declined by close to 10 percent over the decade, dropping from approximately 3,326 in 2014 to about 2,998 in 2022.[64]

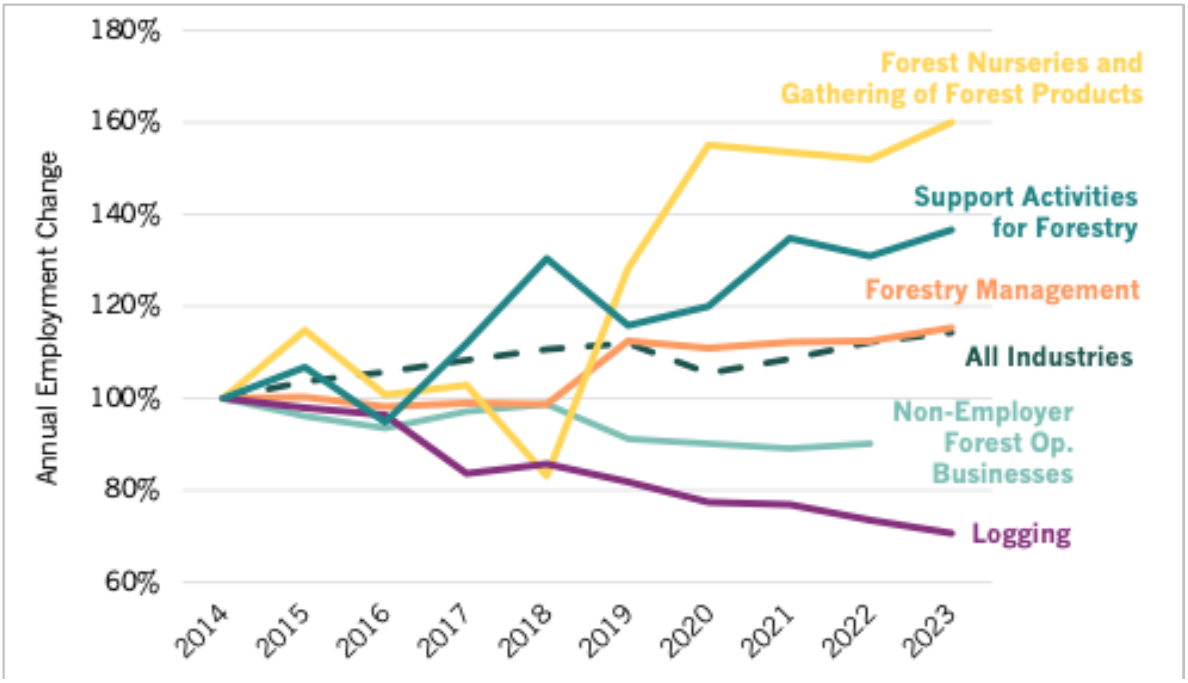
[63] Firm size is based on the annual average employment; due to seasonality, totals may vary by season.
[64] Non-employer establishment counts are adjusted by 1.56, an estimate from the survey, to account for estimated number of workers at each establishment (see discussion under U.S. Census Nonemployer Statistics in previous section).

Exhibit 9. Businesses and Employment by Firm Size, Forest Operations and Management, 2023



Data source: Oregon Employment Department, QCEW, 2023

Exhibit 10. Forest Operations and Management Employment Change, Oregon



Note: Forestry Management is represented by the NAICS industry Timber Tract Operations. Data sources: Oregon Employment Department, QCEW 2014-2023; U.S. Census Bureau, Nonemployer Statistics, 1-year estimates 2014-2022.

Seasonality

Workforce demand in forest operations and management follows weather-driven patterns, with peak employment in July or August and lower employment during the winter months (see Exhibit 11). The size of the seasonal employment swing has shifted over time. In forest operations (private employers), seasonal employment change has increased in size (see Exhibit 77). In forest management (largely public employers), seasonal employment change has declined somewhat over time.

As described in the literature review findings above, workers in labor-intensive forestry jobs, including many workers with H-2B visas, approach the seasonality of forest operations work in a variety of ways, including doing a variety of activities in the woods for most of the year, then taking some time off during the winter; moving around to work in different forests at different times of the year; spending "off seasons" working in other industries,

SEASONAL EMPLOYMENT VARIATION

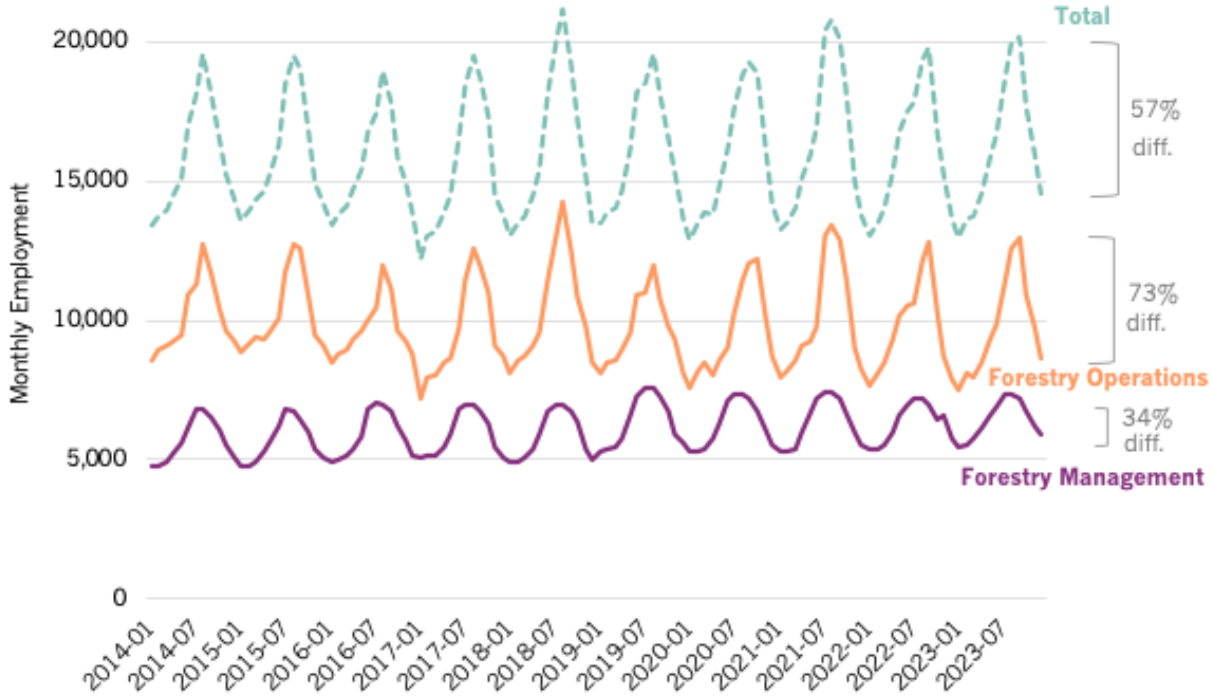
Over the past decade, the seasonal employment swing between summer and winter has increased somewhat in forest operations and declined somewhat in forest management.

Percent difference in peak and trough employment for forest operations and management

- **2014 difference: 47%**
- **2023 difference: 57%**
- **Average difference: 52%**

taking care of family needs, or studying/training; and working "on call," such as for employers doing wildfire suppression activities.

Exhibit 11. Monthly Employment, Forest Operations and Management, Oregon



Data source: Oregon Employment Department, QCEW, 2014-2023

Employment by Region

Forestry employment is concentrated in several regions of the state. The Mid-Valley (16 percent of employment), Rogue Valley (13 percent), and Southwestern Oregon (13 percent) workforce regions account for nearly half (42 percent) of forest operations and management employment (Exhibit 12). East Cascades and Lane each account for roughly 11 percent.

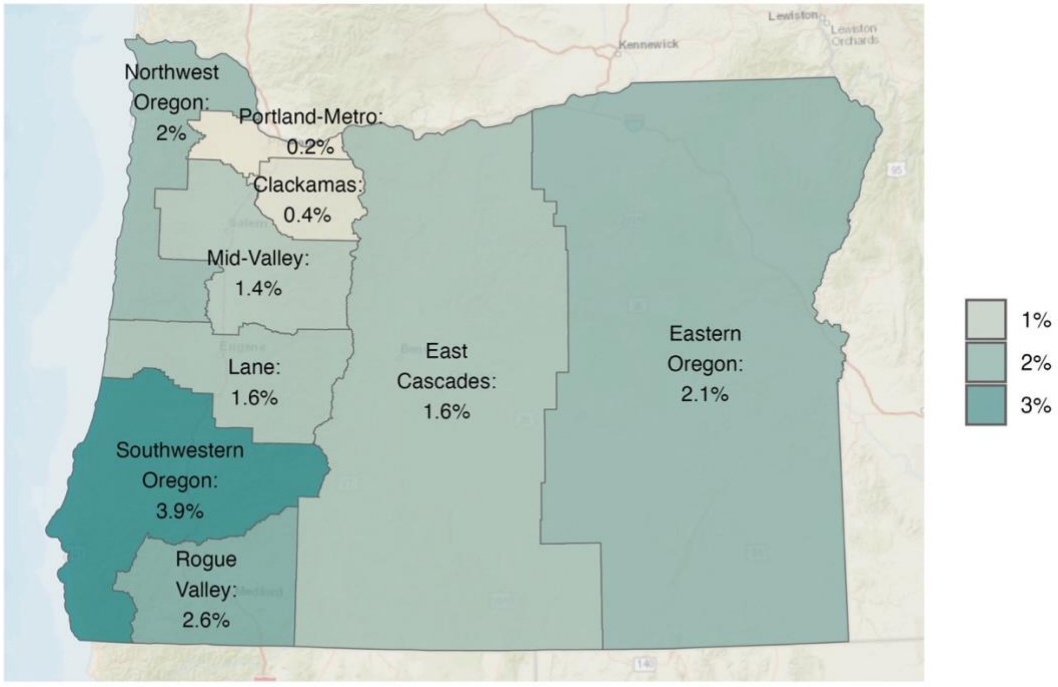
Examining the importance of the sector to each region's economy presents a slightly different picture. As shown in Exhibit 13, forest operations and management employment makes up the highest share of regional employment in Southwestern Oregon (3.9 percent) and Rogue Valley (2.6 percent). Forestry employment accounts for roughly 1 to 2 percent of regional employment in East Cascades, Eastern Oregon, Lane, Mid-Valley, and Northwest Oregon. In addition, the distribution of forest operations and management activity across the state varies by subsector (see Exhibit 78 and Exhibit 79).

Exhibit 12. Forest Operations and Management Workforce by Region, 2023

WORKFORCE REGION	FOREST O&M EMPLOYMENT	NON-EMPLOYER WORKERS	SHARE OF FORESTRY EMPLOYMENT
Clackamas	760	155	4%
East Cascades	2,562	295	11%
Eastern Oregon	1,611	256	7%
Lane	2,509	405	11%
Mid-Valley	3,782	380	16%
Northwest Oregon	1,979	383	9%
Portland-Metro	1,610	220	7%
Rogue Valley	3,100	342	13%
Southwestern Oregon	2,670	553	13%
No associated region	2,061	14	8%
Total	**22,642**	**2,998**	**100%**

*Non-employer workers are estimated by multiplying the number of non-employer businesses by 1.56, a result from the survey (see earlier discussion). Table does not include transportation non-employer workers (regional data not available). Data sources: Oregon Employment Department, QCEW, 2023; Oregon Forestry Workforce Survey, 2025.

Exhibit 13. Forest Operations and Management Employment as a Share of Region's Total Employment, 2023

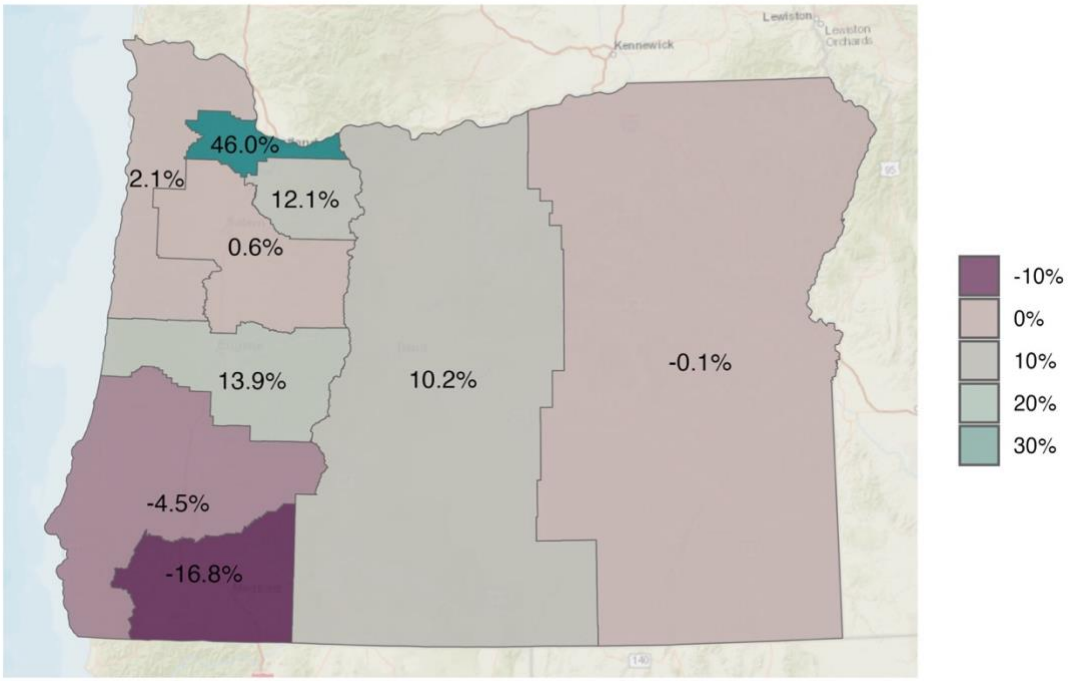


Data source: Oregon Employment Department, QCEW, 2023

Wages

In 2023, the Oregon forest operations and management average pay per employee was approximately $72,600.65 As in other sectors, average pay per employee in the sector varies considerably by region. As illustrated in the exhibits below, regional average pay for forest operations and management is sometimes below the state all-industry average (Exhibit 14) but exceeding the region's all-industry average (Exhibit 15). Exhibit 14 displays the difference between average pay per employee in forest operations and management and Oregon's statewide average ($68,300) and Exhibit 15 compares regional forest operations and management average pay per employee to each region's overall average wage. The relatively low statewide percent difference in Exhibit 15 (6 percent) compared to the regional percent differences is driven by employment and pay differentials across regions. Overall patterns are driven by regional differences in the cost of living and types of forest operations and management businesses.

Exhibit 14. Difference Between Forest Operations and Management and Oregon Average Pay Per Employee, 2023



Data source: Oregon Employment Department, QCEW, 2023

[65] Oregon Employment Department. 2023. *Quarterly Census of Employment and Wages.*

Exhibit 15. Difference Between Forest Operations and Management and All Industries Average Pay Per Employee, by Region, 2023

	AVERAGE PAY PER EMPLOYEE		
Workforce Region	Forest Op. & Mgmt.	All Industries	% Difference
Clackamas	$76,524	$66,899	14%
East Cascades	$75,218	$58,500	29%
Eastern Oregon	$68,212	$50,894	34%
Lane	$77,747	$56,104	39%
Mid-Valley	$68,662	$57,336	20%
Northwest Oregon	$69,722	$55,582	25%
Portland-Metro	$99,674	$80,553	24%
Rogue Valley	$56,835	$53,449	6%
Southwestern Oregon	$65,218	$49,758	31%
Oregon	**$72,599**	**$68,277**	6%

Data source: Oregon Employment Department, QCEW, 2023

2. Workforce Analysis

This chapter focuses on current conditions of the forest operations and management workforce and future baseline needs, including occupation selection and wages, occupational projections, and workforce characteristics analysis. These are followed by highlights from the survey, interview, and focus group findings.

Characterizing workforce demographics can help identify strengths and weaknesses in training and career pathways, as well as opportunities to reach broader pools of potential workers. Incumbent workforce characteristics can influence recruitment strategies, identify potential retention challenges, and identify potential barriers to economic opportunity. The analyses in this chapter are disaggregated by subsector and demographics where the data allow, using publicly available data as well as the survey, interviews, and focus groups conducted for this study.

Occupation Analysis

Oregon's forest operations and management sector requires a broad range of skills due to the diverse activities of its constituent industries. As a whole, forest operations and management require a combination of highly skilled technical workers, machine operators, truck drivers, roading/construction workers, logistics professionals, foresters, compliance specialists, firefighters, laborers, and administrative personnel. Each industry relies on distinct occupational groups, reflecting their specific operational needs.

Based on analysis of the occupational composition of forestry and logging and support activities for agriculture and forestry, and input from HECC, the FWSC, and other interested parties, we identified 18 occupations as key to forest operations and management, due either to prevalence in the industries or importance of role to the sector (see list below). These occupation titles may not align with job titles used by employers or employees; we use them here given their use in federal and state data sources.

Forestry and logging industry employees are largely in farming, fishing, and forestry occupations (58 percent of employment in this industry), followed by transportation and material moving workers (9 percent) to support the movement of raw materials. Support for agriculture and forestry industry employees are similarly largely in farming, fishing, and forestry occupations (71 percent).

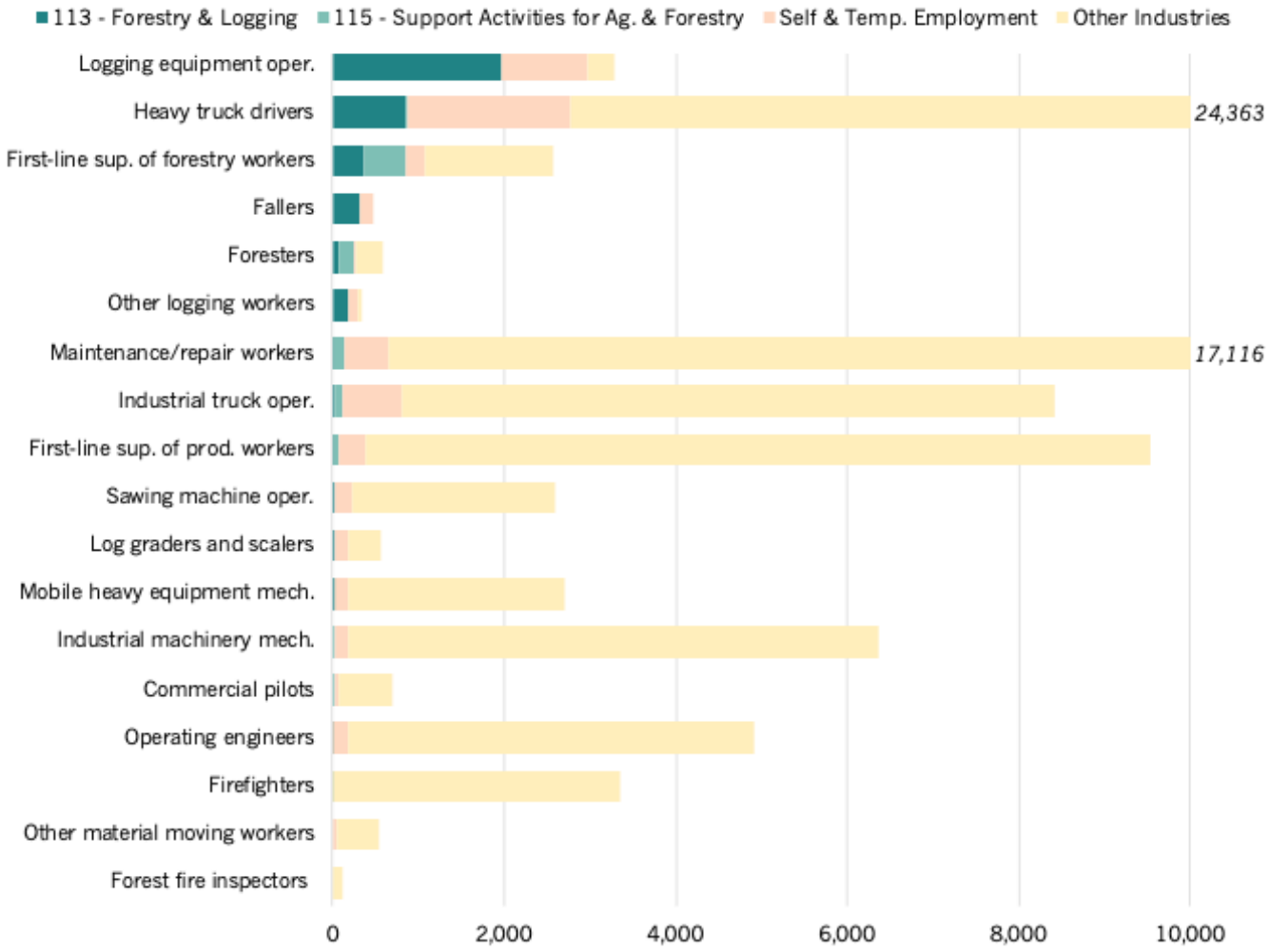
KEY OCCUPATIONS IN FOREST OPERATIONS AND MANAGEMENT

- Commercial pilots
- Fallers
- Firefighters
- First-line supervisors of farming, fishing, and forestry workers
- First-line supervisors of production and operating workers
- Forest fire inspectors and prevention specialists
- Foresters
- Heavy and tractor-trailer truck drivers
- Industrial machinery mechanics
- Industrial truck and tractor operators
- Log graders and scalers
- Logging equipment operators
- Logging workers, all other
- Maintenance and repair workers, general
- Material moving workers, all other
- Mobile heavy equipment mechanics, except engines
- Operating engineers and other construction equipment operators
- Sawing machine setters, operators, and tenders, wood

We estimate that the 18 focal occupations account for 4,886 employees (83 percent of forestry and logging and 9 percent of support activities for agriculture and forestry; see Exhibit 80).[66] Many of these occupations require highly industry-specific skillsets, such as logging equipment operators, fallers, and logging workers, demonstrated in Exhibit 16 by the level of occupational employment in forest operations and management relative to other industries. Other occupations have skillsets applicable to many industries, such as heavy truck drivers and maintenance workers; these have lower employment concentrations within forest operations and management but are nonetheless critical to the sector. The exhibit also highlights reliance on self-employed individuals: forest operations and management formally employ 60 percent of logging equipment operators, whereas 30 percent are self-employed, nearly all of whom presumably work in the sector.

[66] To estimate occupation employment by industry grouping, we applied Oregon's 2023 industry share of occupation to Oregon's 2023 occupational employment. In instances where the industry share of occupation was suppressed in OED's data, we applied the national industry share of occupation, adjusted for known occupational employment in Oregon, to Oregon's 2023 occupational employment.

Exhibit 16. Employment in Forest Operations and Management Focal Occupations, Oregon, 2023

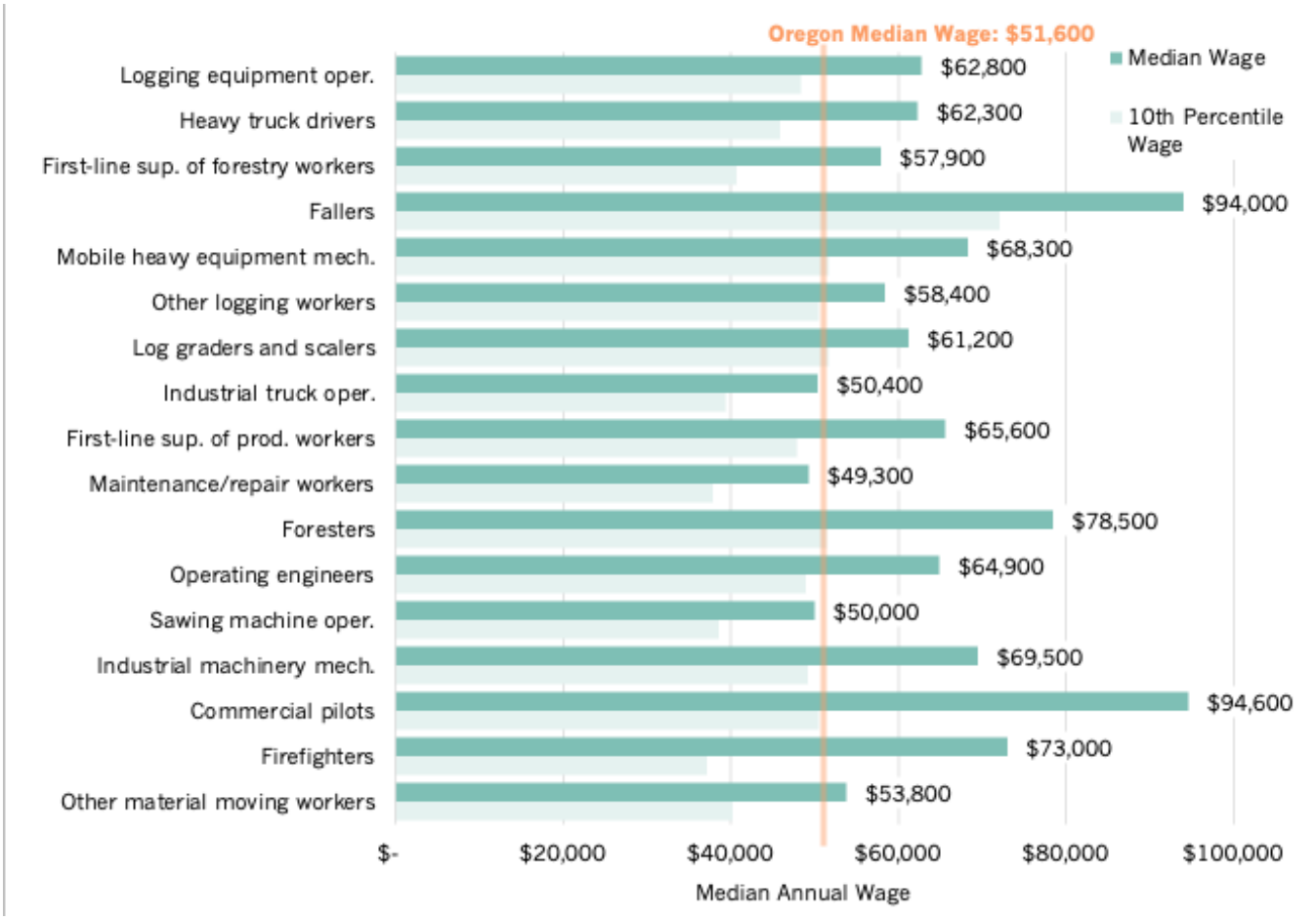


Notes: Government employment is included in "Other Industries." A large share of foresters who work in other industries work in government. Employment is capped at 10,000 for visualization purposes. Data sources: Oregon Employment Department, Industry-Occupation Matrix, 2023; OEWS, 2023; Bureau of Labor Statistics, Industry-Occupation Matrix, 2023. See Exhibit 82 for more detail.

Wages

Occupational wage levels generally align with the level of skill and specialization within an occupation. For example, commercial pilots, fallers, and foresters earn the highest wages of the focal occupations in part due to the training required. Of the focal occupations, 14 earn a median wage above the Oregon median (see Exhibit 17). Occupations appear in the exhibit in order of the highest employment levels within forest operations and management, however, wages reflect overall occupational totals and are not specific to forestry, due to limitations in the available data.

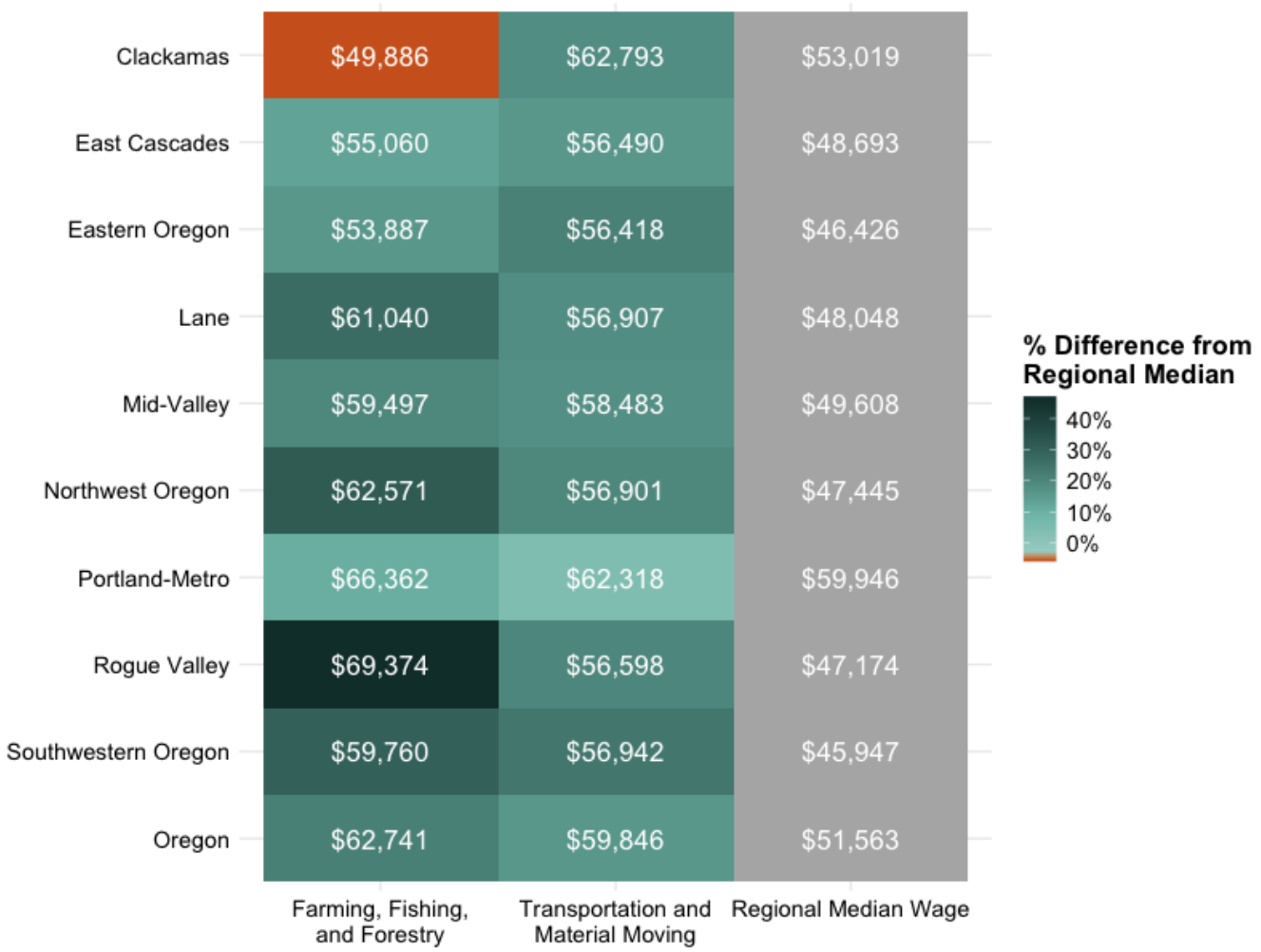
Exhibit 17. 10th-Percentile and Median Wages for Forest Operations and Management Occupations, Oregon, 2024



Note: Median wages are shown for occupations across all industries and ordered by employment in forest operations and management. OED does not report median wage for Forest Fire Inspectors and Prevention Specialists. Data source: Oregon Employment Department, Oregon Wage Information, 2024.

While forest operations and management-related occupations generally offer competitive wages, the extent of this wage premium varies by occupation and region. Exhibit 18 shows the median annual wages for the focal occupations in two key occupational groups, by workforce region. The shading indicates the extent to which forest operations and management wages differ from the overall regional median. Forest operations and management occupations within farming, fishing, and forestry tend to earn a higher wage premium relative to the regional median, with Rogue Valley (47 percent higher than the regional median), Northwest Oregon (32 percent), and Southwestern Oregon (30 percent) having the largest differentials. Transportation and moving occupations yield the largest wage premia in Southwestern Oregon (24 percent higher than the regional median), Eastern Oregon (22 percent), and Rogue Valley (20 percent). The Portland-Metro and Clackamas regions have the lowest wage differentials for these focal occupations, potentially making workforce recruitment and retention more difficult in these areas.

Exhibit 18. Regional Wage Differentials in Forest Operations and Management Occupations, Oregon



Note: Differentials are calculated with respect to the region's median wage. Occupation group wages are the weighted average of the focal occupations' median wages. Data source: Oregon Employment Department, Oregon Wage Information, 2024.

Occupational Projections

OED regularly publishes 10-year occupational and industry projections, with the most recent providing projections from 2023 to 2033. Although projections are not available for the full forest operations and management sector as defined for this report, selected industry and occupational projections nonetheless provide insight into the industry outlook based on information available to OED as of publication.

Looking forward, OED projected Oregon average annual employment growth through 2033 at a relatively slow 0.8 percent per year, and a slow decline in the forestry and logging industry (NAICS 113) of 0.5 percent per year.

As shown in Exhibit 19, many occupations important to the industry will nonetheless expand more rapidly than employment overall, driven in part by growth in other industries

that rely on similar skillsets, indicating potential competition for these workers. Occupations specific to the sector, such as foresters, fallers, and logging workers, are expected to exhibit very slow growth or slow declines in number. Even as the sector employs fewer total workers in some occupations, retirements and other job turnover mean that the sector will require a robust flow of newly trained workers for the foreseeable future. For example, OED projects average annual openings of logging workers and fallers equal to about 13 percent of 2023 employment levels. In other words, the sector will need to replace at least one in eight workers in these positions every year.

The NAICS-based forest and logging industry projections cover only a small portion of the forest operations and management sector (about 16 percent in 2023). To provide an estimate of the total number of new workers needed in the sector through 2033 we combine data from the sector employment analysis, OED industry projections for forestry and logging and support activities for agriculture and forestry, and the OED occupational projections. Using OED's projections as a status quo baseline, we estimate the forest operations and management sector as defined in Chapter 1 will grow by 0.2 percent per year, from 31,513 circa 2023 to 32,030 in 2033. Due to retirements and other job turnover, we estimate the sector will need an average of 3,400 new workers every year.

Changes in harvest levels from the baseline assumed by OED would clearly affect the sector's workforce demand. Examples of strategies and policies that could affect workforce demand include the State's 20-Year Landscape Resiliency Strategy, Governor Kate Brown's Council on Wildfire Response report, and the Pacific Northwest Quantitative Wildfire Risk Assessment, which each quantify and classify Oregon acreage at high risk of wildfire, and the Oregon Housing Production Goal, which calls for Oregon to produce 36,000 housing units per year for the next 10 years, a large increase relative to recent levels of 20,000 or fewer units per year.[67]

Completing the work these strategy reports call for—in whole or in part—will require a larger forest operations and management workforce than the state currently has or is projected to need in 2033—more than 3,400 new workers every year. At the same time, technological advances can increase workers' productivity, allowing forestry businesses to operate in and manage forests more effectively and potentially complete more work with the same number of people.

The study recommendations at the end of this report describe the need for one or more scenario analyses to lay the groundwork for a sector-wide gap analysis to help prioritize workforce investments and other actions.

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[67] Oregon Department of Forestry, *Oregon's 20-Year Landscape Resiliency Strategy*, https://www.oregon.gov/odf/pages/20-year-strategy.aspx
Governor's Council on Wildfire Response, November 2019: Report and Recommendations, https://www.oregon.gov/osfm/Documents/GovWildfireCouncilRpt-FinalRecs.pdf
McEvoy, Andy; Dunn, Christopher; Rickert, Ian. *2023 PNW Quantitative Wildfire Risk Assessment Methods* (2023). [Unpublished Manuscript]. https://oe.oregonexplorer.info/externalcontent/wildfire/PNW_QWRA_2023Methods.pdf
Oregon Statewide Housing Production Goal: https://www.oregon.gov/gov/eo/eo-23-04.pdf

Exhibit 19. Occupational Projections for Key Occupations in Forest Operations and Management

CODE	OCCUPATION TITLE	EMPLOYMENT 2023	PROJECTED EMPLOYMENT 2023	EMPLOYMENT CHANGE	REPLACEMENT OPENINGS	TOTAL OPENINGS	AVERAGE ANNUAL OPENINGS (TOTAL OPENINGS /10)	AVERAGE ANNUAL GROWTH	ANNUAL OPENINGS AS A SHARE OF 2023 EMPLOYMENT
33-2022	Forest fire inspectors and prevention specialists	112	134	22	99	121	12	1.8%	11%
49-9041	Industrial machinery mechanics	6,365	7,606	1,241	5,404	6,645	665	1.8%	10%
49-3042	Mobile heavy equipment mechanics, except engines	2,698	3,048	350	2,317	2,667	267	1.2%	10%
47-2073	Operating engineers and other construction equipment operators	4,914	5,505	591	4,311	4,902	490	1.1%	10%
53-2012	Commercial pilots	699	783	84	838	922	92	1.1%	13%
49-9071	Maintenance and repair workers, general	17,772	19,633	1,861	16,815	18,676	1,868	1.0%	11%
33-2011	Firefighters	3,356	3,637	281	2,548	2,829	283	0.8%	8%
	Total, All Occupations	**2,186,185**	**2,356,224**	**170,039**	**2,476,697**	**2,646,736**	**264,674**	**0.8%**	**12%**
53-3032	Heavy and tractor-trailer truck drivers	27,138	29,009	1,871	28,551	30,422	3,042	0.7%	11%
53-7051	Industrial truck and tractor operators	8,425	8,993	568	8,482	9,050	905	0.7%	11%
45-1011	First-line supervisors of farming, fishing, and forestry workers	2,574	2,740	166	3,635	3,801	380	0.6%	15%
51-1011	First-line supervisors of production and operating workers	9,529	10,105	576	9,096	9,672	967	0.6%	10%

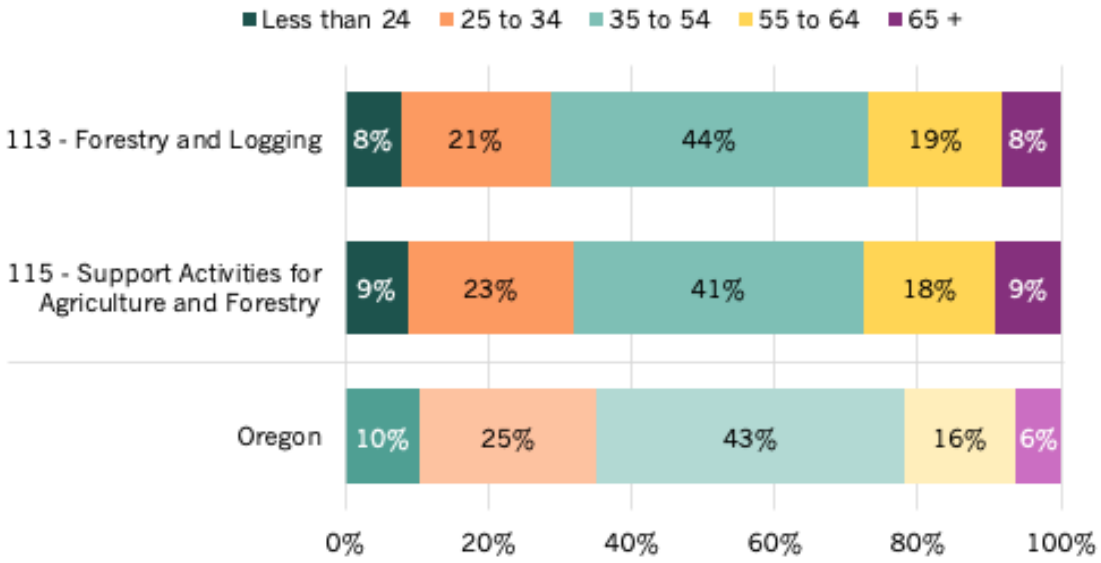
Data source: Oregon Employment Department, 2022-23 Occupational Projections

Worker Characteristics

Age, Gender, Race, and Ethnicity

Forest operations and management employees appear to be a bit older, on average, than the overall Oregon workforce (see Exhibit 20). As noted in the literature review in Chapter 1, the sizable segment of the forestry workforce that is approaching retirement highlights the need for proactive workforce development efforts.

Exhibit 20. Employee Age Distribution in Forest Operations and Management, Oregon



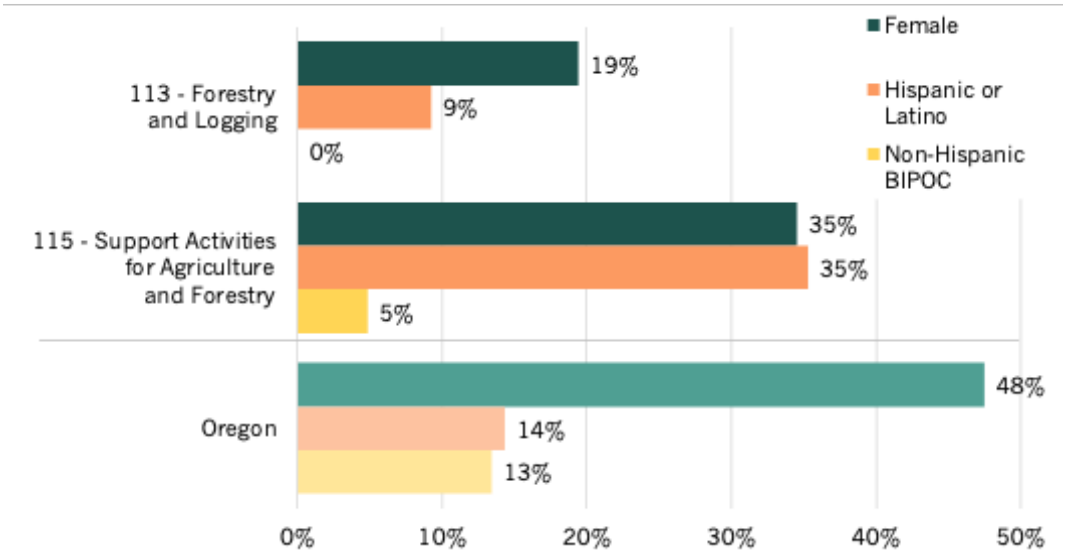
Note: See Exhibit 83 in the Appendix for occupational distributions. Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates.

The sector's workforce has relatively low shares of women employees, especially in forestry and logging (see Exhibit 21). Non-Hispanic Black, Indigenous, and People of Color (BIPOC) populations remain underrepresented in forest operations and management when compared to 13 percent of Oregon's overall workforce. Hispanic or Latino employees make up 9 percent of forestry and logging and 35 percent of support activities, compared to 14 percent of Oregon's workforce overall. These shares do not include Hispanic H-2B visa workers, who make up a sizable portion of the workforce in these industries.[68]

Areas with a larger share of forestry management jobs, such as the Portland Metro, tend to have BIPOC representation in forestry more closely aligned with the region's overall workforce diversity (see Exhibit 81). Regions with a relatively strong presence of forest operations, such as Southwestern Oregon, Mid-Valley, and Rogue Valley, have lower shares of BIPOC employees in the forestry sector than in other industries.

[68] H-2B Employer Data Hub, https://www.uscis.gov/tools/reports-and-studies/h-2b-employer-data-hub

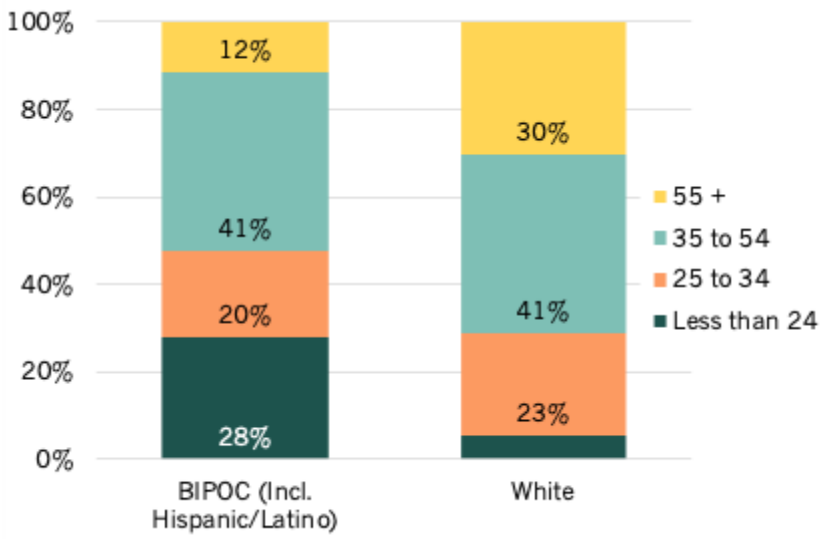
Exhibit 21. Employee Gender and Race/Ethnicity in Forest Operations and Management, Oregon



Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates

This study's engagement with interested parties suggested that some perceive the sector to consist largely of older, white men. However, forest operations and management has a similar age distribution to the rest of Oregon (see Exhibit 20) and even though it is heavily male-dominated, the industry is more racially diverse than many believe, as illustrated above. The sector's BIPOC employees are younger than its non-Hispanic white employees (see Exhibit 22).

Exhibit 22. Employee Age and Race/Ethnicity in Forest Operations and Management, Oregon

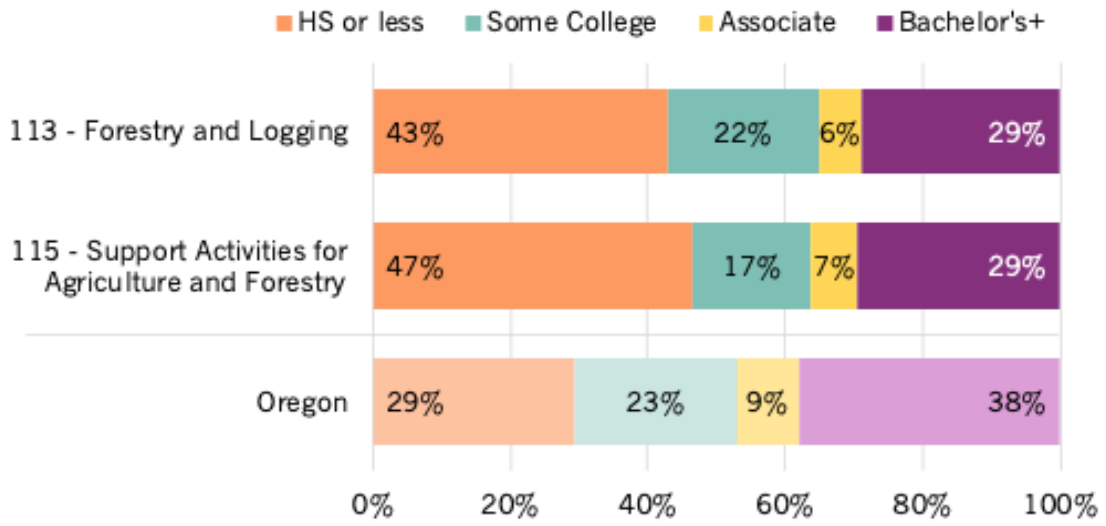


Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates

Educational Attainment

A larger share of forest operations and management employees have a high school diploma or less (between 43 and 47 percent) than the overall Oregon workforce (29 percent, see Exhibit 23). The sector relies heavily on hands-on experience and occupation skills, with workers able to enter stable, well-paying jobs through CTE, apprenticeships, or on-the-job training. Many of these positions require physical labor, mechanical expertise, or technical skills that workers develop outside of the state's colleges and universities.

Exhibit 23. Employee Educational Attainment in Forest Operations and Management, Oregon



Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates

Occupational Education Requirements

As suggested above, forest operations and management depend less on postsecondary education than does the average Oregon industry; job requirements instead typically emphasize technical training and hands-on experience. Exhibit 24 displays, for forestry-related industries and Oregon overall, the share of individuals working in each industry by the competitive education level of their occupation, as defined by OED.[69]

Most forest operations and management employees are in positions that typically require only a high school diploma or equivalent education (57 and 84 percent of employment in these two industries, compared to 36 percent for the state overall). The industries instead rely on skills that workers largely develop through on-the-job training or career and technical programs rather than degree-focused postsecondary education.

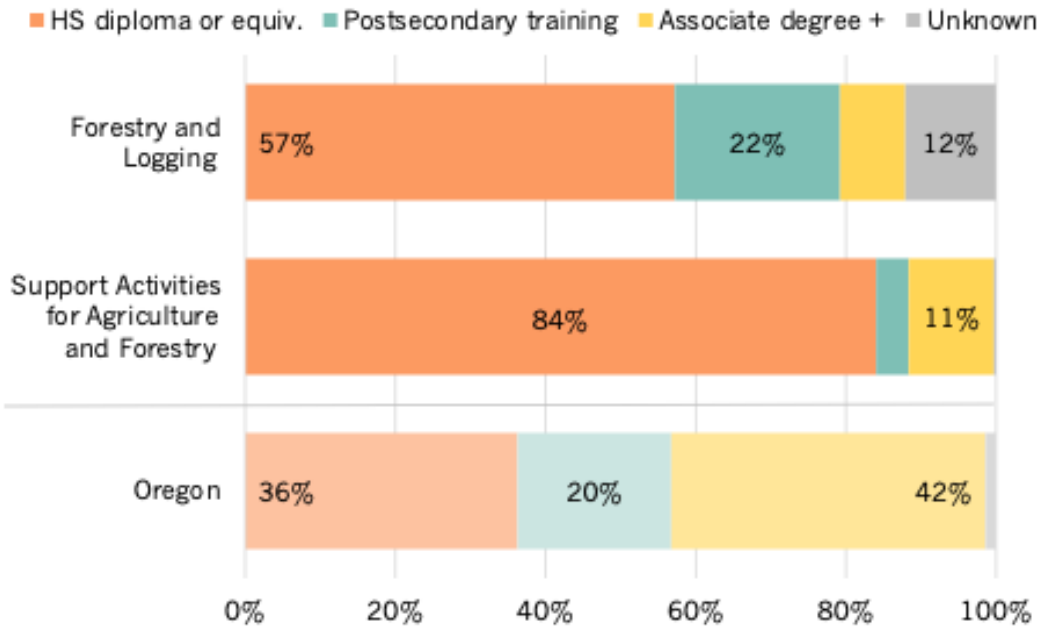
Non-degree postsecondary training—including certificates, apprenticeships, and similar—plays a role in many occupations critical to forest operations and management, at levels

[69] The competitive education level identifies the educational requirements typically necessary for a job applicant to compete successfully for jobs that attract many potential employees.

similar to those for the broader economy. About 22 and 5 percent of employed individuals in the two industries have jobs that often require postsecondary training, such as machine operators, maintenance technicians, and heavy equipment operators (compared to 20 percent in industries overall in Oregon).

Smaller shares of employed individuals in these two industries are in occupations that require associate or more-advanced degrees compared to Oregon's overall economy: 9 and 11 percent of these industries compared to 42 percent of Oregon employees overall. Positions in forestry management, engineering, and technical operations require these higher levels of education, but most forest-related jobs prioritize skill-based training over academic credentials.

Exhibit 24. Individuals Employed in Forest Operations and Management, by Competitive Education Level of their Occupation, Oregon



Data source: Oregon Employment Department, Oregon Employment Projections and Industry-Occupation Matrix, 2023.

Wages by Demographic

Wage disparities can reveal how structural barriers, access to opportunities, and occupational segregation affect workers' economic outcomes. Highlighting these differences helps identify areas where targeted interventions can promote equity across industries.

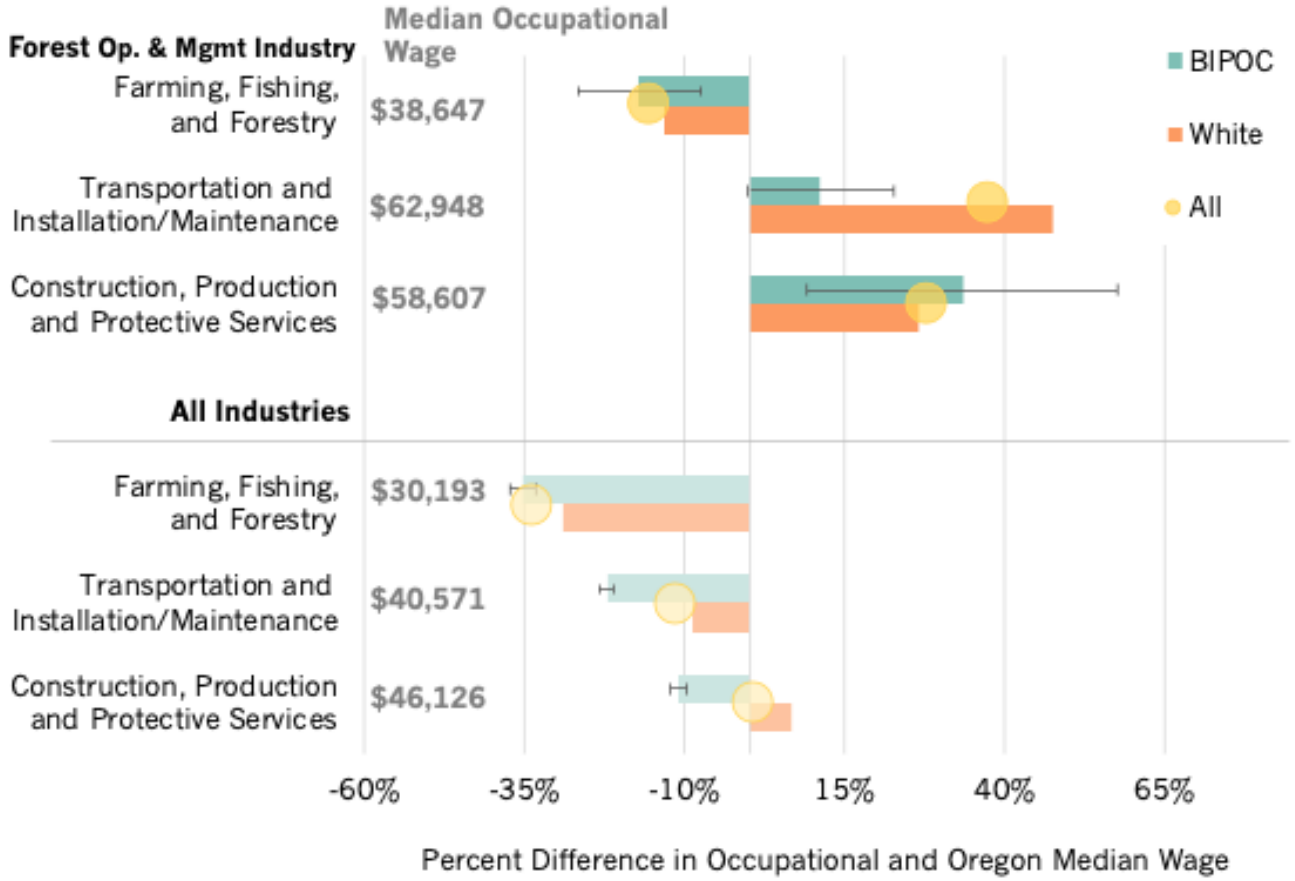
We estimate median wages in this section from the U.S. Census Bureau American Community Survey (ACS) to characterize wage variation across race and ethnicity categories. The underlying ACS data are self-reported, in contrast to the OED data presented in Exhibit 17, which are based on employer-reported information.

Consistent with the wage information presented earlier, across all occupational groups, workers within forest operations and management earn a wage premium compared to workers in all industries. In Exhibit 25 each bar shows the difference between the median wage in an occupation and race/ethnicity group and the Oregon median wage. The top panel is for wage earners in forest operations and management; the bottom panel is for wage earners in all industries. The exhibit also displays the overall median occupational wage for each occupation group.

In forest operations and management, BIPOC workers in farming, fishing, and forestry occupations, which includes primary logging occupations, earn 17 percent less than the Oregon median wage and white workers earn 13 percent less. In all industries, BIPOC workers in these occupations earn 35 percent less than the Oregon median wage and white workers earn 29 percent less. BIPOC workers in transportation and installation/maintenance occupations in forest operations and management earn 11 percent more than the Oregon median while white workers in these occupations earn 47 percent more than the median (considering all industries, both groups earn less than the Oregon median). For each occupational group, note that the data for BIPOC workers have relatively large confidence intervals.

Workers in forest operations and management earn more compared to workers in other industries, and the wage differential for BIPOC workers compared to white workers is slightly smaller in forest operations and management (15 percentage points) than across all industries (18 percentage points).

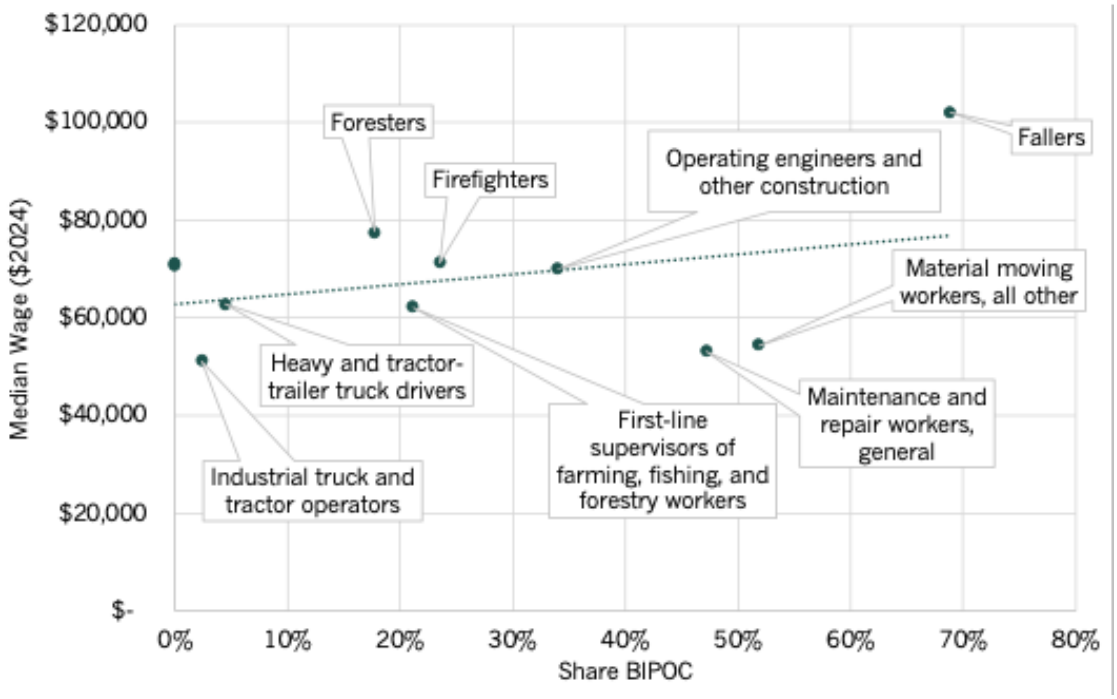
Exhibit 25. Race/Ethnicity Wage Differentials in Occupation Groups



Note: Error bars indicate a 95 percent confidence interval for the wage estimate. Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates.

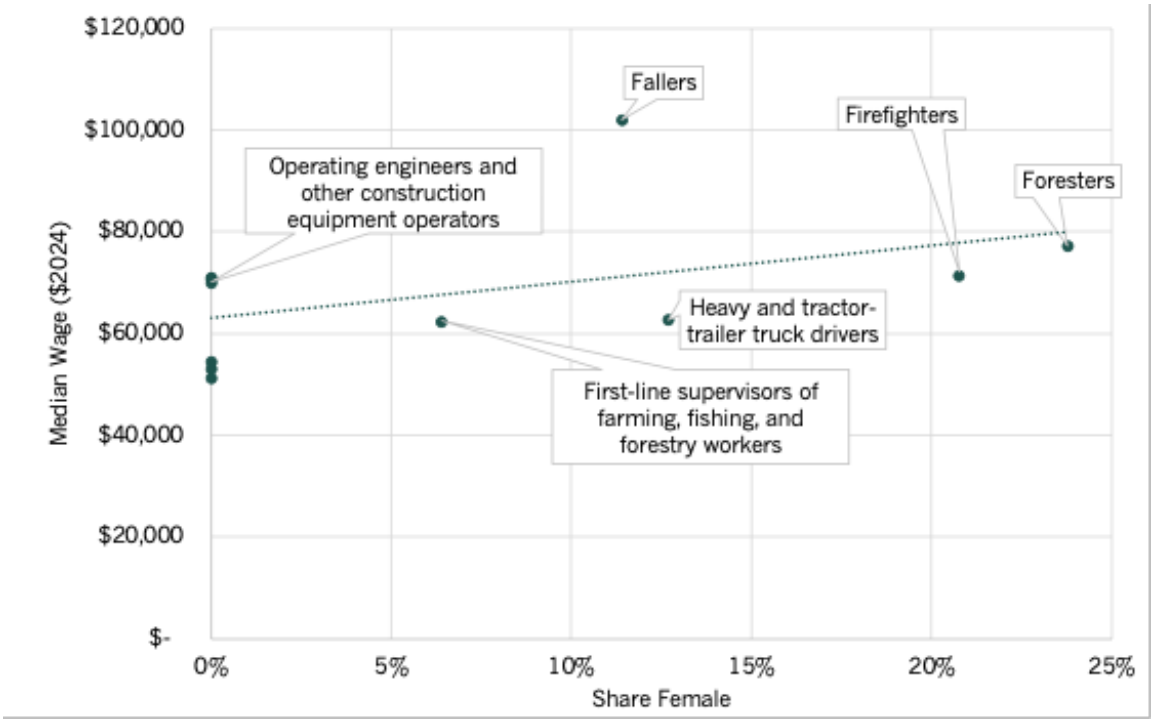
Exhibit 26 and Exhibit 27 suggest that higher wage occupations tend to have higher concentrations of BIPOC workers and women workers, but the trendlines are based on relatively few occupations and have fairly wide confidence intervals.

Exhibit 26. Occupational Median Wages and Race/Ethnicity of Incumbent Workers in Forestry Operations and Management, Oregon



Data sources: OED, Oregon Wage Information, 2024. U.S. Census Bureau (2023) American Community Survey, 5-year Estimates.

Exhibit 27. Occupational Median Wages and Gender of Incumbent Workers in Forestry Operations and Management, Oregon



Data sources: OED, Oregon Wage Information, 2024. U.S. Census Bureau (2023) American Community Survey, 5-year Estimates.

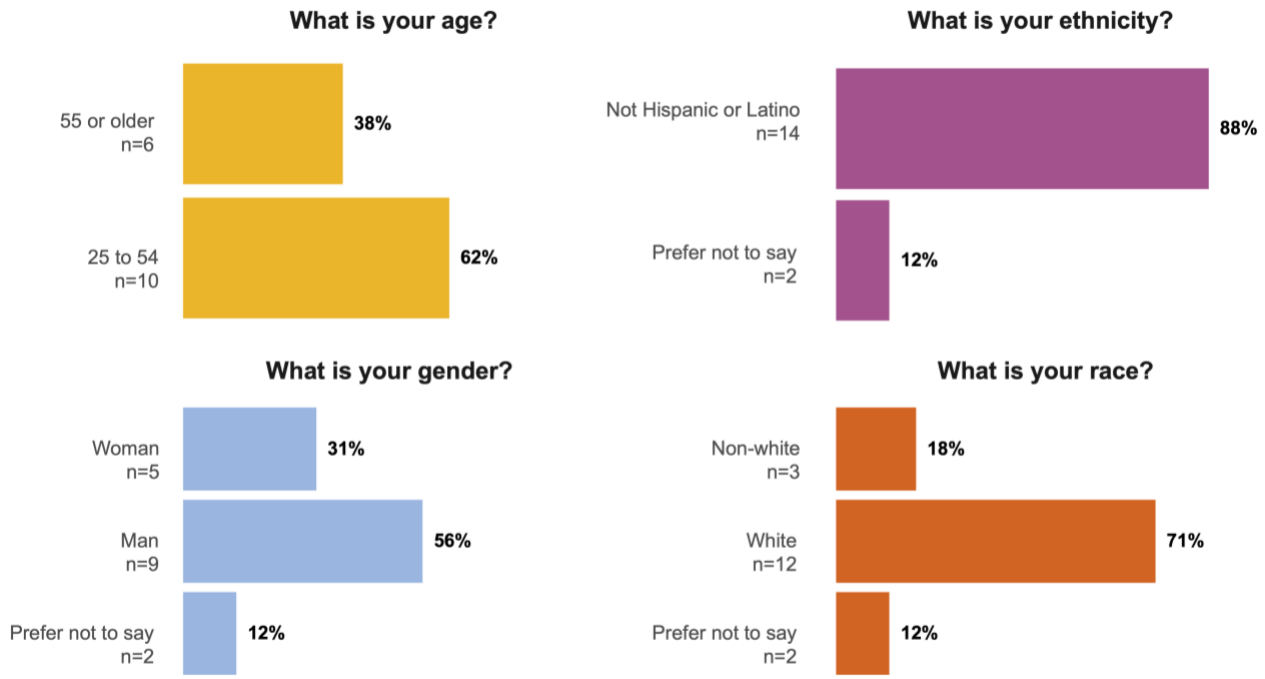
Survey Findings

As described in Chapter 1, this study included a survey of businesses involved in forest operations and management to assess current workforce characteristics and challenges within Oregon's forestry sector. The survey was structured to ask a different but related set of questions of self-employed individuals and employers because of differences in how the two types of entities operate. Just over 100 business representatives responded to the survey. This section presents results for demographics, amount of work, business challenges, and attracting, hiring, and keeping workers.

Demographics

The study's survey of self-employed individuals and employers included questions about demographics. Exhibit 28 displays the demographics of self-employed respondents. Out of 17 self-employed respondents, 10 were 25 to 54 years old; the remainder were 65 or older. Nine respondents identified as men and five as women; two preferred not to say. Self-employed respondents predominantly identified as white (12 respondents) and not Hispanic or Latino (14 respondents).

Exhibit 28. Self-Employed Respondent Demographics, as Share of Each Question's Responses



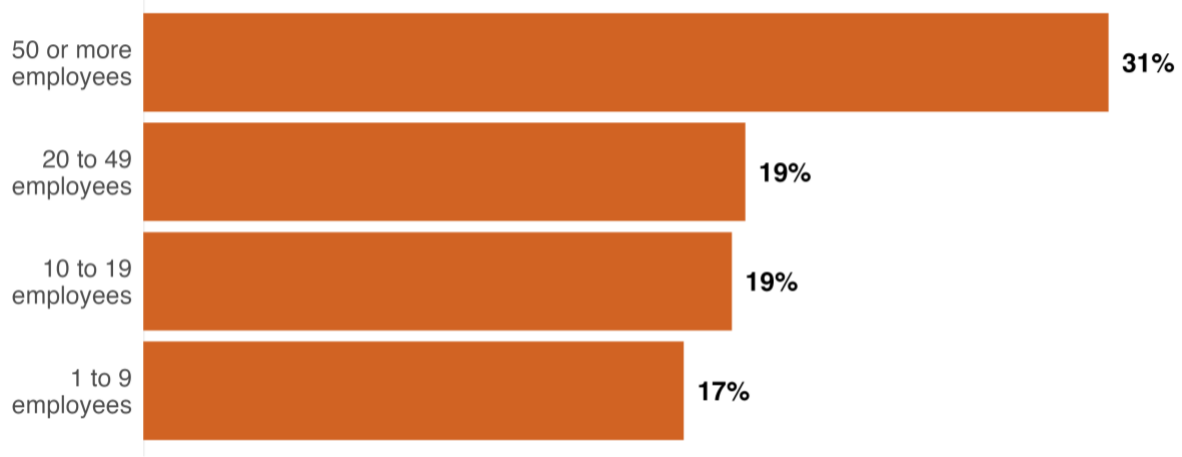
Source: Oregon Forestry Workforce Survey, 2025

Employer respondents were also asked about their businesses' workforce demographics. Respondents from larger businesses generally reported a higher percentage of non-white employees, with firms employing 50 or more people averaging 31 percent non-white staff,

compared to 17 percent among businesses with 1–9 employees (Exhibit 29). Across all employer respondents, non-white workers make up 30 percent of the workforce.

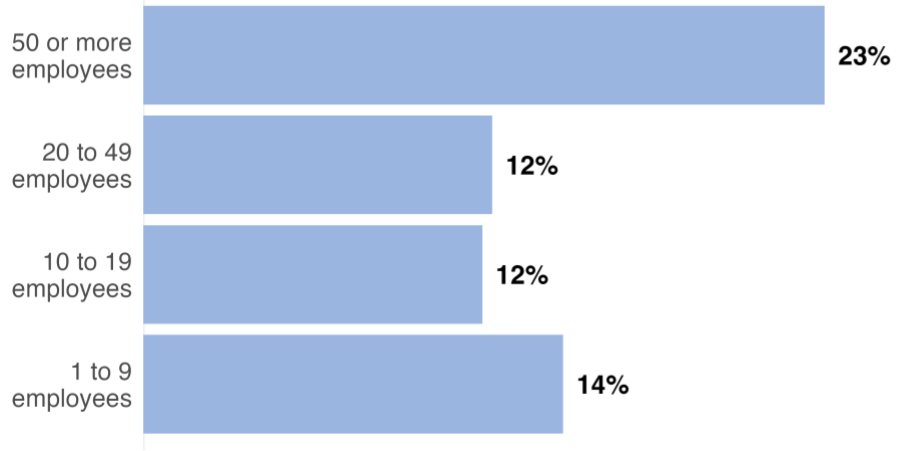
Larger businesses also typically reported higher representation of women among their workforces, with firms of 50 or more employees averaging 23 percent women compared to 12 to 14 percent among smaller businesses (Exhibit 30). Across all respondents, women workers make up 23 percent of the workforce.

Exhibit 29. Non-White Employees as a Share of Total Employees, by Business Size



Note: The weighted average reflects share of non-white employees relative to total employment. Source: Oregon Forestry Workforce Survey, 2025.

Exhibit 30. Women Employees as a Share of Total Employees, by Business Size

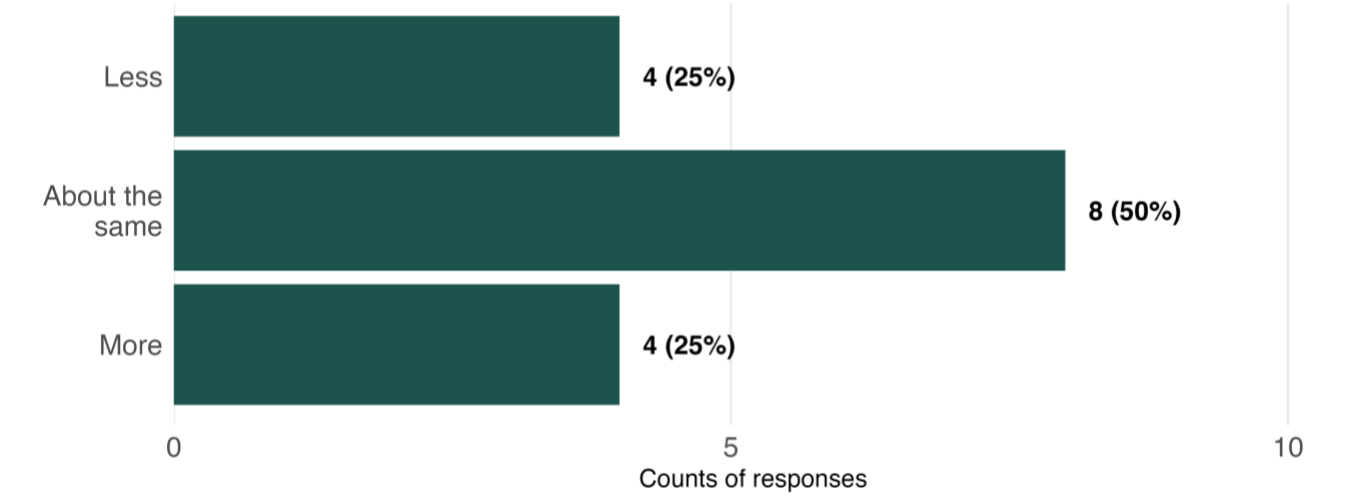


Source: Oregon Forestry Workforce Survey, 2025

Amount of Work

When asked if they worked more, less, or about the same amount as they wanted over the past 12 months, eight self-employed respondents indicated they worked about the amount they wanted (Exhibit 31). Four worked more and four worked less than they wanted.

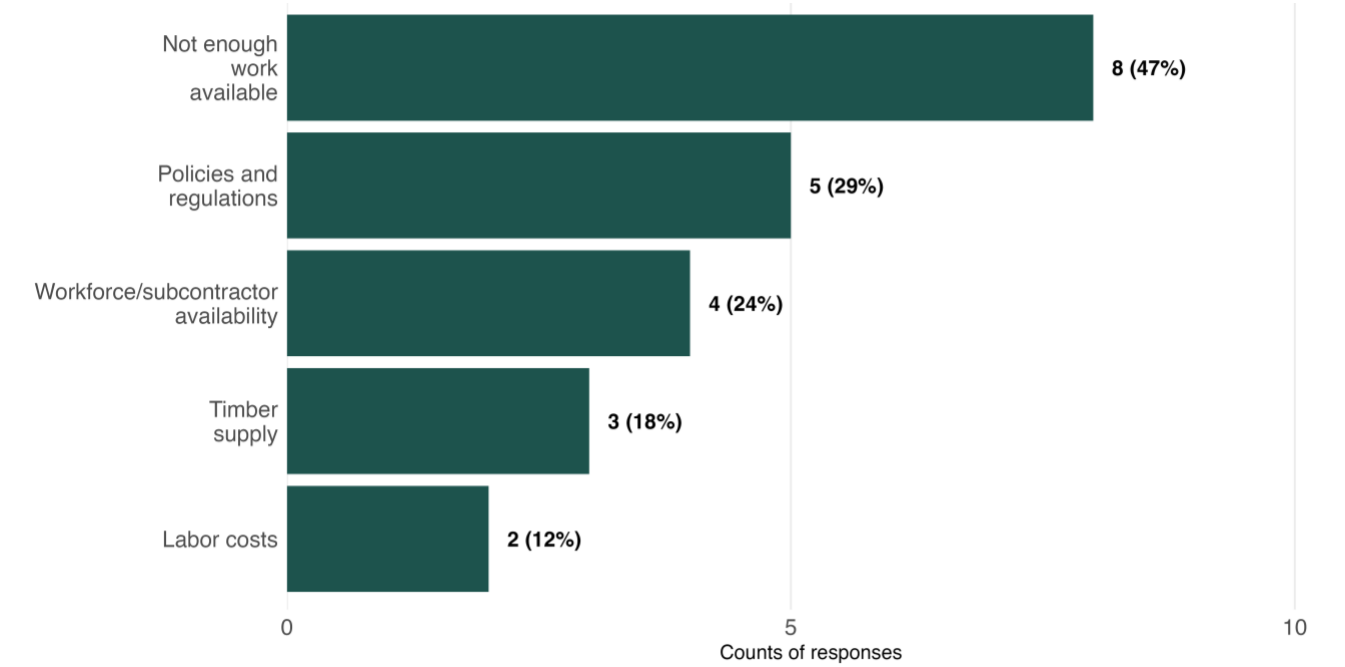
Exhibit 31. Self-employed respondents' actual level of work compared to desired level of work over the past 12 months



Source: Oregon Forestry Workforce Survey, 2025

When asked about the challenges to maintaining their desired level of work, self-employed respondents commonly identified several themes (Exhibit 32). The most frequently cited issue was "not enough work available," mentioned by eight respondents. Policies and regulations were the second most frequently reported barrier, cited by five respondents. Respondents also indicated workforce/subcontractor availability, timber supply, and labor costs as challenges.

Exhibit 32. Self-employed respondents' top challenges to maintaining the desired amount of work



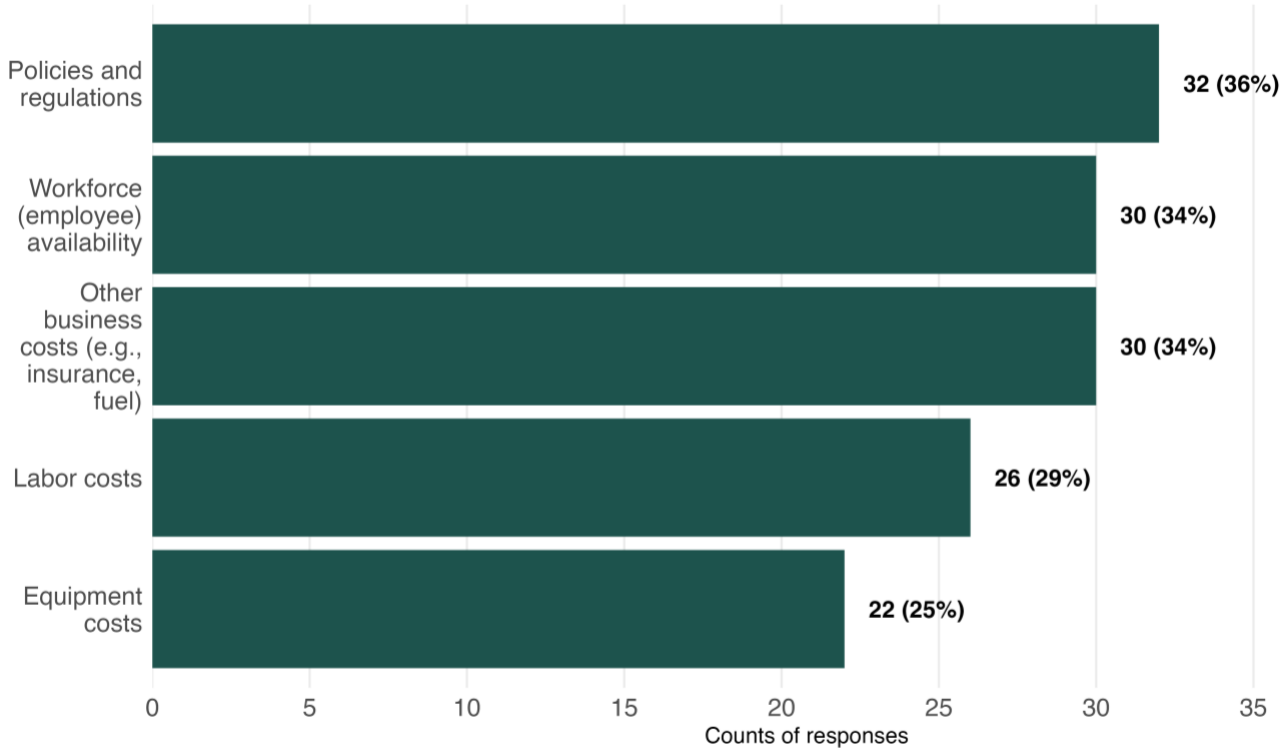
Source: Oregon Forestry Workforce Survey, 2025

Business Challenges

The most frequently cited business challenge was policies and regulations, selected by 32 respondents as shown in Exhibit 33. These responses may point to the challenges of compliance expectations – echoed by some respondents in their open-ended responses at the end of the survey – potentially slowing operations or deterring expansion. Workforce availability and other business costs (e.g., insurance, fuel) were the next most cited challenges, selected by 30 respondents each.

Labor costs were cited by 26 respondents. This reported challenge may reflect rising wage expectations among workers as well as employer concerns about their ability to offer competitive wages for skilled labor in the current job market.

Exhibit 33. Employer respondents' top business challenges in the past 12 months

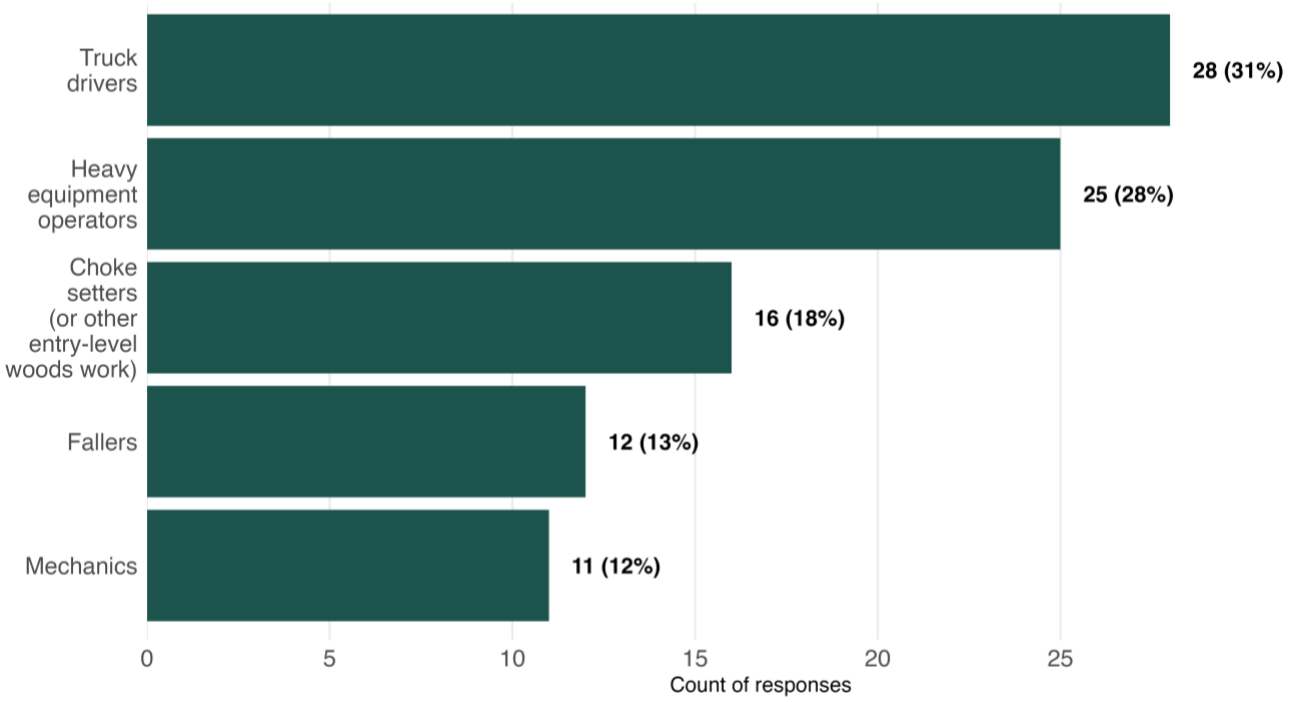


Source: Oregon Forestry Workforce Survey, 2025

Respondents were also asked to identify the types of contractors or workers most difficult to find. While 11 respondents said they had no difficulty finding workers or contractors, 54 identified one or more from a range of factors contributing to their workforce challenges in the last 12 months, presenting a snapshot of some of the most pressing issues facing forestry-related businesses. Exhibit 34 highlights the top five contractor/worker types that employer respondents have the most difficulty finding. Truck drivers and heavy equipment operators topped the list, cited by 28 and 25 respondents, respectively. These roles are critical to the functioning of forestry operations, particularly in the transport of logs, equipment, as well as the execution of harvesting and site-preparation activities.

Following these high-demand types are choker setters and other entry-level woods workers, cited by 16 respondents. These positions, while often requiring less technical training, are physically demanding and play a vital support role in field operations. Difficulty in hiring for these roles could point to the importance of focusing not only on high-skill roles but also on entry points that help sustain and grow the workforce over time.

Exhibit 34. Contractor/worker types most difficult for employer respondents to find

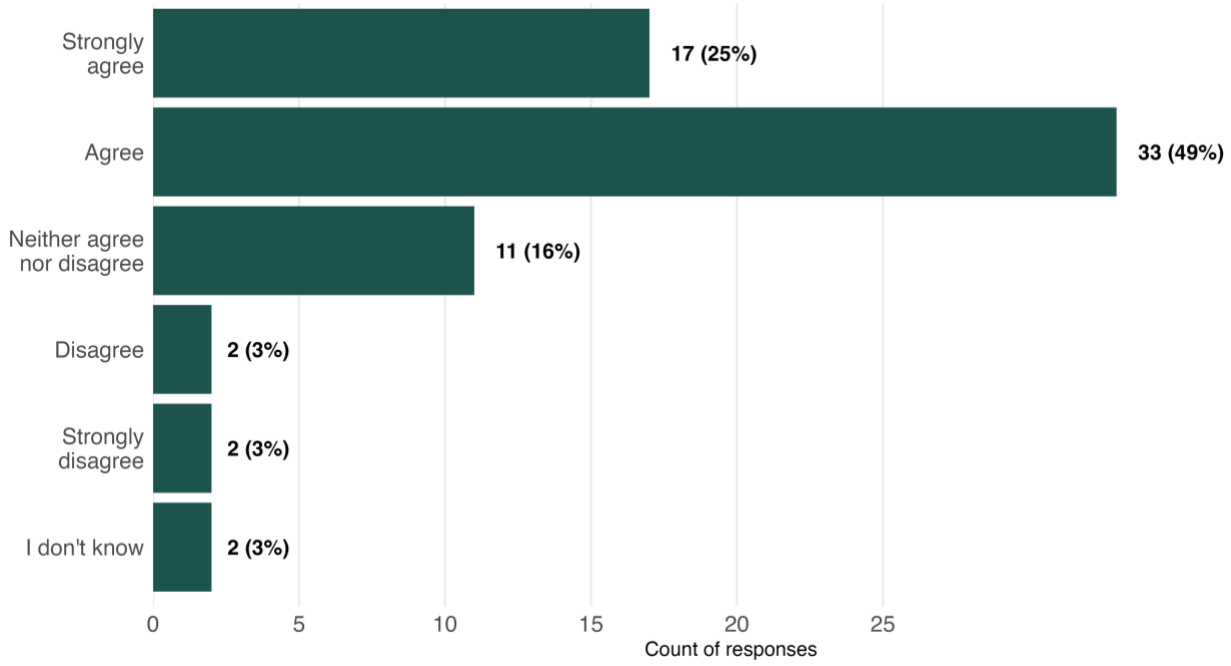


Source: Oregon Forestry Workforce Survey, 2025

Attracting, Hiring, and Keeping Workers

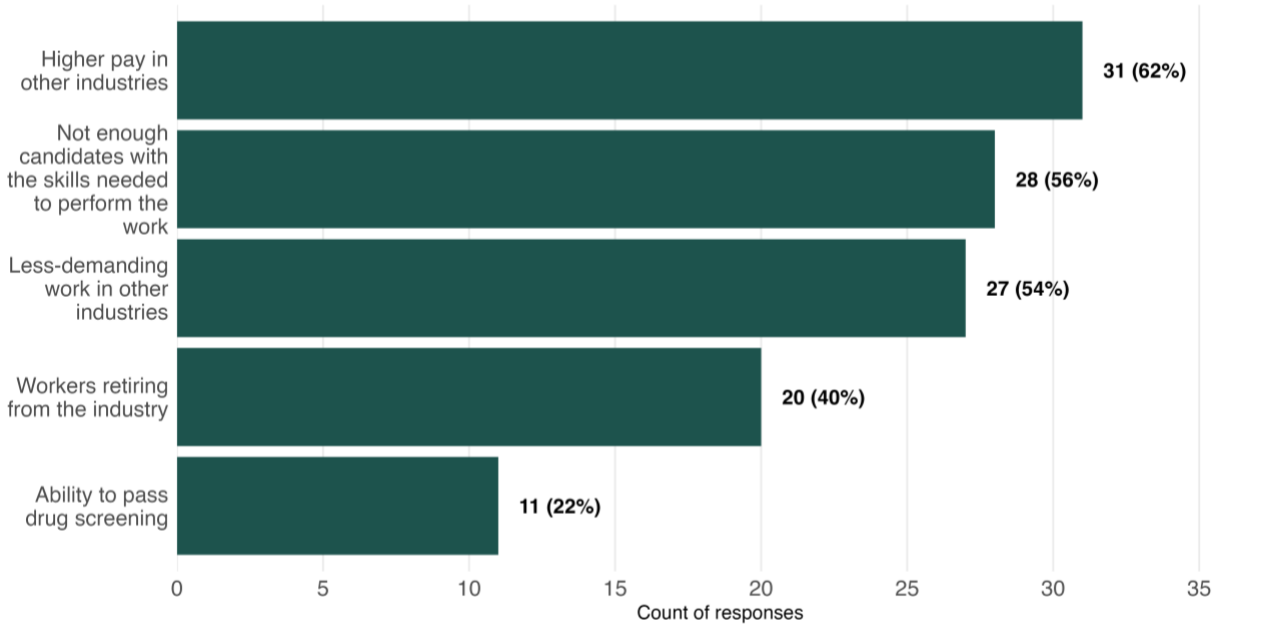
Sixty-seven respondents answered the question about the challenge of attracting and/or hiring workers over the past 12 months. Most of those respondents (50) said they agreed or strongly agreed that attracting or hiring workers has been a significant challenge (Exhibit 35). Those that indicated they either strongly agreed or agreed (or skipped the question) were asked to select their top three challenges in attracting/hiring workers over the past 12 months. Fifty respondents answered the follow-up question. Of those, 31 said they struggled to compete with higher pay in other industries (Exhibit 36). Another highly cited challenge was that there are not enough candidates with the skills needed to perform the work, reported by 28 respondents.

Exhibit 35. Agreement level with "attracting and/or hiring workers has been a significant challenge in the past 12 months"



Source: Oregon Forestry Workforce Survey, 2025

Exhibit 36. Employer challenges in attracting or hiring workers over the last 12 months



Source: Oregon Forestry Workforce Survey, 2025

The survey also asked employers to indicate their level of agreement with a series of statements related to applicants for open positions at their business over the last 12 months (Exhibit 37). Sixty-six respondents provided an answer for at least one statement.

The highest disagreement rates (disagree plus strongly disagree) were for applicants having desired advanced skills (44 percent disagree) and desired occupational skills (37 percent disagree). The next highest disagreement rates were for applicants having essential skills (34 percent), necessary work experience (33 percent), necessary basic skills (30 percent), and necessary credentials or licenses (27 percent). Disagreement rates were lower regarding whether applicants could pass a background check or pass a drug screening (12 and 16 percent, respectively).

In addition to recruitment and hiring challenges, the survey asked employers about their challenges with retaining workers over the past 12 months. Most respondents indicated that they agreed or strongly agreed (20 and 11 respondents, respectively) that keeping workers has been a significant challenge (Exhibit 38).

Respondents who indicated either strong agreement or agreement (and those that skipped the question) were asked a follow-up question to identify their top three challenges in keeping workers (Exhibit 39). Challenges with the highest number of responses included competition from other industries (both in pay and type of work), attendance, level of work available, and competition across other states. "Less-demanding work in other industries" and "higher pay in other industries" were selected by 19 respondents each, indicating that a primary challenge for employers in keeping workers may be competition from other industries.

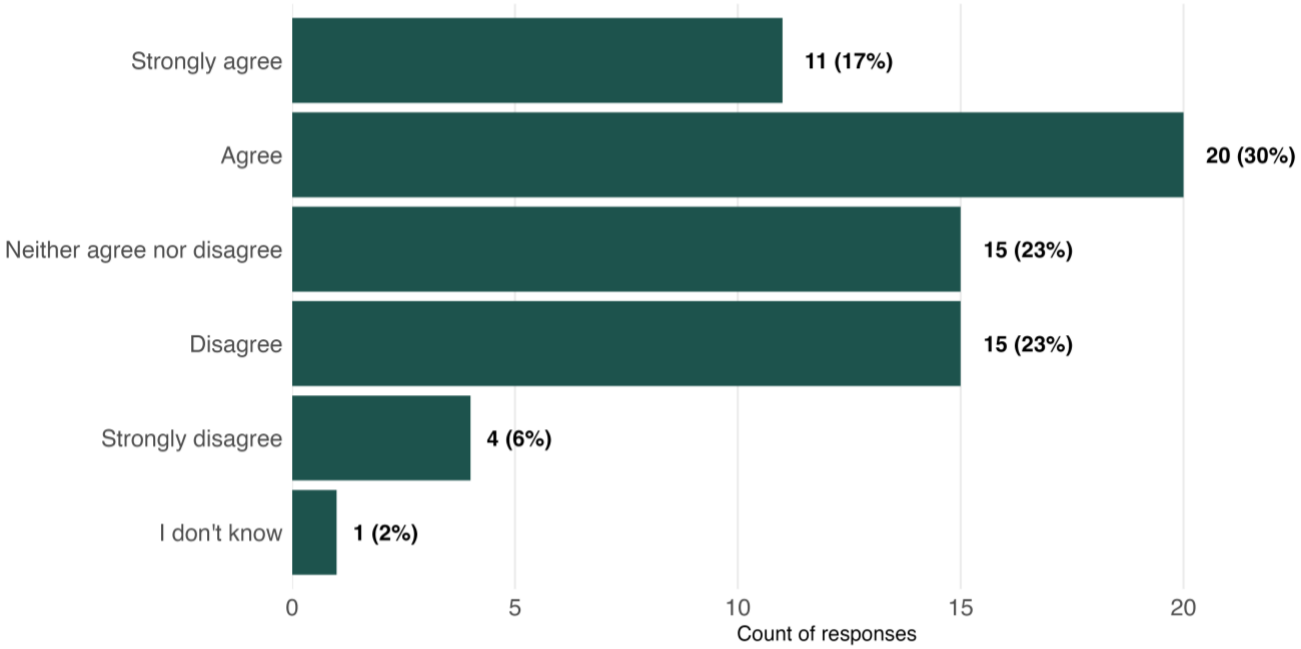
Exhibit 37. Level of agreement with statements about applicants to open positions over the last 12 months, by share of responses

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Share that responded
Applicants have the necessary basic skills[70]	5%	38%	27%	24%	6%	100%	74%
Applicants have essential skills[71]	3%	30%	33%	29%	5%	100%	74%
Applicants have desired advanced skills[72]	2%	15%	39%	30%	14%	100%	74%
Applicants have desired occupational skills[73]	0%	23%	41%	32%	5%	100%	74%
Applicants have the necessary credentials or licenses[74]	2%	33%	38%	18%	9%	100%	74%
Applicants have the necessary work experience	0%	20%	38%	38%	5%	100%	74%
Applicants can pass a background check	2%	38%	48%	9%	3%	100%	73%
Applicants can pass a drug screening	0%	27%	57%	11%	5%	100%	71%

Source: Oregon Forestry Workforce Survey, 2025

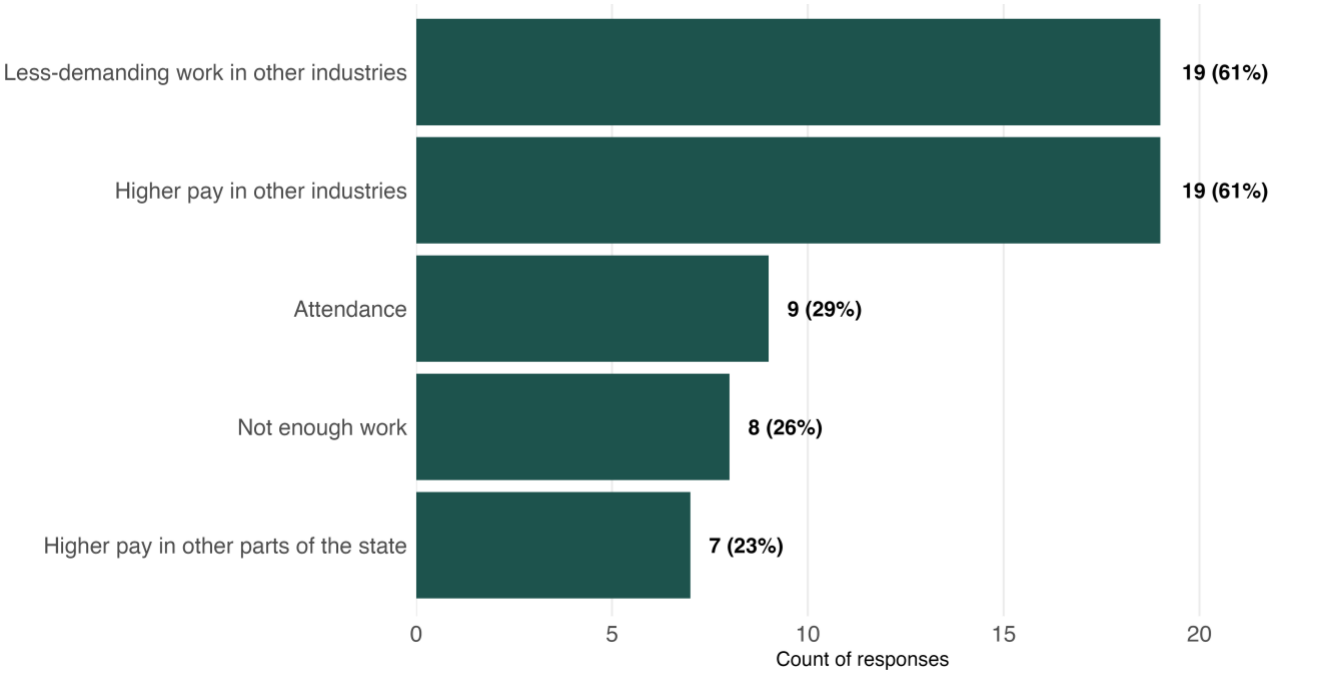
[70] For example, knowledge of and adherence to safety protocols, attendance, etc.
[71] For example, listening, communication, work ethic, willing to learn, problem, etc.
[72] For example, tree identification, terminology knowledge, map reading, etc.
[73] For example, ability to operate tools, vehicles and machinery, etc.
[74] For example, commercial driver license, certificates, etc.

Exhibit 38. Agreement level with "keeping workers has been a significant challenge in the past 12 months"



Source: Oregon Forestry Workforce Survey, 2025

Exhibit 39. Top challenges in keeping workers in the past 12 months



Source: Oregon Forestry Workforce Survey, 2025

Interview and Focus Group Findings

A Workforce in Transition: Shared Opportunities & Pressures

STRUCTURAL BARRIERS, COMPENSATION PRESSURES, AND EMPLOYER ADAPTATIONS

Employers in forest operations and management described how structural barriers – particularly in remote and high-cost-of-living regions – directly shape their ability to attract and retain workers. Long commute times and limited access to affordable housing reduce the size and stability of the available labor pool. One employer observed, "If you are coming from [the west] side of the Cascades and looking to adjust to a tiny town[, that's] a lot of obstacles. You either have to live/work in a remote place or commute." To reduce the commuting burden, many logging companies provide transportation while others avoid assigning work that requires a two-hour commute, recognizing that "you don't get paid for that time. You are making 8 hours but it takes up to 12."

Wage competition is another persistent pressure. Participants noted that wages in forest operations have not kept pace with the rising costs of living or wages in other industries. "Lumber is a commodity product," one interviewee explained. "As prices of lumber haven't...increased with wages, the wages for our logging and forestry workers haven't been able to keep up... That leads to it being a less attractive profession to go into." In response, some employers are experimenting with creative compensation strategies. One focus group participant described a logging company that paid employees a $50/day attendance bonus. While the bonus alone did not fully solve their problem of retention, it illustrated, in one participant's words, "the degree that this logging outfit was reaching into their pockets to try and make this work."

RURAL COMMUNITIES AND YOUTH OFFER GREATER WORKFORCE STABILITY

Several employers emphasized the advantages of recruiting from rural communities. Compared to their urban peers, rural youth are more familiar with forestry-related work, often growing up around it through family or community ties. Employers noted high retention and a greater baseline familiarity with job expectations in their rural locations. "In urban locations, we have much more turnover," one employer said, "versus in rural areas there are less employers. Sutherland is a different pool of people...It's easier to get them to stay because they are familiar with the work." This sense of familiarity reduces the gap between recruitment and readiness, and reduces burdens related to relocation.

SHIFTING WORKFORCE EXPECTATIONS ARE CHANGING HOW EMPLOYERS OPERATE

In addition to regional dynamics, employers described broader generational changes that are reshaping labor conditions in forest operations and management. Employers described a growing gap between expectations of younger workers and the traditional demands of the

field. “People don’t want to get up at 2am, they want stability and lives outside their jobs,” one interviewee shared. “Most successful [operators] have 401(k)s, match funds, have vacation days. That didn’t happen when I started.” Newer entrants seek competitive wages, predictable hours, and a sense of purpose in their work. One participant described a younger company owner offering a four-day workweek and a $40/hour starting wage as part of his strategy to be competitive and attractive to potential employees.

Labor sourcing also continues to evolve. Several employers reported consistent employment of H-2B visa workers, particularly for seasonal and high-turnover roles, praising their skill and dedication. One participant described these predominantly Latino immigrants as “the brightest star in our workforce.” Most of these workers are Spanish speaking, which has prompted operational changes around inclusive training and support to ensure safety. Some employers have adapted their practices to support retention through bilingual safety materials and interpreters at trainings. “We have acquired as many materials as possible in Spanish,” a representative shared. “It’s made a difference; it’s a retention thing. I want [our Spanish speaking employees] to feel comfortable and informed. It's helped us keep people here.” It has also helped them recruit friends and family members of current employees, who spread the word about the inclusive practices there. These examples illustrate how employers are evolving to meet changing workforce expectations through efforts around communication, cultural inclusion, and job design.

Findings Regarding Certain Types of Work

The interviews and focus groups collected information on many but not all roles and types of work in forestry operations and management. The collected data referenced a wide range of roles and meaningful insights centered on four areas of work: logging, wildfire mitigation and restoration, transportation, and public forestry. While findings are organized by types of work for clarity, participants made clear these roles are deeply interrelated in practice. These areas are both interconnected while also operating under distinct conditions that influence workforce stability, advancement pathways, and exposure to new entrants.

LOGGING

Most workers in logging enter through on-the-job training, with no formal education required for entry-level positions. While some individuals pursue college or graduate degrees to return to their family business or to advance faster into management and technical roles, employers emphasized that hands-on experience remains the foundation of the workforce. Transportation is a core component of logging operations, with a Commercial Driver’s License (CDL) typically required, an area of work explored more fully in the following section.

Recruitment and retention challenges for entry-level logging are particularly pronounced in urban areas, where wages are the same as those for less physically demanding jobs. Employers noted that when wages are similar across industries, pride in the work itself becomes a critical factor in retention. “Picking between working $30/hour in Costco or logging, you are going to pick Costco unless you are proud of the work,” explained one

participant. To reduce early turnover, some employers have implemented strategies like first-day job site tours or peer mentoring with long-term staff to help new hires understand what the job entails and whether it is a fit.

TRANSPORTATION

Log hauling is an essential yet increasingly strained link in Oregon's forest operations and management workforce. Employers consistently reported that dependable drivers are difficult to find and harder to keep. Many cited an aging workforce and a shrinking labor pool, with one employer noting, "They are one of the oldest segments of the logging workers." Even when drivers are available, reliability and safety vary: "Out of 8 or 10 trucks, we had 3 or 4 rock solid drivers...the others missed work, had injuries, were aging out." Unlike long-haul commercial driving, logging truck operation often involves remote, narrow roads and highly unstable loads, requiring advanced skill and judgment. These realities, combined with early morning shifts and inconsistent hiring pipelines, make trucking a persistent workforce bottleneck. As one employer summarized, "Not many want to wake up at 3 or 4 in the morning."

Training and licensing requirements further complicate recruitment. Engagement participants emphasized that Oregon has few accessible CDL programs, especially near metro areas, and entry-level driver training regulations make it difficult for younger candidates to enter the field. One participant reflected, "It is very challenging for younger people to obtain a CDL now...the few community colleges offering CDL training...are difficult to get into. That leaves young people paying around $5,000 for four weeks of classroom training." These programs, they added, often provide limited real-world preparation: "The amount of experience they get...in no way prepares them to be out on the road in a big semi." While logging firms can offer off-road driving opportunities for practice, this on-the-job model does not meet federal CDL standards. As older drivers retire, employers emphasized the urgent need for better-aligned, affordable training pathways that reflect the distinct needs of forestry hauling and rural workforce development.

WILDFIRE MITIGATION AND RESTORATION

This part of the workforce spans a wide range of roles, from entry-level seasonal fire mitigation and restoration crews to fire ecologists and land managers. Many workers begin without formal education, gaining skills through on-the-job experience. However, higher paying roles with greater specialization often require a bachelor's or master's degree in forestry, ecology, or related fields. A lack of standardized training for skills required for restoration work remains a concern, particularly for H-2B visa workers who play a vital role in this labor.

Seasonality is a defining feature of wildfire mitigation and restoration roles, and workers may seek stability by cross-training across restoration, fire suppression, and forest management. This enables workers to shift between fire, forestry, and restoration work throughout the year. Programs like Lomakatsi Restoration Project have emerged as leaders in preparing youth with this multifaceted training, while workforce boards increasingly

recognize this space as a growing entry point into the forestry sector for younger generations. As one participant shared, "I have had conversations with youth intrigued, or scared to death, with interest in forestry, environmentalism, forest management. Being surrounded by federal forests, we choke on wildfire smoke every year. Now people are truly interested in being in the solution.... Whether that is as a wildland firefighter [or] replanting, proper forest management is needed."

While there is some overlap in this workforce with more-traditional loggers (for instance, loggers are sometimes hired in the off-season for fuel reduction or thinning projects because of their skills in operating chainsaws, understanding forest structure, and navigating rugged terrain), most of the time these workers remain siloed. Conservation and fire mitigation work is typically led by public agencies (e.g., ODF, USFS), nonprofits like watershed boards, or tribal governments, not private companies. Additionally, the smaller trees removed during fire mitigation often lack commercial value, which can discourage pure logging operators unless subsidized or supported through stewardship contracts.

STATE AND FEDERAL AGENCY FORESTRY JOBS

Because so much forestry work happens on public lands, there is regular crossover between crews working on operations and management and public agency staff or contractors. Public sector forestry roles fall into two broad categories: field-based positions and management roles. Entry-level positions, such as seasonal field crews, often require only a high school diploma and offer advancement through experience. In contrast, roles involving planning or land management typically require a bachelor's or master's degree in forestry, biology, or environmental sciences. While promotion is possible through experience alone, employers noted higher education accelerates career progression.

Despite the appeal of job stability and benefits that public sector forestry roles offer, their hiring processes can be a barrier to entry. Several participants cited long application timelines, hard-to-navigate platforms like USAJobs.gov, and minimum education levels as deterrents for candidates. "That's the issue with government jobs," one educator explained. "If you look at any ODF opening the minimum is a bachelor's degree. I think of one student who took pretty much every [community college] course we offered, he lasted a term at OSU, quit, and now works for an arborist."

Conclusion

Oregon's forest operations and management sector supports a large workforce across many industries. Work in the sector has adapted to automation and technological advancements; demand remains strong for specialized skills in logging, wildfire mitigation, and ecological restoration; and wages are relatively high across subsectors. We estimate the sector has a baseline need for an average of 3,400 new workers every year—more than 10 percent of the workforce size estimate for 2023.

The sector faces ongoing workforce challenges similar to others, including an aging labor force and demographic disparities that require targeted recruitment and training efforts.

Women remain underrepresented, especially in labor-intensive roles. These workforce dynamics present an opportunity to expand recruitment efforts, promote diversity, and develop training programs that attract new talent to ensure the sector's sustainability.

With understanding of occupational composition, workforce and employee characteristics, in addition to training pathways, and sector needs, decision- and policymakers can better align resources to support a well-prepared workforce that can adapt to ongoing changes and steward the long-term success of forest operations and management in Oregon.

3. Programs and Pathways Analysis

Workforce development in the forest operations and management sector follows pathways that move individuals from early exposure to advanced expertise. K–12 education introduces students to forestry concepts and basic skills. Career and Technical Education (CTE) builds on that foundation by providing direct experience and training. Pre-apprenticeship programs prepare participants for the structure and expectations of registered apprenticeships, where they receive paid, hands-on training alongside classroom instruction. These apprenticeships equip workers with skills needed for technical roles in the field. Workers also enter forest operations and management after postsecondary training. Each step in these pathways can support industry entry, professional growth, and skill specialization, ensuring the sector has a steady supply of trained workers across a range of roles. And pathways can take many different configurations as individuals make decisions regarding their careers and education.

This chapter identifies and assesses trends across educational and training pathways related to the occupations and skills utilized in the forest operations and management sector.

Insights from Literature, Interviews, & Focus Groups

Training Pathways

Forest operations and management careers require different levels of education or training depending on the role. Forest and conservation workers typically need a high school diploma, although not always required; forest and conservation technicians, up to an associate degree; and conservation scientists and foresters, at least a bachelor's degree. While a postsecondary degree is required for some roles, many forestry-related jobs, including entry-level positions in logging and fire suppression, are available via on-the-job training, certificate programs, apprenticeships, and short-term training programs offered by government agencies.[75]

A sample of available training pathways into the forestry workforce is illustrated in the table below:

[75] Zilberman, Alan. "Careers in Forestry: Nature's Office Suite." U.S. Bureau of Labor Statistics, August 2016. https://www.bls.gov/careeroutlook/2016/article/forestry-careers.htm#:~:text=To%20enter%20these%20occupations%2C%20forest,at%20least%20a%20bachelor's%20degree

EDUCATION/ TRAINING LEVEL	OCCUPATIONS	KEY TRAINING COMPONENTS	TYPICAL DURATION
Short-term or on-the-job training	Entry-Level Logging & Conservation Workers	Assisting experienced workers	1-12 months
	Entry-Level Forest Firefighters	USFS or state government training programs	Minimum 2-3 days
Apprenticeship	Logging Equipment Operator	Specialized machinery maintenance and repair training	Varies, typically multi-year
Certificate / Certification / License	Truck Driver, Mechanic, Drone pilot	Vehicle/system operation skills, safety, regulation compliance	1-12 months
Associate degree / Career/technical education program	Forest & Conservation Technicians	Hands-on learning, practical skills, applied forestry software	2 years (degree program)/Varies (months to 2 years)
Bachelor's degree	Conservation Scientists & Foresters	Theory, science, project management	4 years (degree program)
Master's/Doctoral degree	Foresters	Specialized forest management tools, research focus	2+ years (graduate education)

Data source: U.S. Bureau of Labor Statistics

Federal employment pathways have long been shaped by fluctuations not only in agency hiring but also in the volume and consistency of available work. Historically, agencies like USFS, BLM, and the National Park Service have adjusted operations in response to federal budget priorities, shifting land management policies, and environmental conditions such as fire severity and forest health. For prospective workers—especially those considering entry-level or seasonal roles—this variability in job availability can present a barrier to entering or staying in the field.

The sections below provide an overview of different parts of training pathways toward employment in forest operations and management in Oregon. We describe the role each pathway section plays and highlight programs, initiatives, organizations, and institutions that are key to Oregon's training pathways.

K–8 Education and Early Exposure

Early exposure during K–8 to forest operations and management can lay critical groundwork for student interest in forestry fields. Research underscores the value of introducing environmental concepts and forestry-relevant activities at a young age through programs like

after-school nature clubs, summer day camps, and hands-on classroom projects.[76] These early learning experiences – especially when supported by trained teachers, community-based organizations, and interactive role models—can foster sustained curiosity about the natural world and a sense of agency in shaping it. A goal of K–8 programming is to develop curiosity and a sense of belonging in outdoor and environmental spaces long before formal career decisions begin.

A key, longstanding Oregon initiative is Outdoor School, a statewide program that has provided immersive, week-long environmental education experiences for 5th and 6th graders since 1957. Funded by a dedicated state revenue stream, every eligible student in participating school districts—regardless of background or income—can participate. The program combines classroom learning with hands-on experiences in natural settings to teach environmental literacy and a sense of stewardship.[77]

OFRI maintains a comprehensive inventory website for K–12 teachers to find and integrate forestry education materials.[78] OFRI provides Oregon Garden Natural Resources Education Program field trips to the Rediscovery Forest in Silverton, and funds other key initiatives, such as the Talk About Trees program, which provides students with in-class and interactive presentations about forestry. OFRI also offers professional development workshops for educators, support for CTE programs in high schools, transportation funds, and access to free curriculum materials aligned with state standards.[79] Interviewees noted OFRI's important role in connecting high schools to postsecondary programs and professional networks.

High School and Career Technical Education

High school and CTE programs are key to building a strong workforce and exposing young people to forestry career pathways. CTE related to Oregon's forest operations and management sector aims to teach students career skills related to balancing human needs with environmental stewardship, ensuring that land and resources are managed sustainably for the future. Curricula emphasize the role of health, safety, and environmental management systems in maintaining productive and sustainable operations. Students learn to demonstrate natural resource stewardship and understand the interconnected nature of food, fiber, and fuel systems.

The Oregon Future Natural Resource Leaders (FNRL) program is a Career Technical Student Organization (CTSO) that supports high school students interested in pursuing educational and career opportunities in the natural resources and forestry sectors.[80] Established in 2016, FNRL provides leadership training to students and professional development to staff,

[76] Bullard, Steven H, T J Walker, and Leslie Burger. "Enhancing Diversity in Undergraduate Degree Programs in Forestry and Related Natural Resources: A Brief Review of Critical Issues and Promising Actions." *Journal of Forestry* 122, no. 2 (March 15, 2024): 107–22. https://doi.org/10.1093/jofore/fvad043
[77] OSU Extension Service, Outdoor School, https://extension.oregonstate.edu/outdoor-school
[78] Oregon Forest Research Institute, https://learnforests.org/
[79] "Forests make amazing classrooms." Oregon Forest Resources Institute. https://oregonforests.org/k-12-programs
[80] What is FNRL? https://sites.google.com/oregonfnrl.org/fnrl/home/what-is-fnrl

integrating classroom instruction with real-world applications. The program's scope includes industry-relevant competitions in areas like compass and pacing, first aid, cable splicing, and timber cruising. FNRL chapters are the Forestry or Natural Resource CTE Programs of Study in high schools in Oregon (see CTE section of this chapter). In collaboration with Associated Oregon Loggers (AOL), FNRL is developing a forest operator industry-recognized credential that will allow students to demonstrate their logging and forest sector skills when applying for jobs directly out of high school.

The engagement findings highlighted some ways that efforts to scale programs remain uneven across Oregon. Insurance and liability concerns are major barriers to launching new programs. Success often depends on the willingness of individual school districts to take on perceived risks. As one educator explained, "The schools that have these programs kind of self-insure. They know some things aren't going to be covered by insurance policies and the school districts take on that liability. There's other schools that get so freaked out about it and say no." Engagement participants described locations in the state that have tried to launch programs but struggled to gain traction due to these concerns.

High school programs benefit most when built on strong partnerships between schools, employers, and community organizations, like those facilitated by OFRI. Evidence-based best practices for this stage include dual enrollment opportunities, where students earn credit towards certifications while completing high school; summer field camps and conservation crews, which provide immersive, hands-on experience; and forestry career days that connect students to working professionals.[81] Sustained engagement by teachers and counselors, as well as continuity across key student transition points (e.g., graduation or college enrollment), are essential to retaining student interest in the field.

Apprenticeships and Youth Workforce Programs

Applied training models such as apprenticeships, youth conservation corps, and service-based programs are pivotal in forestry operations and management workforce development. They offer flexible, applied learning experiences that combine paid employment, technical instruction, and provide community to early-career individuals. They are particularly effective at reaching underrepresented youth, including those at-risk or disengaged from traditional education systems, and at building community among early-career individuals. Notable examples include the California Registered Apprenticeship Forest Training (CRAFT) program, which combines classroom-based learning with on-the-ground forest management experience and is further evaluated in the Best Practice Program Highlights section.[82]

The public sector is central to many of these programs, often providing site access and grant funding to support program operations. In turn, these programs play a vital role in stewarding public lands while preparing a new generation of forest workers. As one interviewee noted, "Every youth is going to talk about our public forests and lands... [Public

[81] Bullard et al. "Enhancing Diversity"
[82] California Registered Apprenticeship Forest Training. "Connecting Talent with Employers in Logging and Forestry." https://craftprogram.net/

agencies] have been the source for our grant funding. We don't run support crews for Weyerhaeuser, but we do a ton for BLM." This public sector alignment reflects broader structural patterns in Oregon, where service corps models have matured into stable pipelines of labor and learning. One prominent example is the Oregon Conservation Corps, a statewide program that blends environmental science education with job readiness training, giving participants both workforce experience and exposure to environmental careers.[83]

Community-based organizations are also critical partners in youth workforce trainings. Programs such as AntFarm, the Community Services Consortium, and the Lomakatsi Restoration Project offer local summer bootcamps and job-training crews in fields forest management, restoration, and fire mitigation. Demand is strong: one interviewee described a youth boot camp for high school juniors, seniors, and early college students that offered "20 slots and were getting 80 applications." These programs are strengthened by private employer support as well. According to interviewees, companies will donate equipment, helping ground participants in industry-relevant skills.

While effective, these programs also face structural limitations, especially when it comes to engaging the private forestry sector. Interview participants noted liability concerns, limited funding, and the logistical complexity of hosting students on private lands all act as barriers. "It would be beneficial to introduce students to work on privately owned land," one educator shared, "But it's harder to get that kind of funding – it's liability, funding, students. All of that I think tends to scare away private landowners." To scale beyond current program levels, youth workforce programs would need additional funding and additional coordination with both public agencies and private employers.

Postsecondary Education

Postsecondary education offers a range of forestry training options from technical certificates to four-year degrees and graduate programs, each playing a distinct role in workforce development. Oregon State University's forestry program is ranked as one of the best in the world and offers three areas of focus: forest restoration and fire, forest management, and forest operations.[84]

Community colleges in Oregon play an especially important role in developing entry-level talent. Central Oregon, Mt. Hood Community College, and Southwestern Oregon Community College offer accredited forestry programs designed to meet the needs of employers, with students often continuing to four-year universities. Other programs, such as those at Clackamas Community College, focus on wildland firefighting and preparing students for immediate entry into the workforce. Umpqua Community College, in collaboration with Oregon State University and industry stakeholders, is currently developing a Forestry

[83] Oregon Conservation Corps. "Program Partners." https://oregonconservationcorps.org/program-partners/
[84] OSU College of Forestry Rankings: https://www.forestry.oregonstate.edu/rankings

Machine and Maintenance Operation certificate within their forestry engineering program to support equipment training needs.

Despite this progress, focus group discussions revealed community colleges face several structural barriers to program expansion. Many short-term offerings often do not qualify for federal financial aid unless they are part of longer-term academic pathways, making them harder to sustain. Faculty and staff also reported the challenges operating flexible programs without institutional subsidies, especially if student enrollment is not consistent. "We can start these night and weekend programs," one educator noted, "but we have to have enough students to pay for themselves or accept that they need to be supplemented." Several faculty and staff described the difficulty of launching credential programs that align with industry needs while still meeting administrative and funding requirements.

To improve recruitment, retention, and workforce readiness, research points to several best practices. Orientation-style bridge camps – held before students begin postsecondary studies – help build confidence, peer networks, and familiarity with forestry tools, language, and career pathways. An example is the Tanglewood Fall Field Camp held by the School of Forest Resources at the University of Maine, which is further discussed in the Best Practice Program Highlights section.[85] Other effective practices include transfer pathways from community colleges to universities, supported by advising and financial aid.

Mentorship is a recurring theme across high school and postsecondary settings. Multi-layered mentorship networks involving peers, faculty, and professionals have been shown to increase student retention and belonging. Visible role models improve engagement and programs like career guest panels offer accessibility to the diversity of work and people in the field.[86] Many institutions also designate dedicated staff to coordinate outreach, mentoring, and student support, helping to ensure that students from varied backgrounds are supported throughout their academic journey.

Postsecondary pathways equip workers with technical forestry skills, but employer expectations extend beyond technical competencies. A 2013 national survey of forestry employers gave high ranking to the importance of human dimensions and social skills such as communicating effectively, behaving ethically, listening effectively, and communicating with clients and the public. Employers largely agreed that new employees from 4-year degree programs were prepared in traditional and technical field forestry competencies like stand and landscape aesthetics, forest science, forest wildlife, and arboriculture.[87] However, many noted a need for stronger communication and relationship-building skills to support collaboration, leadership, and community engagement in the field.[88]

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[85] Bullard et al. "Enhancing Diversity"
[86] Ibid.
[87] Sample, V. Alaric, R. Patrick Bixler, Maureen H. McDonough, Steven H. Bullard, and Mary M. Snieckus. "The Promise and Performance of Forestry Education in the United States: Results of a Survey of Forestry Employers, Graduates, and Educators." *Journal of Forestry* 113, no. 6 (November 16, 2015): 528–37. https://doi.org/10.5849/jof.14-122
[88] Bullard, Steven H. "Forestry Curricula for the 21st Century—Maintaining Rigor, Communicating Relevance, Building Relationships." *Journal of Forestry* 113, no. 6 (November 4, 2015): 552–56. https://doi.org/10.5849/jof.15-021

Adult Workforce Services

Local workforce development boards in Oregon play an important role in connecting individuals with employment opportunities across industries. They coordinate training, education, and job placement services tailored to regional labor needs, partnering with community colleges, employers, and public agencies to develop programs that equip workers with job skills. For example, Clackamas Workforce Partnership (Clackamas County) partners with AntFarm and connects individuals to wildfire science through Clackamas Community College, and Rogue Workforce Board (Josephine and Jackson counties) partners with Lomakatsi Restoration Project and the Southern Oregon Forest Restoration Collective.

One challenge expressed is that funding streams change and don't always continue to support effective programs or recruiting efforts. We also heard, as described again in the following chapter, that many workforce boards categorize forestry with manufacturing and primarily engage with manufacturing subsector representatives. As a result, key subsectors such as logging, restoration, wildfire mitigation, and nursery production are underrepresented in some workforce planning discussions.

In addition to regional workforce partnerships, several programs support adults entering the forest operations and management sector through career transitions or alternative pathways. For example, one community college noted in focus groups that many of its forestry students are veterans. And ODF partners with the Oregon Department of Corrections to provide incarcerated individuals with opportunities to gain hands-on forestry experience. Through supervised custody crews, individuals engage in forest management activities such as fire suppression, thinning, controlled burns, and recreation infrastructure maintenance. Their South Fork Camp location can produce up to 28,000 person-days of skilled adults-in-custody labor in any given year.[89]

Best Practice Program Highlights

Across the U.S., several states have developed innovative forestry education models that incorporate best practices. This section highlights programs outside of Oregon at the K–8, high school, apprenticeship, youth workforce program, and postsecondary levels that reflect an evolving approach to training and education in forest operations and management.

Washington State: High School Program & College Coordination

Cascadia Technical Academy is a public CTE high school located in Vancouver, Washington, serving over 1,400 juniors and seniors annually through partnerships with 10 school districts across Clark County. Students receive specialized, hands-on training in career-focused fields – including forest management – and can earn college credits as well as

[89] "Adults in custody rehabilitation." Oregon Department of Forestry. https://www.oregon.gov/odf/forestbenefits/pages/rehabilitation.aspx

certifications and licenses within their program areas.[90] Their one-year forest management program offers practical experience in plant identification, timber harvesting, silviculture, fire ecology, and more while also providing certifications such as Chainsaw Safety, Washington Master Logger, and OSHA 10.[91]

Washington State's 20 Centers of Excellence are housed at community or technical colleges, funded through state legislature, and administered by the State Board for Community and Technical Colleges, serving as statewide resources linking a specific industry sector to state education systems.[92] The Agriculture & Natural Resource Center of Excellence is housed at Walla Walla Community College and focuses on partnerships between agriculture, natural resource, and forestry and community college faculty and students.[93] A program guide lists the community colleges and programs for pathways in forestry, natural resources, and restoration.[94] The Center aggregates and disseminates information on professional development programs, job postings, and scholarships available across Washington's forestry and natural resource education network.

California: Pre-Apprenticeship & Apprenticeship Program

Shasta College is a community college in Redding, California, offering a one-semester Heavy Equipment Logging Operations (HELO) Program that provides students with over 400 hours of hands-on training on full-scale mechanized logging equipment.[95] The program prepares students for entry-level positions as logging equipment operators and culminates in a certificate that can be stacked with the college's Heavy Equipment Operator program.[96]

Also at Shasta College, the California Registered Apprenticeship Forest Training (CRAFT) is a state-registered 24-month apprenticeship initiative designed to develop a skilled workforce in California's logging and forest management industries. It offers a structured "earn-and-learn" pathway that combines paid, full-time employment with classroom-based instruction and on-the-job training. The HELO program serves as a pre-apprenticeship to CRAFT.[97]

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[90] Cascadia Technical Academy. "What is Cascadia Tech?" https://www.cascadiatechnicalacademy.org/page/what-is-cascadia-tech
[91] Cascadia Technical Academy. "Forest Management." https://www.cascadiatechnicalacademy.org/page/forest-management
[92] Washington State Centers of Excellence. "About." https://coewa.org/about
[93] Agriculture & Natural Resource Center of Excellence. "About." https://agcenterofexcellence.com/about-us/
[94] "Pathways to Excellence: Agriculture & Natural Resource Program Guide." Agriculture & Natural Resources Center of Excellence. https://agcenterofexcellence.com/wp-content/uploads/2024/09/2024-Program-Guide.pdf
[95] Roe, Becky. "Training Effective Stewards Of Our Forests." *Forest Resources Association*. March 28, 2024. https://forestresources.org/2024/03/28/training-effective-stewards-of-our-forests/
[96] Shasta College. "Heavy Equipment Logging Operations and Maintenance Certificate." https://www.shastacollege.edu/academics/programs/heavy-equipment-operations/heavy-logging-equipment-operations/
[97] California Registered Apprenticeship Forest Training. "Connecting Talent".

Wisconsin: K–8 Program

Learning, Experiences, & Activities in Forestry (LEAF) is Wisconsin's K–12 Forestry Education Program and a partnership between the Washington Department of Natural Resources – Division of Forestry and the Wisconsin Center for Environmental Education in the College of Natural Resources at University of Wisconsin-Stevens Point. Primarily funded from the state Conservation Fund allocated by state legislature, the program provides Wisconsin-focused curriculum, resources, and staff support aligned with state standards to help K–12 teachers teach about forests. The program also provides professional development to enhance teacher's knowledge and skills.[98]

Maine: Summer Bridge Program

Tanglewood Fall Field Camp held by the School of Forest Resources at the University of Maine is a one-week field-based course taken by students in all majors in the school, allowing newly arriving students to interact with each other and professors. Activities might include visiting a timber harvesting operation, performing trail maintenance, or learning about forest recreation and sustainability.[99]

Virginia: K-8 Program

Graduate students at the College of Natural Resources and Environment at Virginia Tech created the Wildlife Viewing Club,[100] consisting of curriculum delivered weekly after school to local 5th graders for 12 weeks, featuring hands-on learning experiences and professionals that highlight career options. The project was funded through a grant from the Virginia Department of Wildlife Resources.[101]

Survey Findings

Self-employed respondents answered questions about the types of training or education they found most useful as preparation for forestry-related work. As shown in Exhibit 40, nearly all self-employed respondents (15) indicated that on-the-job training and/or industry experience is crucial to their line of work. This highlights the value to these businesses of practical, hands-on learning, particularly in industries where formal educational pathways may be limited. For many small-scale or independent forestry respondents, direct experience in the field can be an effective and accessible method of building necessary skills. The second-most cited source of useful training was continuing education seminars and/or online courses (10 respondents).

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[98] University of Wisconsin Stevens Point. "About LEAF – Wisconsin's K-12 Forestry Education Program." https://www.uwsp.edu/wcee/wcee/leaf/about-leaf/

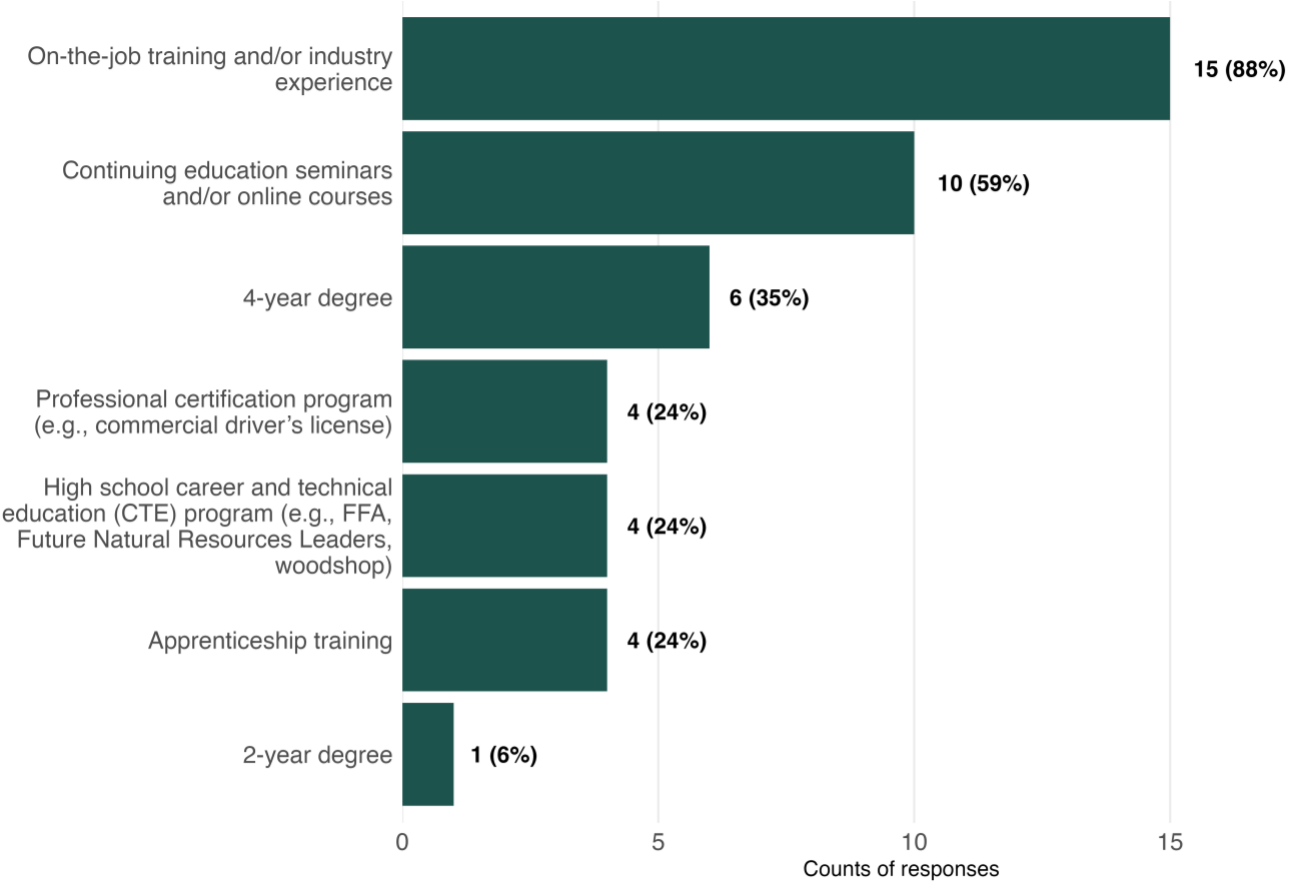
[99] University of Maine. "Field Experience." https://forest.umaine.edu/undergraduate-programs/field-experience/

[100] Bullard et al. "Enhancing Diversity."

[101] Robertson, Jimmy. "Wildlife Viewing Club spotlights future career opportunities for local elementary school students." *Virginia Tech News*. December 2, 2022. https://news.vt.edu/articles/2022/12/cnre-wildlife-viewing-club.html

Six respondents selected four-year degree programs, suggesting the relevance of university-level education for work in some of the self-employed segment. A smaller share selected professional certification programs, CTE programs, and apprenticeship training.

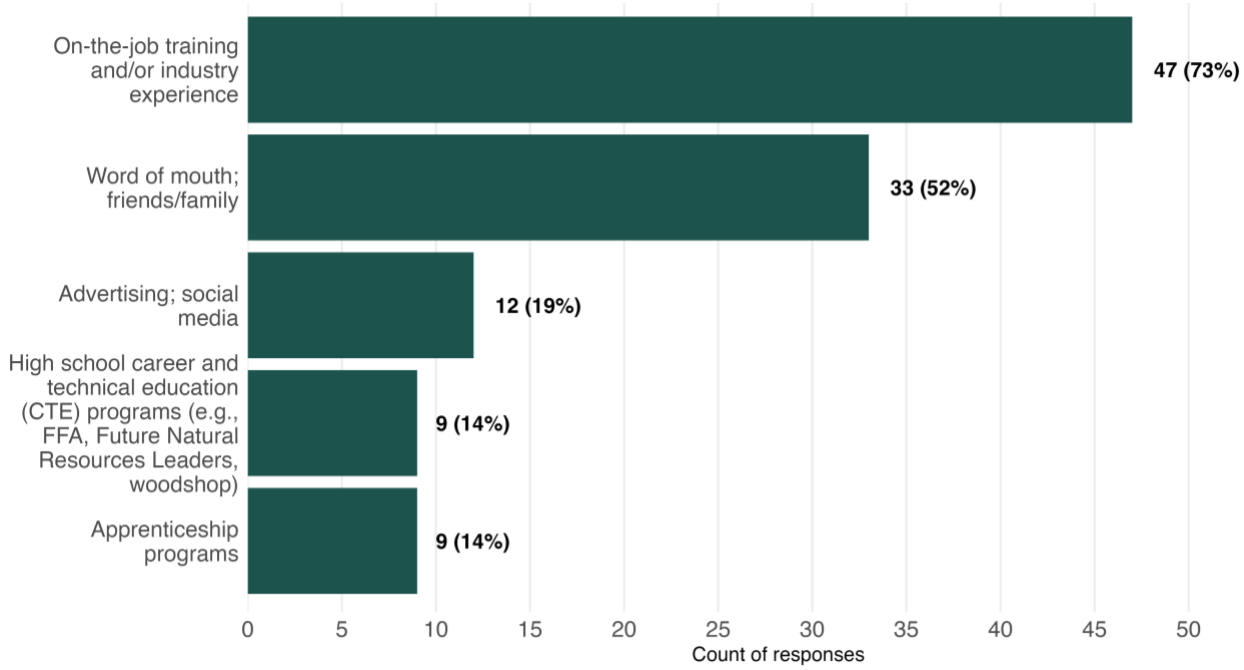
Exhibit 40. Most useful types of training or education received or obtained by self-employed respondents



Reliable Sources of Skilled Workers

Survey respondents identified several reliable sources of skilled workers for their businesses. Most respondents (47) cited on-the-job training or industry experience as a reliable source, followed by word of mouth and friends/family (33 respondents). These top two response categories highlight the critical role relationships and networks play within the forestry workforce. Smaller shares of respondents indicated advertising and social media (12 respondents) and high school CTE programs and apprenticeship programs (9 respondents each) as reliable sources for skilled workers (Exhibit 41).

Exhibit 41. Respondents' most reliable sources of skilled workers



Seventeen respondents answered a follow-up question about specific programs or organizations that provide their business with skilled workers. The top categories from the open-ended responses were as follows:

- Colleges and universities (9 mentions)
- Associated Oregon Loggers (AOL) (3 mentions)
- High school programming (3 mentions)
- Job boards (3 mentions)
- Social media (3 mentions)

Responses in the colleges and universities category mentioned Oregon State University, Northern Arizona University, University of Idaho, and Shasta College (CA). Responses related to high school programming included references to FNRL, Trajectory, and CTE. Other responses in the other listed categories included mentions of Indeed and Headhunters as sources for skilled workers.

Career and Technical Education (CTE) Programs

CTE related to Oregon's forest operations and management sector offers students a structured pathway to explore, prepare for, and enter careers in natural resource management and forestry sectors. These programs are part of the broader Agriculture, Food, and Natural Resources (AFNR) Career Learning Area, which encompasses disciplines

such as agriculture, environmental sciences, fisheries, forestry, horticulture, and wildlife management.

The AFNR CTE programs include nine career pathways that provide students with hands-on experiences and technical knowledge, preparing them for various post-high school opportunities such as direct employment, apprenticeships, and further education at two-year or four-year institutions. These programs emphasize the development of technical skills, professional practices, and academic knowledge critical for career success in high-wage, in-demand areas. Each specific career pathway program is designed to align with industry standards and are subject to a renewal cycle every four years, to support alignment of curriculum with current industry to workforce needs.[102]

- **Natural Resources and Agriculture Career Pathway Focus Areas:**
  - **Natural Resources** prepares students to manage natural environments with an emphasis on ecological principles and sustainable use. Key skills include planning resource use, monitoring resource status using GIS and technical tools, identifying flora and fauna, and managing hazards like invasive species or wildfire risk.
  - **Forestry and Forest Products** develops deep knowledge of forest ecosystems, emphasizing sustainable management and timber production. Students learn forest ecology, Oregon forest history and policy, forest health and fire management, timber harvesting techniques, and multiple-use land principles. The curriculum integrates leadership, forest mensuration (measurement), and business planning skills necessary for working in silviculture, logging, timber processing, and environmental policy roles.
  - **General Agriculture** prepares students for working with the systems, tools, and technologies central to modern agriculture. Students in this program engage in a broad spectrum of learning experiences that include managing agricultural enterprises, understanding biological and ecological principles, ensuring food safety and quality, and working with mechanical and technological systems used in agriculture.

In the 2024-2025 school year, 44 high schools across Oregon had a Natural Resource / Forestry CTE Program of Study.[103] These programs participate within FNRL and have various forestry career development events. FNRL estimates that 1,000 students participate in local, regional, and state-level career development events.[104]

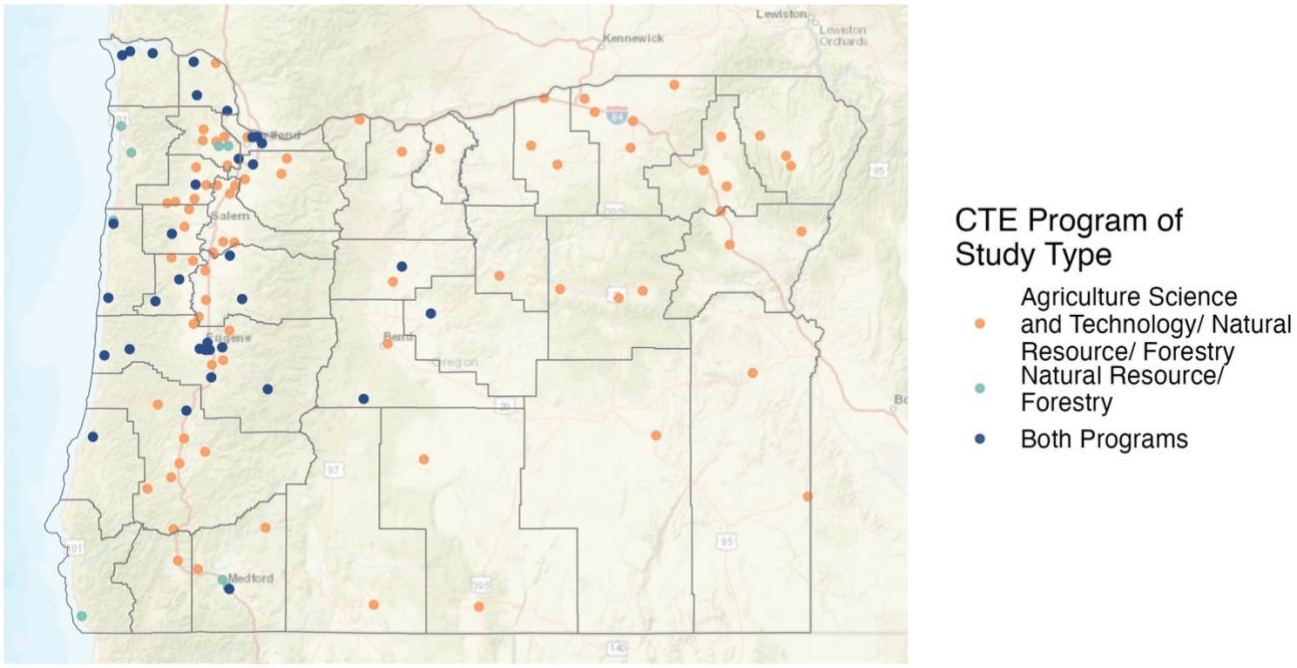
About 70 additional high schools have an Agriculture Science and Technology CTE Program of Study with a forestry unit and/or forestry-related classes and forestry-related career

[102] Oregon Department of Education. "Agriculture, Food and Natural Resources Systems." https://www.oregon.gov/ode/learning-options/CTE/resources/Pages/AgricultureFoodNaturalResourcesSystems.aspx
[103] Oregon Department of Education. "CTE Programs of Study Application Resources." https://www.oregon.gov/ode/learning-options/CTE/resources/Pages/CTEPOS_Application_Resources.aspx
[104] Email communication from Oregon Department of Education to ECOnorthwest.

development events. The Oregon Department of Education reports that, in 2022–2023, about 38,600 students participated in a CTE Program of Study and took at least one course (0.5 credit) in Natural Resource / Forestry / Agriculture. About 9,200 students took two or more credits.[105]

Exhibit 42 displays the location of forestry-related CTE programs.[106] The map includes all approved programs for natural resource / forestry as well as the state's agriculture programs that include forestry / natural resources instruction.

Exhibit 42. Oregon High Schools with Forestry-Related CTE Programs of Study, 2024-25



Notes: Forestry-related programs and categories are identified by ODE. Data source: ODE, 2025. NCES EDGE, 2024.

Apprenticeship and Pre-Apprenticeship Programs

Apprenticeship programs are structured training systems that combine paid on-the-job experience with classroom instruction, directly aligning with specific occupations. Each program develops the technical and professional skills needed for success in its respective field. Pre-apprenticeship and apprenticeship programs train individuals for skilled jobs through structured, hands-on learning. In Oregon, the Bureau of Labor and Industries (BOLI) oversees these programs to meet workforce needs and industry standards. Pre-apprenticeship programs prepare people to enter registered apprenticeships. These programs teach basic skills, introduce career options, and help participants meet entry

[105] Ibid
[106] Ibid. See also Oregon Department of Education, Approved CTE Programs (Detail). https://www.ode.state.or.us/apps/CTEReports/ApprovedPrograms/Details

requirements. Registered apprenticeship programs combine paid, on-the-job training with classroom instruction. Participants earn industry-recognized credentials and gain experience in trades-related occupations.

Analysis of apprenticeship and pre-apprenticeship programs relevant to forest operations and management was limited by data availability and inability to isolate programs specific to forestry. The available data also did not allow analysis of pathways from programs into industries, nor did they distinguish between union and non-union apprenticeship programs. Thus, we are unable to indicate the relationship between these programs and the forestry sector.

Below we provide the available information about five apprenticeship program types most closely aligned with forestry-related roles:

- **Firefighters** respond to emergencies, extinguish fires, and perform rescue operations to protect life and property.
- **Operating Engineers** operate heavy construction equipment such as bulldozers, cranes, and excavators to build infrastructure like roads, bridges, and buildings.
- **Heavy Truck Drivers** transport goods over long distances, operating vehicles with a gross weight over 26,000 pounds.
- **Maintenance and Repair Workers, General** workers maintain and repair machines, mechanical equipment, and buildings, performing tasks across multiple trades.
- **Industrial Machinery Mechanics** install, maintain, and repair industrial machinery, which is often specialized, used in manufacturing and production.

In 2024, Oregon had 312 active apprentices in these programs, 95 of whom completed their apprenticeship in 2024 (see Exhibit 43). Operating engineer apprentices were the most common among active apprentices (34 percent of the total), while maintenance and repair workers accounted for the largest share of completers (45 percent), consistent with completion trends since 2020, likely due in part to the demand of these occupations across many sectors of the economy. Similarly, more apprentices for heavy truck driver and operating engineer occupations complete compared to firefighters and industrial machinery mechanics. Between 2015 and 2024, an average of 84 maintenance/repair workers apprentices completed each year, followed by 54 operating engineers and 27 heavy truck drivers. Information on where completers enroll in forestry-related apprenticeships is limited.

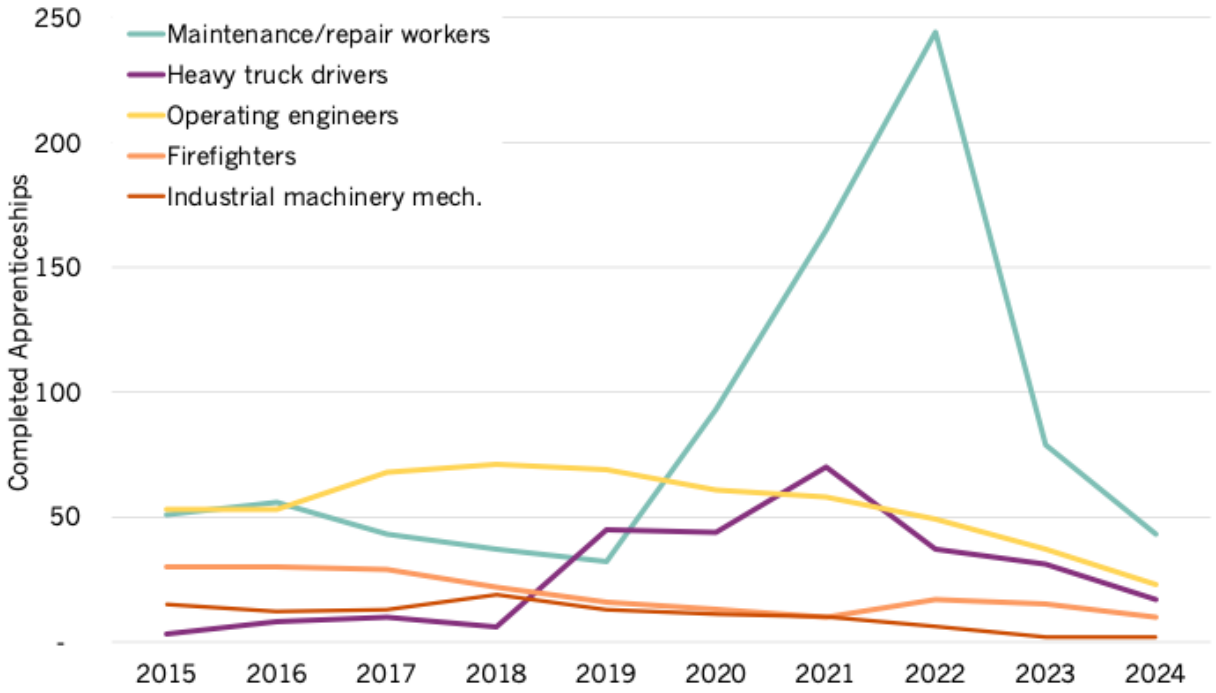
Apprenticeship completions for maintenance and repair workers begin increasing in 2020 and peaked in 2022 at 244 completed apprentices (see Exhibit 44). However, completed apprentices have returned close to pre-pandemic levels. A similar pattern is observed for heavy truck driver apprentices. Completions in the other programs has declined year over year since 2018.

Exhibit 43. Number of Active Apprentices and Completed Apprenticeships, Oregon, 2024

OCCUPATION CODE	OCCUPATION TITLE	ACTIVE APPRENTICES	COMPLETED APPRENTICES
47-2073	Operating engineers	106	23
49-9071	Maintenance/repair workers	87	43
33-2011	Firefighters	77	10
53-3032	Heavy truck drivers	39	17
49-9041	Industrial machinery mech.	3	2
	Total	**312**	**95**

Data source: U.S. Department of Labor, 2024

Exhibit 44. Completed Apprenticeships, Oregon



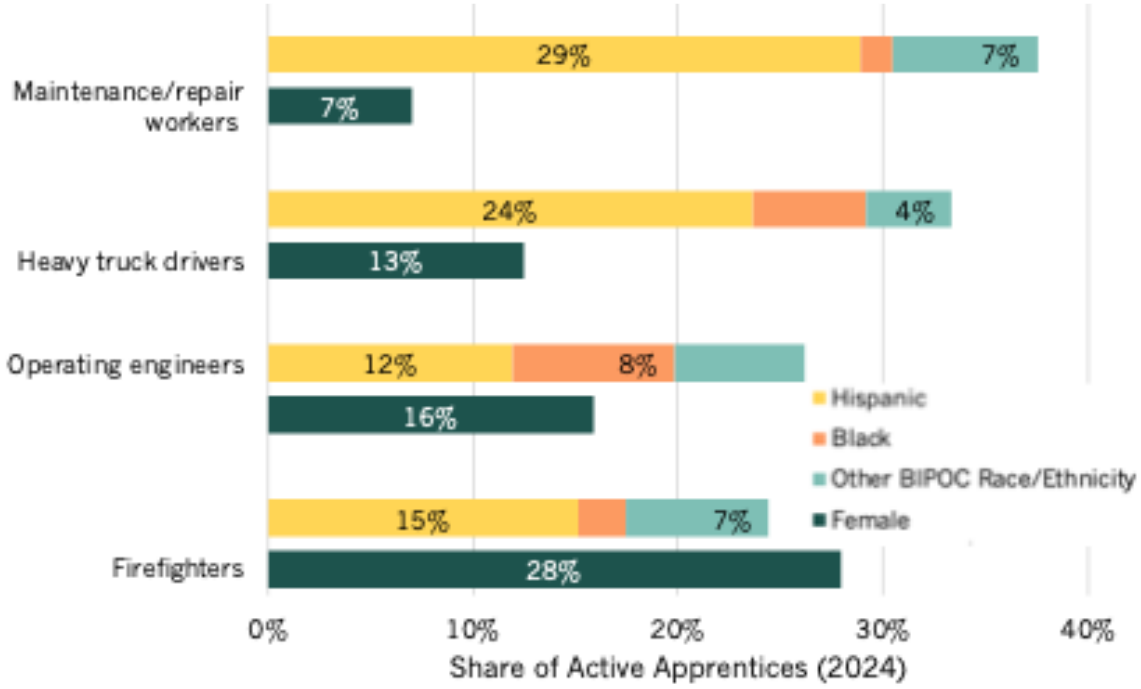
Data source: U.S. Department of Labor, 2015-2024

Apprentices in these programs are much more likely to be men than women, with approximately 17 percent identifying as women, mirroring the demographic makeup of the associated workforce (see Chapter 2). Nearly all maintenance and repair worker and heavy truck driver active apprentices identify as men, and only 12 percent of firefighter apprentices identify as women (see Exhibit 45). Black, Indigenous, and People of Color (BIPOC) are most represented among maintenance and repair and heavy truck driver apprentices, accounting for 26 percent and 15 percent of completers, respectively.

Exhibit 46 presents the status of apprenticeships for men and women in recent years. Within each cohort year, a smaller share of women than men had completed apprenticeships. In 2024, close to a quarter of male apprentices completed while all of

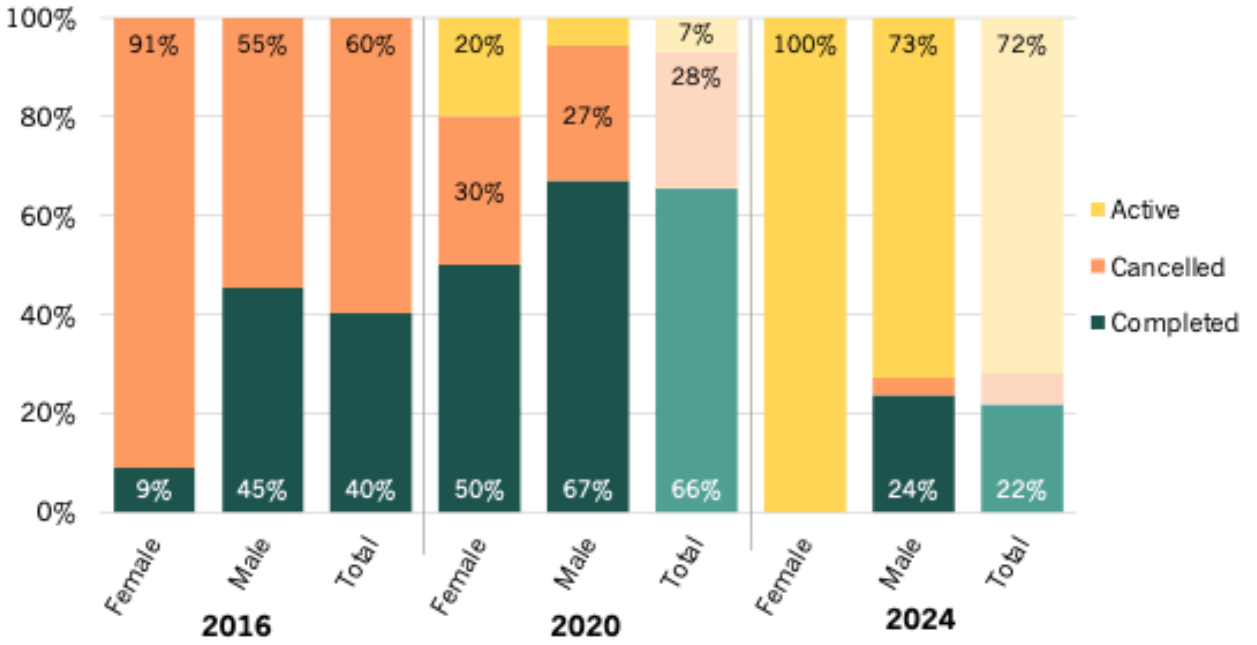
female apprentices are still active. As presented in Exhibit 47, white and Hispanic or Latino apprentices have the highest completion rates in most cohort groups, with the exception of the 2016 cohort in which white and Black apprentices had the highest completion rates.

Exhibit 45. Share of Active Apprentices Who are BIPOC and Women, Oregon, 2024



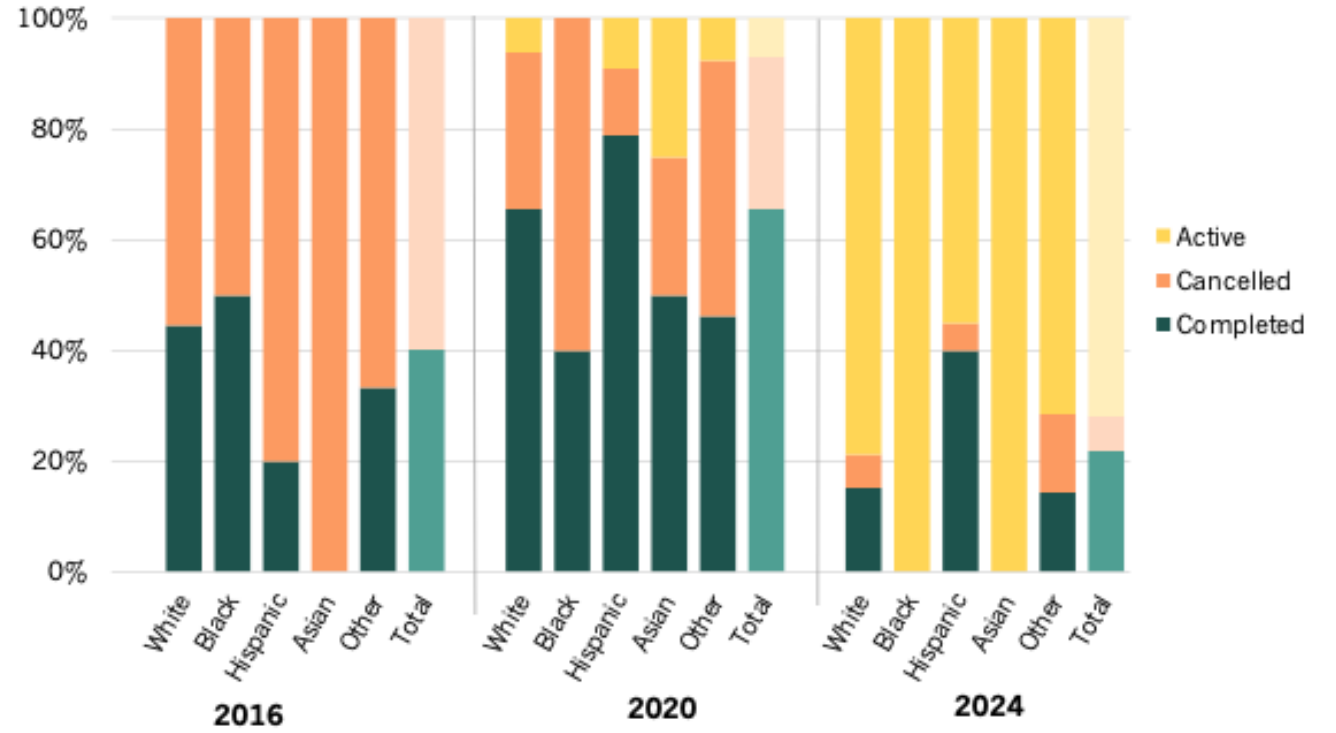
Data source: U.S. Department of Labor, 2024

Exhibit 46. Apprenticeship Status by Sex and Starting Year, Oregon



Data source: U.S. Department of Labor, 2012-2024

Exhibit 47. Apprenticeship Status, by Race/Ethnicity and Starting Year, Oregon



Note: Grey bars indicate lack of data for that race during that year. Data source: U.S. Department of Labor, 2012-2024

Pre-Apprenticeship Programs

Pre-apprenticeship programs are typically 6–8 weeks long and designed for individuals with little to no experience or who experience barriers to employment. Pre-apprenticeships are an important pathway into construction occupations in particular. Oregon has a number of pre-apprenticeship programs, however, we did not receive the requested data from BOLI to be able to summarize pre-apprenticeship activity across the state. A forestry-related pre-apprenticeship program in Oregon is under development. As described earlier, California has a successful model at Shasta College (a one-semester Heavy Equipment Logging Operations (HELO) Program) that serves as a pre-apprenticeship to the CRAFT apprenticeship program.[107] Oregon sector representatives are learning from that and other pre-apprenticeship programs as they consider a program for Oregon.

Postsecondary Credential Programs

Postsecondary credential programs that help train the forest operations and management workforce were identified using a combination of the programs included in the OFRI *Find Your Path* publication or offered through the Oregon State University (OSU) College of

[107] Roe, Becky. "Training Effective Stewards Of Our Forests." *Forest Resources Association*. March 28, 2024. https://forestresources.org/2024/03/28/training-effective-stewards-of-our-forests/

Forestry, and that mapped to a forestry occupation.[108] Postsecondary credential programs can be matched to each occupation within the industry via a crosswalk provided by the National Center of Education Statistics (NCES), which matches postsecondary programs to occupations based on specific skills and knowledge needed to be successful in an occupation.[109] NCES assigns Classification of Instructional Programs (CIP) codes to fields of study and groups them into categories. For example, the fields of study matched to the forester occupation—General Forestry, Forest Management, Forest Sciences and Biology, and more—are each assigned a CIP code and included in the Forestry program category.

A total of 39 CIP codes compose our "broad" definition of programs that relate to the forest operations and management workforce. We group these into 11 program categories (Exhibit 85 in the Appendix). This analysis, however, focuses primarily on a subset of programs that are most relevant to forest operations and management. In this "core" definition, there are 16 CIP codes across four program categories: natural resource and conservation (which we further split into natural resources/environmental and forestry), engineering, and security and protective services (included programs relate specifically to firefighting). Exhibit 48 details the core CIP codes and program titles within each program category.

[108] OFRI, *Find Your Path*. https://oregonforests.org/publication-library/find-your-path
[109] National Center for Education Statistics. *Classification of Instructional Programs (CIP): 2020 CIP Code Lookup Tool. U.S. Department of Education.* https://nces.ed.gov/ipeds/cipcode/post3.aspx?y=56.

Exhibit 48. Core Forest Operations and Management Programs, Oregon

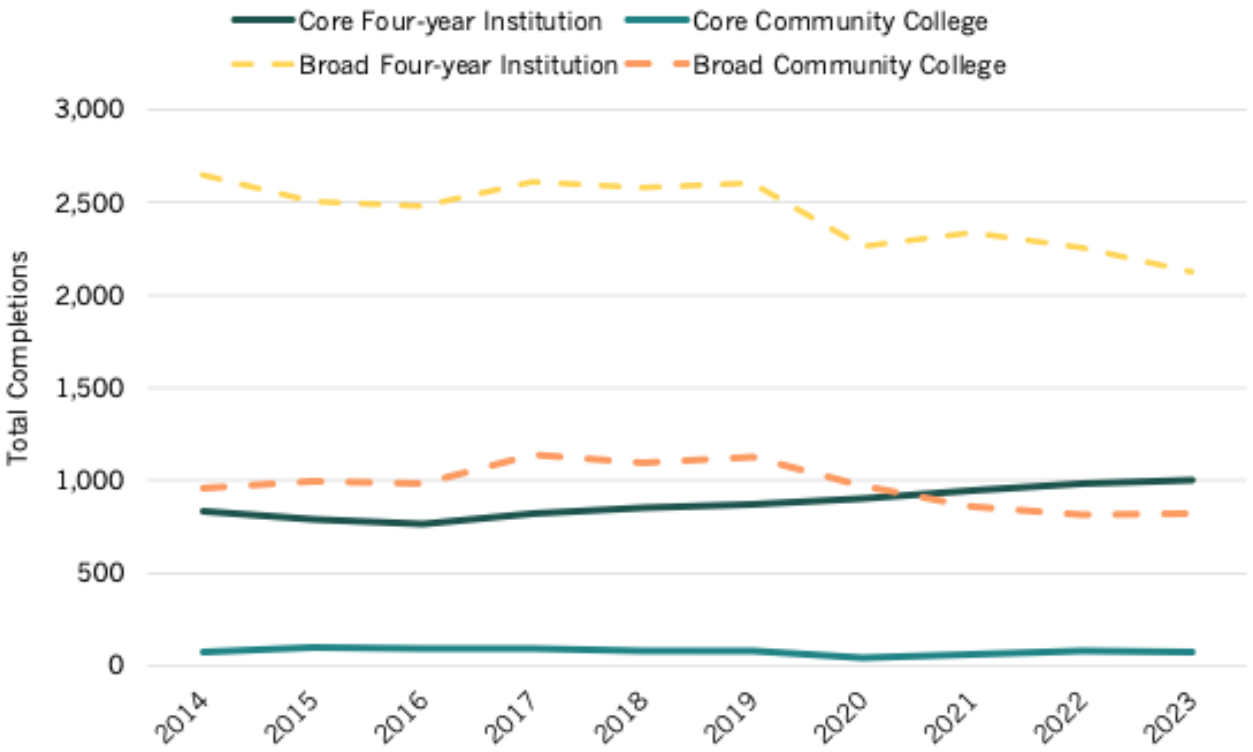
Program Code and Title	Average Annual Completions (2019-2023)
Natural Resources/Environmental	
03.0101-Natural Resources/Conservation, General	25
03.0103-Environmental Studies	188
03.0104-Environmental Science	285
03.0201-Environmental/Natural Resources Management and Policy, General	184
03.0301-Fishing and Fisheries Sciences and Management	135
Forestry	
03.0501-Forestry, General	4
03.0502-Forest Sciences and Biology	1
03.0506-Forest Management/Forest Resources Management	19
03.0508-Urban Forestry	10
03.0511-Forest Technology/Technician	13
03.0599-Forestry, Other	14
03.0601-Wildlife, Fish and Wildlands Science and Management	70
Engineering	
14.3401-Forest Engineering	49
15.1102-Surveying Technology/Surveying	11
Firefighting	
43.0203-Fire Science/Fire-fighting*	3
43.0206-Wildland/Forest Firefighting and Investigation	1
Total	**1,011**

Note: *Fire Science/Fire-fighting is only considered a core program at Clackamas CC.

Core Forest Operations and Management Program Completers

In 2023, Oregon public postsecondary institutions produced 4,028 completers of forest operations and management programs, with 1,082 in core programs. The total number of completions across all relevant programs definition have slowly declined over the last decade (see Exhibit 49). However, core completions at four-year institutions (93 percent of total core completions in 2023), have increased slowly over the past decade. The number of core completions at community colleges remained relatively constant over the same period, peaking at close to 100 completions in 2017.

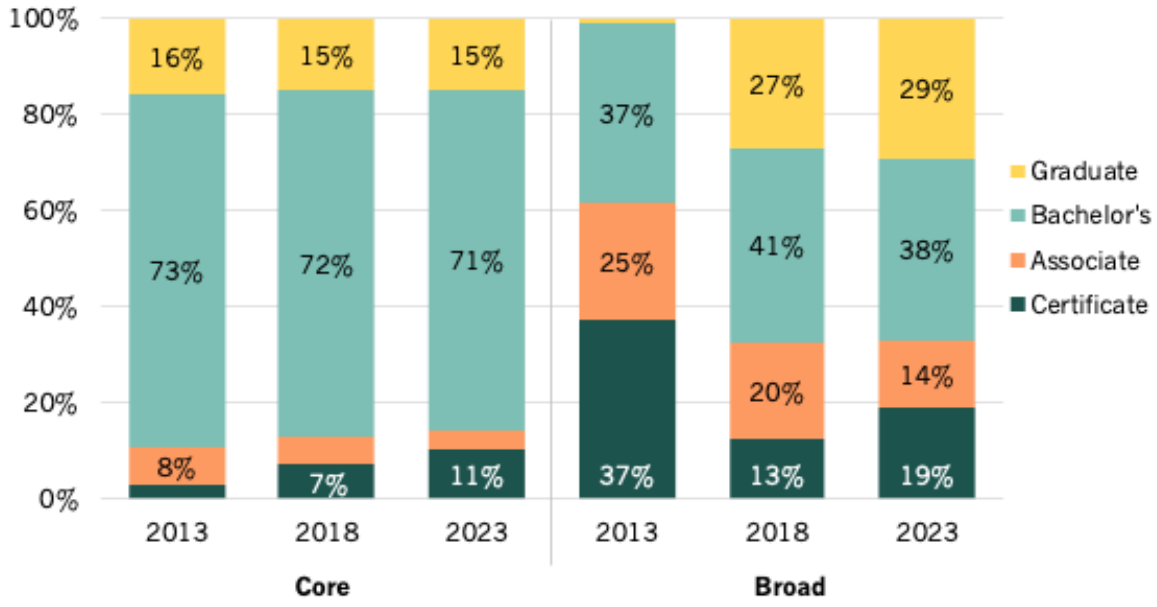
Exhibit 49. Core and Broad Completions by Institution Type, Oregon



Note: For a full list of broad programs see Appendix Exhibit 85. Data source: NCES IPEDS, Oregon.

Exhibit 50 displays completions by credential type for selected years. As suggested in the chart above, a large share (86 percent in 2023) of core completers earn a bachelor's or more advanced degree. Over time, the share of core completers earning a certificate or associate degree has increased, likely due to program availability and student interest. In 2023, 86 percent of core completers earned bachelor's degree or higher, a slight decrease from 2018. Certificate attainment has increased within core programs from 7 percent in 2018 to 11 percent of completions in 2023. A smaller share of completions within broad programs are at the bachelor's degree level, with associate and graduate degrees accounting for larger shares compared to core program completions.

Exhibit 50. Core and Broad Completions by Award Type and Year



Data source: NCES IPEDS, Oregon, 2014-2023

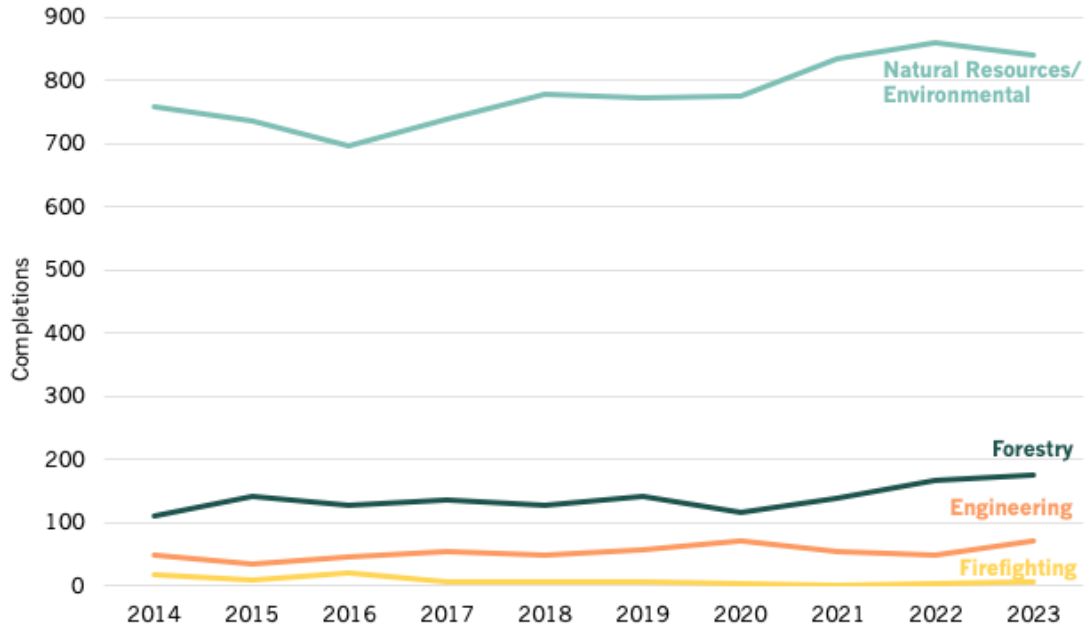
Core Forest Operations and Management Program Completions

Focusing on core programs allows for more detailed analysis of programs most closely supporting the forest operations and management workforce. Of the 1,082 core program completions in 2023, 78 percent (840 completions) were in natural resource and environmental programs (see Exhibit 51); forestry programs accounted for 15 percent (165 completions) of the total, followed by engineering at 7 percent (71 completions) and firefighting at 1 percent (6 completions).

In recent years, forestry completions increased at the fastest rate among the four program categories, with an average annual growth rate of 6 percent between 2014 and 2023. Natural resource and environmental program completions increased more slowly, at an average of 1 percent per year. Engineering programs, which include forestry engineering and surveying, increased at an average annual rate of 4 percent, from 48 completions in 2014 to 71 completions in 2023. Firefighting completions decreased, but from a very small base.

Environmental science and environmental studies programs consistently make up the highest share of completions in forest operations and management related programs. Environmental management and policy and fishing and fisheries sciences and management and forest engineering completions account for over one-quarter of all core completions. Except for wildlife, fish, and wildlands science and management completions, which increased rapidly in recent years, other programs account for relatively small shares of the total.

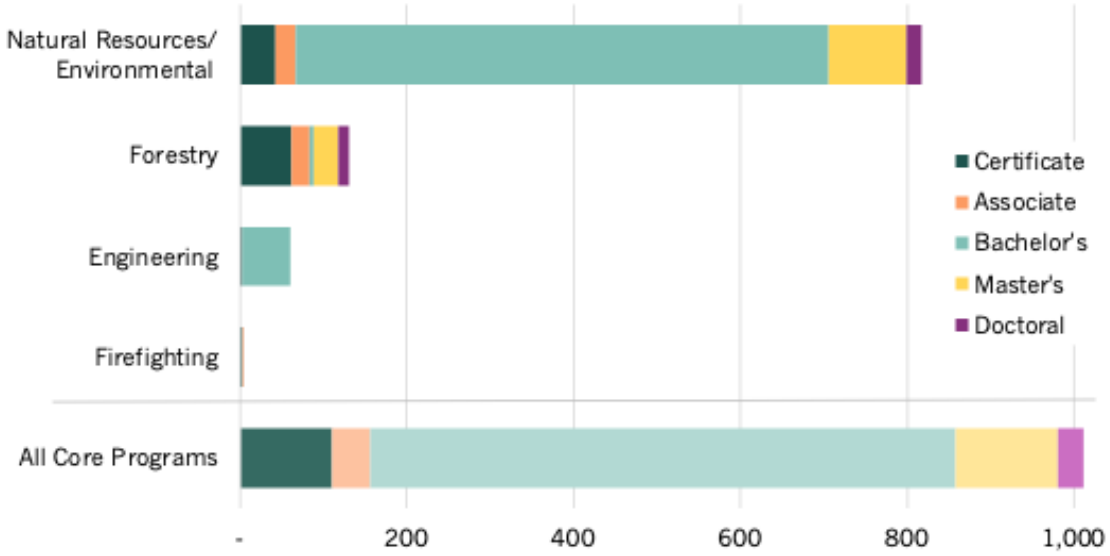
Exhibit 51. Core Completions Timeseries by Program Category



Data source: NCES IPEDS, Oregon, 2014-2023

Core forest operations and management completers generally obtain a bachelor's degree or a higher credential (Exhibit 52). However, specific programs have a concentration of completers earning a certificate or associate degree. Between 2019 and 2023, most completers in natural resources and engineering programs earned a bachelor's degree or higher, while over half of the completers in forestry programs earned a certificate or associate degree (Exhibit 87). Overall, about 15 percent of core program completers earned a certificate or associate degree, on average, between 2019 and 2023.

Exhibit 52. Average Annual Core Completions by Program Category



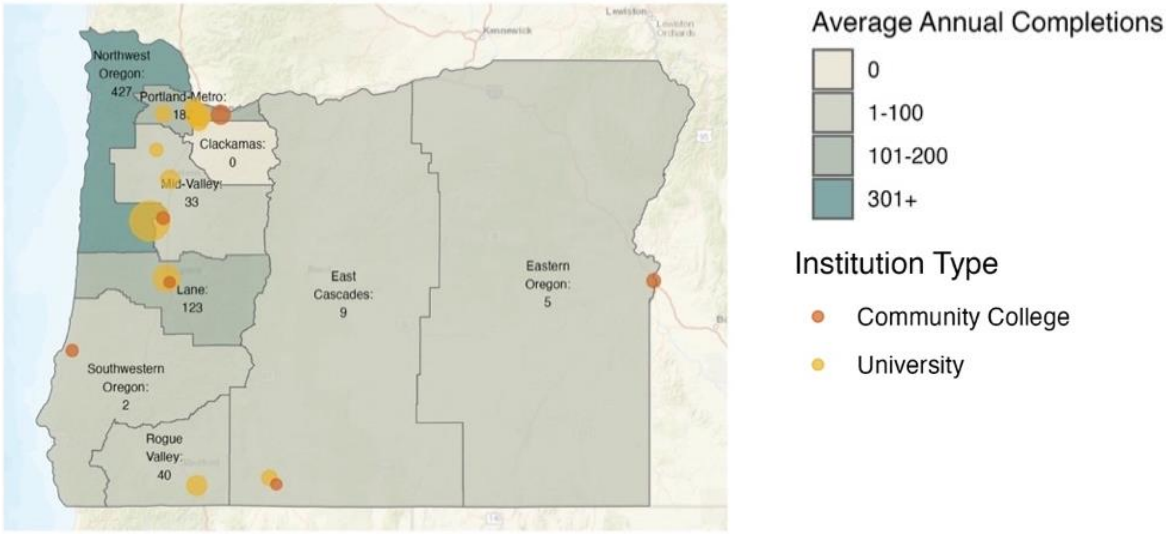
Data source: NCES IPEDS, Oregon, 2019-2023

Geographical dispersion of core forest operations and management completions and the institutions providing these programs are presented in Exhibit 53 (see Exhibit 88 for completions by institution).

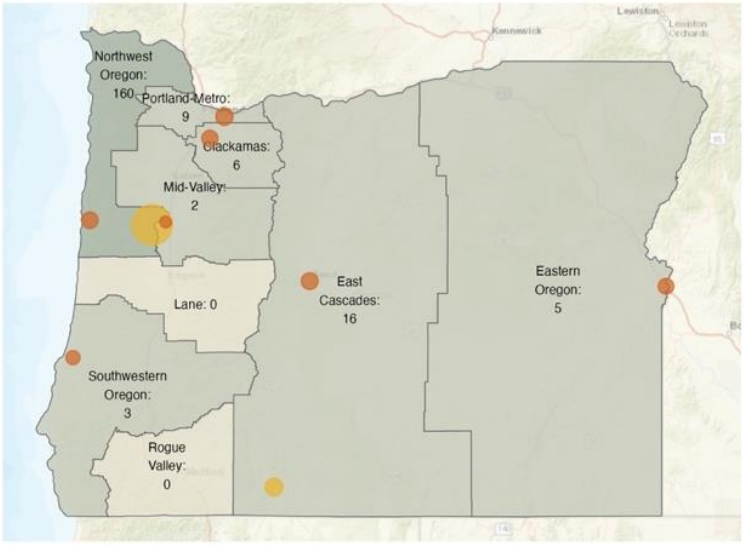
Core completions within the natural resources/environmental program category are concentrated at universities in the Northwest Oregon workforce region, which includes Oregon State University (OSU), and the Lane workforce region, which includes University of Oregon (UO). For all other core programs, the Northwest Oregon workforce region institutions graduate the most completers, followed by the East Cascades and Clackamas regions.

Exhibit 53. Average Annual Completions by Workforce Region (2019-2023)

Natural Resources/Environmental Programs



All Other Core Programs

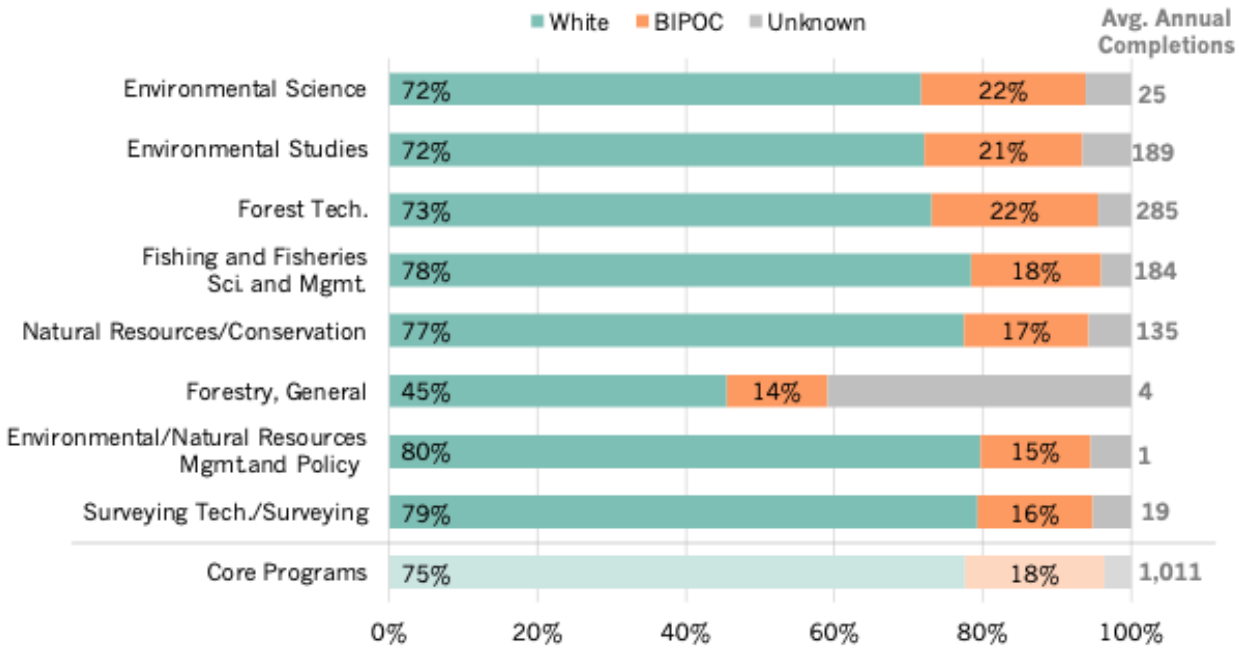


Data source: NCES IPEDS, Oregon, 2019-2023

Completer Demographics

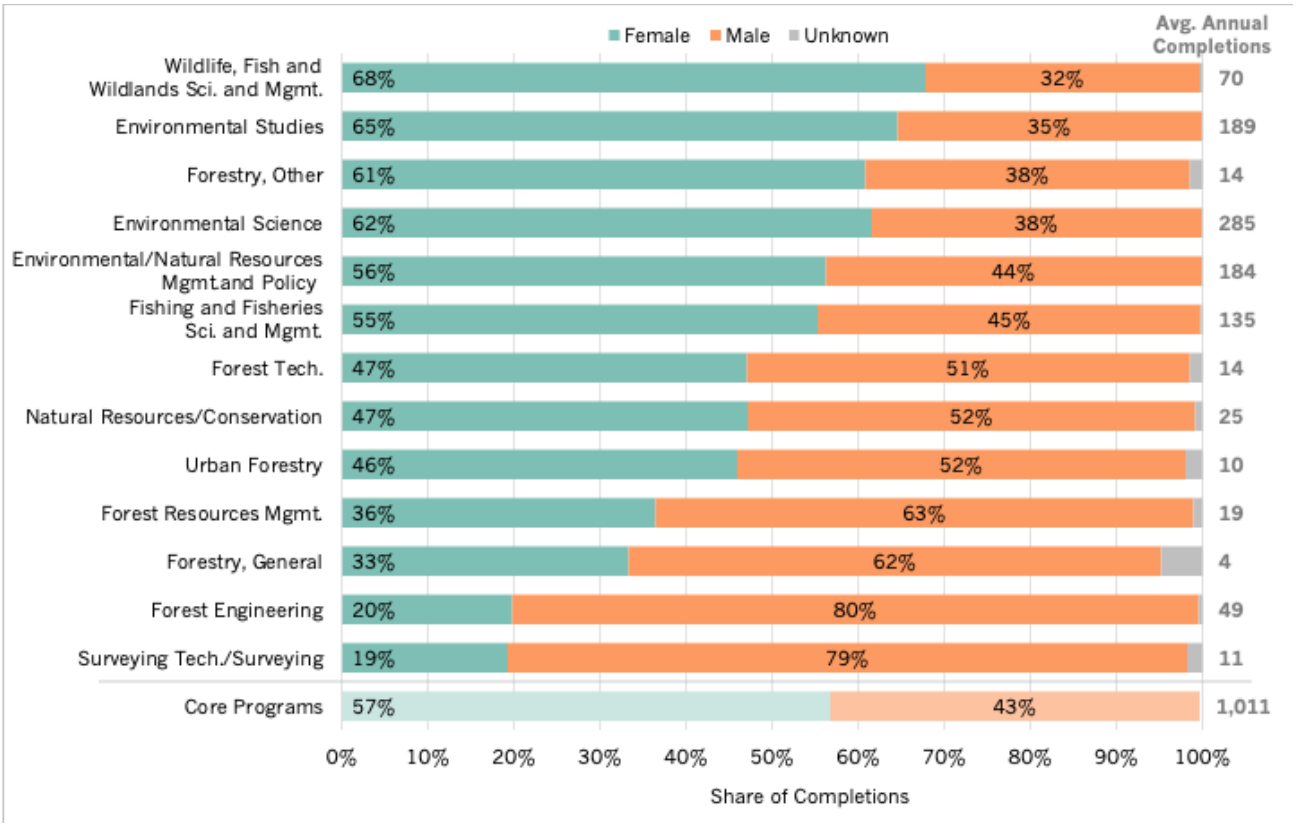
BIPOC students comprise 18 percent of core forest operations and management program completers (see Exhibit 54). Environmental sciences and studies programs and forest technician programs have the highest share of BIPOC students, with just over 20 percent of program completers identifying as BIPOC. Women make up most of the graduates in wildlife, fish and wildlands science and management (68 percent), environmental studies (65 percent), and environmental science (62 percent). However, as programs become more specialized or technical, such as forest engineering and surveying technology, women represented a smaller share of completers. Across core forest operations and management programs, women represent 57 percent of completers (see Exhibit 55).

Exhibit 54. Average Annual Share of Core Program Completers that are BIPOC, by Program Type (2019-2023)



Data source: NCES IPEDS, Oregon, 2019-2023

Exhibit 55. Average Annual Share of Core Program Completers that are Women, by Program Type (2019-2023)



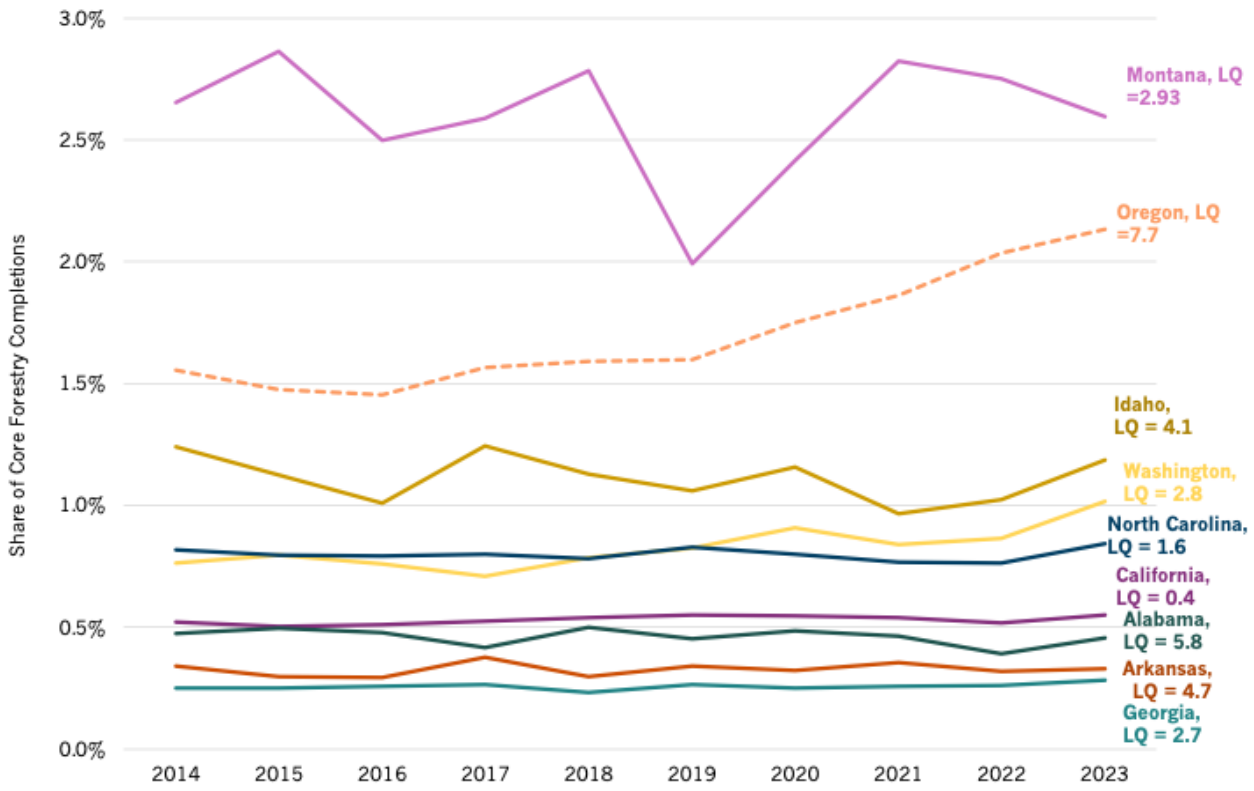
Data source: NCES IPEDS, Oregon, 2019-2023

Completions in Context

States that offer forest operations and management education programs aligned with the forestry and logging industry (NAICS code 113) are well positioned to drive and support growth in the sector. Exhibit 56 presents completions in core forest operations and management programs as a share of each state's total completions from 2014 to 2023. Additionally, Exhibit 56 shows each state's employment location quotient (LQ) for the forestry and logging industry. The LQ represents the concentration of employment in the industry relative to the national average and serves as a measure of industry specialization within the state.

As shown in the exhibit, Oregon has both a high forestry and logging LQ and a high share of completions associated with forestry operations and management (2.1 percent in 2023), compared to other states with sizeable softwood timber sectors.

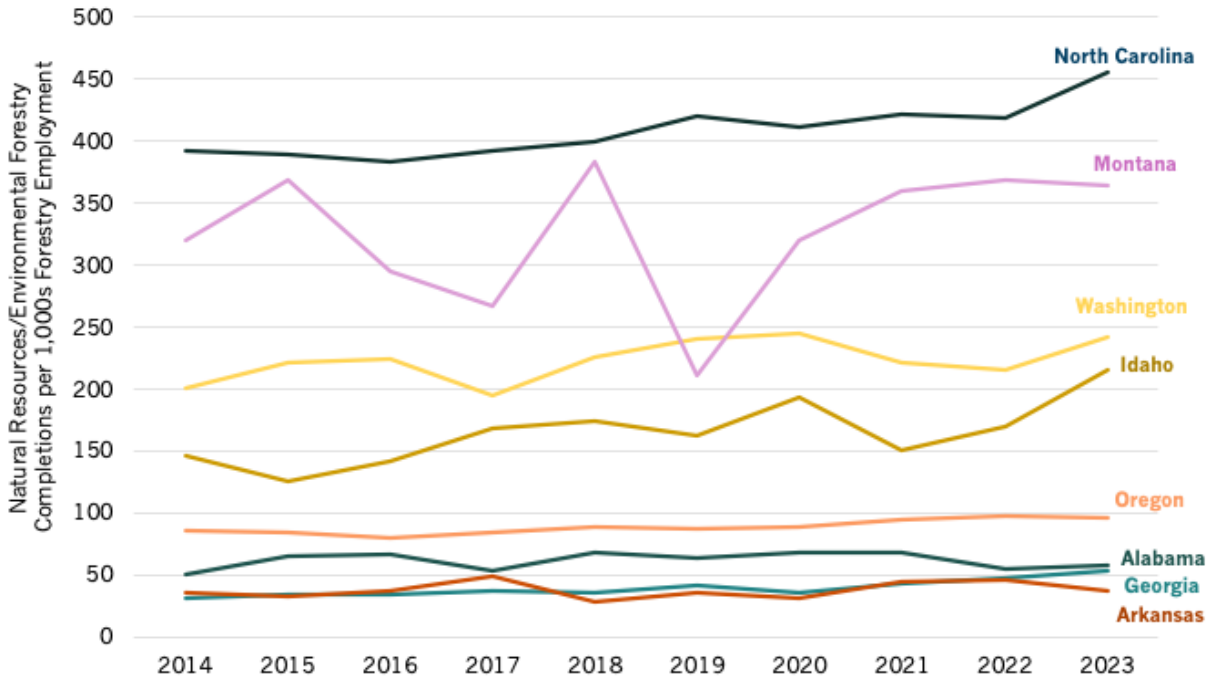
Exhibit 56. Core Forestry-Related Completions as a Share of Total Completions, by State and Year



Note: LQ=location quotient, for private ownership Forestry and Logging (NAICS 113), representing the concentration of employment in the industry relative to the national average. Data sources: BLS, IPEDS.

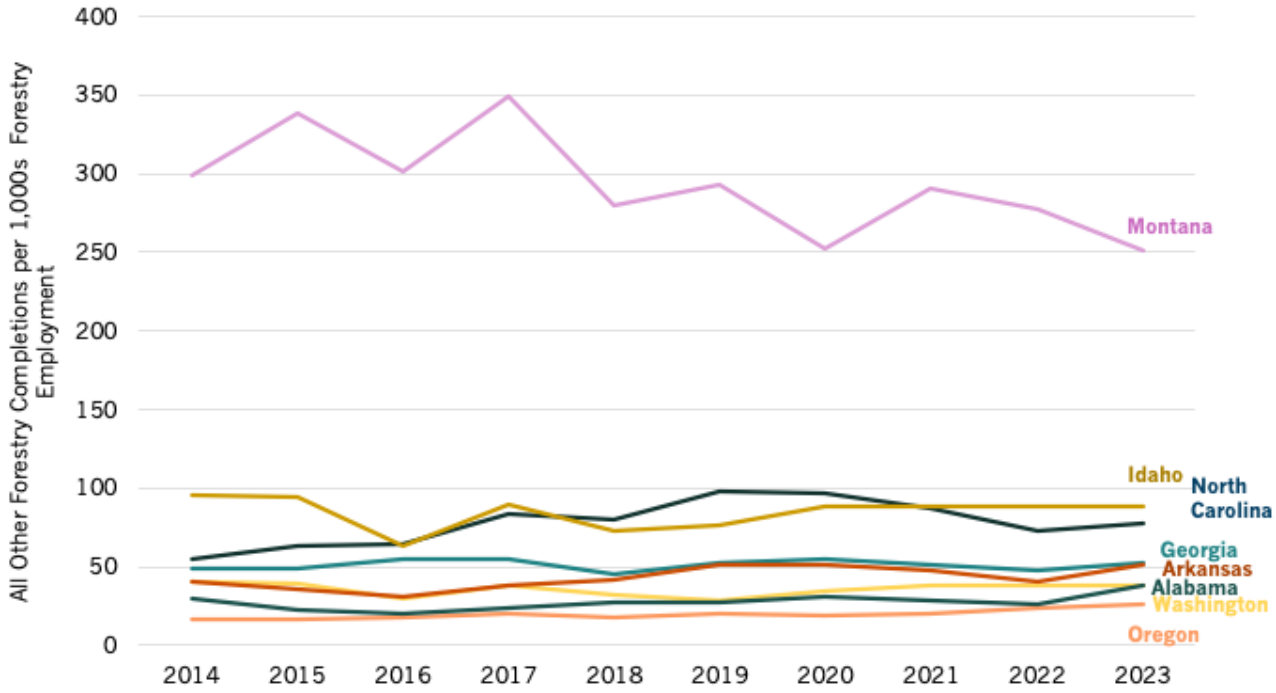
The ratio of core completions to forestry employment provides another metric for assessing the extent to which a state's postsecondary forest operations and management pathways support the industry's scale in the state. Exhibit 57 and Exhibit 58 display the number of core completions per 1,000 employees in the forestry and logging industry within each state and over time, separately for natural resources/environmental completions (Exhibit 57) and forestry, engineering, and firefighting completions (Exhibit 58). By these metrics, Oregon's postsecondary forestry pathways appear relatively small compared to comparison states. This reflects to some extent Oregon's large forestry industry, relative to the size of the state's economy, and a need to rely on skilled workers trained in other states, but could also indicate opportunities to expand programs to better support the industry.

Exhibit 57. Core Natural Resources/Environmental Completions as a Share of Forestry and Logging Employment, by State and Year



Note: Employment is calculated for Forestry and Logging (NAICS 113). Data sources: BLS, IPEDS.

Exhibit 58. Core Forestry, Engineering, and Firefighting Completions as a Share of Forestry and Logging Employment, by State and Year



Note: Employment is calculated for Forestry and Logging (NAICS 113). Data sources: BLS, IPEDS.

Public Postsecondary Programs in Oregon: Outcomes Analysis

In addition to analyzing publicly available data described in earlier chapters, we examined student-level data provided by the Higher Education Coordinating Commission (HECC). This data covers students enrolled in selected education pathways at Oregon's public postsecondary institutions and employment outcomes for students who completed core forest operations and management credential programs.

Linking student-level data to employment outcomes provides a valuable picture of the extent to which selected Oregon education pathways support the forest operations and management workforce. It can also provide high-level benchmarks to evaluate the strength of existing pathways and their potential to promote greater workforce diversity.

The analysis described below provides a starting point for quantitatively assessing the adequacy and effectiveness of Oregon pathways through public postsecondary programs. Similar analyses of apprenticeship and other program data, if and when available, would provide a more complete picture, adding significantly to our understanding of the relevant pathways.

The overview of core completions and completer demographics in the previous section utilizes publicly available data from NCES and includes all educational institutions whereas we summarize completion information provided by HECC. The data provided by HECC differs slightly from what is available in the NCES IPEDS database in that it (1) only includes public universities and (2) has more detailed race and ethnicity demographic information.[110]

The analysis utilizes student-level education and employment data provided through a data-sharing agreement with HECC. The data include student-level demographics, course enrollments, credential completions, and employment information, including annual hours worked and wages by industry of the employer. We focus below on students who received a credential during the 2013 academic year or later, in one of the core forest operations and management programs identified in the previous sections.

We analyze employment outcomes at one year prior to graduation, one year post-completion, and five years post-completion. Employment outcomes are presented for those with more than half-time employment on a quarterly basis (260 hours per quarter). Outcomes are examined for completers who completed a credential between the 2012-2013 and 2018-2019 academic years. This to ensure that we have observable employment information for a maximum of five years post-completion. We do not have information regarding self-employment or employment in other states. Thus, students not identified as employed in the analysis may in fact be employed in Oregon's forestry sector through self-employment, or employed in another state.

[110] NCES IPEDS does not provide race and ethnicity information for students who are not citizens of the United States.

We categorize employment outcomes as either forestry operations and management, defined elsewhere in this report, employment in an adjacent industry (see Exhibit 59) or any other industry, most of which are only indirectly relevant to the sector or not relevant at all.

Exhibit 59. Definition of Forest Operations and Management Adjacent

Forest Op. & Mgmt. Adjacent Industries	
541620	Environmental consulting services
813312	Environmental and conservation orgs
924120	Administration of conservation programs
611310	Colleges, universities, community colleges, and professional schools

Note: These industries are considered adjacent because some of the employment is relevant to Forest Op. & Mgmt.

Oregon's Public Postsecondary Forest Operations and Management Pathways

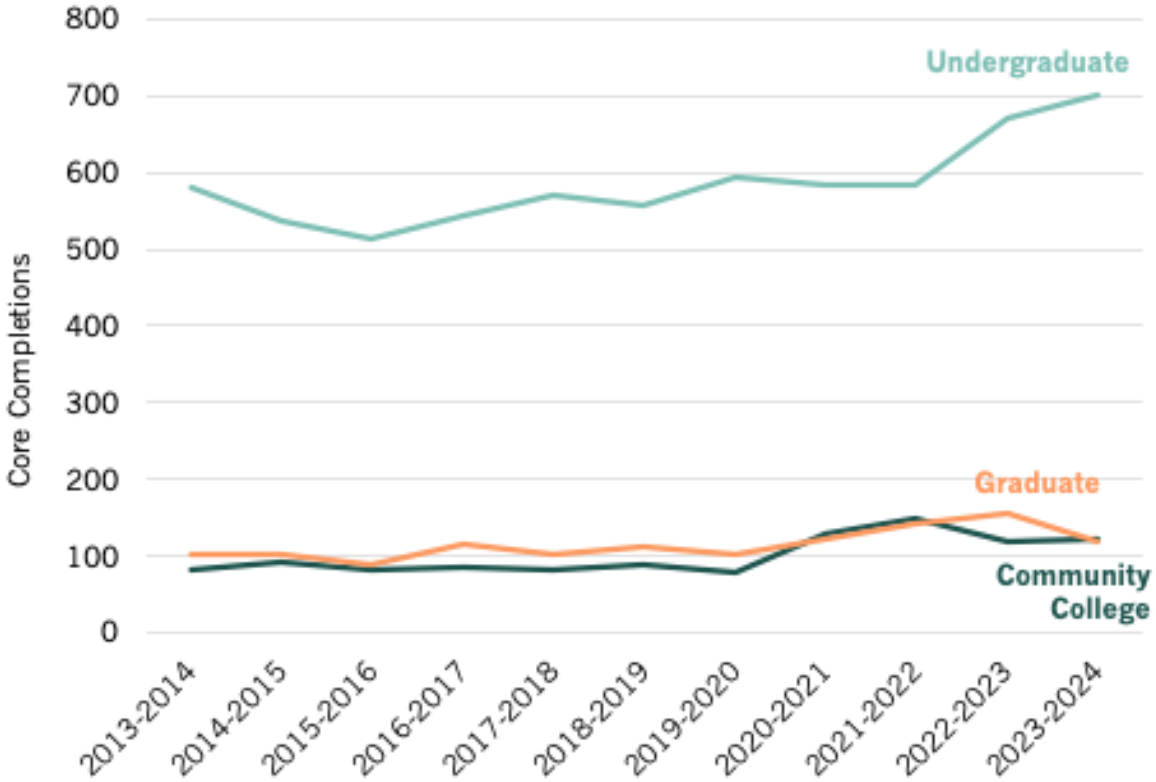
This section presents the characteristics and employment outcomes of recent graduates from core educational pathways at Oregon's public postsecondary institutions. The findings show how these pathways connect to forest operations and management employment.

CORE COMPLETERS IN FOREST OPERATIONS AND MANAGEMENT

At Oregon's public postsecondary institutions, core forest operations and management completions totaled 941 in 2023 and have increased at an annual average rate of 8.5 percent. Undergraduate credentials comprise the largest share of completions in the core forest operations and management programs (see Exhibit 60), consistently accounting for close to 75 percent of completions in the 2023-2024 academic year. Graduate and community college completions totaled approximately 240 in the most recent academic year.

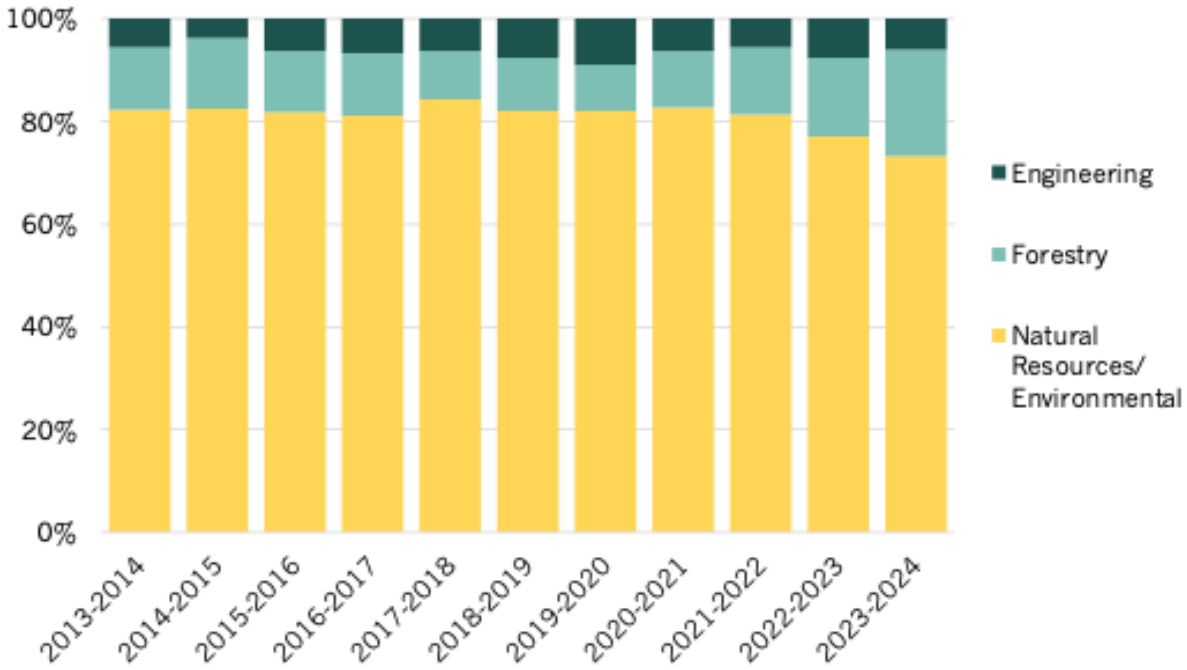
The number of core completions increased over the past decade, primarily due to an increased in undergraduate degrees awarded. Much of the growth in recent years was driven by an increase in forestry credentials (see Exhibit 61). Engineering and firefighting completions represent a small share of the total.

Exhibit 60. Core Completions by Degree Type



Data source: Oregon Higher Education Coordinating Commission

Exhibit 61. Core Completions by Program Category

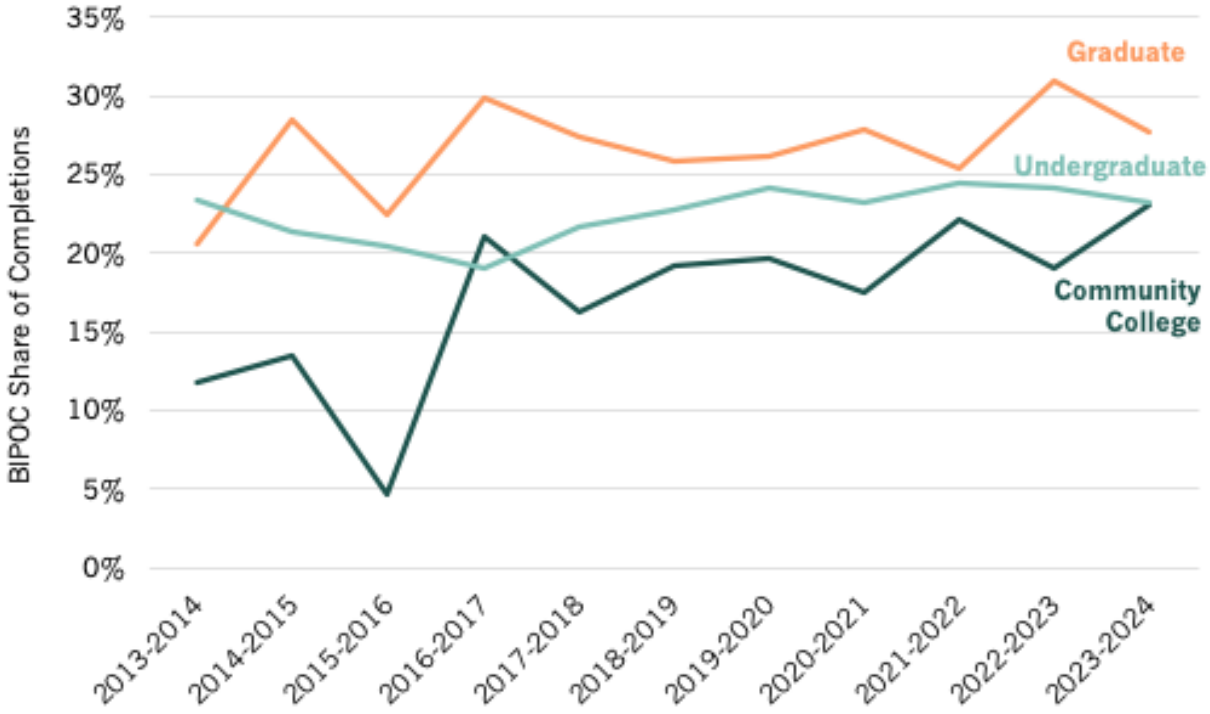


Note: Firefighting is omitted due to confidentiality. Data source: Oregon Higher Education Coordinating Commission.

CHARACTERISTICS OF CORE COMPLETERS

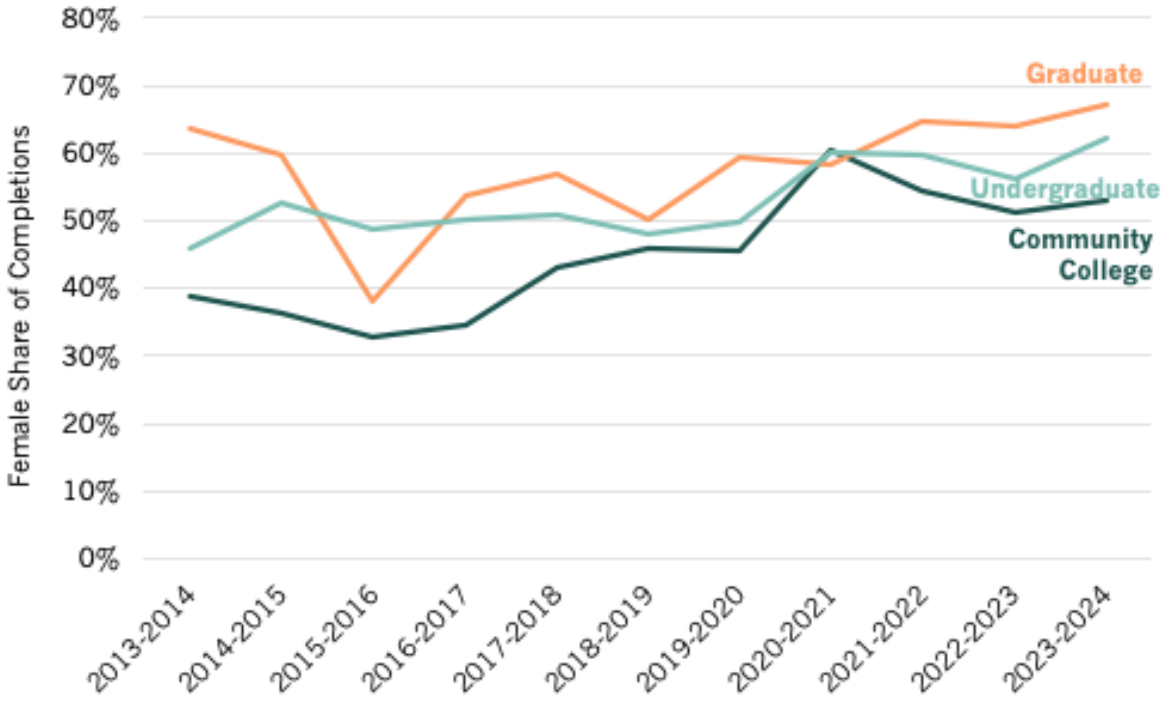
In the 2023-2024 academic year, BIPOC individuals made up approximately one quarter of core program completers, with variation by credential level (see Exhibit 62 and Exhibit 89). Across credential levels, the share of BIPOC completers has increased over the past decade, particularly among community college completers. Exhibit 63 illustrates similar trends for women completers in forest operations and management. A comparatively high share of graduate completers identified as women (67 percent in the 2023-2024 cohort) and across all credential levels, the share of women completers increased over the past decade.

Exhibit 62. BIPOC Completers in Core Programs



Data source: Oregon Higher Education Coordinating Commission

Exhibit 63. Women Completers in Core Programs



Data source: Oregon Higher Education Coordinating Commission

In the 2023-2024 cohort, over half of the undergraduate completers in core programs were under the age of 25 years old at the time of completion. Across academic years, the share of undergraduate completers that are under 25 years old has ranged from 43 percent to 52 percent. Graduate completers were, not surprisingly, older with approximately 2 percent under the age of 25 years old, on average across the 2013-2014 to 2023-2024 cohorts. Community college completers vary more in age, with only about one quarter under the age of 25 years old, 30 percent between the ages of 25 and 29 years old, and approximately 45 percent were over 29.

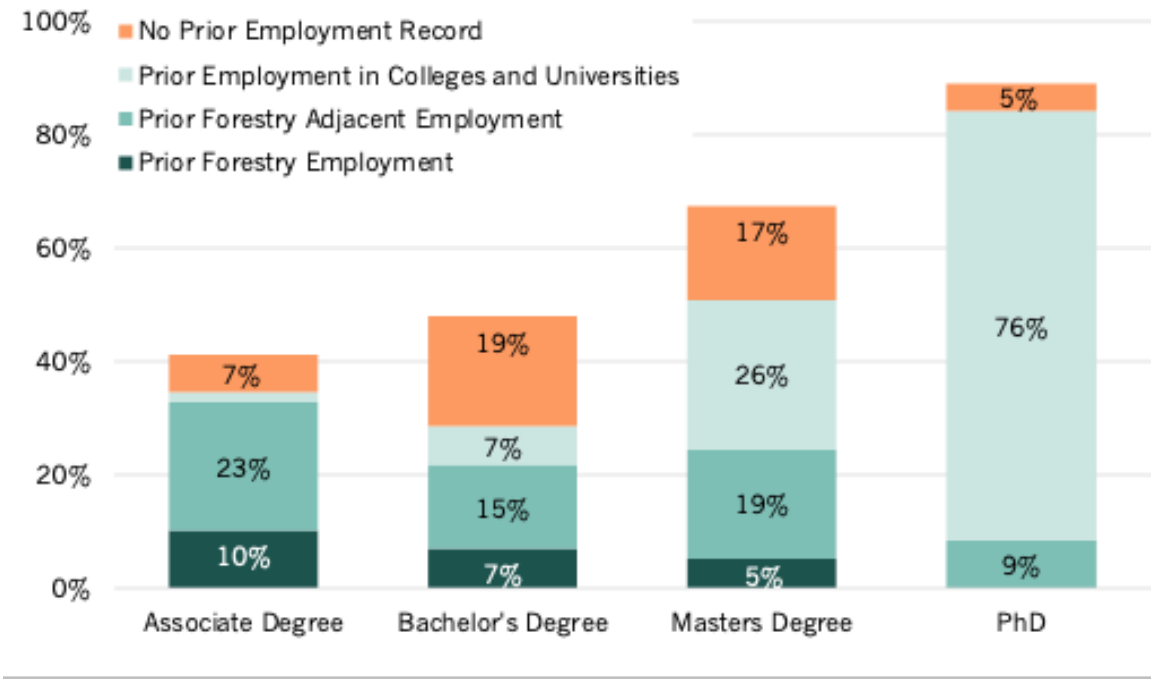
EMPLOYMENT PRIOR TO COMPLETION

This analysis focuses on identifying individuals who worked in the forest operations and management sector in the year prior to completion—one aspect of the intertwining pathways between industry and associated educational pathways. We define prior employment as any recorded employment within the year before completing a credential. Many students do not work before graduating, or they work in fields unrelated to their intended postsecondary studies. Still, reviewing prior employment among students who go on to complete core forest operations and management programs helps assess the connections between education and industry.

Exhibit 64 shows prior employment by credential type. Individuals who earned a core associate degree were most likely to have had prior forestry or forestry-adjacent employment, while PhD recipients were much more likely overall to have had any

employment in the year prior to graduation, most of it in the postsecondary education sector.

Exhibit 64. Employment within 1 Year Prior to Completion, Core Credential Completers by Degree Level



Note: Prior Employment in Colleges and Universities is included in Prior Forestry Adjacent Employment in all other figures. Prior employment includes any duration of employment. Data source: Oregon Higher Education Coordinating Commission.

POST-COMPLETION EMPLOYMENT OUTCOMES

We analyze employment outcomes for core program completers at two points in time: one year after and up to five years after completion, combining completion cohorts to increase sample size and precision. The employment outcomes described in this chapter cover 669 community college completers (associate degrees and certificates) and 8,542 university completers (post-baccalaureate certificates, bachelor's and master's degrees, and PhD), as described in Exhibit 65. We observe employment outcomes for 62 percent of the community college core completers and 49 percent of the university completers (some of the remainder may have been self-employed or employed out-of-state during the analysis period).

Characteristics of the Post-Completion Employment Cohort

Exhibit 66 describes the demographic characteristics of the employment cohort. BIPOC completers make up 17 percent of university completers (691) and 11 percent of community college completers (44). Women completers account for approximately half of the university cohort with employment outcomes (2,059 completers), but only 30 percent of the community college portion of the cohort (125 completers).

Exhibit 65. Core Completers with Post-Completion Employment Outcomes, by Credential

Degree Level	Core Completers	Core Completers Employed in Oregon Post-Completion	Core Completers Employed in OR Post-Completion as a Share of All Core Completers
Community College	**669**	**417**	**62%**
Certificate	91	40	44%
Associate Degree	578	377	65%
University Level	**8,542**	**4,144**	**49%**
Bachelor's Degree	6,688	3,367	50%
Postbaccalaureate Certificate	544	154	28%
Master's Degree	1,017	473	47%
PhD	293	150	51%

Data source: Oregon Higher Education Coordinating Commission

Exhibit 66. Demographic Characteristics of Core Completers with Post-Completion Employment Outcomes

Characteristic	Community College		University	
	Employed in Oregon Post-Completion	Share of All Core Completers	Employed in Oregon Post-Completion	Share of All Core Completers
Race/Ethnicity				
White	337	64%	3,230	49%
BIPOC	44	51%	691	43%
Unknown	36	68%	223	63%
Gender				
Female	125	54%	2,059	44%
Male	278	67%	2,063	53%

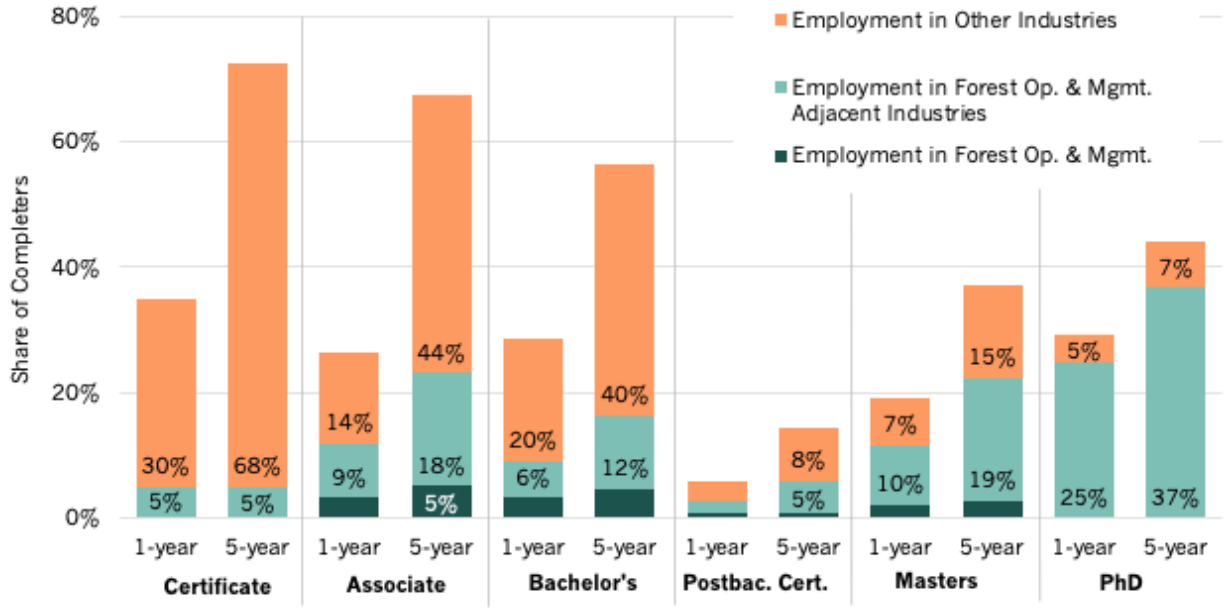
Data source: Oregon Higher Education Coordinating Commission

Employment Outcomes

Exhibit 67 presents the employment outcomes for core forest operations and management program completers at one year and five years post-completion by credential type

(individuals employed within one year are also, by definition, considered as employed within five years). In general, the exhibit shows lower levels employment levels for more advanced degrees, likely indicating a higher share of out-of-state employment rather than unemployment. Of note, most observed employment outcomes for individuals earning a certificate, associate degree, or bachelor's degree were in industries not closely related to forestry. The reverse is true for more advanced degree earners, many of whom gained employment in the postsecondary sector (not shown).

Exhibit 67. Post-Completion Employment Outcomes (1-year and 5-year) for Core Program Completers, by Degree Level

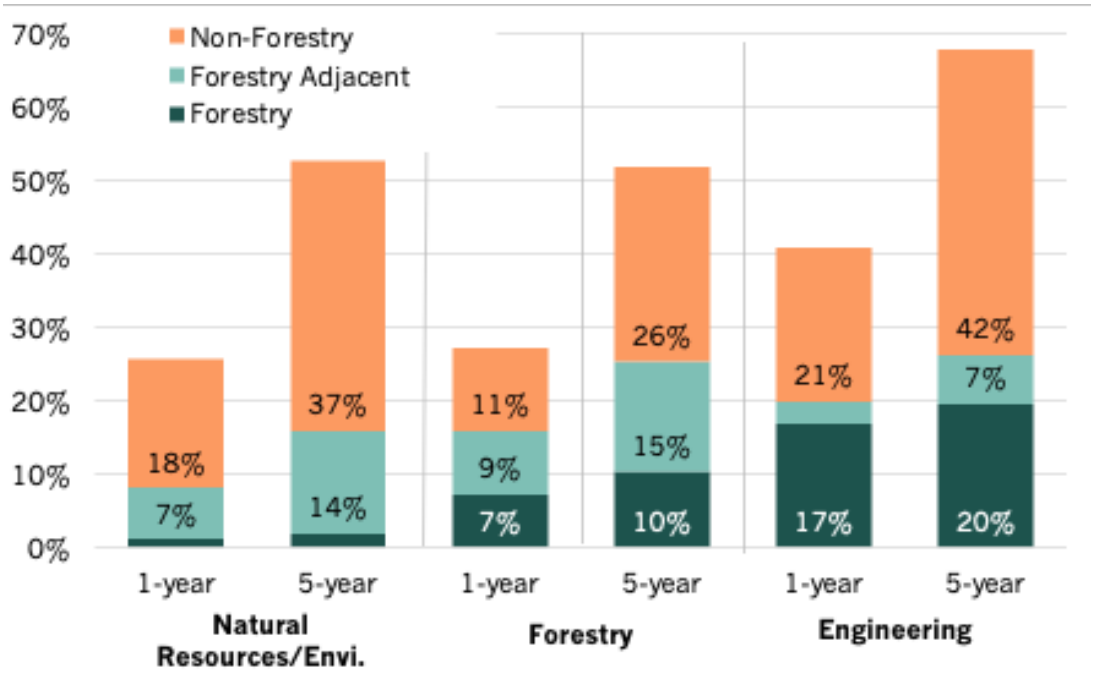


Data source: Oregon Higher Education Coordinating Commission

Engineering and forestry graduates were most likely to work in forest operations and management roles over time, while firefighting and natural resources graduates showed higher levels of employment in unrelated industries (see Exhibit 68 and Exhibit 90).

Only 1 percent of natural resources/environmental core completers gained employment in forest operations and management after one year and only 2 percent within five years. These completers were more likely to gain employment in adjacent industries (7 percent within one year post-completion and 14 percent within five years). Firefighting graduates showed limited change across the timeframes. The share of firefighting completers employed in forest operations and management adjacent industries was 9 percent for one year and five years post-completion.

Exhibit 68. Post-Completion Employment Outcomes (1-year and 5-year) for Core Program Completers by Program Group



Note: Firefighting is omitted due to confidentiality. Data source: Oregon Higher Education Coordinating Commission.

Exhibit 69 displays the average number of quarters worked post-completion during one or five years post-completion. Among core completers who worked at least one quarter post-completion, those that gained employment in forest operations and management tended to spend fewer quarters employed in the sector compared to adjacent industries and all other industries. Across all credential levels, core completers spent, on average, less than one quarter employed in the forest operations and management sector (the table does not reflect employment in other industries for those employed in a forestry-related industry). The average time employed in forest operations and management adjacent industries was between 2 and 2.8 quarters within the first year and 2 to 9 quarters within five years of completion.

Except for advanced degree earners, most employed recipients of a core credential gain employment in non-forestry industries, although completers for whom we do not observe employment may participate in the industry in other capacities or other states. As data systems improve, additional analysis will yield greater insight into the ability of specific pathways to support Oregon's forestry operations and management sector.

Exhibit 69. Average Quarters Worked by Core Program Completers who have Worked at Least One Quarter

	Average Quarters in Forest Op. & Mgmt.		Average Quarters in Forest Op. & Mgmt. of those who worked at least one quarter in Forest Op. & Mgmt.		Average Quarters in Any Industry	
Degree Level	1-year	5-year	1-year	5-year	1-year	5-year
Certificate	-	-	-	-	2.8	12.9
Associate Degree	0.2	0.4	2.3	5.3	2.5	11.3
Bachelor's Degree	0.2	0.7	2.9	9.1	2.6	11.3
Postbaccalaureate Certificate	0.1	0.1	2.0	2.0	2.4	10.3
Master's Degree	0.2	0.5	2.8	5.1	2.6	10.9
PhD	-	-	-	-	2.4	11.0

Data source: Oregon Higher Education Coordinating Commission.

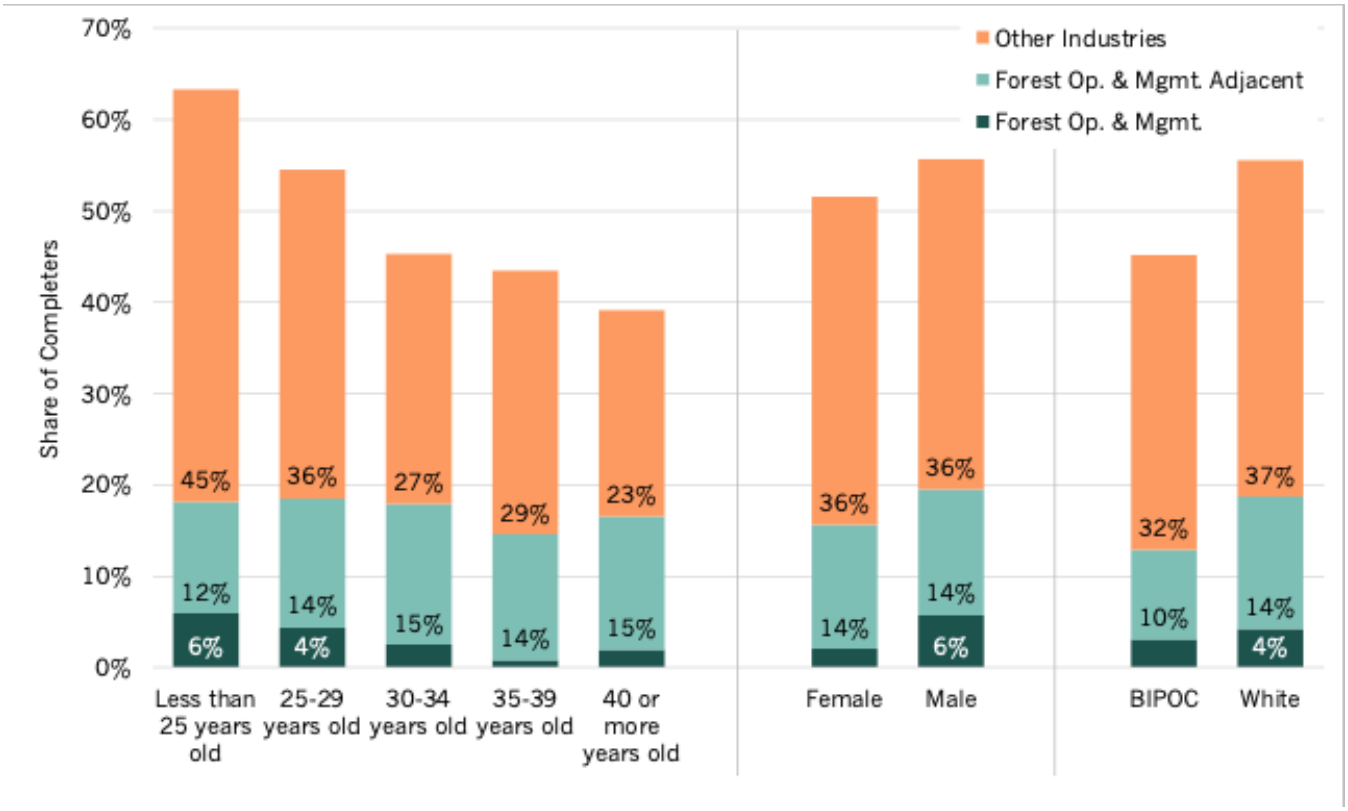
DEMOGRAPHICS OF EMPLOYED COMPLETERS

Core completers under the age of 25 were the most likely to enter forest operations and management sector, with 6 percent of this group gaining employment within five years of completion. The share of completers working in adjacent industries is consistently at approximately 15 percent across all age groups. Completers who are 30 years or older tend to not gain employment in Oregon, regardless of industry, within five years post completion.

Men and women core completers had similar rates of employment in adjacent industries (14 percent) and all other industries (36 percent). However, women core completers are underrepresented in the forest operations and management sector, with only 2 percent of women gaining employment in the sector within five years post-completion compared to 6 percent of men, consistent with patterns observed across the sector's workforce.

Employment outcomes for BIPOC core completers show a slightly higher rate of attrition out of the Oregon labor market, with 65 percent of BIPOC completers unrepresented in Oregon employment data compared to 45 percent of white completers (see Exhibit 70). BIPOC core completers are underrepresented in both the forest operations and management sector and adjacent industries. Ten percent of BIPOC core completers gained employment in adjacent industries, compared to 14 percent of white completers, and 3 percent in forest operations and management compared to 4 percent of white completers.

Exhibit 70. Post-Completion Employment Outcomes (5-year) for Core Program Completers by Demographic



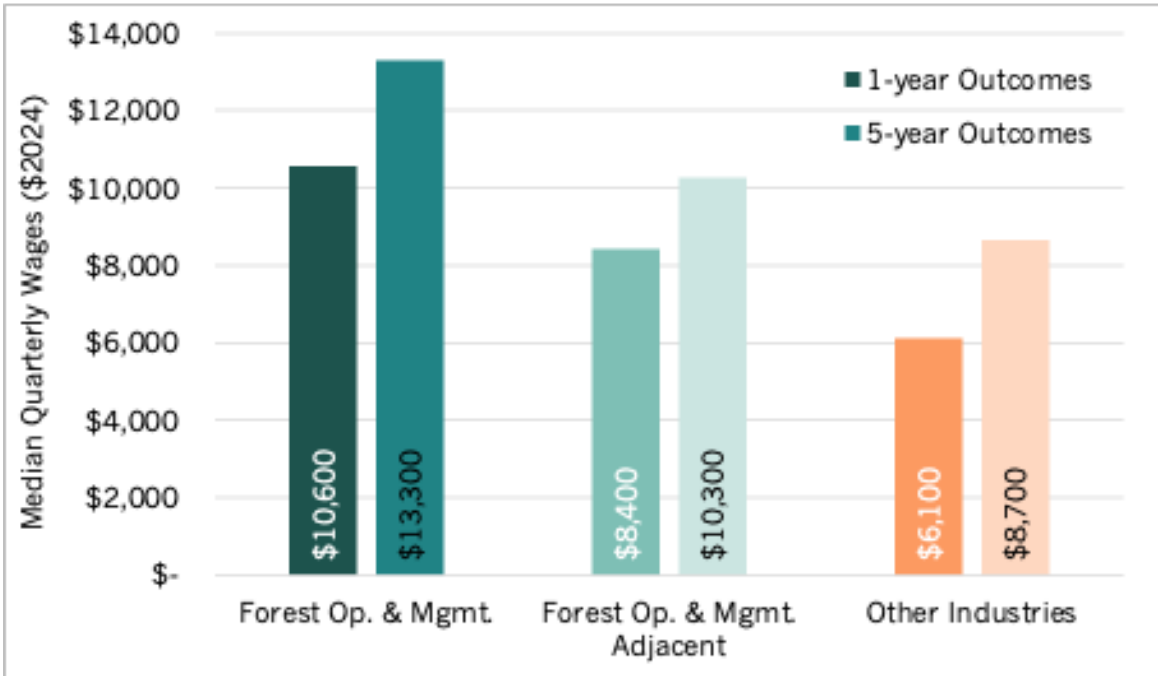
Data source: Oregon Higher Education Coordinating Commission

POST-COMPLETION WAGE OUTCOMES FOR COMPLETERS

This section concludes with an overview of median quarterly wages one year and five years after completion of forest operations and management programs, segmented by credential type and employment sector.

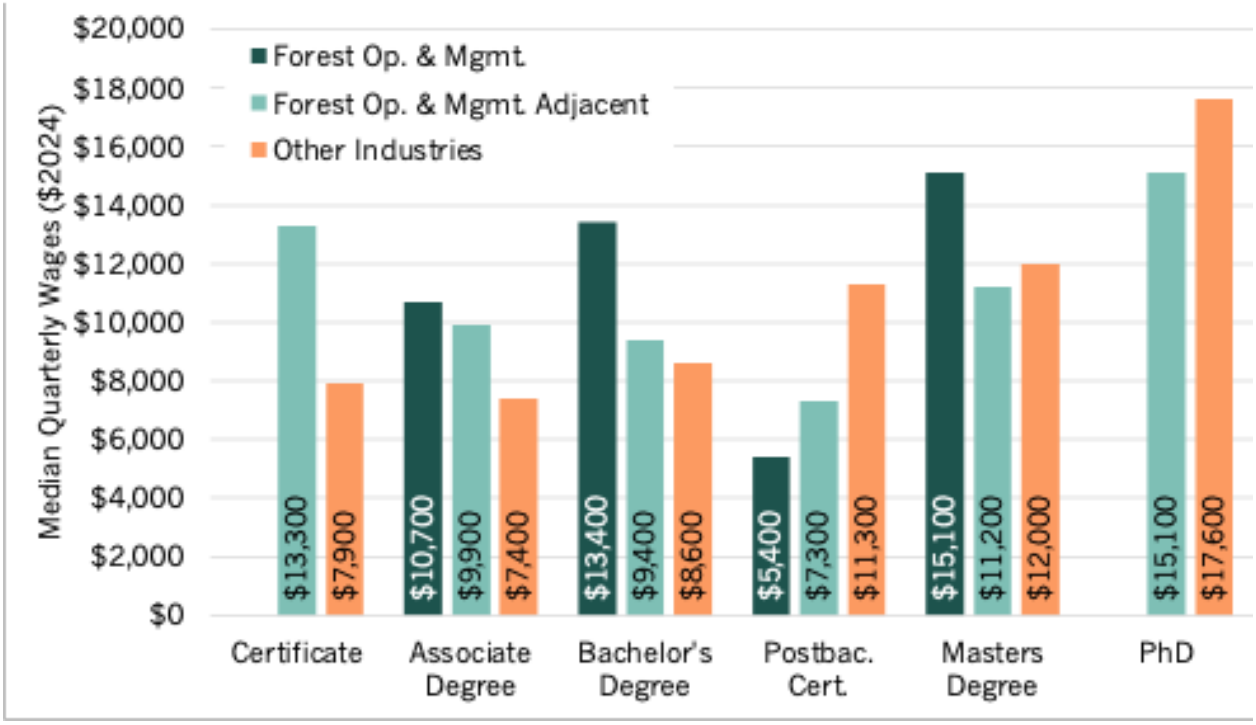
Overall, core completers working in forest operations and management earn more than those working in adjacent and all other industries within both one year and five years post-completion (see Exhibit 71). Employment in the sector also appears to offer a wage premium across credential levels, with the exception of post-baccalaureate certificate completers (Exhibit 72). Similarly, employment in forestry-adjacent industries appears to offer a similar wage premium for certificate, associate, and bachelor's degree completers.

Exhibit 71. Median Quarterly Wages for Core Completers



Data sources: Oregon Higher Education Coordinating Commission. CPI.

Exhibit 72. Five-Year Median Quarterly Wages for Core Completers by Degree



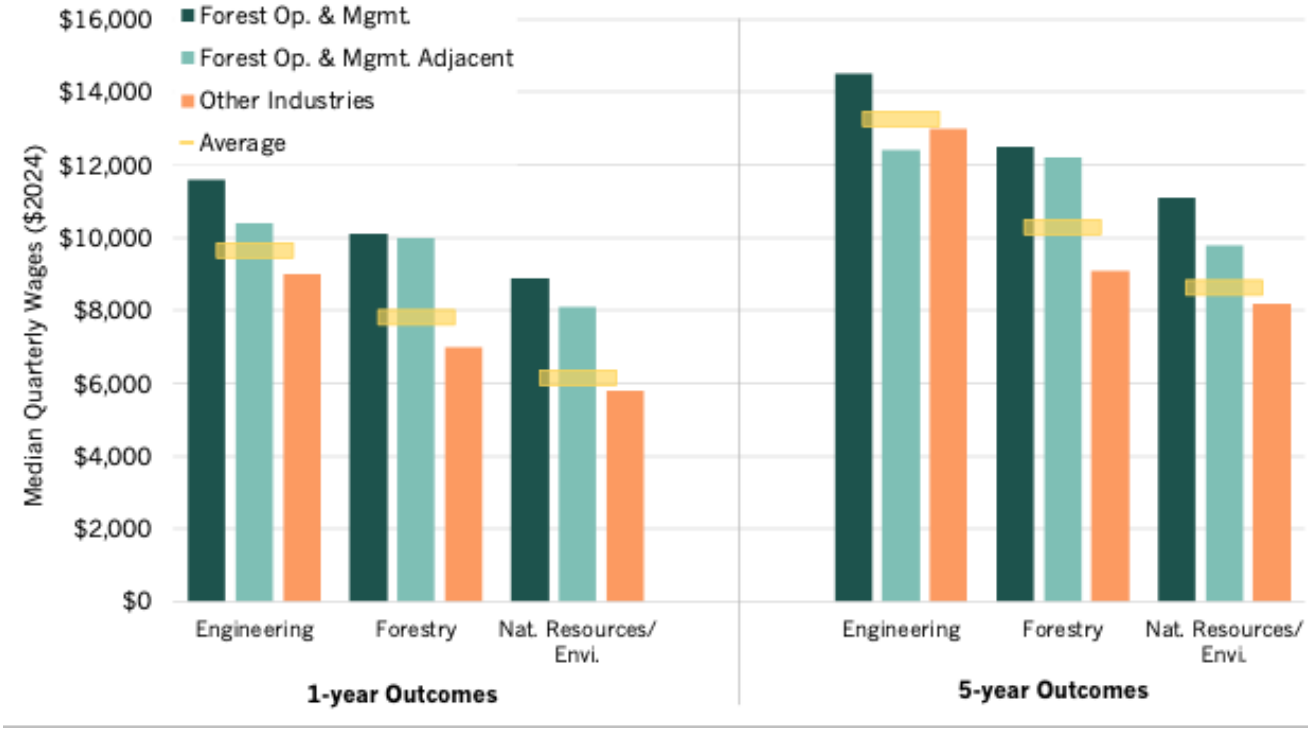
Data sources: Oregon Higher Education Coordinating Commission. CPI.

Across all program areas, graduates working in forest operations and management consistently earn more than those employed in other industries, with adjacent industries offering a moderate wage advantage (see Exhibit 73).

Forestry program core completers who gained employment in forest operations and management and adjacent industries earn roughly $12,000 compared to $9,000 in all other industries five years post-completion. Core completers in natural resources and environmental programs also earn more in forest operations and management and adjacent industries compared to all other industries.

Engineering completers earn the highest wages most consistently across sectors, with forest operations and management offering a wage premium ($14,500 five years post-completion compared to $13,000 in all other industries). Firefighting core completers earn higher wages in adjacent industries both within one year and five years post-completion.

Exhibit 73. Median Quarterly Wages for Core Completers by Program Group



Note: Firefighting is omitted due to confidentiality. Data sources: Oregon Higher Education Coordinating Commission. CPI.

4. Conclusions and Recommendations

Workforce Needs

Using OED's projections, our estimates of the sector's size, and other data, we estimate the forest operations and management sector, as defined in this report, will grow by 0.2 percent per year, from 31,513 circa 2023 to 32,030 in 2033. Due to retirements and other job turnover, we estimate the sector will need an average of 3,400 new workers every year—more than 10 percent of the workforce size estimate for 2023.

As outlined in the study recommendations, key next steps include development of scenario and gap analyses based on the best available data to help guide workforce investments and planning. Acting on the study's data recommendations would strengthen the quality and depth of the analysis.

Insights gleaned from the engagement and analysis of this study provide guidance for both improving data availability and acting to address identified workforce needs in the near term. Many businesses in the sector face recruiting and retention challenges associated with perception of the industry; the nature of the work, particularly entry-level, in many subsectors; and competition from other sectors of the economy that offer similar or better wages, working conditions, or convenience. Working to address misperceptions about the industry and to better communicate to younger populations the longer-term benefits of employment in the sector, including job satisfaction, may be as important as training capacity and program availability per se, although we also see opportunities for improvement in the latter.

The Chapter 3 IPEDS analysis indicates that, while Oregon's postsecondary system focuses on forestry-related programs more than many states, the outsized footprint of the state's forest operations and management sector means the state will likely always face difficulties meeting all industry training needs, simply because the sector is so large. This suggests the importance of understanding Oregon's comparative advantages in training the future forestry workforce, where the state and sector can rely on formal postsecondary programs, and where a reliance on less formal pathways or out-of-state training is appropriate. Analysis completed for this study starts to provide an outline of this understanding. Better data availability and future intentional, regular analysis can help fill in the details.

Survey Findings

At the end of the survey, respondents were asked for open-ended responses on three topics: recommendations on how the State could better support the forestry sector's workforce; solutions that have helped or may help address businesses' workforce and/or operational

challenges; and any additional thoughts or concerns about Oregon's forestry workforce. The responses to those questions are summarized below.

Recommendations for the State

Forty-one respondents answered an open-ended question about how the State could better support the sector's workforce and operations. The top categories of responses were the following:

- Expand training infrastructure (22 mentions)
- Regulatory reform (10 mentions)
- Increase harvesting (7 mentions)
- Reduce taxes (5 mentions)
- Increase industry awareness (5 mentions)

The top category (expand training infrastructure) had 9 mentions of the need to support high school programs. Respondents noted that high school forestry programs that promote trade work or apprenticeship programs would help build a natural talent pool for companies.

"Timely completion of useful technical guidance, make it known in high schools as a good and viable industry with multiple excellent job opportunities."

Respondents also mentioned the need for support of technical schools (2 mentions), CDL (2 mentions), and certificate programs (2 mentions); the value of apprenticeship-type roles for young people (1 mention); and the need for streamlined onboarding processes for companies (1 mention).

"Quit trying to stop programs like [Good Neighbor Authority] GNA and let [Oregon Department of Forestry] ODF sell some trees. We need work for future

Another common theme among respondents was the costs associated with regulations, workforce compliance, and insurance (10 mentions). Respondents recommended that the State increase timber harvesting (7 mentions), indicating that limited harvesting opportunities are affecting their ability to hire workers. Respondents also mentioned tax reductions and increased industry awareness as suggestions for the State. These mentions indicated that current tax rates discourage individuals from working and living in Oregon, while the perceived negativity around logging and harvesting practices discourages young workers from joining the forestry sector all together.

Solutions to Challenges

Respondents shared solutions they have developed, know of, or are using for their company that have helped or may help address their business's workforce and/or operational challenges (27 responses). The top categories of responses were the following:

- Recruitment and talent pathways development (12 mentions)
- Retention through compensation and job quality (10 mentions)
- Strategic business response (6 mentions)
- Upskilling, training, and safety (6 mentions)
- Operational efficiency and technological innovation (2 mentions)

Within the top category of recruitment and talent pathways development, respondents mentioned high school engagement three times, internship programs twice, and on-the job training once.

Respondents also frequently mentioned compensation and job quality as successful solutions to workforce challenges. Themes centered on pay increases, production bonuses, changes to benefits, better equipment, and minimizing drive times to job sites for workers.

"We have started trying to train younger existing workers on machines. Trying to build operators from our current employee pool."

"People that are able to learn and retain [specialized skills] are driven away from our line of work due to lack of compensation."

Additional Thoughts and Concerns

Finally, 26 respondents expressed broader thoughts and concerns about the forestry workforce, in the following top categories:

- Need to improve public policy and public perception (8 mentions)
- Forestry education needs to align with industry (6 mentions)
- Need for sustainable harvesting (5 mentions)
- Concern over people not wanting to work (4 mentions)
- Industry consolidation and structural stress (3 mentions)

"Promote an atmosphere where young people see forestry as a viable, exciting and dependable career choice. Too often we hire, train up and employ good workers just to lay them off. Combined with the message the forest sector is a dying industry, it confirms the worst and drives young people to more reliable employment."

Respondents who mentioned the need for public policy and perception improvements specifically cited the negative portrayals of the sector in relation to environmental sustainability (4 mentions). A few responses mentioned the need for more government leadership and engagement on natural resource management issues as well.

Other responses within the public policy and public perception category noted the costs of compliance with workforce rules; the challenges of recruiting, training, retaining, and promoting workers due to public perception; and the high start-up costs for logging businesses.

Respondents provided additional thoughts and concerns regarding the alignment of forestry education and industry needs (6 mentions), including the need for on-the-job training and a focus in high schools on careers in trade. The focus on developing forestry career interest among young workers aligns with other responses in the "Concern over people not wanting to work" category. Responses in that category cited concerns over an aging workforce (2 mentions) and lack of labor force engagement among younger generations (4 mentions) — particularly in small, rural communities (2 mentions).

"High school over-emphasis on academic careers is devastating to Oregon employers and to rural trades occupations; absent of deficient trades career exposure."

"Large logging contractors and cutting contract holders create such a monopoly that small time cutters and loggers cannot make it. The only way to compete is to grow and there isn't enough wood being moved anymore to get big."

In the categories of sustainable harvesting practices (5 mentions) and industry consolidation and structural stress (3 mentions), responses highlighted a lack of timber supply and industry monopolization as barriers to workforce retention, productivity, and profitability. One response suggested improving upon the current harvesting conditions by increasing the log supply from federal forests, while another mentioned the need for proactive forestry work that benefits society (e.g., "fuels reduction thinning for forest health, supporting local mills and rural economies"). Another response noted that larger timber companies have lower billing rates that make it difficult for smaller contracting companies with less capital to compete, often reducing their chances of attracting and retaining skilled workers. Similarly, larger timber companies can mechanize their operations much faster than smaller companies. Responses mentioned that this imbalance in operational efficiency makes it difficult for smaller companies to stay competitive within the industry.

Interviews and Focus Groups

The interviews and focus groups also collected ideas and recommendations from participants about strengthening and improving Oregon's forest operations and management workforce ecosystem. The main themes are highlighted below.

PUBLIC PERCEPTION & STORYTELLING: REACHING THE RIGHT PEOPLE

Participants noted that the way young people view forestry careers deeply shapes recruitment and engagement. By highlighting community impact, environmental stewardship, and innovation, industry leaders can demonstrate how their field offers meaningful, values-driven opportunities that align with the priorities of young people.

- Public understanding of forestry is evolving, especially among young people who care deeply about climate resilience and sustainable land management. Some youth – particularly those who grew up in rural communities or forestry families – already recognize the benefits of active forest management and see forestry as a pathway to making a difference in their own communities.
- At the same time, four-year university programs described a lack of growth in student interest in traditional forestry degrees. Students are drawn to careers they perceive as addressing complex environmental challenges rather than roles associated with timber harvesting or resource extraction. This creates a disconnect between the goals of modern forestry and the perceptions held by young people.
- Given the diverse ways young people perceive the forestry sector, it's important to tell the full story of how each subsector contributes to sustainable forest management — including practices like restoration and community-based land stewardship. These narratives can both expand understanding among new audiences and resonate with those already connected to the work.
  - *"The idea that "these kids don't want to work." That's just inaccurate. This is the kind of work they want to do in the landscape they want to be in... They are willing to move across the country in a rural area they aren't familiar with for a seasonal job, no benefits – that shows how dedicated they are. The key is figuring out how to reach out to this applicant pool and create a work environment they want to be in – that creates meaning to them, their community, and family."*
- This approach moves beyond "fixing perception" to expanding access, representation, and relevance. It means actively working to make forestry more visible in classrooms and communities, diversifying who sees themselves in the field, and ensuring messaging reflects the range of pathways and purposes that forestry can serve.

INSIGHTS TO INFORM FUTURE ACTION

The insights shared through the engagement process provide not just an understanding of forestry workforce realities, but also a roadmap for where to focus collective effort to strengthen the State's forestry workforce.

- Workforce Development Ecosystem
  - **Short-term credentials need long-term support.** Stackable credentials and immersive training modules are in-demand across the forestry sector. However, traditional funding structures – particularly federal financial aid – do not as easily support non-degree formats. This, combined with uncertainty around enrollment, can make community colleges hesitant to launch new credential programs. High schools may also face liability concerns when offering hands-on training. Meanwhile, students often need wraparound supports like transportation and flexible schedules to participate. Addressing these challenges will require policy innovation and support by private company and education partnerships to ensure non-traditional training formats are viable and accessible. *Relevant quote: '[Industry partners] need to be willing to hire a student for internships. All those are critical components of our program. We are always looking for industry partners to support us."*
  - **Career perception isn't the barrier, it's the pathway.** Young people might not understand the diversity of roles across forestry subsectors, or see the clear steps needed to enter and grow within the field. Others may not realize sustainable forestry includes both restoration and responsible harvesting practices. Strengthening and promoting "bridge programs" such as pre-apprenticeships, stackable credentials, and partnerships between community colleges and private employers can help clarify entry points, making career pathways more visible and accessible.
  - **Sector engagement needs refinement.** Many workforce boards currently categorize forestry under a broader umbrella of "manufacturing" and primarily engage with manufacturing subsector representatives. As a result, key subsectors such as logging, restoration, wildfire mitigation, and nursery production are underrepresented in workforce planning discussions. Grouping forestry with manufacturing influences how workforce data are collected and interpreted, which in turn affects funding patterns, training program design, and support services. Engaging with the forestry sector on its own, where appropriate, would improve boards' ability to align planning efforts with actual industry needs. *Relevant quote: "I think the workforce boards is the place where the employment department data receives its narrative. Our economists talk about the reports, but they say this is what it means to you. If we could figure out a way so that cabinet making isn't the representative data of the wood products industry. Cabinet making is part of wood, but what we are talking about is a traded sector industry."*
- Private Company-Education Alignment & Youth Pipelines

- **Youth education works best when it is localized and engaging.** Programs rooted in the local landscape and cultural context, particularly those that involve employers directly, are more effective in building youth interest in forestry careers. Hands-on learning, real-world experiences, and visible community impact create tangible pathways from school to work.
- **Private employer visibility in youth workforce programs is limited but needed.** Students express more interest in public employer forestry careers, in part because these roles are more visible through strong state and federal agency partnerships with education programs who provide hand-on learning opportunities. Increasing the presence of private employers in education spaces – through continued partnerships with high school programs, community colleges, and youth education programs – could help expand students' understanding of the full range of career opportunities in the sector.

- Employer-Led Retention Strategies
  - **Inclusive practices are retention strategies.** Rather than viewing inclusive efforts such as language accessibility as separate from business operations, logging employers described these practices as key to improving safety, communication, and retention. Inclusive strategies not only reduce turnover but also foster stronger community cohesion and word-of-mouth recruitment.
  - **Retention depends on housing, transportation, and work-life balance.** Forestry employers noted that long commute times to remote job sites can be a major barrier to retaining workers. In response, some businesses adopted informal or formal policies to cap commutes at around two hours while others have supported ride-sharing or organized carpools to reduce the burden on employees. While interest in workforce housing solutions exist, especially in high-cost or rural areas, implementation has been limited. Proximity to housing and manageable commute times continue to be critical components of workforce infrastructure in the forestry sector.

Recommendations

The recommendations below, based on the findings of this study, focus on meeting forest operations and management workforce needs and increasing opportunities for Oregonians from all backgrounds and communities to gain employment in the sector. Improved access to education, training, and employment opportunities and influencing public perception is essential to enhancing recruitment and retention and increasing diversity in the workforce and to preparing for forestry workforce needs of the future.

While a well-trained workforce is necessary, it is not sufficient to guarantee a steady flow of forest operations and management work. In Oregon, and elsewhere, the forestry sector faces several headwinds not directly related to workforce. These challenges are not the focus of this study but are essential context in which to consider any forestry workforce strategies—efforts to address workforce challenges must occur alongside broader forest

management planning and implementation and within the context of conditions that are harder to address through state and local policy. The engagement results presented throughout this report make clear that workforce issues are not the only prominent factor contributing to challenges in forestry operations and management—some employers and contractors report lacking enough work to fill their time. Additional headwinds, many of which interact in complex ways, include market uncertainty, limited access to insurance, and housing and transportation access, especially in rural areas. Efforts to address these challenges need to continue, simultaneous with workforce development strategies.

Create one or more scenario analyses, followed by a sector-wide gap analysis

We recommend the development of one or more scenario analyses based on specific policies likely to significantly affect the sector's workforce. The data collection and analysis process for scenario development will likely reveal data limitations that, if addressed, would enable more robust and ongoing gap analyses in the future. The scenario analyses should be followed by a sector-wide gap analysis based on the best available information on future workforce capacity verses workforce needs. Without these analyses, the state and its partners could continue to face challenges in targeting workforce investments effectively. Implementing the data recommendations below could considerably improve the analysis.

Promote the sector and reduce the size of awareness gaps

Using timber products in building is more sustainable than more resource-intensive alternatives like concrete or steel. Wood is a renewable resource that, when managed and harvested responsibly, contributes to a lower carbon footprint. Beyond its environmental advantages, timber harvesting also supports local economies, aids in wildfire mitigation, and offers secondary benefits such as creating roads into forests that can be used for recreation or emergency services. There is clear evidence that well-managed forests provide material for climate-conscious construction and supports broader community stewardship. However, these benefits are not widely understood or accepted across Oregon.

The timber industry in Oregon has a complex legacy involving many historical, environmental, social, and political factors. The State can affect public perception of the industry by promoting case studies of timber companies practicing responsible forestry, restoring ecosystems, or providing strong community benefits. They could also create a campaign that frames the forestry industry as part of Oregon's climate solution, with an emphasis on carbon sequestration, renewable materials, and sustainability careers. By positioning Oregon's forest operations and management sector as forward-looking, environmentally responsible, and community-centered, the State can rebuild public trust and make the sector more attractive to a new, skilled, and diverse workforce.

Encourage collaboration among training programs and employers

The foundation of effective talent development is collaborative relationships between training/education providers and employers. Fuller and Raman (2022) describe "a growing gulf between those who teach and those who hire," particularly in the middle-skills environment, that "underserv[es] the needs of aspiring workers, employers, and ultimately, communities."[111] They recommend the following framework to overcome this disequilibrium:

1. Partner with each other [community colleges, training programs, and employers] to offer training and education that is aligned with industry needs.
2. Establish relationships with each other that result in the recruitment and hiring of students and graduates.
3. Make supply and demand decisions that are informed by the latest data and trends.

Various initiatives and partnerships throughout the state are examples of this approach and could potentially be scaled. One example: Umpqua Community College has industry partnerships with the U.S. Department of Agriculture's Forest Service, along with Orenco Systems, Con-Vey, Roseburg Forest Products, and North River Boats through the Manufacturing Workforce Ready Grant. These options allow students to move right into the workforce with their associate degrees. Students at Umpqua often come from the CTE programs at Roseburg High School, which emphasize forestry career development. This example of introducing forestry at the high-school level and then offering a pipeline to a local community college and on to a local industry job is a best practice in reaching rural youth interested in forest operations and management.

Key to collaboration success is a focus on the needs of specific roles in the sector. Role-specific input such as the following could be the beginning of role-specific strategizing:

- Harvesting: CTE programs are essential, including hands-on experiences (e.g., with forestry equipment training simulators); need to foster a "love of the woods"
- Trucking: Age requirements can be a barrier, as can the high costs to entry, including insurance; the skillset for forestry trucking is very specific and CDL alone isn't sufficient training
- Wildfire, trail, conservation, thinning, and planting work (entry-level and youth-focused): Applying for jobs through government portals is more difficult than it should be

[111] Joseph Fuller and Manjari Raman (Dec 2022). *The Partnership Imperative: Community Colleges, Employers, and America's Chronic Skills Gap*, https://www.hbs.edu/managing-the-future-of-work/Documents/research/The%20Partnership%20Imperative_Executive%20Summary_12.12.2022.pdf

- Forest management: For roles that typically require a bachelor's degrees, perhaps an associate degree would suffice, particularly one from an accredited program

The State can encourage collaboration by promoting existing successful practices and examples and creating a coordinating structure (see Next Steps below) designed around regional collaboration. An increase in collaboration could result in local training that better meets local employers' needs and more-reliable provision of up-to-date and well-balanced training across skill types (e.g., technical, occupational, advanced).

Support early and ongoing development of a skilled, diverse workforce

A well-functioning workforce system should enable individuals to enter the forestry workforce early, gain essential skills, and receive competitive wages. This is possible through many pathway types, all of which should be presented as options for potential workers, in addition to the option to enter the workforce directly and receive mentorship to advance in one's career. These pathways include the following types of programs: youth workforce, career and technical education, youth corps, pre-apprenticeship, apprenticeship, certificate, associate degree, and bachelor's degree.

Integrate forestry topics into core K–12 subjects and curriculum such as science and geography and offer hands-on projects such as forest mapping or wildfire simulations to generate career interest among youth. Expanding CTE pathways in middle and high schools can help align classroom learning with real-world forestry skills. Experiential learning through field trips to forests or mills provides students direct exposure to the industry. Collaborating with state agencies and local timber companies to provide guest lectures, job shadows, and internships that deepen engagement could grow interest at critical points in student's pathways. Additionally, after-school programs and youth organizations like FNRL or FFA can reinforce these interests through forestry-themed clubs and competitions.

Additionally, the recently passed Senate Bill 784, relating to dual credit programs, will aid in creating clearer pipelines from early education through postsecondary training and into forestry careers—especially by identifying where support, curriculum, or mentorship opportunities are needed.[112]

Consider or continue steps to develop a forest operator apprenticeship program in Oregon—modeled after California's CRAFT apprenticeship program. Oregon Bureau of Labor & Industries (BOLI) should develop a standards-based apprenticeship program and set competency benchmarks for equipment operation, safety, maintenance, and environmental compliance.

Continue exploring and advocating for ways to use federal financial aid at the community college level for non-degree programs or create special programs that are eligible for aid.

[112] https://citizenportal.ai/articles/3148959/Oregon/Senate-Bill-784-establishes-dual-credit-programs-in-Oregons-agriculture-and-forestry-sectors

Dynamic faculty, good marketing, and a strong likelihood of a job after completing Clackamas's Community College 6-month wildland firefighting program has led to strong enrollments. Short-term programs (1 year or less) are desired for students looking for a quick career move and less student debt.

Expand and/or improve access to continuing education seminars and/or online courses, which employers and self-employed workers cited as particularly useful training tools. Short-form or modular training programs tailored to rural forestry professionals allows for flexibility in training and the ability to train remotely. The State could assist in funding new and improved training resources aimed at improving safety, efficiency, and professionalism in the timber industry and ensuring access to materials in Spanish. Currently, Associated Oregon Loggers (AOL) offers a variety of training resources aimed at improving safety, efficiency, and professionalism in the timber industry. Ensuring that these materials are up to date with the latest technologies and offered in both English and Spanish is critical to the training and safety of forestry workers.

Review forest-related policies, plans, and regulations that forestry businesses experience as barriers

To continue this study's investigation of recruitment and retention challenges that employers face, we recommend further collaborative review of policies and regulations that affect workflow and business costs. While extensive review was outside the scope of this study, we heard general statements from many employers about costs associated with regulations, workforce compliance, and insurance. Through the coordinating structure recommended below (Next Steps), industry and government representatives could collaborate to review, consider, and propose changes to streamline or adjust rules, regulations, and/or processes that affect the forest operations and management workforce.

Continue to improve data collection about industry structure, composition, and industry-associated training and education pathways

Like many industries, while reasonably easy to define in plain language, the forestry operations and management sector is not easily characterized using standard industrial and occupational classification systems. As suggested throughout this report, these challenges to quantifying the sector's size and characteristics are particularly acute because of its reliance on relatively small, independent operators and contractors and the multifaceted nature of many forestry firms' operations. Despite these challenges, an accurate, comprehensive accounting of the sector's operations is critical for both the State and the sector to attract and inform future workforce investments.

Broadly, the data gaps fall into three categories:

- **Standard industry classifications do not allow a clean distinction between forest operations and management and other, related sectors.** OED and industry organizations like OFRI have made strides toward remedying the situation by, for example, manually identifying forestry-related firms that fall into NAICS-based industries, like transportation, that serve other segments of the economy as well. The State and industry should collaborate to extend these or similar efforts into subsectors not yet captured by OED's definition, including forest road construction and maintenance, aggregate production, and forest technical services.
- **Information about non-employer entities is sparse.** Government data provide counts of non-employer establishments for some subsectors of forest operations and management but provide little to no information about specific activities or the number of individuals involved. The survey conducted for this study sheds some light on these issues. The State and industry should work towards formalizing similar data collection efforts to provide a more robust accounting of the scale and activities of non-employers. Similarly, the USDOT transportation data described in this report provides order-of-magnitude estimates for the number of transportation entities and truck drivers associated with the forest operations and management sector, but further analysis could lead to better estimates, particularly if combined with a targeted survey of transportation firms.
- **Standard occupational classifications do not necessarily identify all roles important to the sector, and do not reflect the multiple roles played by many individuals in the sector** (e.g., contractors working across fuels reduction, road construction, logging, and firefighting). These challenges are not unique to forest operations and management, but as noted, the sector's reliance on businesses already not well-reflected in official data that operate across multiple subsectors amplifies their importance to characterizing the sector. Additional research through survey and other engagement efforts that were outside the scope of this study could more fully describe common skillsets needed by employers and of incumbent workers in the sector to support efforts to improve workforce training for the sector. The knowledge gained would allow trainers (employers, postsecondary institutions, and others) to better align curriculum with needs in the field.

Continue efforts to link and analyze CTE, apprenticeship, postsecondary, and employment data

Oregon has made great progress in recent years linking the large educational, training, and employment databases held by the state. These linkages provide a powerful resource for understanding the adequacy and effectiveness of public education and training programs in supporting industry workforce needs and individual's employment success. But significant work remains.

As noted in this report, although HECC provided useful information regarding employment outcomes for completers of postsecondary education programs important to the sector,

and although relevant data exist, we were unable to access similar information for apprentices, and almost no information regarding CTE students. The forest operations and management sector relies less heavily than many industries on formal pathways at Oregon's postsecondary institutions, increasing the importance of these limits to data availability. For example, as the sector seeks to overcome misperceptions about industry operations and stewardship of Oregon's forest resources, understanding how well the state's forestry CTE programs ultimately support employment in the sector can provide concrete information about whether the programs effectively foster high school students' interests in working for the sector.

Deeper and more consistent analysis of forestry-related pathways, from high school through employment in the industry, will facilitate system-level improvements in programs along the training and education continuum.

Next Steps

Scenario analyses, a sector-wide gap analysis, and other needs outlined above are key to understanding the future needs of the sector's workforce. We also recommend building on existing public-private partnerships or creating a new coordinating body at the state level to continue researching and addressing forestry workforce questions and needs in Oregon, followed by a permanent coordinating body or intermediary organization to support sector organization and growth and strengthen the talent pool.[113]

The organization could initially be a loose structure around existing programs, expanding and formalizing over time, with governance and accountability as crucial considerations. Much of the coordinating work should take place at the regional level, within public/private partnerships, with periodic statewide gatherings to discuss initiatives and assessment.

A working group or coordinating body with three teams—Workforce Entry, Ongoing Skill Development, and Policy Review—each with representatives from three groups—Industry, Training/Education, and Government—would provide space for holistic and successful initiatives based on the recommendations above. The three teams would focus on different aspects of the workforce ecosystem: pathways into jobs in the sector (Workforce Entry); opportunities to progress within the sector and train others (Ongoing Skill Development); and opportunities to review and make recommendations about policies and regulations that forestry businesses experience as barriers to workforce recruitment and retention (Policy Review).

[113] The Western Forestry and Conservation Association (WFCA) has had a Forest Sector Workforce Development Working Group since January 2024 (https://www.westernforestry.org/events/workforce-development/). WFCA covers the Pacific Northwest; the proposed working group would be specific to Oregon.

	Workforce Entry	Ongoing Skill Development	Policy Review
Industry	Team 1	Team 2	Team 3
Training/Education			
Government			

Business and industry, including business organizations that represent and support minority-owned firms, must play a major role in this structure, to ensure employer needs and perspectives are central to the work. Each of the three groups could potentially contribute to the working group or coordinating body in many ways, including, but not limited to, the following:

Industry

- Actively participate in the location, design, and implementation of educational and training programs to best address emergent workforce needs
- Offer real-world experiences, internships, and apprenticeships to bridge the gap between education/training and industry needs
- Serve as a conduit for communicating new or innovative approaches to forestry emerging from within the industry

Training/Education

- Develop and deliver relevant and effective training and curricula that align with the needs of employers and the sector's emerging workforce
- Establish partnerships and coordinate with employers to facilitate practical learning experiences for individuals with limited exposure or who are new to the industry, such as high school students

Government

- Collect data and conduct analysis that informs program development and improvement
- Provide supportive policies, regulations, incentives, and funding for workforce development and training programs
- Ensure equal access to opportunities for all individuals, regardless of background

This organizational structure will allow for deep discussion of the needs in each of the three areas: workforce entry, ongoing skill development, and policy review. The group or body could use this study's findings and recommendations as a starting place for their discussions and work.

A collaborative approach will be instrumental in tracking metrics and other approaches to measure the success of ongoing initiatives. Regular assessments and data collection can ensure the continuous improvement and adaptability of programs, fostering innovation, workforce diversity, and sustained growth in the forestry sector.

Appendix 1: Chapter Appendices

1. Forest Operations and Management in Oregon

Study Research Questions:

- What businesses, nonprofit organizations, education and workforce providers, and public entities compose the forestry sector in Oregon (industry, size, number of entities, and geographic distribution)?
- What are the occupational and socioeconomic characteristics of the forestry workforce?
  - Which forestry occupations, skills, and credentials are most in demand and/or currently in short supply or projected to be in short supply?
- What level of alignment exists between current and future forestry workforce needs and the capacity in the State's existing secondary and post-secondary education, training, apprenticeship, and workforce development programs that prepare Oregonians for careers in the forestry workforce?
  - What are the educational and labor market experiences of program participants?
  - What are the demographic characteristics and labor market experiences of recent "forestry enrollees and completers" (defined by major at completion and/or specific course enrollments regardless of major at completion) in Oregon?
- What are the workforce-related barriers and opportunities within the forestry sector?
  - What barriers do people face in accessing forest career pathways and jobs?
  - What barriers do employers face in recruiting and retaining a skilled workforce?
  - What opportunities exist to increase equitable access to forest career pathways and jobs, reduce barriers to recruitment and retention, or to otherwise improve training and education pathways?
- What community benefits does the forestry sector provide?

Exhibit 74. Forest Sector Employment by Type, Oregon

INDUSTRY NAME	FEDERAL	STATE	LOCAL	PRIVATE	NONEMPLOYERS	TOTAL
Primary Forest Products	-	-	-	18,909	561	19,470
Forestry Support	49	15	-	10,618	1,899	12,581
Secondary Forest Products	-	-	-	11,889	463	12,352
Forestry Management	4,600	958	296	1,195	-	7,048
Forestry-Dependent Industries	-	-	-	3,416	154	3,570
All other identified forestry sector firms	-	4	-	1,376	-	1,380
Transportation	-	-	-	5,842	-	5,842
Total	**4,648**	**977**	**345**	**53,244**	**3,077**	**62,291**

Data source: Oregon Employment Department, Forest Sector Employment

Manufacturing Subsector Descriptions: Forest Product and Dependent Industries

Primary Forest Products focuses on the initial processing and conversion of raw timber into essential wood-based products. The category includes sawmills, veneer and plywood manufacturing, paper mills, pulp mills, wood preservation, and various types of paper and paperboard manufacturing. These industries transform harvested wood into materials used in construction, packaging, and consumer goods.

Secondary Forest Products processes wood-based materials into finished or semi-finished products. This includes wood furniture, millwork, prefabricated buildings, cabinets, flooring, pallets, and architectural woodwork.

Forestry-Dependent Industries rely on forest products for their core business activities, including wholesale trade of lumber, plywood, millwork, industrial paper, and printing and writing paper. While they do not produce or directly process raw timber, they play a critical role in the distribution and supply chain of wood-based products to other industries, such as construction.

Exhibit 75. NAICS-Based Part of Forest Operations and Management Quantified in Exhibit 6

NAICS CODE	NAICS TITLE
Forestry Operations (includes full industries(*) as well as individually identified firms in other industries)	
113210*	Forest Nurseries and Gathering of Forest Products
113310*	Logging
115310*	Support Activities for Forestry
624310	Vocational Rehabilitation Services
Forestry Management (includes a full industry(*) as well as individually identified firms in other industries)	
113110*	Timber Tract Operations
551114	Corporate, Subsidiary, and Regional Managing Offices
813910	Business Associations
924120	Administration of Conservation Programs
Transportation (individually identified firms only)[1]	
~50 different industries	
All Other NAICS Codes (individually identified firms only)	
111421	Nursery and Tree Production
481212	Nonscheduled Chartered Freight Air Transportation
484220	Specialized Freight (except Used Goods) Trucking, Local
488119	Other Airport Operations
488320	Marine Cargo Handling
488490	Other Support Activities for Road Transportation
524210	Insurance Agencies and Brokerages
541511	Custom Computer Programming Services
541613	Marketing Consulting Services
541618	Other Management Consulting Services
541620	Environmental Consulting Services
541820	Public Relations Agencies
561990	All Other Support Services
813312	Environment, Conservation and Wildlife Organizations
813319	Other Social Advocacy Organizations
813410	Civic and Social Organizations

*Full NAICS industry is included in definition of the Forest Operations and Management Sector.

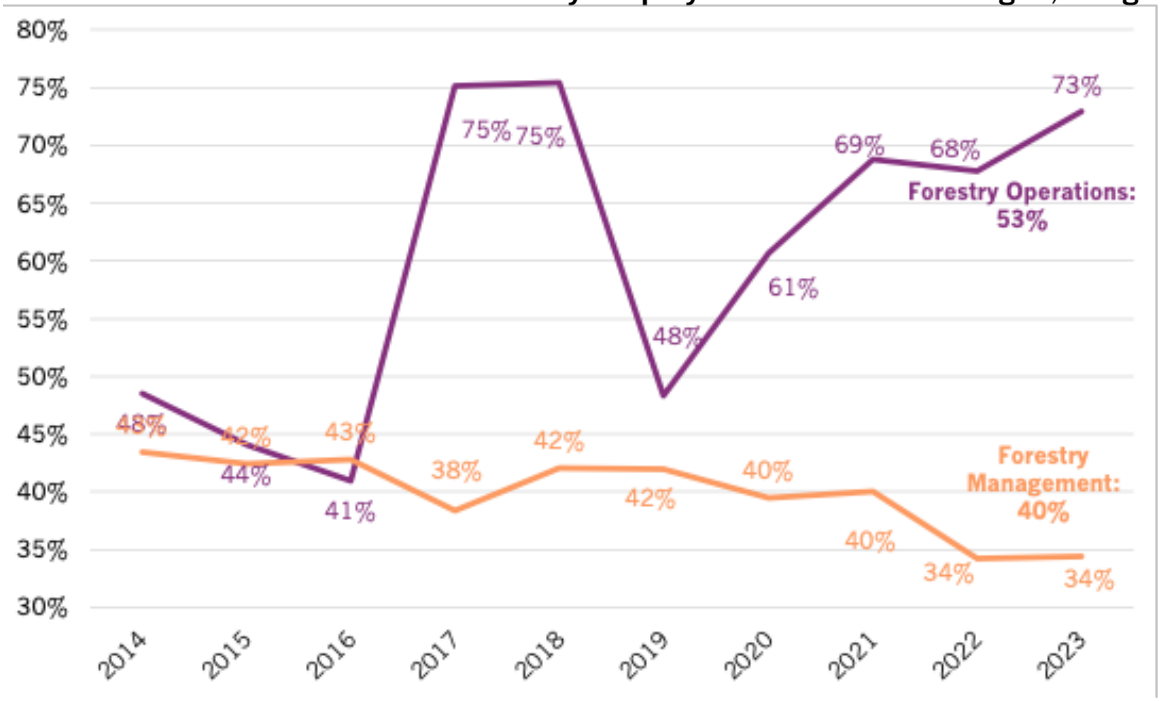
[1] Criteria for transportation employers: have log and chip truck registration with ODOT; have identifiable covered employment; are not included in other categories of the analysis. Data source: Oregon Employment Department.

Exhibit 76. Industries Essential to Forest Operations and Management but Without a Determined Share of Employment Associated with the Sector

NAICS		OREGON EMPLOYMENT
Roads and Aggregate Production		**11,673**
212319	Other Crushed and Broken Stone Mining and Quarrying	357
212321	Construction Sand and Gravel Mining	945
213115	Support Activities for Nonmetallic Minerals (except Fuels) Mining	77
237310	Highway, Street, and Bridge Construction	8,840
237990	Other Heavy and Civil Engineering Construction	1,453
Technical Services		**31,753**
541330	Engineering Services	14,105
541370	Surveying and Mapping (except Geophysical) Services	604
541620	Environmental Consulting Services	1,653
541690	Other Scientific and Technical Consulting Services	6,237
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	5,237
541990	All Other Professional, Scientific, and Technical Services	3,918
Transportation		**9,739**
481219	Other Nonscheduled Air Transportation	147
484110	General Freight Trucking, Local	2,420
484220	Specialized Freight (except Used Goods) Trucking, Local	3,955
488490	Other Support Activities for Road Transportation	689
488510	Freight Transportation Arrangement	2,528
Additional NAICS		**38,860**
111421	Nursery and Tree Production	8,246
115115	Farm Labor Contractors and Crew Leaders	7,174
561730	Landscaping Services	12,519
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	3,748

Data source: Oregon Employment Department, QCEW, 2023

Exhibit 77. Difference between Monthly Employment Peak and Troughs, Oregon



Data source: Oregon Employment Department, QCEW, 2014-2023

Exhibit 78. Forest Operations and Management Employment by Workforce Region, 2023

	SUBSECTOR GROUP	
Workforce Region	Forest Operations	Forest Management
Clackamas Area	292	267
East Cascades Area	726	1,178
Eastern Oregon Area	344	546
Lane Area	893	647
Mid-Valley Area	2,283	210
Northwest Oregon Area	941	360
Portland-Metro Area	255	588
Rogue Valley Area	2,399	328
Southwestern Oregon Area	1,601	298
blank	46	1,992
Total	**9,780**	**6,414**

Data source: Oregon Employment Department, QCEW, 2023. Note: Due to confidentiality requirements, some employment is excluded from this exhibit.

Exhibit 79. Share of Forest Operations and Management Employment by Workforce Region, 2023

	SUBSECTOR GROUP	
Workforce Region	Forest Operations	Forest Management
Clackamas Area	3%	4%
East Cascades Area	7%	18%
Eastern Oregon Area	4%	9%
Lane Area	9%	10%
Mid-Valley Area	23%	3%
Northwest Oregon Area	9%	6%
Portland-Metro Area	3%	9%
Rogue Valley Area	25%	5%
Southwestern Oregon Area	16%	5%
No associated region	0%	31%
Total	100%	100%

Data source: Oregon Employment Department, QCEW, 2023

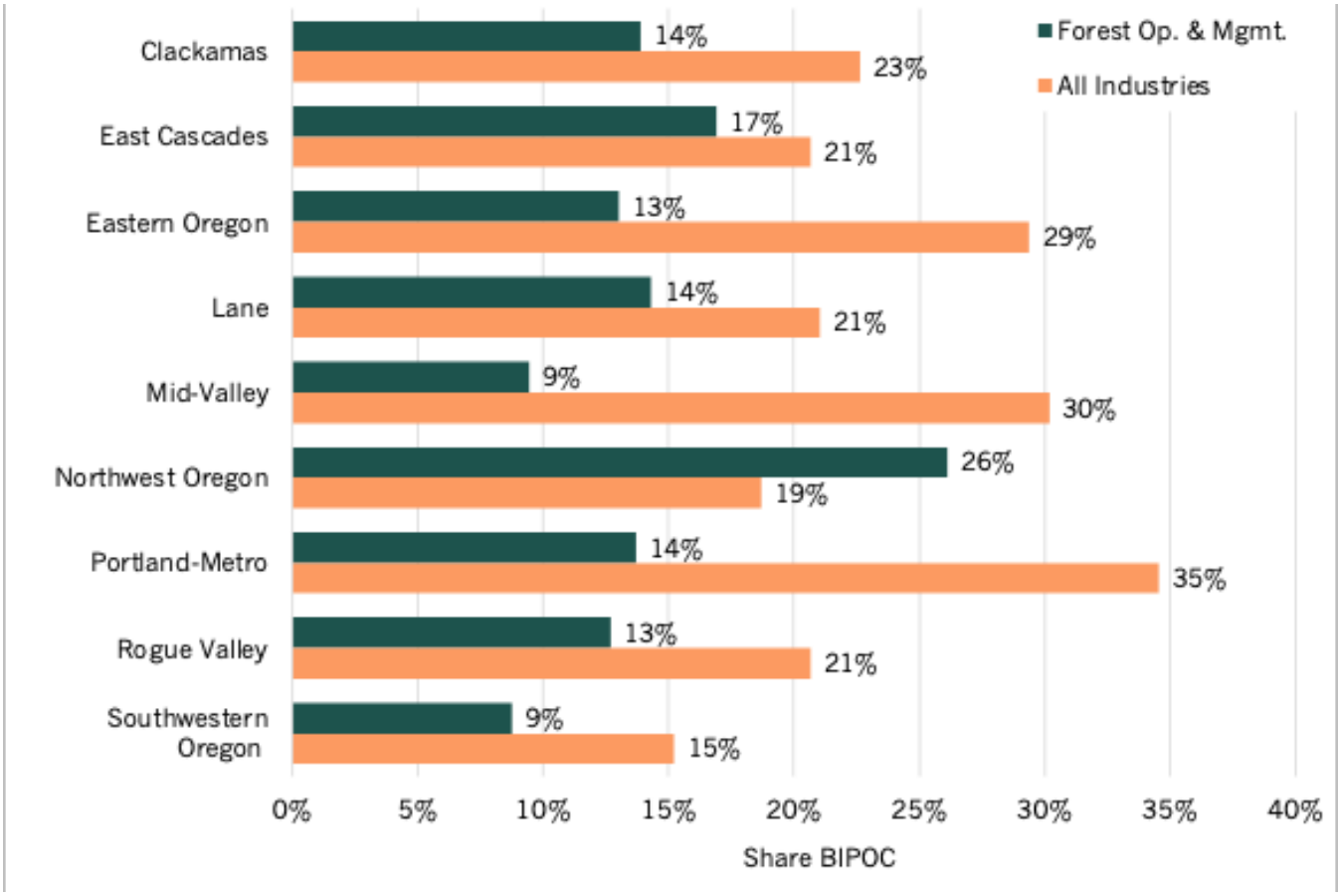
2. Workforce Analysis

Exhibit 80. Focal Occupations' Share of NAICS 113 and 115 Employment, Oregon

OCCUPATION	113 - FORESTRY AND LOGGING	115 - SUPPORT ACTIVITIES FOR AGRICULTURE AND FORESTRY
Logging Equipment Operators	40%	
Heavy and Tractor-Trailer Truck Drivers	17%	2%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	7%	3%
Fallers	7%	
Logging Workers, All Other	4%	
Mobile Heavy Equipment Mechanics, Except Engines	3%	
Foresters	1%	
Sawing Machine Setters, Operators, and Tenders, Wood	1%	
Operating Engineers and Other Construction Equipment Operators	1%	
Industrial Truck and Tractor Operators	0%	1%
Maintenance and Repair Workers, General	0%	1%
Commercial Pilots		1%
Industrial Machinery Mechanics		1%
First-Line Supervisors of Production and Operating Workers	0%	0%
Log Graders and Scalers	0%	
Firefighters		
Material Moving Workers, All Other		
Forest Fire Inspectors and Prevention Specialists		
Total	**83%**	**9%**

Data sources: Oregon Employment Department, Industry-Occupation Matrix, 2023; Bureau of Labor Statistics, Industry-Occupation Matrix, 2023

Exhibit 81. Race/Ethnicity of Workers in Forest Operations and Management, by Workforce Region



Data source: U.S. Census Bureau (2023) American Community Survey, 5-year Estimates

Exhibit 82. Employment in Focal Occupations in Forest Operations and Management, Oregon

SOC CODE	OCCUPATION	113 - FORESTRY AND LOGGING	115 - SUPPORT ACTIVITIES FOR AGRICULTURE AND FORESTRY	SELF & TEMP. EMPLOYMENT	OTHER INDUSTRIES
45-4022	Logging equipment oper.	1,969	-	1,000	324
53-3032	Heavy truck drivers	844	32	1,899	24,363
45-1011	First-line sup. of forestry workers	368	485	231	1,490
45-4021	Fallers	325	-	143	-
19-1032	Foresters	65	176	22	314
45-4029	Other logging workers	181	-	101	52
49-9071	Maintenance/repair workers	1	132	523	17,116
53-7051	Industrial truck oper.	22	97	685	7,621
51-1011	First-line sup. of prod. workers	11	68	308	9,142
51-7041	Sawing machine oper.	34	-	184	2,376
45-4023	Log graders and scalers	21	-	168	366
49-3042	Mobile heavy equipment mech.	18	1	167	2,511
49-9041	Industrial machinery mech.	-	15	163	6,187
53-2012	Commercial pilots	-	14	46	639
47-2073	Operating engineers	5	-	171	4,738
33-2011	Firefighters	-	1	-	3,355
53-7199	Other material moving workers	-	-	45	499
33-2022	Forest fire inspectors	-	-	-	112

Data sources: Oregon Employment Department, Industry-Occupation Matrix, 2023; OEWS, 2023; Bureau of Labor Statistics, Industry-Occupation Matrix, 2023

Exhibit 83. Focal Occupation Characteristics and Demographics

OCC. CODE	OCCUPATION	FOREST OP. & MGMT EMPLOYMENT	OCCUPATIONAL MEDIAN WAGE	% FEMALE	% BIPOC	% 55+	% ASSOCIATE+
45-4022	Logging equipment oper.	1,969	$62,774	3%	17%	24%	11%
53-3032	Heavy truck drivers	876	$62,254	13%	4%	36%	12%
45-1011	First-line sup. of forestry workers	853	$57,866	6%	21%	36%	37%
45-4021	Fallers	325	$93,974	3%	17%	24%	11%
19-1032	Foresters	241	$78,499	24%	18%	19%	100%
45-4029	Other logging workers	181	$58,406	3%	17%	24%	11%
49-9071	Maintenance/repair workers	133	$49,296		47%	7%	25%
53-7051	Industrial truck oper.	119	$50,419		2%		
51-1011	First-line sup. of prod. workers	79	$65,645				
51-7041	Sawing machine oper.	34	$49,962				
45-4023	Log graders and scalers	21	$61,152	3%	17%	24%	11%
49-3042	Mobile heavy equipment mech.	20	$68,266			13%	13%
49-9041	Industrial machinery mech.	15	$69,493				
53-2012	Commercial pilots	14	$94,600				
47-2073	Operating engineers	5	$64,938		34%	23%	8%
33-2011	Firefighters	1	$73,008	21%	24%	11%	47%
53-7199	Other material moving workers	.	$53,789		52%	39%	
33-2022	Forest fire inspectors	.				64%	100%

Note: Occupation codes may not directly match occupation codes used in the occupation tables due to differences in data availability from the US Census and OED. Data sources: Oregon Employment Department, Industry-Occupation Matrix, 2023; OED, Oregon Wage Information, 2024; Bureau of Labor Statistics, Industry-Occupation Matrix, 2023. ACS PUMS 5-year Estimates, 2023.

3. Programs and Pathways Analysis

Exhibit 84. Apprenticeship Durations for Programs Highlighted in Chapter 3

COHORT START YEAR	AVERAGE COHORT DURATION (YEARS)		
	Completed	Cancelled	Active
2014	3.9	2.4	-
2015	3.7	1.4	-
2016	4.0	1.3	-
2017	5.0	1.4	-
2018	4.1	1.5	-
2019	3.8	1.5	-

Data source: USDOL, 2024

Exhibit 85. Broad Program List

01.0000-Agriculture, General	47.0302-Heavy Equipment Maintenance Technology/Technician
01.0101-Agricultural Business and Management, General	47.0303-Industrial Mechanics and Maintenance Technology/Technician
01.0304-Crop Production	48.0503-Machine Shop Technology/Assistant
01.1102-Agronomy and Crop Science	52.0201-Business Administration and Management, General
03.0510-Forest Resources Production and Management	52.0205-Operations Management and Supervision
14.3501-Industrial Engineering	15.1501-Engineering/Industrial Management
15.1301-Drafting and Design Technology/Technician, General	31.0101-Parks, Recreation, and Leisure Studies
15.1302-CAD/CADD Drafting and/or Design Technology/Technician	52.0203-Logistics, Materials, and Supply Chain Management
43.0201-Fire Prevention and Safety Technology/Technician	01.1101-Plant Sciences, General
43.0203-Fire Science/Fire-fighting	49.0205-Truck and Bus Driver/Commercial Vehicle Operator and Instructor
45.0701-Geography	15.1307-3-D Modeling and Design Technology/Technician
45.0702-Geographic Information Science and Cartography	01.0205-Agricultural Mechanics and Equipment/Machine Technology/Technician

Exhibit 86. Core Completions by Program Type, 2008-2023

PROGRAM TITLE	2008	2013	2018	2023
Natural Resources/Environmental				
03.0104-Environmental Science	137	225	255	294
03.0103-Environmental Studies	94	-	229	193
03.0101-Natural Resources/Conservation, General	10	-	43	22
03.0201-Environmental/Natural Resources Management and Policy, General	67	105	143	195
03.0301-Fishing and Fisheries Sciences and Management	71	110	109	136
Forestry				
03.0506-Forest Management/Forest Resources Management	15	27	21	20
03.0599-Forestry, Other	-	4	1	20
03.0511-Forest Technology/Technician	17	27	23	14
03.0508-Urban Forestry	-	14	10	7
03.0501-Forestry, General	11	14	22	1
03.0502-Forest Sciences and Biology	15	-	4	-
03.0601-Wildlife, Fish and Wildlands Science and Management	12	5	25	103
Engineering				
14.3401-Forest Engineering	18	27	39	57
15.1102-Surveying Technology/Surveying	11	-	9	14
Firefighting				
43.0203-Fire Science/Fire-fighting*	4	9	3	6
43.0206-Wildland/Forest Firefighting and Investigation	-	-	2	-
Total	**482**	**567**	**938**	**1,082**

Note: *Only relevant for Clackamas CC. Data source: NCES IPEDS, Oregon, 2008-2023.

Exhibit 87. Average Annual Core Completions by Program Category (2019-2023)

	CERT.	ASSOCIATE	BACHELOR'S	MASTER'S	DOCTORAL	TOTAL
03.0101-Natural Resources/Conservation, General	15	10	-	-	-	**25**
03.0103-Environmental Studies	2	1	164	18	4	**188**
03.0104-Environmental Science	1	1	246	27	9	**285**
03.0201-Environmental/Natural Resources Management and Policy, General	6	1	135	42	-	**184**
03.0301-Fishing and Fisheries Sciences and Management	19	11	94	7	4	**135**
03.0501-Forestry, General	-	-	-	2	2	**4**
03.0502-Forest Sciences and Biology	-	1	-	-	0	**1**
03.0506-Forest Management/Forest Resources Management	-	1	-	15	4	**19**
03.0511-Forest Technology/Technician	2	11	-	-	-	**13**
03.0601-Wildlife, Fish and Wildlands Science and Management	46	8	5	7	4	**70**
14.3401-Forest Engineering	-	-	49	-	-	**49**
15.1102-Surveying Technology/Surveying	3	-	9	-	-	**11**
43.0206-Wildland/Forest Firefighting and Investigation	-	1	-	-	-	**1**
03.0599-Forestry, Other	4	-	-	6	3	**14**
03.0508-Urban Forestry	10	-	-	-	-	**10**
43.0203-Fire Science/Fire-fighting*	2	0	-	-	-	**3**
Total	**109**	**47**	**701**	**123**	**31**	**1,011**

Data source: NCES IPEDS, Oregon, 2019-2023

Exhibit 88. Average Annual Core Completions by Institution (2019-2023)

Institution	Cert.	Associate	Bachelor's	Master's	Doctoral	Total
Community Colleges						
Central Oregon CC	2	4	-	-	-	**7**
Clackamas CC	5	0	-	-	-	**5**
Klamath CC	-	0	-	-	-	**0**
Lane CC	-	0	-	-	-	**0**
Linn-Benton CC	-	2	-	-	-	**2**
Mt Hood CC	13	26	-	-	-	**38**
Oregon Coast CC	3	3	-	-	-	**6**
Southwestern Oregon CC	1	2	-	-	-	**3**
Treasure Valley CC	-	8	-	-	-	**8**
Sub-Total Community Colleges						**70**
Four-year Institutions						
Lewis & Clark College	-	-	19	-	-	**19**
Linfield University	-	-	6	-	-	**6**
Multnomah University	-	-	0	-	-	**0**
Oregon Health & Science University	-	-	-	1	0	**1**
Oregon Institute of Technology	-	-	16	-	-	**16**
Oregon State University	83	-	381	93	22	**579**
Pacific University	-	-	14	-	-	**14**
Portland State University	-	-	57	14	6	**77**
Reed College	-	-	13	-	-	**13**
Southern Oregon University	3	-	26	11	-	**39**
University of Oregon	-	-	113	5	3	**121**
University of Portland	-	-	26	-	-	**26**
Willamette University	-	-	28	-	-	**28**
Sub-Total Four-year						**941**
Total	**109**	**47**	**701**	**123**	**31**	**1,011**

Data source: NCES IPEDS, Oregon, 2019-2023

Exhibit 89. BIPOC Completers in Core Programs, 2012-2024

		SHARE BIPOC			
CIP	Title	Community College	Undergraduate	Graduate	Overall
3.0103	Environmental Studies	15%	26%	29%	27%
3.0601	Wildlife, Fish and Wildlands Science and Management	17%	26%	23%	20%
3.0104	Environmental Science	36%	25%	28%	26%
3.0301	Fishing and Fisheries Sciences and Management	22%	20%	28%	21%
3.0201	Environmental/Natural Resources Management and Policy, General	50%	20%	26%	21%
14.3401	Forest Engineering		16%	29%	16%
15.1102	Surveying Technology/Surveying	19%	13%		13%
3.0506	Forest Management/Forest Resources Management	50%	13%	24%	16%
3.0101	Natural Resources/Conservation, General	15%			15%
3.0501	Forestry, General	25%		35%	29%
3.0502	Forest Sciences and Biology	10%		32%	29%
3.0508	Urban Forestry	28%			28%
3.0511	Forest Technology/Technician	8%			8%
3.0599	Forestry, Other	32%		26%	27%
43.0206	Wildland/Forest Firefighting and Investigation	46%			46%
All Forestry Programs		**17%**	**23%**	**27%**	**23%**

Note: Blank rows indicate no BIPOC completions within a specific CIP in the time period. Data source: Oregon Higher Education Coordinating Commission.

Exhibit 90. Post-Completion Employment Outcomes (5-year) for Core Program Completers by Program Group and Institution Type

Degree Level	Forest Op. & Mgmt.	Forest Op. & Mgmt. Adjacent	Other Industries
Community College			
Engineering	0%	5%	52%
Firefighting	9%	9%	45%
Forestry	10%	6%	55%
Natural Resources/Environmental	0%	27%	39%
University			
Engineering	21%	7%	41%
Firefighting			
Forestry	11%	19%	13%
Natural Resources/Environmental	2%	13%	37%

Data source: Oregon Higher Education Coordinating Commission.

Appendix 2: Forestry Workforce Survey Analysis

As part of a broader forestry sector workforce study commissioned by the Oregon Higher Education Coordinating Commission, ECOnorthwest conducted a survey to assess current workforce characteristics and challenges within Oregon's forestry sector, with a focus on businesses involved in forest operations and management.

To capture perspectives from across the diverse business operations within the sector the survey was distributed to more than 1,000 forestry businesses via forestry organizations' digital newsletters and e-mail lists.[114] Because forestry businesses often work across industries, or may belong to more than one forestry organization, the estimated pool of potential respondents likely counts some businesses more than once.

Survey windows varied in length by distribution channel, but all surveys were initially distributed between the weeks of March 24, 2025, and April 4, 2025. The survey closed on April 28, 2025, resulting in 109 responses. Three respondents selected forest product manufacturing as their sole work type and were thus excluded from the sample.[115] The remaining 106 responses make up approximately 9 percent of the estimated pool of potential respondents (Exhibit 91). Most respondents (91) came from forestry-organization member-specific e-mails that included the online link to the survey.

The survey was structured to ask a different but related set of questions of self-employed individuals and employers because of differences in how the two types of entities operate. Most of the 106 respondents identified as employers, as shown in Exhibit 92. Respondents who selected "Employer," "Unknown," or "Skipped" were directed to the employer-specific survey questions. Those who identified as self-employed were shown a similar set of questions, modified to reflect a self-employed context.

Among employer respondents, the majority held executive roles. The most common position was President, Chief Executive Officer, or Owner (33 responses) followed by Operations Manager (22 responses) and Vice President, Chief Operating Officer, or Chief Financial Officer (11 responses). Fewer respondents identified as Human Resources Directors or Managers (8 responses) and Supervisors (6 responses), as seen in Exhibit 93. Written-in "Other" responses were recategorized based on available answer options, where

[114] Organizations that helped distribute the survey: Association of Consulting Foresters (ACF), American Forest Resource Council (AFRC), Associated Oregon Loggers (AOL), Business Oregon COBID, Forest Resources Association (FRA), and Oregon Forest Industries Council (OFIC). In addition, the Grand Ronde Tribal Natural Resources Department completed the survey.

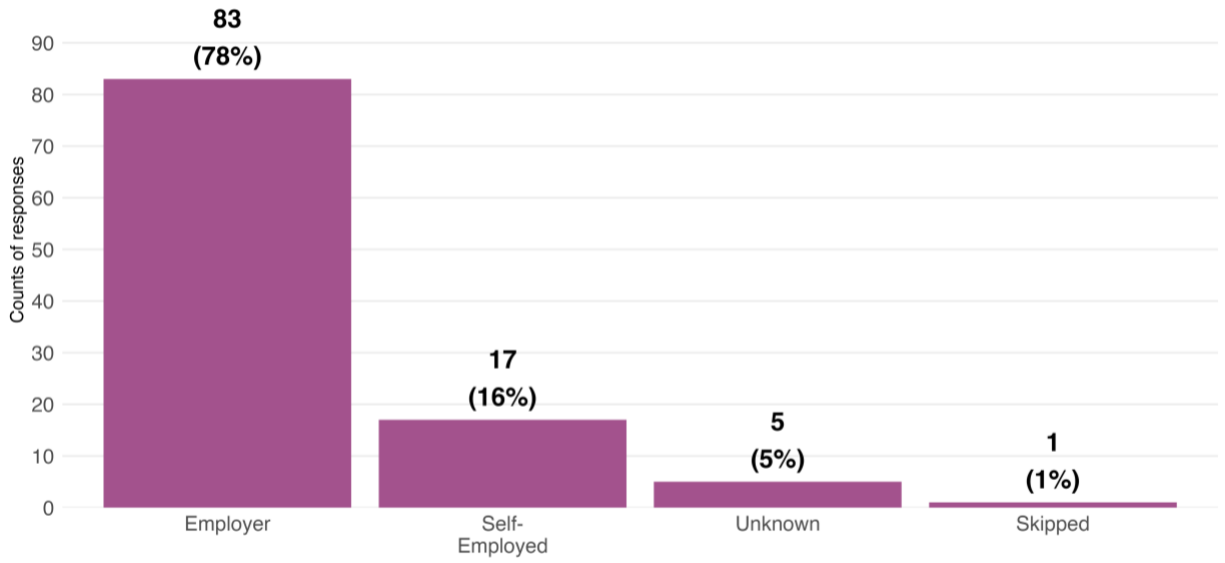
[115] Due to a change in the focus of the broader study directed by the Forestry Workforce Steering Committee, respondents who identified as forestry manufacturing businesses only were excluded from the analysis presented in this document. No respondent identified as working in energy production only or in manufacturing and energy production only.

applicable.[116] The distribution of respondent roles suggests that the survey captured insights primarily from individuals in senior leadership positions within their organizations, although not every employer necessarily has an individual employee at every position identified in the chart.

Exhibit 91. Responses by survey distribution method

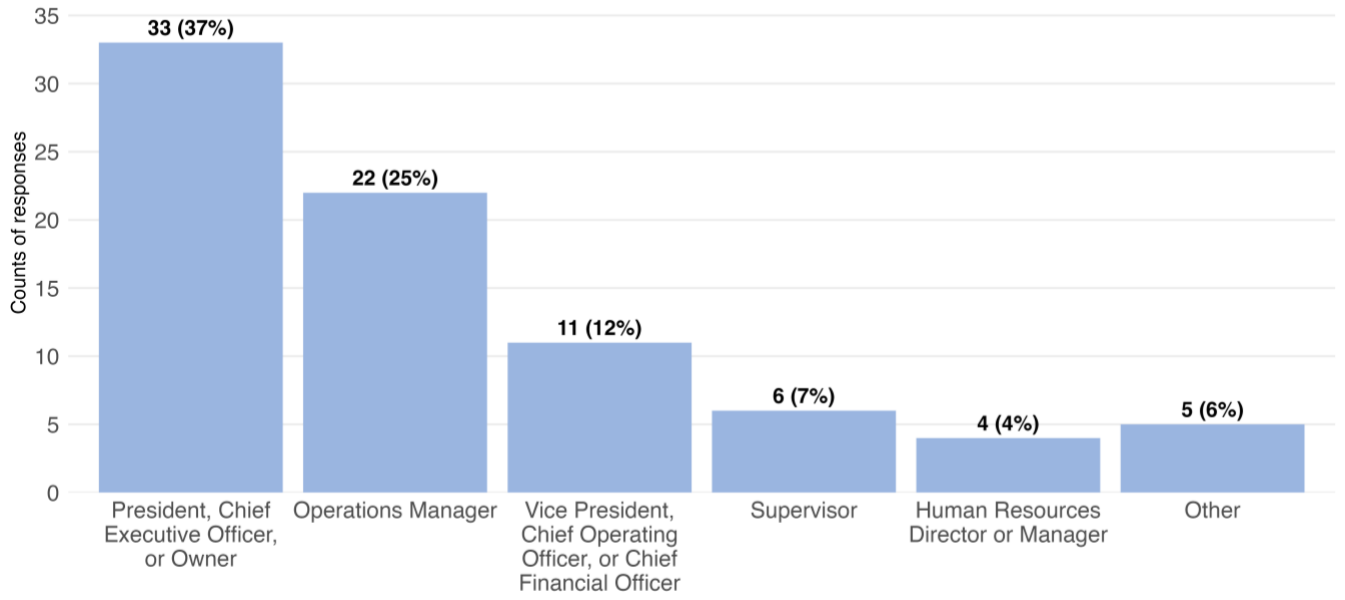
Distribution Method	Number of Responses	Share of Total Responses
Associated Oregon Loggers (AOL) member newsletter	57	54%
American Forest Resource Council (AFRC) member newsletter	18	17%
Oregon Forest Industries Council (OFIC) member e-mail	16	15%
All other methods	15	14%
Total	**106**	**100%**

Exhibit 92. Survey responses by business type



[116] Two respondents reported roles related to forester procurement or procurement management and were recategorized into "Operations Manager."

Exhibit 93. Distribution of employer respondent roles[117]



Both employers and self-employed individuals were asked whether their businesses were **COBID-certified** (Certification Office for Business Inclusion and Diversity) to provide information about owner diversity. A small portion of all survey respondents (7 responses) reported having COBID certification.

Forestry Business Characteristics

Survey respondents were asked to identify the type(s) of work their businesses conduct. Options included a wide array of field-based and logistical activities that support the harvesting, transportation, and management of forest resources. Responses show that many businesses are not confined to a single function but are actively engaged across operational domains such as contracting, trucking, and technical services. This versatility suggests that workforce capacity and business models in forestry operations are structured to meet diverse and interconnected demands, from on-the-ground forest work to transportation and planning.

Areas of Work

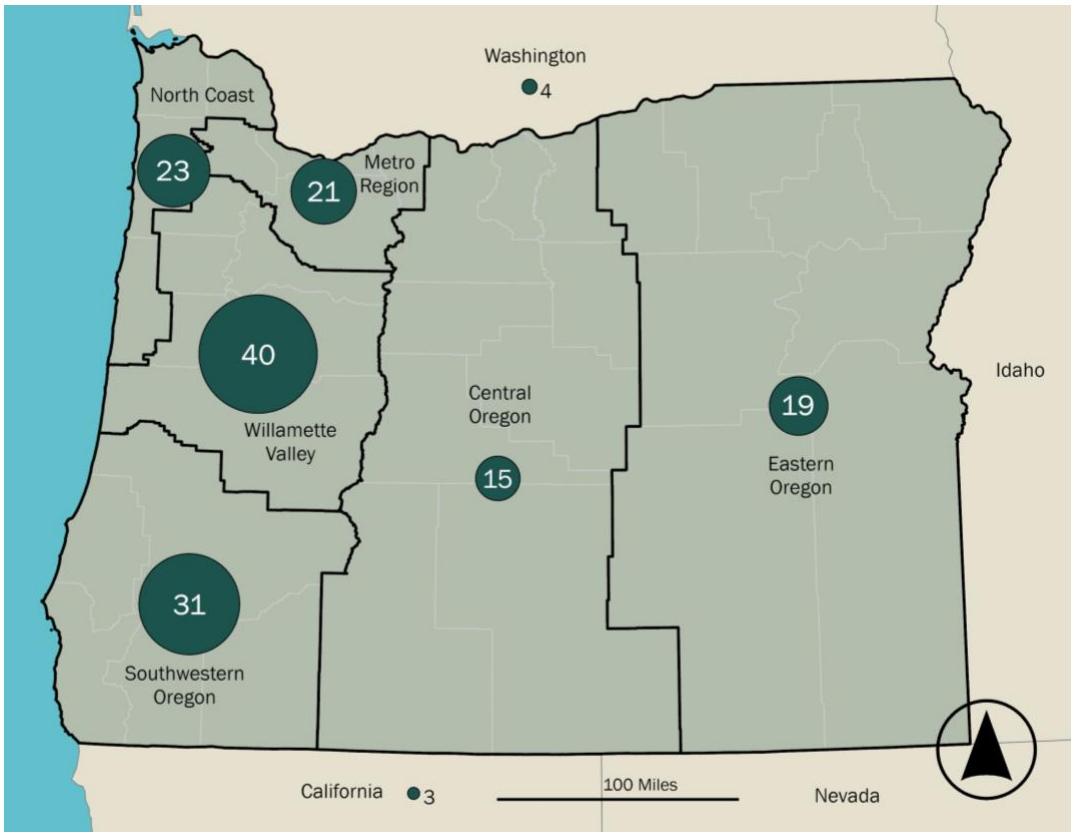
Survey responses underscore a diverse and regionally distributed landscape of forestry-related work across Oregon. Of the 106 respondents, 73 reported that their businesses primarily operate in Oregon and 10 reported that they did not (the latter nonetheless

[117] Seven respondents wrote-in "Other" business roles. Of those seven, two wrote "procurement manager" and "forester procurement," both were recategorized to "Operations Manager." The remaining write-in responses consisted of "admin," "support," "bookkeeper," "sales," and "consulting forester," and were left in the "Other" category.

reported operating in Oregon some of the time). Exhibit 94 shows the primary location of business operation among respondents.

The Willamette Valley was the most frequently identified work area (40 responses), followed by Southwestern Oregon (31 responses) and the North Coast region (23 responses). The Metro Region, Eastern Oregon, and Central Oregon also had meaningful representation. Relatively higher response in the Willamette Valley and Southwestern Oregon aligns with established forestry activity in those areas. California and Washington show a few responses each.[118]

Exhibit 94. Areas of work by number of responses[119]



Types of Work

On average, respondents selected at least two different industries that best described the type of work their business conducts. Exhibit 95 illustrates the number of times respondents reported working in a forestry-related industry. Over half of respondents (60) reported working in forest operations/contracting, 51 respondents reported working in the

[118] Twenty-three respondents skipped the question, "Where in Oregon does your business usually operate? Select all that apply. (If your business operates only or also in locations outside of Oregon, please list these under 'Other.'" Respondents who wrote in "all across Oregon" or simply "Oregon" (two respondents) to the question were recategorized as having operations in each of the Oregon regions. One respondent wrote that most of their business operations were in the western U.S.; their response was recorded as operating in each Oregon region, as well as California and Idaho. One respondent listed Pennsylvania as an area of work.

[119] Counts include areas that were selected as the only area of work or in combination with other areas.

technical or other contracted services, 47 respondents said they worked in transportation/trucking, and 46 respondents said they worked in forest management and forestry (forest landowners). Eighteen respondents reported work in forest products manufacturing in combination with work in other industries.

Exhibit 95. Respondents' industries, by type-of-work selection

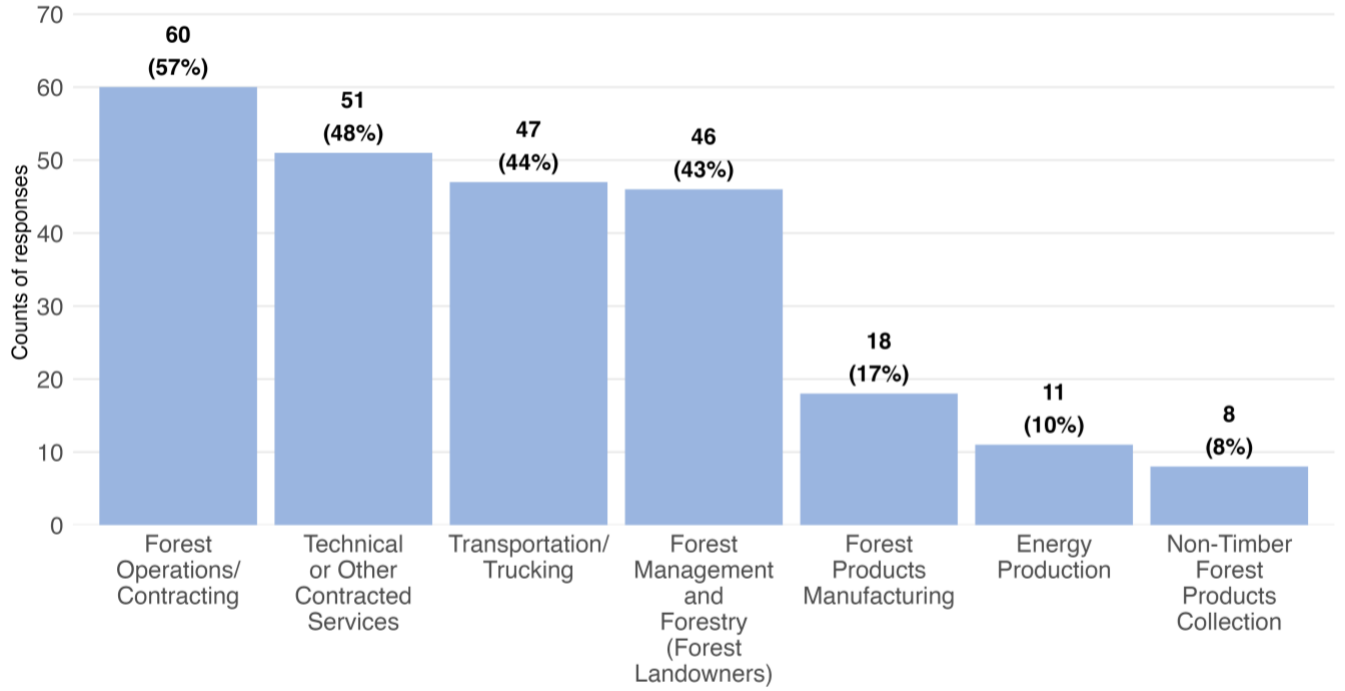


Exhibit 96 shows the detail of responses identifying multiple types of work. Of the 78 responses across all industries, 12 respondents indicated that they worked in both transportation/trucking and forest operations/contracting, 10 respondents said they worked in both forestry management and forestry (forest landowners) and technical or other contracted services, and 9 respondents selected forest management and forestry (forest landowners), forest operations contracting, and technical or other contracted services. Three respondents selected all seven work types.

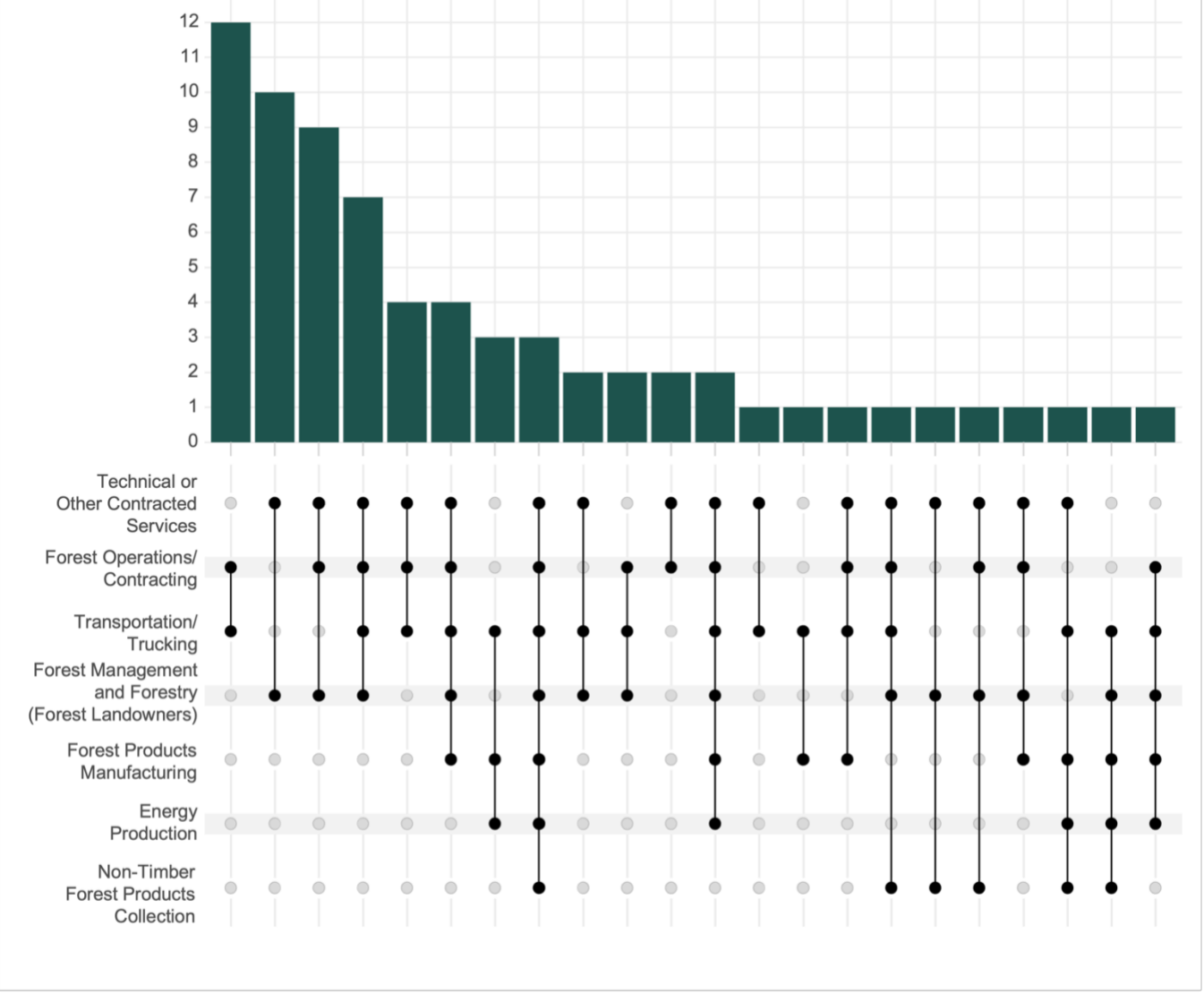
Within each industry, respondents were asked to select specific types of work. On average, respondents selected 7 to 8 types. Of the 60 respondents who work in forest operations/contracting, 39 selected logging; 34 selected road construction, reconstruction and maintenance; 29 selected falling; and 29 selected firefighting. The appendix displays full response counts for each type of work.

The 29 respondents who work in firefighting selected, on average, more work types than did those who do not work in firefighting (11 types compared to 8, respectively). Other work types for the 29 firefighting respondents included fuels reduction (21 responses), road construction (19 responses), logging (18 responses), and falling (15 responses). Outside of forest operations/contracting, firefighting respondents frequently selected lowboy

equipment transportation (within trucking/transportation) and forest planning (within forest management and forestry) and, with 16 responses and 15 responses, respectively.

Moreover, the cross-industry overlap indicates strong interdependencies across different parts of the forestry sector (as seen in Exhibit 96). For instance, those working in transportation/trucking are often also part of logging and fuels reduction crews, while technical service providers may also be involved in planning and restoration. The survey responses reinforce that the forestry workforce cannot be easily segmented into siloed categories. The numerous combinations of skills and work-types suggested by respondents, especially among respondents working in areas like firefighting or road maintenance, suggests a dynamic and adaptive labor force.

Exhibit 96. Industry cross-over, by combination of industry responses



Note: Five respondents that selected only one industry are not included in this chart.

Self-Employed Businesses

Size and Demographics

Self-employed businesses are typically small and often family-run. Survey responses from these businesses can offer insights into how they support the broader sector in ways not easily identifiable from more-traditional data sources, such as employer wage records.

As shown in Exhibit 97, most self-employed survey respondents were concentrated in technical or other contracted services (n=11) and forest management and forestry (n=10), with smaller but notable representation in forest operations/contracting (n=6) and transportation/trucking (n=3) (respondents could select multiple industries).

Forest operations/contracting showed the most reliance on additional labor, with all but one respondent reporting the involvement of two or more partners or unpaid family members. Roughly half of forest management and forestry (forest landowners) and technical or other contracted services respondents reported working with two or more partners or family members. These findings reinforce the diverse nature of self-employed forestry businesses and suggest that behind many small enterprises is a family- or partner-supported workforce operating in flexible, multi-skilled roles.[120]

Exhibit 98 displays the demographics of self-employed respondents. Most respondents (10) are 25 to 54 years old; the remainder are 65 or older and may be business owners, longtime operators, and/or nearing retirement. Nine respondents identified as men and five as women; two preferred not to say. Self-employed respondents predominantly identified as white (12 respondents) and not Hispanic or Latino (14 respondents), with an additional two respondents preferring not to disclose their ethnicity.[121]

[120] Elsewhere in this study, the average number of workers across respondents, 1.56, is multiplied by the number of non-employer establishments in logging and support activities for forestry to estimate workforce size for those establishments.

[121] One respondent skipped the question regarding ethnicity.

Exhibit 97. Number of workers (including the respondent) in self-employed businesses during highest work period over the past 12 months, by industry

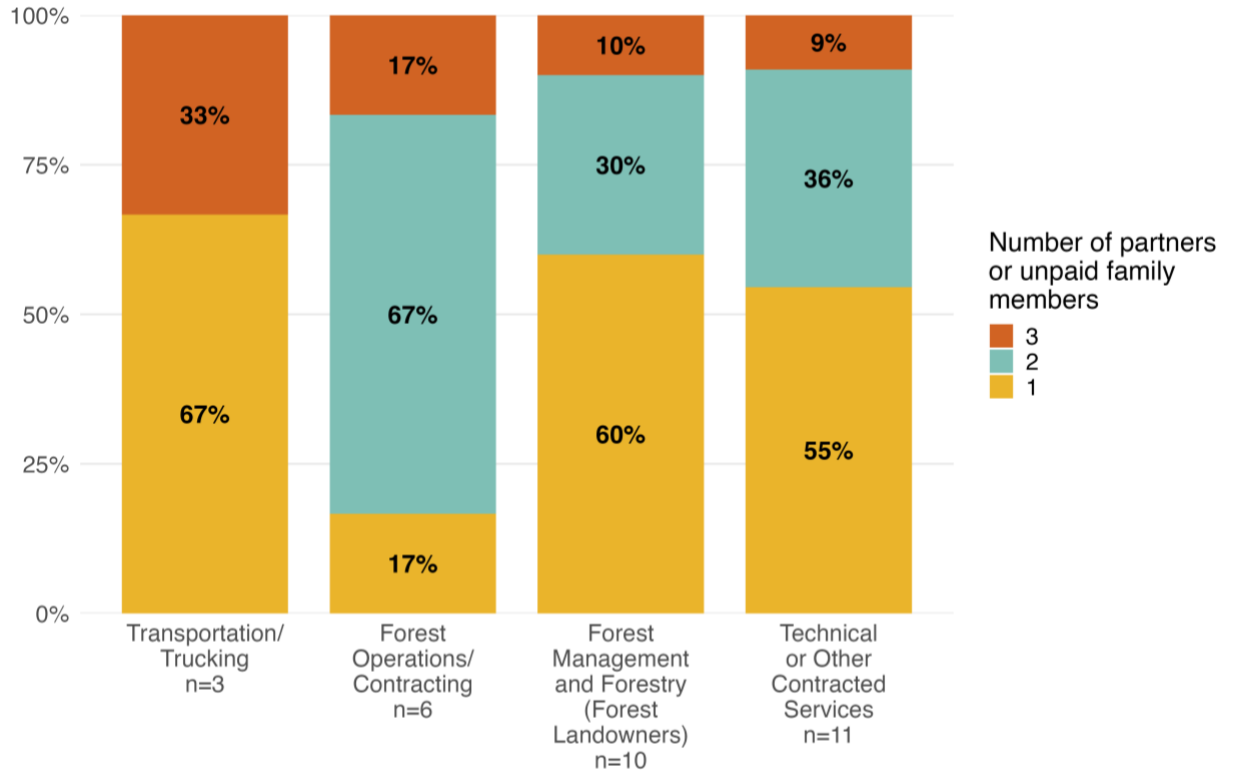
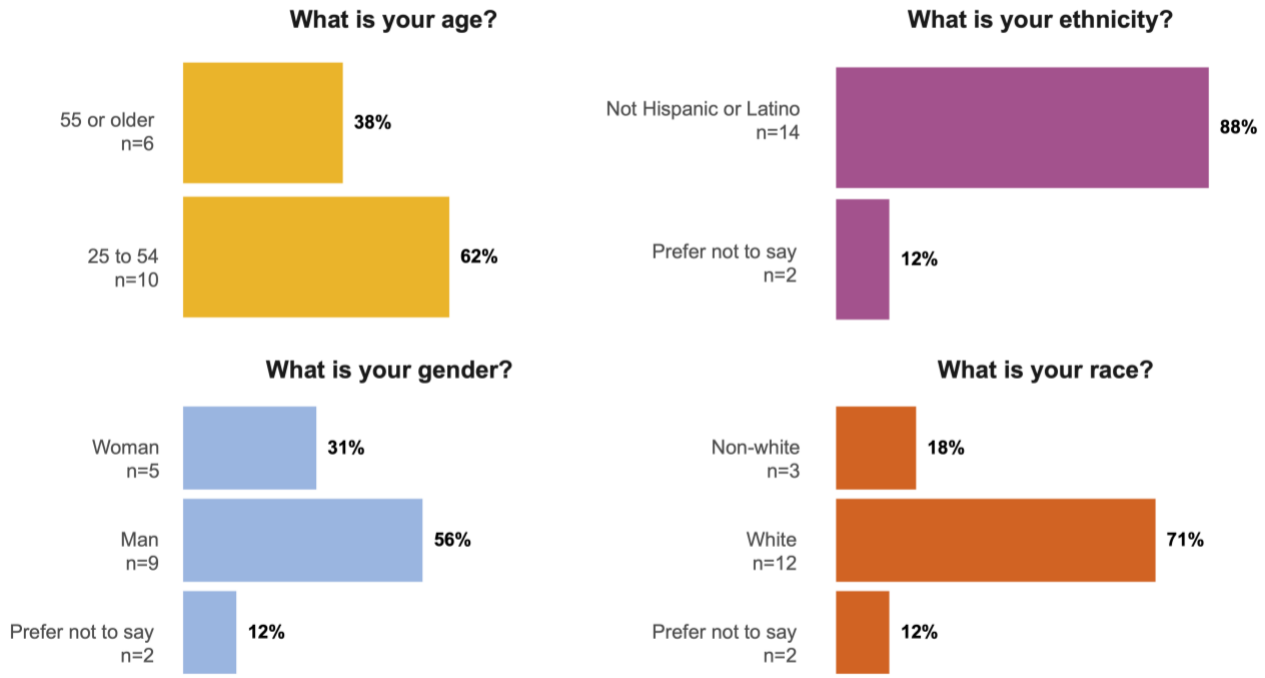


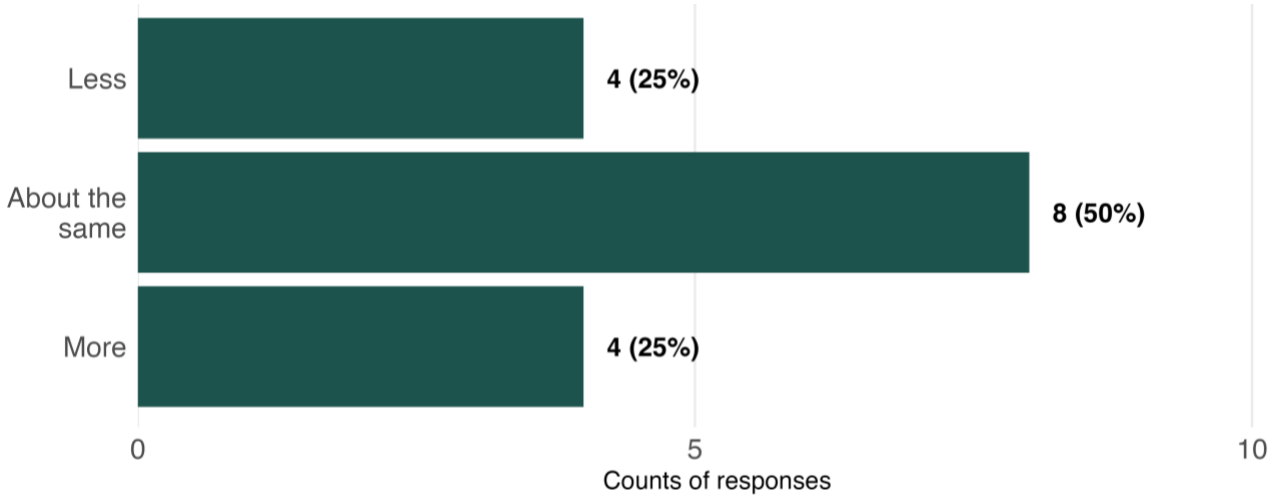
Exhibit 98. Self-employed respondent demographics, as share of each question's responses



Amount of Work

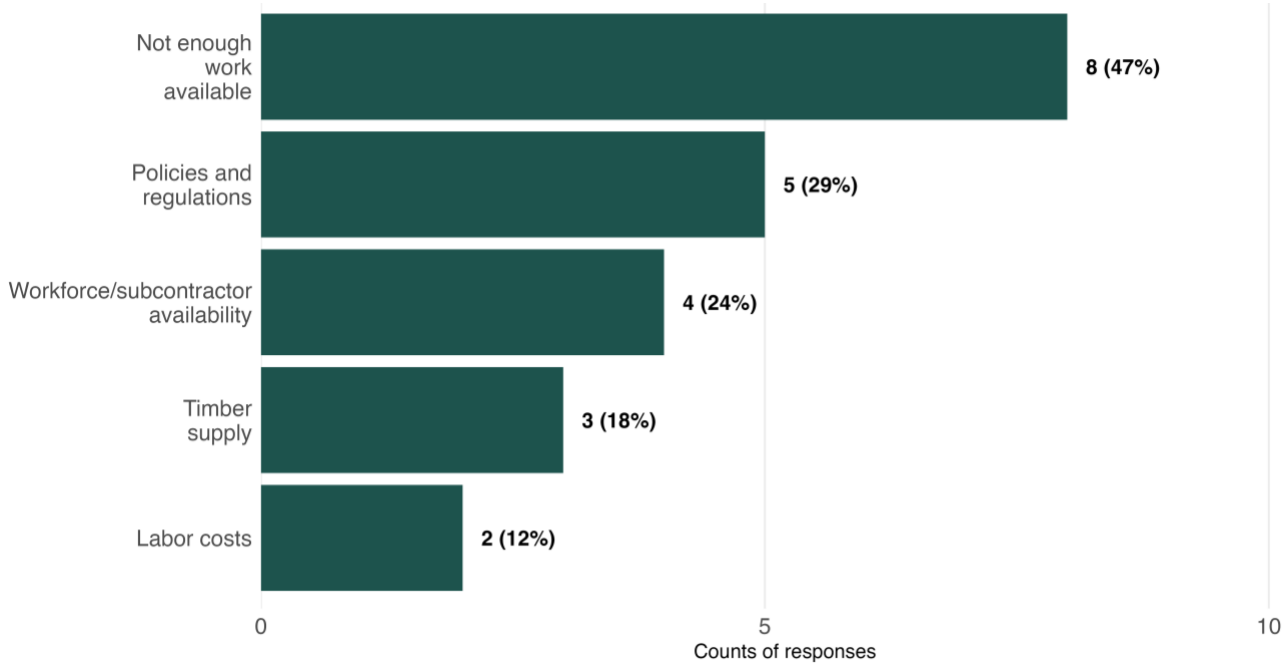
When asked if they worked more, less, or about the same amount as they wanted over the past 12 months, eight self-employed respondents indicated they worked about the amount they wanted (Exhibit 99). Four worked more and four worked less than they wanted.

Exhibit 99. Self-employed respondents' actual level of work compared to desired level of work over the past 12 months



When asked about the challenges to maintaining their desired level of work, self-employed respondents commonly identified several themes (Exhibit 100). The most frequently cited issue was "not enough work available," mentioned by eight respondents. Policies and regulations were the second most frequently reported barrier, cited by five respondents. Respondents also indicated workforce/subcontractor availability, timber supply, and labor costs as challenges.

Exhibit 100. Self-employed respondents' top challenges to maintaining the desired amount of work

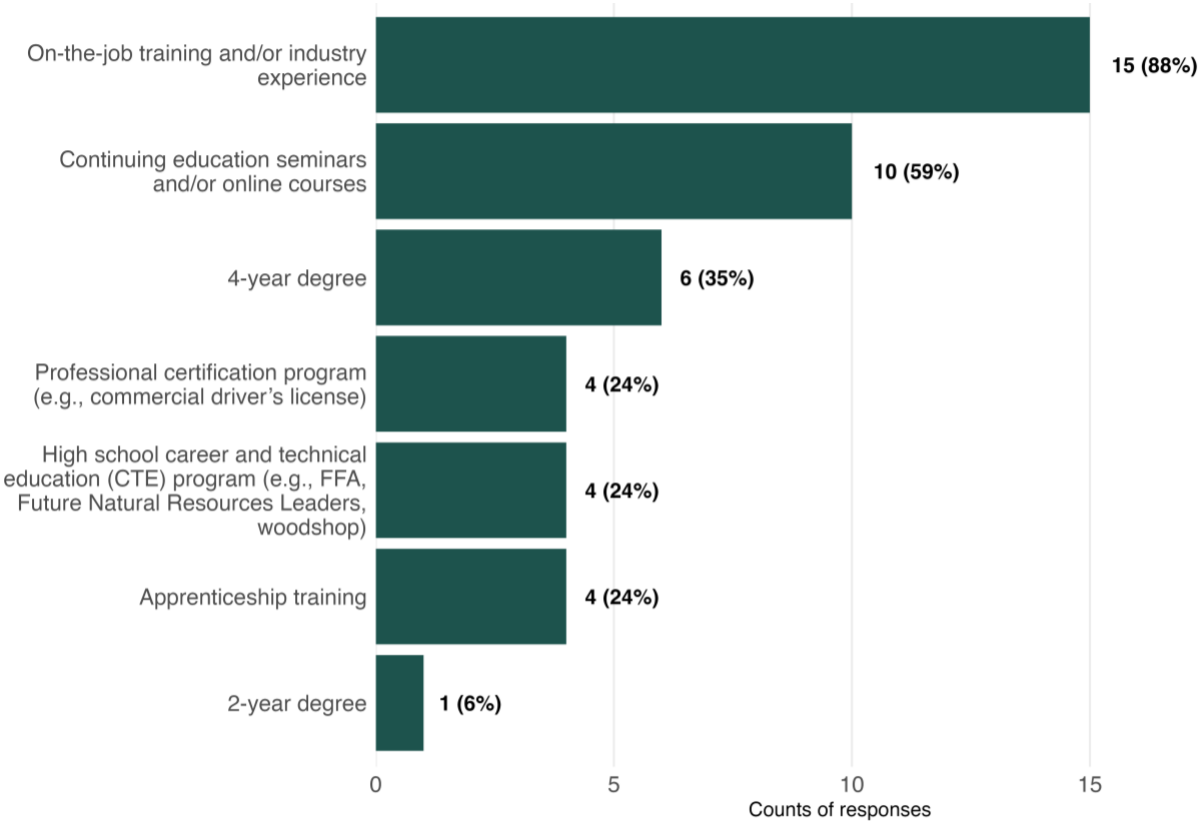


Training and Education

Self-employed respondents also answered questions about the types of training or education they found most useful as preparation for forestry-related work. As shown in Exhibit 101, nearly all self-employed respondents (15) indicated that on-the-job training and/or industry experience is crucial to their line of work. This highlights the value to these businesses of practical, hands-on learning, particularly in industries where formal educational pathways may be limited. For many small-scale or independent forestry respondents, direct experience in the field can be an effective and accessible method of building necessary skills. The second-most cited source of useful training was continuing education seminars and/or online courses (10 respondents).

Six respondents selected four-year degree programs, suggesting the relevance of university-level education for work in some of the self-employed segment. A smaller share selected professional certification programs, CTE programs, and apprenticeship training.

Exhibit 101. Most useful types of training or education received or obtained by self-employed respondents

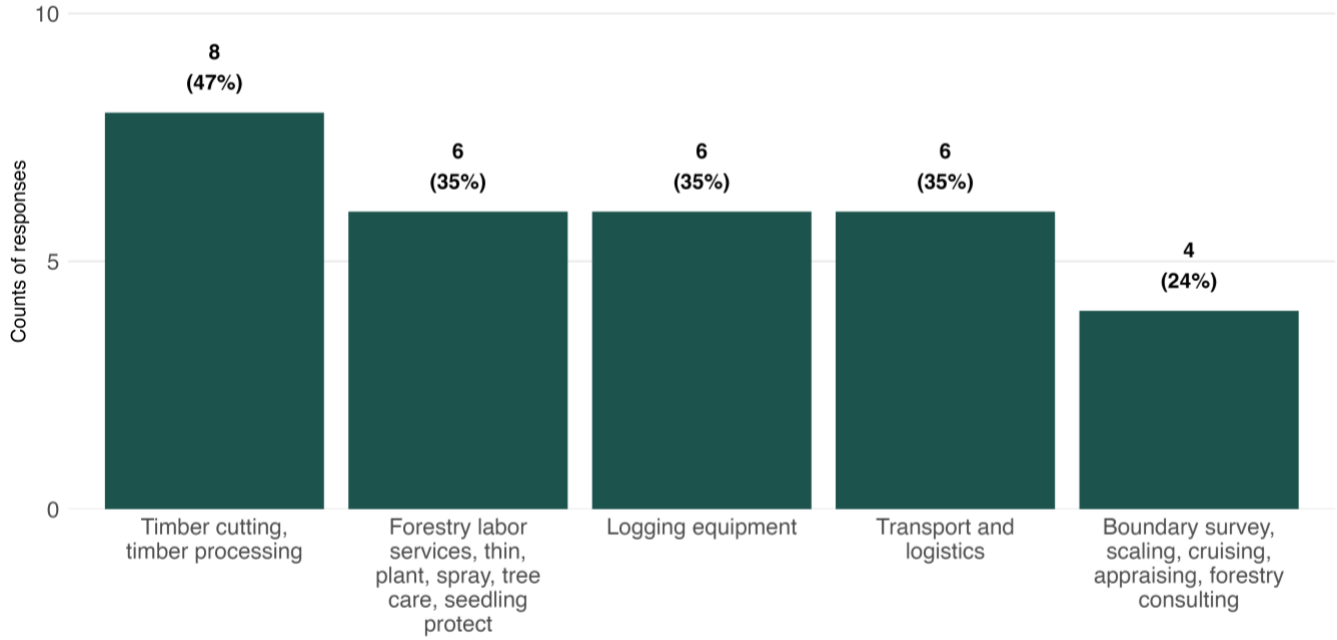


Self-employed individuals also rely on contractors and support services to conduct business. Exhibit 102 highlights the top forestry-related services used by respondents, with timber cutting and timber processing the most frequently cited (by 8 respondents).

The next most cited options were forestry labor services, including thinning, planting, spraying, tree care, and seedling protection; logging equipment; and transport and logistics, each with 6 responses. These categories reflect core operational functions integral to the forest management lifecycle. The selection of these services may suggest that self-employed businesses in this space adopt flexible models where labor and equipment are sourced externally, allowing them to scale operations during peak periods or manage specialized tasks without the burden of maintaining full-time staff or expensive machinery.

Finally, four respondents selected boundary survey, scaling, cruising, appraising, and forestry consulting. These professional or administrative services may be needed intermittently, such as for land assessments, compliance documentation, or technical planning. Their inclusion in the top five underscores their importance in complementing field operations.

Exhibit 102. Top contractors and/or support services used regularly by self-employed respondents



Employers

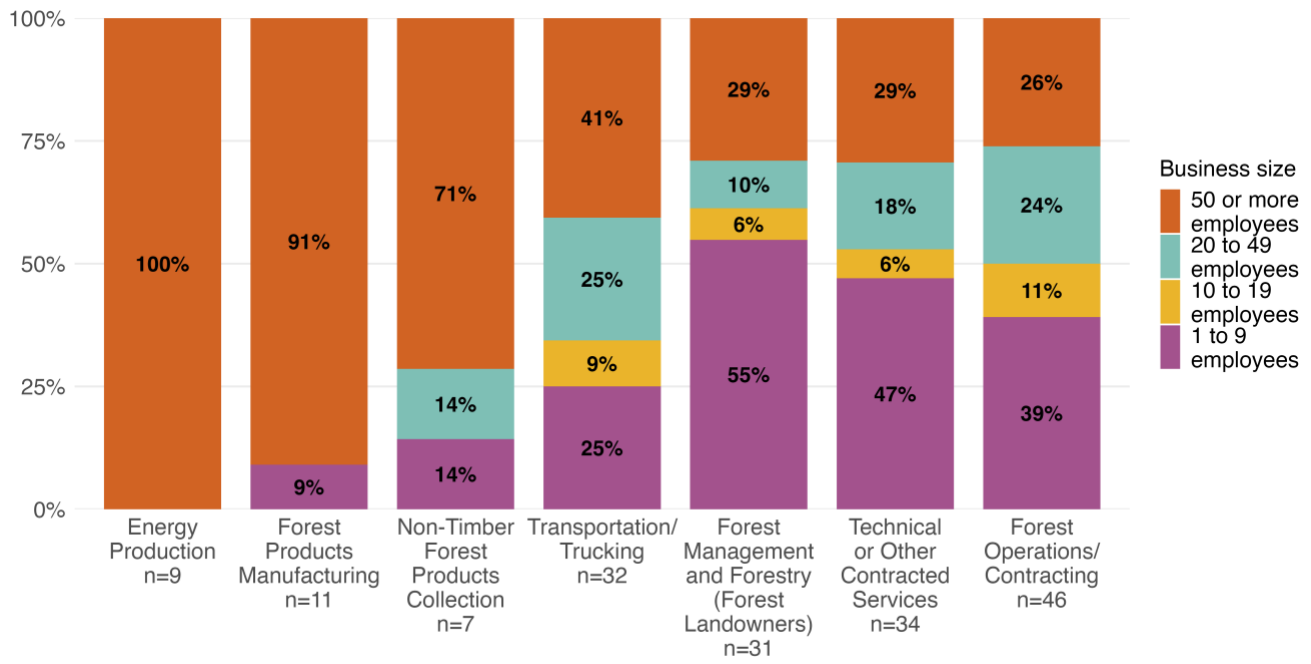
Size and Demographics

Respondents were asked to provide an estimated count of employees during high and low employment periods during the past 12 months. Among the 89 respondents who completed the employer branch of the survey, the median number of employees was 29.[122] Twenty-seven respondents reported 50 or more employees during the high employment period, another 27 said 1–9 employees, 13 said 20–49 employees, and 8 said 10–19 employees.

Exhibit 103 displays the distribution of high-season employment by industry (some businesses fall in multiple industries). Notably, industries such as **forest products manufacturing** and **non-timber forest products collection** are dominated by larger firms. Comparatively, forest management and forestry (forest landowners), technical or other contracted services, and forest operations/contracting show a larger share of smaller firms; over half of the respondents in each industry reported having fewer than 20 employees.

[122] 83 respondents identified as employers, 6 were unknown and 14 skipped the relevant questions.

Exhibit 103. Business size during high employment periods, by industry[123]



Employer respondents were also asked about their businesses' workforce demographics. Respondents from larger businesses generally reported a higher percentage of non-white employees, with firms employing 50 or more people averaging 31 percent non-white staff, compared to 17 percent among businesses with 1–9 employees (Exhibit 104).[124] Across all employer respondents, non-white workers make up 30 percent of the workforce.

Larger businesses also typically reported higher representation of women among their workforces, with firms of 50 or more employees averaging 23 percent women compared to 12 to 14 percent among smaller businesses (Exhibit 105). Across all respondents, women workers make up 23 percent of the workforce.[125]

[123] Respondents who did not provide an estimate of their business size during high employment counts were removed from the calculations used to create Exhibit 104.

[124] Twenty-three respondents reported having no non-white employees.

[125] Twelve respondents reported having no women employees.

Exhibit 104. Non-white employees as a share of total employees, by business size[126]

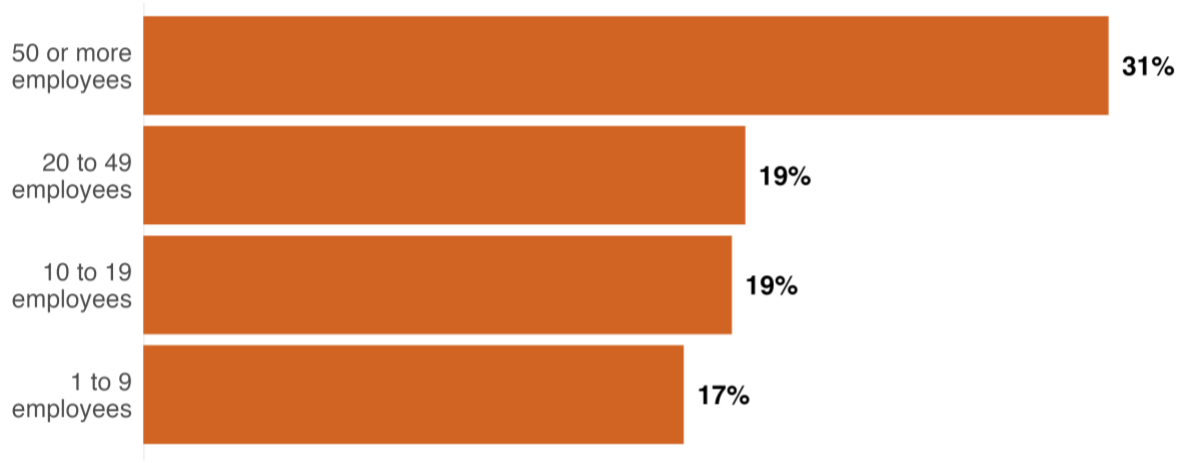
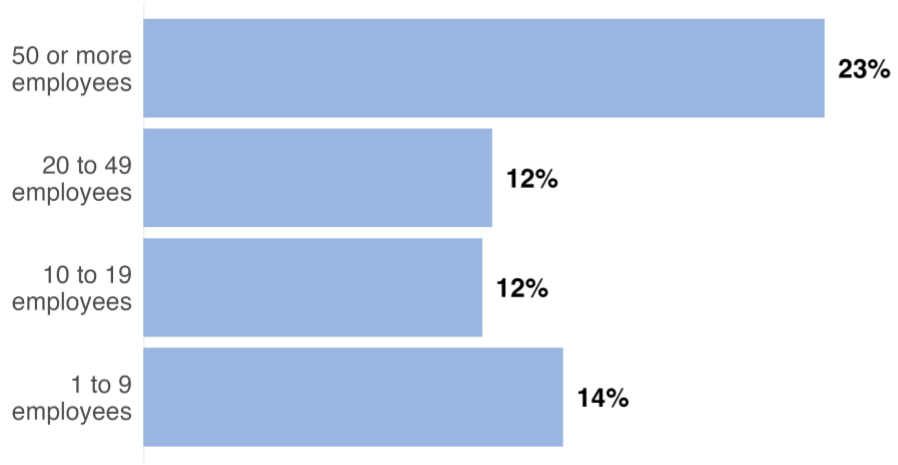


Exhibit 105. Women employees as a share of total employees, by business size



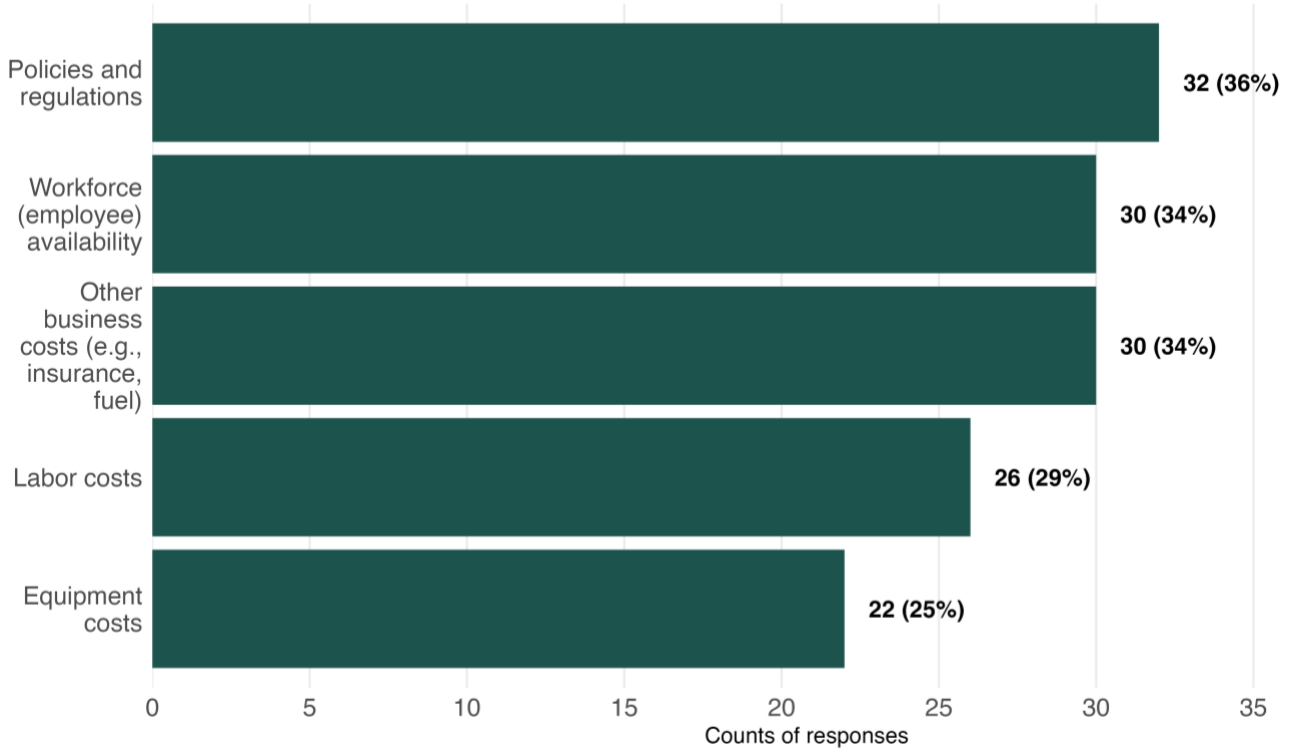
Business Challenges

The most frequently cited business challenge was policies and regulations, selected by 32 respondents as shown in Exhibit 106. These responses may point to the challenges of compliance expectations – echoed by some respondents in their open-ended responses at the end of the survey – potentially slowing operations or deterring expansion. Workforce availability and other business costs (e.g., insurance, fuel) were the next most cited challenges, selected by 30 respondents each.

Labor costs were cited by 26 respondents. This reported challenge may reflect rising wage expectations among workers as well as employer concerns about their ability to offer competitive wages for skilled labor in the current job market.

[126] The weighted average reflects not only the presence of non-white employees, but their share relative to total employment, providing a more accurate workforce-level view than simple firm averages.

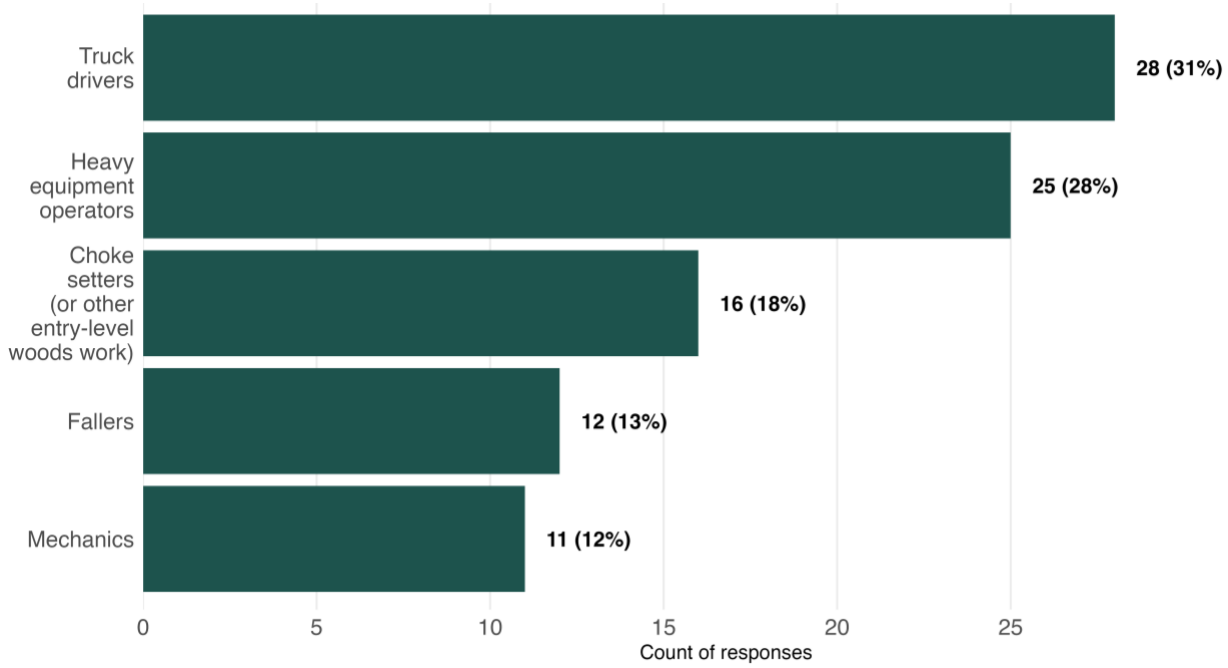
Exhibit 106. Employer respondents' top business challenges in the past 12 months



Respondents were also asked to identify the types of contractors or workers most difficult to find. While 11 respondents said they had no difficulty finding workers or contractors, 54 identified one or more from a range of factors contributing to their workforce challenges in the last 12 months, presenting a snapshot of some of the most pressing issues facing forestry-related businesses. Exhibit 107 highlights the top five contractor/worker types that employer respondents have the most difficulty finding. Truck drivers and heavy equipment operators topped the list, cited by 28 and 25 respondents, respectively. These roles are critical to the functioning of forestry operations, particularly in the transport of logs, equipment, as well as the execution of harvesting and site-preparation activities.

Following these high-demand types are choker setters and other entry-level woods workers, cited by 16 respondents. These positions, while often requiring less technical training, are physically demanding and play a vital support role in field operations. Difficulty in hiring for these roles could point to the importance of focusing not only on high-skill roles but also on entry points that help sustain and grow the workforce over time.

Exhibit 107. Contractor/worker types most difficult for employer respondents to find



Attracting, Hiring, and Keeping Workers

Sixty-seven respondents answered the question about the challenge of attracting and/or hiring workers over the past 12 months.[127] Most of those respondents (50) said they agreed or strongly agreed that attracting or hiring workers has been a significant challenge (Exhibit 108). Those that indicated they either strongly agreed or agreed (or skipped the question) were asked to select their top three challenges in attracting/hiring workers over the past 12 months. Fifty respondents answered the follow-up question. Of those, 31 said they struggled to compete with higher pay in other industries (Exhibit 109). Another highly cited challenge was that there are not enough candidates with the skills needed to perform the work, reported by 28 respondents.

[127] Twenty-two respondents skipped the question.

Exhibit 108. Agreement level with "attracting and/or hiring workers has been a significant challenge in the past 12 months"

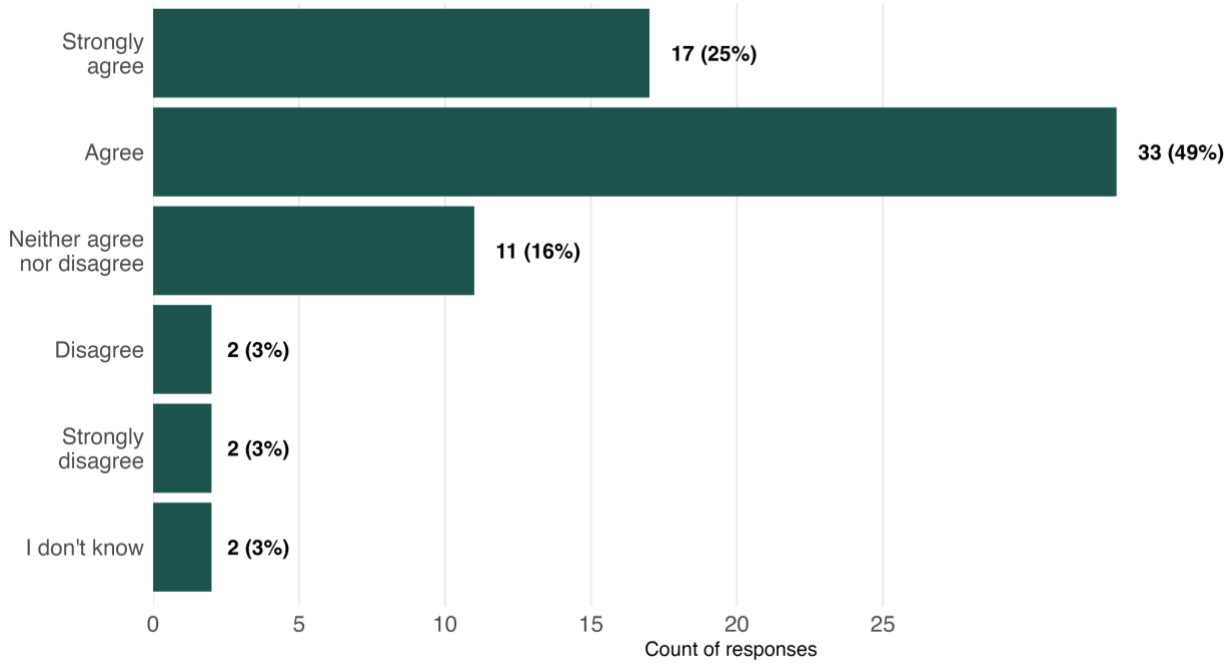
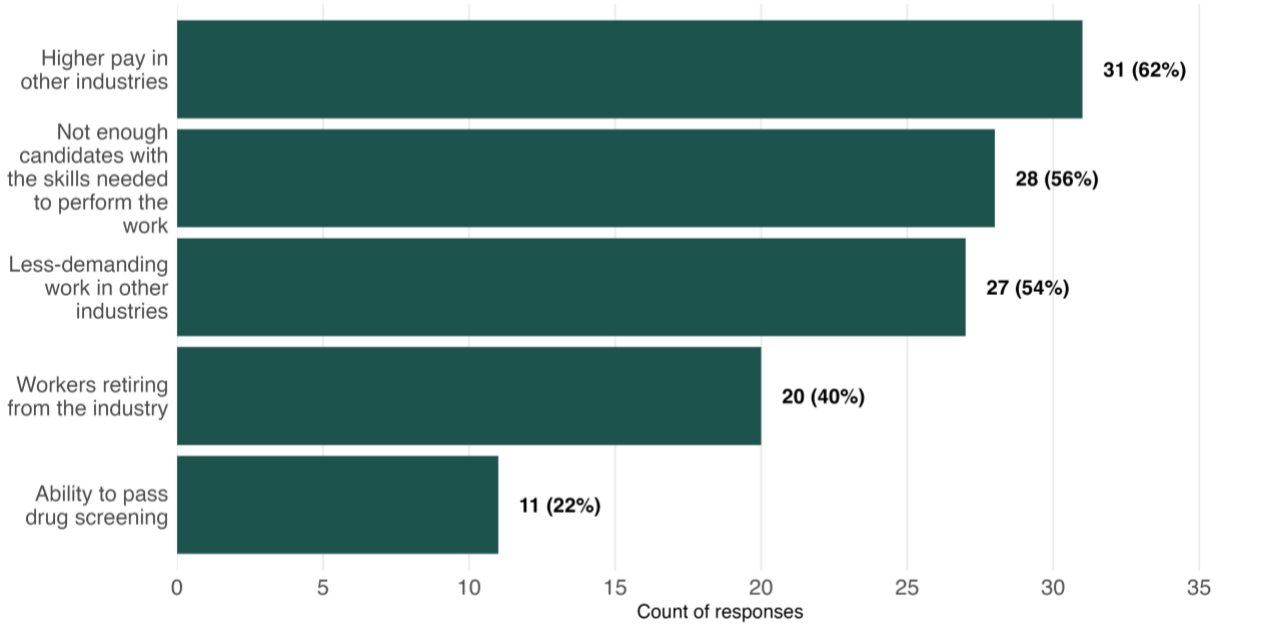


Exhibit 109. Employer challenges in attracting or hiring workers over the last 12 months



The survey also asked employers to indicate their level of agreement with a series of statements related to applicants for open positions at their business over the last 12 months (Exhibit 110). Sixty-six respondents answered the question.[128]

[128] This count includes any respondent who provided an answer for at least one statement. Some respondents did not provide answers for all statements; the share of respondents who answered each statement is provided in the last column of Exhibit 110.

The highest disagreement rates (disagree plus strongly disagree) were for applicants having desired advanced skills (44 percent disagree) and desired occupational skills (37 percent disagree). The next highest disagreement rates were for applicants having essential skills (34 percent), necessary work experience (33 percent), necessary basic skills (30 percent), and necessary credentials or licenses (27 percent). Disagreement rates were lower regarding whether applicants could pass a background check or pass a drug screening (12 and 16 percent, respectively).

In addition to recruitment and hiring challenges, the survey asked employers about their challenges with retaining workers over the past 12 months. Most respondents indicated that they agreed or strongly agreed (20 and 11 respondents, respectively) that keeping workers has been a significant challenge (Exhibit 111).

Respondents who indicated either strong agreement or agreement (and those that skipped the question) were asked a follow-up question to identify their top three challenges in keeping workers (Exhibit 112). Challenges with the highest number of responses included competition from other industries (both in pay and type of work), attendance, level of work available, and competition across other states. "Less-demanding work in other industries" and "higher pay in other industries" were selected by 19 respondents each, indicating that a primary challenge for employers in keeping workers may be competition from other industries.

Exhibit 110. Level of agreement with statements about applicants to open positions over the last 12 months, by share of responses

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Share that responded
Applicants have the necessary basic skills[129]	5%	38%	27%	24%	6%	100%	74%
Applicants have essential skills[130]	3%	30%	33%	29%	5%	100%	74%
Applicants have desired advanced skills[131]	2%	15%	39%	30%	14%	100%	74%
Applicants have desired occupational skills[132]	0%	23%	41%	32%	5%	100%	74%
Applicants have the necessary credentials or licenses[133]	2%	33%	38%	18%	9%	100%	74%
Applicants have the necessary work experience	0%	20%	38%	38%	5%	100%	74%
Applicants can pass a background check	2%	38%	48%	9%	3%	100%	73%
Applicants can pass a drug screening	0%	27%	57%	11%	5%	100%	71%

[129] For example, knowledge of and adherence to safety protocols, attendance, etc.
[130] For example, listening, communication, work ethic, willing to learn, problem, etc.
[131] For example, tree identification, terminology knowledge, map reading, etc.
[132] For example, ability to operate tools, vehicles and machinery, etc.
[133] For example, commercial driver license, certificates, etc.

Exhibit 111. Agreement level with "keeping workers has been a significant challenge in the past 12 months"

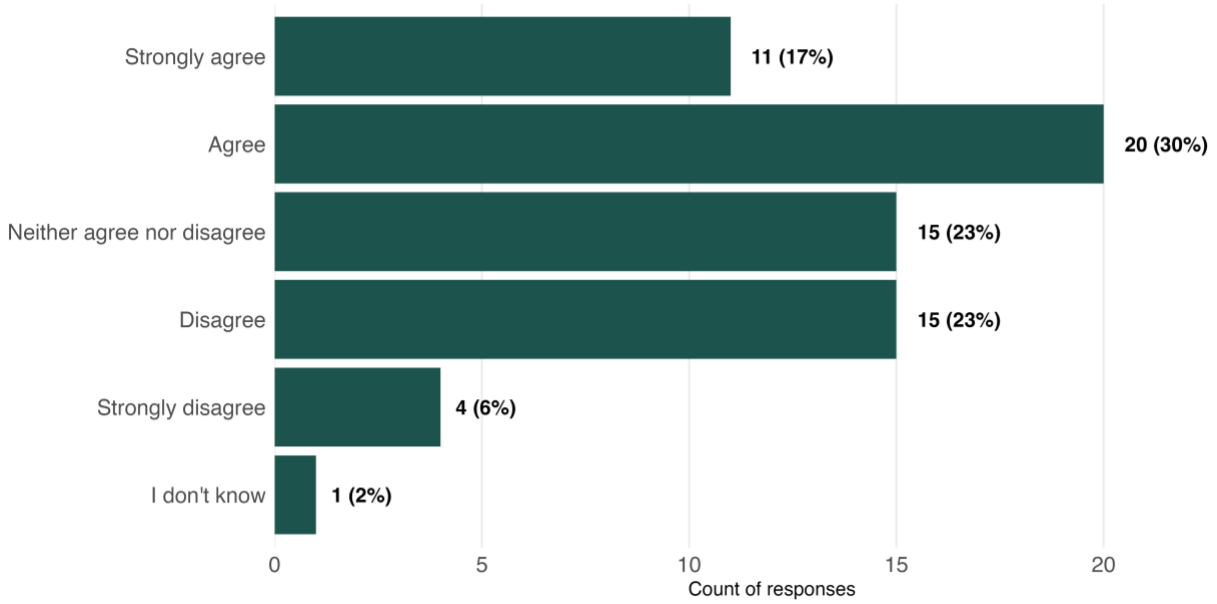
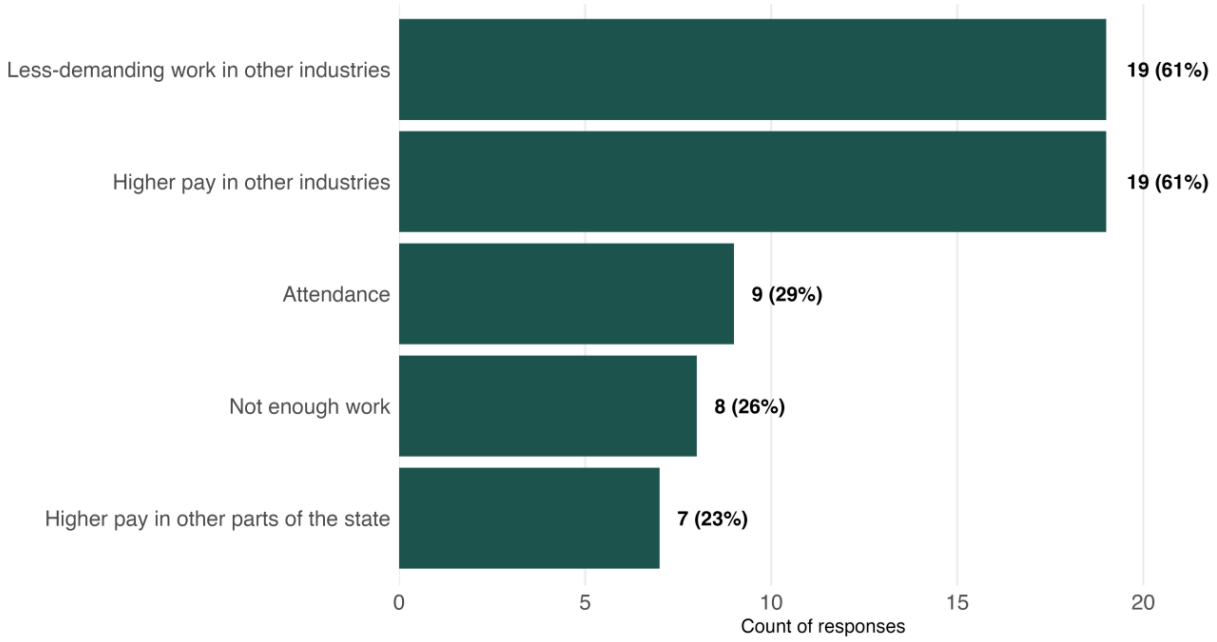


Exhibit 112. Top challenges in keeping workers in the past 12 months



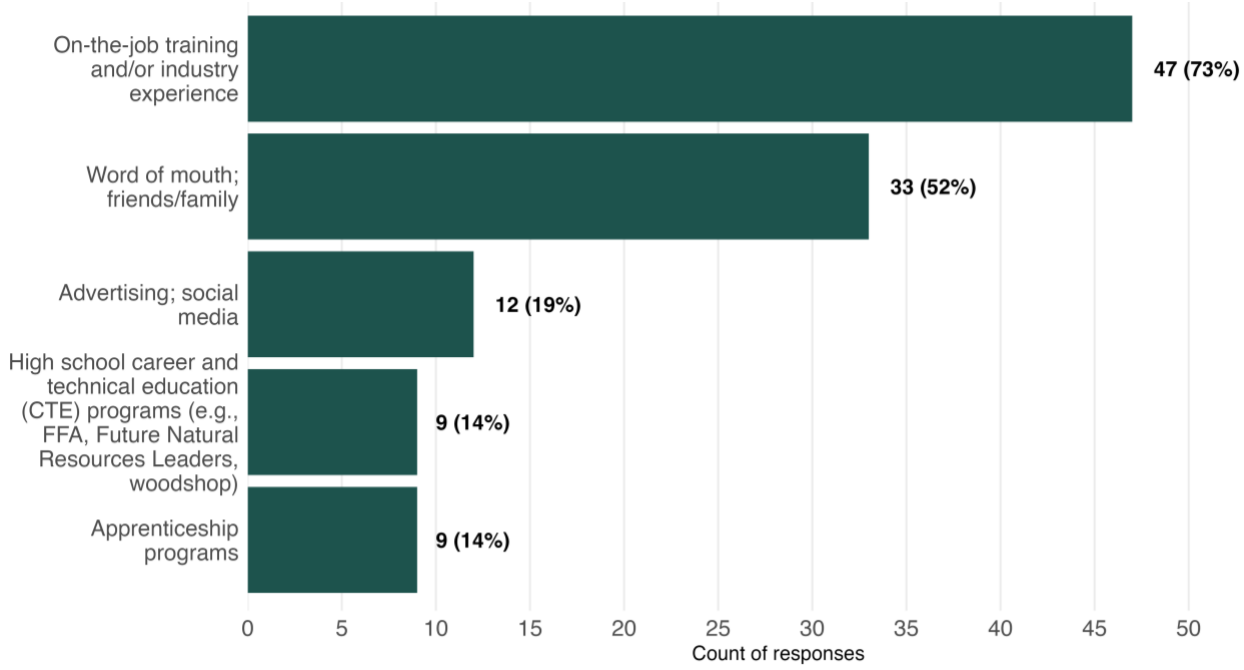
Reliable Sources of Skilled Workers

Respondents identified several reliable sources of skilled workers for their businesses.[134] Most respondents (47) cited on-the-job training or industry experience as a reliable source, followed by word of mouth and friends/family (33 respondents). These top two response

[134] Nine respondents did not select any of the provided options, which included "none" and an open-ended response option.

categories highlight the critical role relationships and networks play within the forestry workforce. Smaller shares of respondents indicated advertising and social media (12 respondents) and high school CTE programs and apprenticeship programs (9 respondents each) as reliable sources for skilled workers (Exhibit 113).

Exhibit 113. Respondents' most reliable sources of skilled workers



Seventeen respondents answered a follow-up question about specific programs or organizations that provide their business with skilled workers. The top categories from the open-ended responses were as follows:

- Colleges and universities (9 mentions)
- Associated Oregon Loggers (AOL) (3 mentions)
- High school programming (3 mentions)
- Job boards (3 mentions)
- Social media (3 mentions)

Responses in the colleges and universities category mentioned Oregon State University, Northern Arizona University, University of Idaho, and Shasta College (CA). Responses related to high school programming included references to FNRL, Trajectory, and CTE. Other responses in the other listed categories included mentions of Indeed and Headhunters as sources for skilled workers.

Recommendations, Solutions, and Additional Thoughts and Concerns

Recommendations for the State

Forty-one respondents answered an open-ended question about how the State could better support the sector's workforce and operations. The top categories of responses were the following:

- Expand training infrastructure (22 mentions)
- Regulatory reform (10 mentions)
- Increase harvesting (7 mentions)
- Reduce taxes (5 mentions)
- Increase industry awareness (5 mentions)

The top category (expand training infrastructure) had 9 mentions of the need to support high school programs. Respondents noted that high school forestry programs that promote trade work or apprenticeship programs would help build a natural talent pool for companies.

"Timely completion of useful technical guidance, make it known in high schools as a good and viable industry with multiple excellent job opportunities."

Respondents also mentioned the need for support of technical schools (2 mentions), CDL (2 mentions), and certificate programs (2 mentions); the value of apprenticeship-type roles for young people (1 mention); and the need for streamlined onboarding processes for companies (1 mention).

"Quit trying to stop programs like [Good Neighbor Authority] GNA and let [Oregon Department of Forestry] ODF sell some trees. We need work for future

Another common theme among respondents was the business costs associated with regulations, workforce compliance, and insurance (10 mentions). Respondents recommended that the State increase timber harvesting (7 mentions), indicating that limited harvesting opportunities are affecting their ability to hire workers. Respondents also mentioned tax reductions and increased industry awareness as suggestions for the State. These mentions indicated that current tax rates discourage individuals from working and living in Oregon, while the perceived negativity around logging and harvesting practices discourages young workers from joining the forestry sector all together.

Solutions to Challenges

Respondents shared solutions they have developed, know of, or are using for their company that have helped or may help address their business's workforce and/or operational challenges (27 responses). The top categories of responses were the following:

- Recruitment and talent pathways development (12 mentions)
- Retention through compensation and job quality (10 mentions)
- Strategic business response (6 mentions)
- Upskilling, training, and safety (6 mentions)
- Operational efficiency and technological innovation (2 mentions)

Within the top category of recruitment and talent pathways development, respondents mentioned high school engagement three times, internship programs twice, and on-the job training once.

Respondents also frequently mentioned compensation and job quality as successful solutions to workforce challenges. Themes centered on pay increases, production bonuses, changes to benefits, better equipment, and minimizing drive times to job sites for workers.

"We have started trying to train younger existing workers on machines. Trying to build operators from our current employee pool."

"People that are able to learn and retain [specialized skills] are driven away from our line of work due to lack of compensation."

Additional Thoughts and Concerns

Finally, 26 respondents expressed broader thoughts and concerns about the forestry workforce, in the following top categories:

- Need to improve public policy and public perception (8 mentions)
- Forestry education needs to align with industry (6 mentions)
- Need for sustainable harvesting (5 mentions)
- Concern over people not wanting to work (4 mentions)
- Industry consolidation and structural stress (3 mentions)

"Promote an atmosphere where young people see forestry as a viable, exciting and dependable career choice. Too often we hire, train up and employ good workers just to lay them off. Combined with the message the forest sector is a dying industry, it confirms the worst and drives young people to more reliable employment."

Respondents who mentioned the need for public policy and perception improvements specifically cited the negative portrayals of the sector in relation to environmental sustainability (4 mentions). A few respondents mentioned the need for more government leadership and engagement on natural resource management issues as well.

Other respondents within the public policy and public perception category noted the costs of compliance with workforce rules; the challenges of recruiting, training, retaining, and promoting workers due to public perception; and the high start-up costs for logging businesses.

Respondents provided additional thoughts and concerns regarding the alignment of forestry education and industry needs (6 mentions), including the need for on-the-job training and a focus in high schools on careers in trade. The focus on developing forestry career interest among young workers aligns with other responses in the "Concern over people not wanting to work" category. Responses in that category cited concerns over an aging workforce (2 mentions) and lack of labor force engagement among younger generations (4 mentions) — particularly in small, rural communities (2 mentions).

"High school over-emphasis on academic careers is devastating to Oregon employers and to rural trades occupations; absent of deficient trades career exposure."

"Large logging contractors and cutting contract holders create such a monopoly that small time cutters and loggers cannot make it. The only way to compete is to grow and there isn't enough wood being moved anymore to get big."

In the categories of sustainable harvesting practices (5 mentions) and industry consolidation and structural stress (3 mentions), responses highlighted a lack of timber supply, industry monopolization, and high mechanization costs as barriers to workforce retention, productivity, and profitability. One response suggested improving upon the current harvesting conditions by increasing the log supply from federal forests, while another mentioned the need for proactive forestry work that benefits society (e.g., "fuels reduction thinning for forest health, supporting local mills and rural economies"). Another response noted that larger timber companies have lower billing rates that make it difficult for smaller contracting companies with less capital to compete, often reducing their chances of attracting and retaining skilled workers. Similarly, larger timber companies can mechanize their operations much faster than smaller companies. Responses mentioned that this imbalance in operational efficiency makes it difficult to stay competitive within the industry.

Survey Analysis Appendix

Work-type responses as a share of industry total

Industry	Work Type	Work Type Count	Industry Total	Share of Industry Total
Forest Operations/Contracting	Logging	39	60	65%
Forest Operations/Contracting	Road construction, reconstruction, and maintenance	34	60	57%
Forest Operations/Contracting	Falling	29	60	48%
Forest Operations/Contracting	Firefighting	29	60	48%
Forest Operations/Contracting	Fuels reduction	29	60	48%
Forest Operations/Contracting	Reforestation	19	60	32%
Forest Operations/Contracting	Rocking	15	60	25%
Forest Operations/Contracting	Restoration	10	60	17%
Forest Operations/Contracting	Pest control/rodent control	8	60	13%
Forest Operations/Contracting	Other	5	60	8%
Forest Operations/Contracting	Pit or vault toilet construction	1	60	2%
Forest Operations/Contracting	Trail maintenance	1	60	2%
Technical or Other Contracted Services	Forest consulting	30	51	59%
Technical or Other Contracted Services	Layout	27	51	53%
Technical or Other Contracted Services	Small landowner technical assistance	24	51	47%
Technical or Other Contracted Services	Marketing	21	51	41%
Technical or Other Contracted Services	Appraisal	18	51	35%
Technical or Other Contracted Services	Mechanic service	13	51	25%
Technical or Other Contracted Services	Surveying	11	51	22%
Technical or Other Contracted Services	Log scaling	6	51	12%
Technical or Other Contracted Services	Carbon accounting	4	51	8%
Transportation/Trucking	Log trucking	30	47	64%
Transportation/Trucking	Lowboy equipment transportation	30	47	64%
Transportation/Trucking	Chip trucking	12	47	26%
Transportation/Trucking	Finished product or veneer transportation	11	47	23%
Transportation/Trucking	Rail transportation	8	47	17%
Transportation/Trucking	Other	6	47	13%
Transportation/Trucking	Air transportation	1	47	2%
Forest Management and Forestry (Forest Landowners)	Forest planning	43	46	93%
Forest Management and Forestry (Forest Landowners)	Forest layout	38	46	83%
Forest Management and Forestry (Forest Landowners)	Silviculture	32	46	70%

Forest Management and Forestry (Forest Landowners)	Forest engineering	25	46	54%
Forest Management and Forestry (Forest Landowners)	Other	1	46	2%
Forest Management and Forestry (Forest Landowners)	Procurement	0	46	0%
Forest Products Manufacturing	Dimensional and/or treated lumber	12	18	67%
Forest Products Manufacturing	Chips, beauty bark, and/or beauty mulch	8	18	44%
Forest Products Manufacturing	Studs	5	18	28%
Forest Products Manufacturing	Hardwood and/or softwood veneer	4	18	22%
Forest Products Manufacturing	Particle board	3	18	17%
Forest Products Manufacturing	Poles	3	18	17%
Forest Products Manufacturing	Engineered wood products	2	18	11%
Forest Products Manufacturing	Fencing	2	18	11%
Forest Products Manufacturing	Millwork	2	18	11%
Forest Products Manufacturing	Plywood layup	2	18	11%
Forest Products Manufacturing	Cabinets, windows, and/or doors	1	18	6%
Forest Products Manufacturing	I don't know	1	18	6%
Forest Products Manufacturing	Other	1	18	6%
Forest Products Manufacturing	Pallets	1	18	6%
Forest Products Manufacturing	Signage	1	18	6%
Forest Products Manufacturing	Flooring	0	18	0%
Forest Products Manufacturing	Furniture	0	18	0%
Forest Products Manufacturing	Manufactured/mobile homes	0	18	0%
Forest Products Manufacturing	Mass timber products	0	18	0%
Forest Products Manufacturing	Pulp and/or paper	0	18	0%
Forest Products Manufacturing	Trusses	0	18	0%
Energy Production	Co-gen	6	11	55%
Energy Production	Pellets	5	11	45%
Energy Production	Electricity	2	11	18%
Energy Production	Renewable aviation fuels	0	11	0%
Energy Production	Renewable diesel	0	11	0%
Energy Production	Renewable hydrogen	0	11	0%
Energy Production	Renewable natural gas	0	11	0%
Non-Timber Forest Products Collection	Cones	4	8	50%
Non-Timber Forest Products Collection	Boughs	3	8	38%
Non-Timber Forest Products Collection	Bark	2	8	25%
Non-Timber Forest Products Collection	Fibers	1	8	12%
Non-Timber Forest Products Collection	I don't know	1	8	12%

Appendix 3: Oregon Forestry Workforce Survey

Introduction and Partnership

This survey is part of the Forestry Workforce Study being conducted for Oregon's Workforce and Talent Development Board and Higher Education Coordinating Commission. Forest sector partners collaborating on the study and this survey include Associated Oregon Loggers, Oregon Forest Industries Council, and American Forest Resource Council.

Survey Purpose

This survey will help us better understand the challenges facing Oregon's forestry workforce and employers. Your input will bring valuable industry insight and support efforts to strengthen the forest sector across public, private, and non-profit businesses and organizations.

Who Should Participate?

This survey is for self-employed individuals and employers with operations in Oregon's forest sector. All responses will be anonymous, and all questions are optional. We expect the survey to take 15 minutes.

At the end of the survey, you'll have the chance to share any additional comments, challenges, recommended solutions, and insights on what has helped sustain your business. As you go through the survey, please keep these in mind and include them at the end.

Thank you in advance for your valuable contribution to the Oregon Forestry Workforce Study.

...

All Respondents

1. The following question helps identify portions of Oregon's forestry workforce that are less likely to be represented in other data (i.e., self-employed individuals or businesses with unpaid family workers).
   Does your business pay Unemployment Insurance (UI) taxes to the State of Oregon?
   a. Yes - My business includes paid non-family workers, and/or paid family workers
   b. No - I am self-employed and/or rely only on partners, contractors, or unpaid family workers
   c. I don't know

---------- *survey page break* ----------

Q1 > If Yes, I don't know, or did not answer:

Employer Respondent Branch

2. A COBID-certified business is a business that is minority-owned, women-owned, service-disabled veteran-owned, or an emerging small business that has received an official business certification from Business Oregon's Certification Office for Business Inclusion and Diversity (COBID).

   Is your business COBID-certified?

   a. Yes
   b. No
   c. I don't know

3. Which role best describes your position? Select one of the following.
   a. President, Chief Executive Officer, or Owner
   b. Vice President, Chief Operating Officer, or Chief Financial Officer
   c. Operations Manager
   d. Human Resources Director or Manager
   e. Supervisor
   f. Other (please specify):

---------- *survey page break* ----------

4. About how many employees did your business have at its **highest employment point** over the past 12 months (rounding is fine)? [Enter number]
5. About how many employees did your business have at its **lowest employment point** over the past 12 months (rounding is fine)? [Enter number]

---------- *survey page break* ----------

6. About what share of your employees are **non-white**? [Slider 0-100%]
7. About what share of your employees are **women**? [Slider 0-100%]

---------- *survey page break* ----------

Please select the type(s) of work your business does in each of the following categories. Select all that apply.

8. **Forest Operations/Contracting:**
   a. My business does not work in Forest Operations/Contracting
   b. Falling
   c. Logging (e.g., ground based, cable, helicopter)
   d. Road construction, reconstruction, and maintenance
   d. Rocking (e.g., quarry or pit development, shooting, crushing, hauling)
   e. Firefighting (e.g., wildland firefighting, prescribed fire operations)
   f. Fuels reduction (e.g., brushing/piling, mastication, limbing)
   g. Reforestation (e.g., planting, herbicide application)
   h. Restoration (e.g., small tree removal, stream enhancement, invasive species)

i. Pest control/rodent control
j. Trail maintenance
k. Pit or vault toilet construction
l. Other (please specify):
m. I don't know

9. Forest Products Manufacturing:

a. My business does not work in Forest Products Manufacturing
b. Hardwood and/or softwood veneer
c. Plywood layup
d. Dimensional and/or treated lumber
e. Particle board
f. Pallets
g. Studs
h. Poles
i. Chips, beauty bark, and/or beauty mulch
j. Pulp and/or paper
k. Engineered wood products
l. Mass timber products
m. Millwork
n. Manufactured/mobile homes
o. Cabinets, windows, and/or doors
p. Furniture
q. Flooring
r. Fencing
s. Trusses
t. Signage
u. Other (please specify):
v. I don't know

10. Forest Management and Forestry (Forest Landowners):

a. My business does not work in Forest Management
b. Silviculture
c. Forest planning
d. Forest layout
e. Forest engineering
f. Procurement
g. Other (please specify):
h. I don't know

11. Non-Timber Forest Products Collection:

a. My business does not work in Non-Timber Forest Products Collection
b. Bark
c. Moss/lichen
d. Mushrooms
e. Cones
f. Boughs

g. Gums
h. Needles
i. Fibers
j. Furs
k. Other (please specify):
l. I don't know

12. Transportation/Trucking:

a. My business does not work in Transportation/Trucking
b. Lowboy equipment transportation
c. Log trucking
d. Chip trucking
e. Finished product or veneer transportation
f. Rail transportation
g. Air transportation
h. Other (please specify):
i. I don't know

13. Technical or Other Contracted Services:

a. My business does not work in Technical or Other Contracted Services
b. Layout
c. Surveying
d. Appraisal
e. Log scaling
f. Mechanic service (e.g., field, remote, heavy equipment/vehicle, electronic, small motor)
g. Forest consulting
h. Small landowner technical assistance
i. Marketing
j. Carbon accounting
k. Other (please specify):
l. I don't know

14. Energy Production:

a. My business does not work in Energy Production
b. Co-gen
c. Renewable diesel
d. Renewable aviation fuels
e. Electricity
f. Renewable natural gas
g. Renewable hydrogen
h. Pellets
i. Other (please specify):
j. I don't know

15. If your business's forestry work is not in one of the categories above, please describe the work. (Open ended response)

---------- *survey page break* ----------

16. Does your business primarily operate in Oregon?
    a. Yes
    b. No
    c. I don't know
17. Where in Oregon does your business usually operate? Select all that apply. (If your business operates only or also in locations outside of Oregon, please list these under "Other.")
    a. Central Oregon – Crook, Deschutes, Gilliam, Jefferson, Klamath, Lake, Sherman, Wasco, and Wheeler counties
    b. Eastern Oregon – Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa counties
    c. Metro Region – Clackamas, Hood River, Multnomah, and Washington counties
    d. Southwestern Oregon – Coos, Curry, Douglas, Jackson, and Josephine counties
    e. North Coast – Clatsop, Columbia, Lincoln, and Tillamook counties
    f. Willamette Valley – Benton, Lane, Linn, Marion, Polk, and Yamhill counties
    g. Other (please specify):
    h. I don't know

---------- *survey page break* ----------

18. Please select the **top three challenges** your business has had over the past 12 months.
    a. Not applicable; we haven't had business challenges over the past 12 months
    b. Not enough work available
    c. Infrastructure conditions (e.g., roads, bridges)
    d. Timber supply
    e. Policies and regulations
    f. Litigation
    g. Labor costs
    h. Equipment costs
    i. Other business costs (e.g., insurance, fuel)
    j. Business financing (e.g., interest rates, loan terms)
    k. Workforce (employee) availability
    l. Subcontractor availability
    m. Other (please specify):
    n. I don't know

---------- *survey page break* ----------

19. Please select the **three types of contractors or workers** your business had the **most difficulty finding** over the past year.
    a. We did not have difficulty finding contractors or workers
    b. Fallers
    c. Truck drivers
    d. Choker setters (or other entry-level woods work)

e. Heavy equipment operators
f. Qualified firefighters
g. H2B workforce
h. Planters
i. Green chain workers
j. Mill workers
k. Foresters
l. Millwrights
m. Electricians
n. Mechanics
o. Saw filers
p. Administrative staff
q. Sales personnel
r. Other (please specify):
s. I don't know

---------- *survey page break* ----------

20. Please indicate your agreement with the following statement:
Attracting and/or hiring workers has been a significant challenge for my business in the past 12 months.

a. Strongly agree
b. Agree
c. Neither agree nor disagree
d. Disagree
e. Strongly disagree
f. I don't know

---------- *survey page break* ----------

Q20 > If Strongly agree, Agree, or no answer, [1-question branch]

21. Please select your business's top three challenges in **attracting and/or hiring** workers.

a. Language and/or communication barriers
b. Safety concerns
c. Workers retiring from the industry
d. Immigration regulations (e.g., availability of workers with H-2B visas)
e. Higher pay in other industries
f. Higher pay in other parts of the state
g. Less-demanding work in other industries
h. Lack of housing options
i. Lack of childcare options
j. Distance to job site
k. Difficulty with reliable transportation to and from job sites
l. Ability to pass drug screening
m. Not enough candidates with the skills needed to perform the work

n. Other (please specify):
o. I don't know

---------- *survey page break* ----------

22. Thinking about open positions at your business over the last 12 months, please indicate your agreement with the following statements. [Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree, Not applicable, I don't know]
    a. Applicants have the **necessary basic skills** (e.g., knowledge of and adherence to safety protocols, attendance)
    b. Applicants have **essential skills** (e.g., listening, communication, work ethic, willing to learn, problem-solve)
    c. Applicants have **desired advanced skills** (e.g., tree identification, terminology knowledge, map reading)
    d. Applicants have **desired occupational skills** (e.g., ability to operate tools, vehicles and machinery)
    e. Applicants have the **necessary credentials or licenses** (e.g., commercial driver license, certificates)
    f. Applicants have the **necessary work experience**
    g. Applicants can **pass a background check**
    h. Applicants can **pass a drug screening**

---------- *survey page break* ----------

23. Please indicate your agreement with the following statement:
    Keeping workers has been a significant challenge for my business in the past 12 months.
    a. Strongly agree
    b. Agree
    c. Neither agree nor disagree
    d. Disagree
    e. Strongly disagree
    f. I don't know

---------- *survey page break* ----------

Q23 > If Strongly agree, Agree, or no answer, [1-question branch]

24. Please select your business's top three challenges in **keeping** workers.
    a. Language and/or communication barriers
    b. Safety concerns
    c. Workers retiring from the industry
    d. Immigration regulations (e.g., availability of workers with H-2B visas)
    e. Higher pay in other industries
    f. Higher pay in other parts of the state
    g. Less-demanding work in other industries
    h. Lack of housing options

i. Lack of childcare options
j. Distance to job site
k. Difficulty with reliable transportation to and from job sites
l. Ability to pass drug screening
m. The work turned out to be a poor fit
n. Attendance
o. Not enough work
p. Lack of career development opportunities
q. Other (please specify):
r. I don't know

---------- *survey page break* ----------

25. Please select the **top three reliable sources of skilled workers** for your business.
    a. On-the-job training and/or industry experience
    b. Continuing education seminars and/or online courses
    c. Apprenticeship programs
    d. Youth work programs and/or youth corps
    e. High school career and technical education (CTE) programs (e.g., FFA, Future Natural Resources Leaders, woodshop)
    f. CTE centers/academies associated with high schools and/or districts
    g. Community college CTE and/or certificate programs
    h. Work camps
    i. Corrections programs; work release
    j. Military outplacement programs
    k. Professional certification programs (e.g., commercial driver's license)
    l. 2-year educational programs
    m. 4-year educational programs
    n. Word of mouth; friends/family
    o. Advertising; social media
    p. Career centers at community colleges or universities
    q. Community-based organizations (e.g., church, civic)
    r. Private staffing /employment agencies
    s. WorkSource Oregon services
    t. Other (please specify):
    u. I don't know

---------- *survey page break* ----------

If any response to Q25 is checked, [1-question branch]

26. If relevant, please list up to three specific programs or organizations that provide your business with skilled workers. [Open ended with three rows]

---------- *survey page break* ----------

Q1 > If No,

Self-Employed Respondent Branch

27. A COBID-certified business is a business that is minority-owned, women-owned, service-disabled veteran-owned, or an emerging small business that has received an official business certification from Business Oregon's Certification Office for Business Inclusion and Diversity (COBID).

    Is your business COBID-certified?

    a. Yes
    b. No
    c. I don't know

---------- *survey page break* ----------

Please select the type(s) of work your business does in each of the following categories.

28. **Forest Operations/Contracting:**
    a. My business does not work in Forest Operations/Contracting
    b. Falling
    c. Logging (e.g., ground based, cable, helicopter)
    d. Road construction, reconstruction, and maintenance
    n. Rocking (e.g., quarry or pit development, shooting, crushing, hauling)
    o. Firefighting (e.g., wildland firefighting, prescribed fire operations)
    p. Fuels reduction (e.g., brushing/piling, mastication, limbing)
    q. Reforestation (e.g., planting, herbicide application)
    r. Restoration (e.g., small tree removal, stream enhancement, invasive species)
    s. Pest control/rodent control
    t. Trail maintenance
    u. Pit or vault toilet construction
    v. Other (please specify):
    w. I don't know

29. **Forest Products Manufacturing:**
    a. My business does not work in Forest Products Manufacturing
    b. Hardwood and/or softwood veneer
    c. Plywood layup
    d. Dimensional and/or treated lumber
    e. Particle board
    f. Pallets
    g. Studs
    h. Poles
    i. Chips, beauty bark, and/or beauty mulch
    j. Pulp and/or paper
    k. Engineered wood products
    l. Mass timber products
    m. Millwork
    n. Manufactured/mobile homes

o. Cabinets, windows, and/or doors
p. Furniture
q. Flooring
r. Fencing
s. Trusses
t. Signage
u. Other (please specify):
v. I don't know

30.Forest Management and Forestry (Forest Landowners):

a. My business does not work in Forest Management
b. Silviculture
c. Forest planning
d. Forest layout
e. Forest engineering
f. Procurement
g. Other (please specify):
h. I don't know

31.Non-Timber Forest Products Collection:

a. My business does not work in Non-Timber Forest Products Collection
b. Bark
c. Moss/lichen
d. Mushrooms
e. Cones
f. Boughs
g. Gums
h. Needles
i. Fibers
j. Furs
k. Other (please specify):
l. I don't know

32.Transportation/Trucking:

a. My business does not work in Transportation/Trucking
b. Lowboy equipment transportation
c. Log trucking
d. Chip trucking
e. Finished product or veneer transportation
f. Rail transportation
g. Air transportation
h. Other (please specify):
i. I don't know

33.Technical or Other Contracted Services:

a. My business does not work in Technical or Other Contracted Services
b. Layout
c. Surveying

d. Appraisal
e. Log scaling
f. Mechanic service (e.g., field, remote, heavy equipment/vehicle, electronic, small motor)
g. Forest consulting
h. Small landowner technical assistance
i. Marketing
j. Carbon accounting
k. Other (please specify):
l. I don't know

34. Energy Production:

a. My business does not work in Energy Production
b. Co-gen
c. Renewable diesel
d. Renewable aviation fuels
e. Electricity
f. Renewable natural gas
g. Renewable hydrogen
h. Pellets
i. Other (please specify):
j. I don't know

35. If your business's forestry work is not in one of the categories above, please describe the work. (Open ended response)

---------- *survey page break* ----------

36. Including yourself, about how many partners or unpaid family workers did your business have working at its **highest work period(s)** over the past 12 months? [Enter number, including self]
37. Including yourself, about how many partners or unpaid family workers did your business have working at its **lowest work period(s)** over the past 12 months? [Enter number, including self]

---------- *survey page break* ----------

38. What is your age?

a. Younger than 25
b. Between 25 and 54
c. Between 55 and 64
d. 65 or older
e. Prefer not to say

39. What is your ethnicity?

a. Hispanic or Latino
b. Not Hispanic or Latino
c. Prefer not to say

40. What is your race?

a. American Indian or Alaska Native
b. Asian
c. Black or African American
d. Native Hawaiian or Other Pacific Islander
e. White
f. Two or More Races
g. Prefer not to say

41. What is your gender?
a. Woman
b. Man
c. Other
d. Prefer not to say

---------- *survey page break* ----------

42. Do you primarily work in Oregon?
a. Yes
b. No

43. Where in Oregon does your business usually operate? Select all that apply. (If your business operates only or also in locations outside of Oregon, please list these under "Other.")
a. Central Oregon – Crook, Deschutes, Gilliam, Jefferson, Klamath, Lake, Sherman, Wasco, and Wheeler counties
b. Eastern Oregon – Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa counties
c. Metro Region – Clackamas, Hood River, Multnomah, and Washington counties
d. Southwestern Oregon – Coos, Curry, Douglas, Jackson and Josephine counties
e. North Coast – Clatsop, Columbia, Lincoln, Tillamook and counties
f. Willamette Valley – Benton, Lane, Linn, Marion, Polk, and Yamhill counties
g. Other (please specify):

---------- *survey page break* ----------

44. Over the past 12 months, did you work more, less, or about the same as you wanted?
a. More
b. Less
c. About the same

45. Please select and rank your **top three challenges to maintaining** your desired amount of **work** over the past 12 months.
a. Not applicable; I've had no difficulty maintaining my desired amount of work
b. Not enough work available
c. Infrastructure conditions (e.g., roads, bridges)
d. Timber supply
e. Policies and regulations
f. Litigation
g. Labor costs

h. Equipment costs
i. Other business costs (e.g., insurance, fuel)
j. Business financing
k. Workforce/subcontractor availability
l. Other (please specify):
m. I don't know

---------- *survey page break* ----------

46. Please select the **three most useful type(s) of training or education** you have received or obtained.
    a. On-the-job training and/or industry experience
    b. Continuing education seminars and/or online courses
    c. Apprenticeship training
    d. Youth work program and/or youth corps
    e. High school career and technical education (CTE) program (e.g., FFA, Future Natural Resources Leaders, woodshop)
    f. CTE center/academy associated with high schools and/or districts
    g. Community college CTE and/or certificate program
    h. Work camp
    i. Corrections program; work release
    j. Military outplacement program
    k. Professional certification program (e.g., commercial driver's license)
    l. 2-year degree
    m. 4-year degree
    n. Other (please specify):
    o. I don't know

---------- *survey page break* ----------

47. What type(s) of contractors and/or support services do you use regularly? Select all that apply.
    a. Logging equipment
    b. Timber cutting, tree processing
    c. Loading, reloading
    d. Transport and logistics
    e. Sawmills and processing plants
    f. Mechanical services
    g. Roads and bridges
    h. Engineering, geotech, hydrology
    i. Boundary survey, scaling, cruising, appraising, forestry consulting
    j. Forestry labor services, thin, plant, spray, tree care, seedling protect
    k. Warehousing and distribution centers
    l. Satellite imaging
    m. Satellite communication
    n. GPS locational

o. Drones
p. Data analytics tools
q. Fire prevention, firefight, burning, and pest control technology
r. Other (please specify):

---------- *survey page break* ----------

All Respondents

48. Please share any recommendations you have about how the State could better support the forestry sector's workforce. [Open Ended]
49. Please share any solutions you have developed, know of, or are using for your company that have helped or may help address your business's workforce and/or operational challenges. [Open Ended]
50. Please share any additional thoughts or concerns about Oregon's forestry workforce. [Open Ended]

---------- *survey page break* ----------

Thank you for completing the Oregon Forestry Workforce Survey. Your contribution is greatly appreciated.

Appendix 4: Data Collection

Quantitative Data Collection

No single data source can comprehensively describe the forestry workforce as defined for this study. We used data from a variety of sources to depict workforce conditions and characteristics as completely as possible given the project's time and resource constraints.

- **Confidential establishment-level Quarterly Census of Employment and Wages (QCEW) data.** Provides detailed information about the location, size, and number of business establishments in Oregon by detailed industry. We requested and received these data from OED.
- **Nonemployer Statistics (NES) (U.S. Census Bureau).** Provide establishment counts for sole proprietors, freelancers, and independent contractors who generate revenue but do not have payroll staff and are not included in QCEW employment counts.
- **Company Census File, Motor Carrier Management Information System (USDOT).** Contains records for active entities registered with the Federal Motor Carrier Safety Administration (FMCSA). Used to estimate the number of self-employed truckers and family-owned trucking businesses working in forest operations and management.
- **American Community Survey microdata (PUMS).** Provides detailed socioeconomic information about the state's population and workforce.
- **Bureau of Labor Statistics (BLS) employment and compensation data by industry and occupation.** Provides a variety of metrics regarding specific industries and occupations.
- **Oregon Employment Department (OED) employment, compensation, and projection data by industry and occupation.** Specific to Oregon, these data complement the BLS data.
- **Integrated Postsecondary Education Database (IPEDS) institution-level enrollment and completion data from postsecondary institutions.** Provides information about the capacity and credential production levels of relevant training pathways.
- **Individual-level apprenticeship data held by the Oregon Bureau of Labor and Industries (BOLI).** Provides information about the capacity and throughput of relevant apprenticeship and pre-apprenticeship programs. We requested these data but ultimately did not receive them. We instead relied on data from the U.S. Department of Labor.
- **Confidential student-level data held by HECC linked to OED wage records.** Provides information about the extent to which enrollees and completers of relevant postsecondary programs gain employment in relevant industries in Oregon. We requested and received these data from HECC.

- **Additional sources:** The consultant team investigated several additional sources of information to fill potential gaps in the data sources identified above, including subscription services, administrative data held by agencies not identified above (e.g., USFS and BLM purchase and contracting databases), and industry organizations. As data suggestions were received, the team evaluated relevance, benefits, and costs associated with each source to determine whether and how to proceed with data requests.

Interview and Focus Group Data Collection

Participants and Recruitment

Between December 2024 and April 2025, ECOnorthwest recruited 147 individuals and ultimately engaged 62 through a combination of 28 in-depth interviews and 5 facilitated focus group sessions. Participants were identified through referrals from study committee members and targeted outreach to capture a wide range of perspectives. The goal was to recruit individuals with firsthand insight to clarify the opportunities, structural conditions, ongoing innovations, and career pathways that define Oregon's forestry workforce today.

Initial Engagement: Focus on Employers

The first round of engagement focused on business and workforce system stakeholders. From December 2024 through February 2025, we conducted interviews with logging employers, state and federal agencies, workforce board directors, economic development professionals, and advocacy leaders. These conversations illuminated the current labor market landscape. In February 2025, two employer focus groups brought together representatives from a diverse range of small and large forestry companies. These sessions offered space for cross-employer dialogue, highlighting shared workforce pressures as well as effective recruitment and retainment strategies.

A substantial portion of the participants in the employer focus groups represented the manufacturing subsector, including mills and wood products. While their perspectives provided valuable insight into workforce dynamics in manufacturing settings, it was determined the final analysis would focus solely on forest operations and management after input from the study committee. As a result, insights from manufacturing employers are not presented in the findings.

Follow-up Engagement: Focus on Education/Training Providers

In late March and April 2025, we conducted three additional focus groups with education and youth-serving organizations, including faculty and administrators from community colleges, high school and CTE program leaders, pre-apprenticeship and youth corps program managers, and state education officials. These conversations examined how

forestry-related education and training programs are evolving, what barriers students face, and where coordination between educators and employers creates stronger, more accessible pathways into forestry careers.

Characteristics of Respondents

Participants in both interviews and focus groups represented a wide range of roles and organizational types connected to Oregon's forestry workforce. The breadth of perspective across conversations revealed both general and industry-specific workforce challenges and opportunities:

- Small and large private-sector employers in logging, wood products manufacturing, and forest operations.
- Education and workforce stakeholders included educators and administrators from four-year universities, community colleges, high schools, CTE programs, pre-apprenticeship programs, youth corps.
- Representatives from regional workforce boards.
- Staff in advocacy organizations and natural resource representation.
- Public sector and economic development perspectives provided by the Oregon Employment Department, Oregon Department of Forestry, Bureau of Land Management, University of Montana, and University of Oregon.

Although engagement captured a wide range of viewpoints, we were not able to include all parties suggested by study committee members and the organizations they represent. For example, federal agencies such as the U.S. Forest Service (USFS) were not represented due to limitations on their availability during the engagement period. Future outreach to engage additional representatives and groups could expand the foundation provided through this study, further developing a common understanding of the forestry workforce.

Topics and Questions Discussed

ECOnorthwest conducted 28 semi-structured interviews, each lasting 30 to 45 minutes, and five semi-structured focus groups, each lasting one hour. The interviews were guided by a core set of questions while focus-group-specific questions were tailored to the unique perspectives of each group. For example, we developed questions specific to educators and training providers to address their insights on working with students. Additional questions were incorporated as needed, based on insights that emerged during the discussions.

Interview Questions

- Where does your workforce typically come from – geographically or in terms of career pathways?

- Has attracting, hiring, and/or keeping employees has been a significant challenge for your company recently?
    - Follow up: What positions are hardest to fill? What is the biggest challenge?
- What are you doing about it? How do you see this changing over time?
- Why do you think students in school/workers decide to go into forestry operations and management?
    - Follow up: Has interest in fire-related work changed over time?
- Why do students/workers specifically not want to enter or decide to leave the field?
- Generally, what are some challenges you have seen new employees face in being successful in working in forestry operations and management?
- What is the role of experience versus formal education in career progression in the forestry operations and management?
- What are some instances you know of where schools/forest operations and management are promoting educational initiatives within the industry? How successful have they been?
- Approximately what percentage of your seasonal workforce transitions into long-term or permanent positions?

Focus Group Questions

EMPLOYERS

- Would you say your company is growing? Contracting? Stable?
- What educational backgrounds do your employees have?
    - Follow up: What skills do they have? What skills are they missing?
- As individuals move into management roles, are there opportunities for you to get professional development?
- In your company, what role does immigrant labor play in your workforce? Have you used the H-2B visa programs?

COMMUNITY COLLEGES

- Are the students completing your programs going directly into industry or continuing their education at a 4-year university? What jobs or Universities are they going to?
- What kind of jobs do they want to get?
- What do you think is needed to make sure your programs can continue to offer the support needed for the jobs that exist in the forest?

YOUTH WORKFORCE PROGRAMS

- Does your program struggle with recruitment?
- What partnerships with industry does your program have? Private companies, private forests, or the public sector within your curriculum or on your boards.
- Where are your students going after they finish?

ECONORTHWEST | 920 SW 6TH AVE, SUITE 1400 | PORTLAND, OR 97204 | ECONW.COM