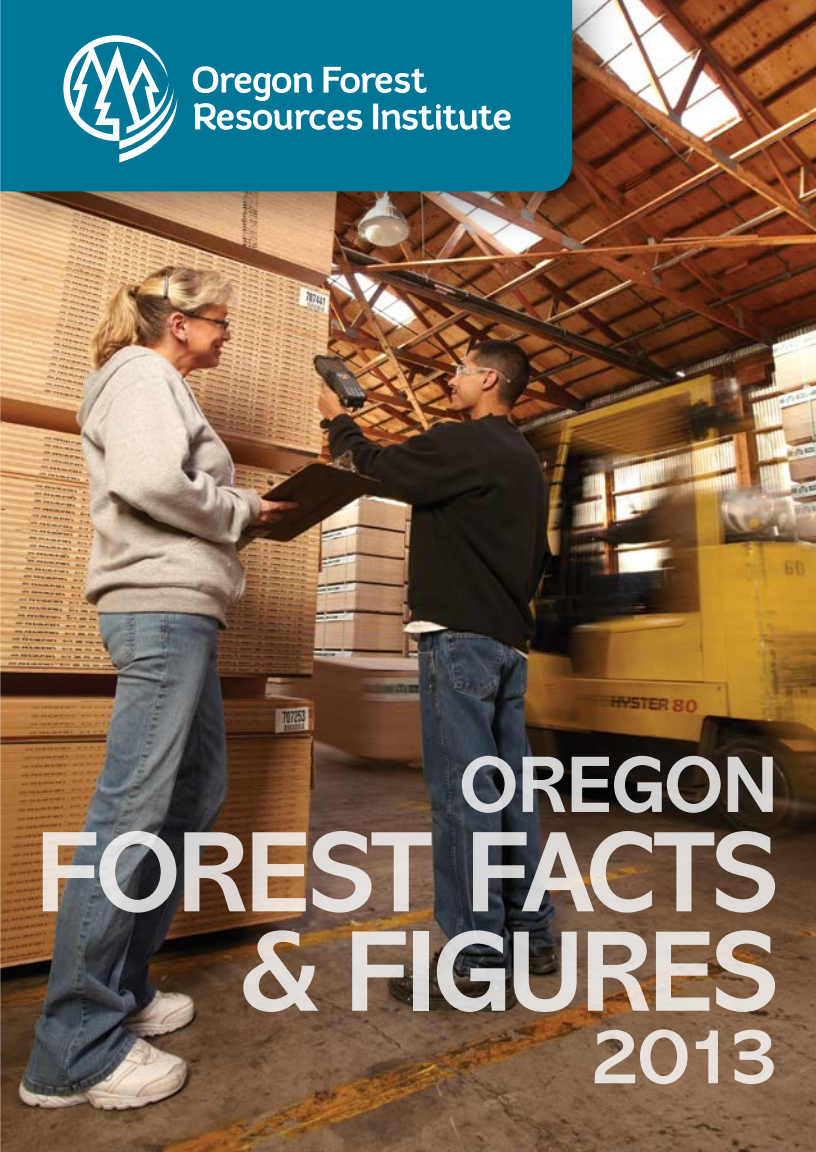
Oregon Forest Resources Institute



OREGON FOREST FACTS & FIGURES 2013

On the rebound

From Oregon's earliest days, timber has been a cornerstone of the state economy. The forest sector today continues to grow and innovate, and it remains especially vital. Forestry and forest products, while a smaller portion of a growing economy following the recession, are expected to continue increasing their importance to Oregon's prosperity, especially in rural areas.

Statewide, the forest sector accounts for 1 in 20 jobs. And Oregon remains the No. 1 U.S. producer of plywood and softwood lumber.

This third edition of *Oregon Forest Facts & Figures* is enriched by data from a comprehensive study of Oregon's forest economy. *The Forest Report*, commissioned by the Oregon Forest Resources Institute, was published in 2012.

The Forest Report found that the forest sector directly employs 76,000 Oregonians and generates $5.2 billion in total income, of which $3.5 billion is employee compensation, including benefits. The state's forest sector generates $12.7 billion in direct economic output.

These are big numbers. And these are the numbers we see as Oregon emerges from an economic low after the collapse of the U.S. housing market and the Great Recession, and which result from a statewide timber harvest well below historic levels.

As this edition goes to press, housing and construction markets appear to be on the mend, though gradually. Oregon's forest sector is poised to grow again as U.S. and global economies improve. In addition to their contributions to clean water, wildlife habitat, recreational opportunities and other benefits that Oregonians cherish, forests will continue as a vital source of sustainable jobs and income in Oregon.

Sincerely,

Mike Cloughesy

Mike Cloughesy
Director of Forestry

Oregon forestland area [1, 2]

Oregon spans 63 million acres, about half of which is forestland. The federal government manages about 60 percent of Oregon's forestland. Forestland is land that is capable of having at least 10 percent cover of trees. Roughly 80 percent of total forestland is classified as timberland, which can grow commercial-grade timber and excludes forestland with low growth rates and areas where logging is restricted – such as wilderness areas.

Oregon Total Land Area	**63,018,000**	
Forestland	**30,472,000**	
Timberland	**24,735,000**	
Other land (urban, cropland, etc.)	**32,546,000**	
Government	**Forestland**	**Timberland**
U.S. Forest Service national forest	**12,133,000**	**11,756,000**
U.S. Forest Service reserved lands (e.g., wilderness)	**2,139,000**	
U.S. Forest Service national grassland	**11,000**	
National Park Service	**159,000**	
Bureau of Land Management	**3,760,000**	**2,238,000**
U.S. Fish & Wildlife Service	**16,000**	
Other federal	**27,000**	**27,000**
Total Federal	**18,245,000**	**14,021,000**
State forests	**848,000**	**790,000**
Other state (parks, ODOT, OSU College of Forestry)	**159,000**	**148,000**
Total State	**1,007,000**	**938,000**
County and municipal lands	**156,000**	**145,000**
Total Government	**19,408,000**	**15,104,000**
Private		
Large private landowners (=/> 5,000 acres)	**5,933,000**	**5,777,000**
Small private landowners (< 5,000 acres)	**4,668,000**	**3,497,000**
Total Private	**10,601,000**	**9,274,000**
Tribal		
Native American Tribal	**463,000**	**358,000**
TOTAL	**30,473,000**	**24,735,000**

Totals may be off because of rounding.

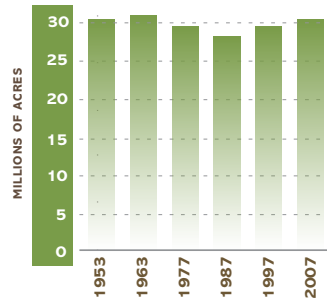
Historic changes in forestland area [3]

Total forestland acreage – public and private – has held relatively steady for more than 30 years. This is due in large part to Oregon's unique system of land use laws and comprehensive planning. And there is nearly as much wood growing in Oregon forests today, by volume, as was growing in the early 1950s.

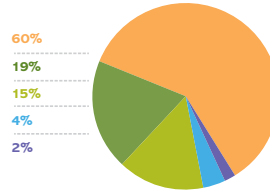
Forest ownership vs. timber harvest

The federal government manages the majority of the forestland in Oregon. However, three-quarters of the timber harvest comes from private land.

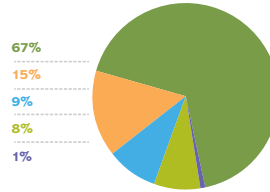
Oregon forestland acreage



WHO OWNS OREGON'S FORESTS? [1]



PERCENT OF HARVEST BY OWNER [4]



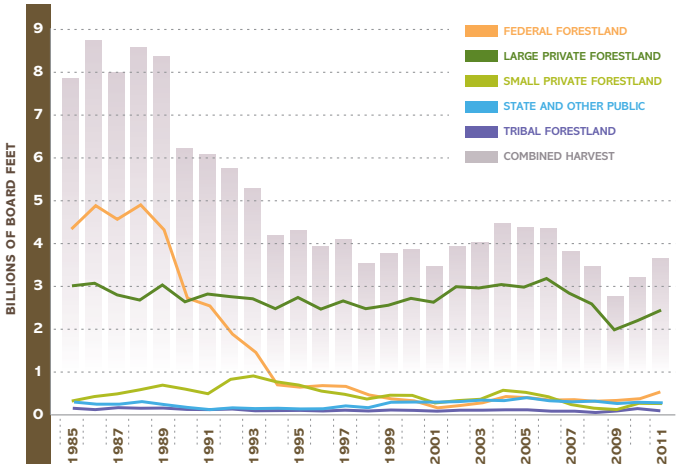
FEDERAL GOVERNMENT
LARGE PRIVATE
SMALL PRIVATE
STATE AND OTHER PUBLIC
TRIBAL

Oregon's timber harvest by ownership [4]

Oregon's timber harvest hit bottom in 2009, following the collapse of the housing market. However, it rebounded slightly, to about 3.65 billion board feet, in 2011. The 2009 harvest was the smallest since the Great Depression.

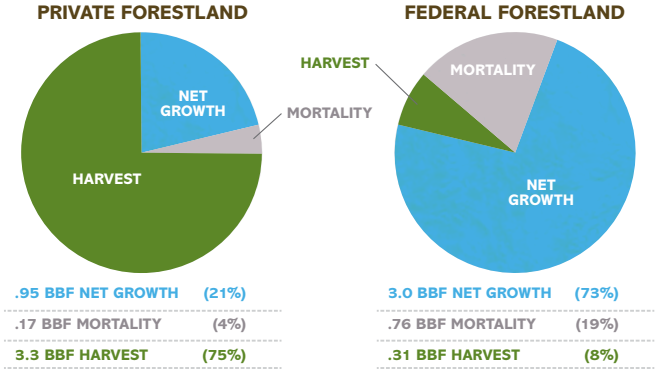
From the end of World War II until 1989, timber harvests in Oregon generally ranged from 7 billion to 9 billion board feet annually. Since 1989, timber harvests on federal lands have dropped about 90 percent, due to environmental litigation and a change in management emphasis. Meanwhile, harvests from private lands have remained relatively stable. Today, about 75 percent of Oregon's timber harvest comes from private forestlands. The harvest from federal lands edged up in 2010 and 2011, and in 2011, it accounted for 15 percent of the total Oregon harvest.

Oregon timber harvest by owner



Sustainable timber harvest[1, 4]

Annual timber harvest and mortality (2001-2005)*



*Most recent data available (full chart represents gross annual growth in billion board feet).

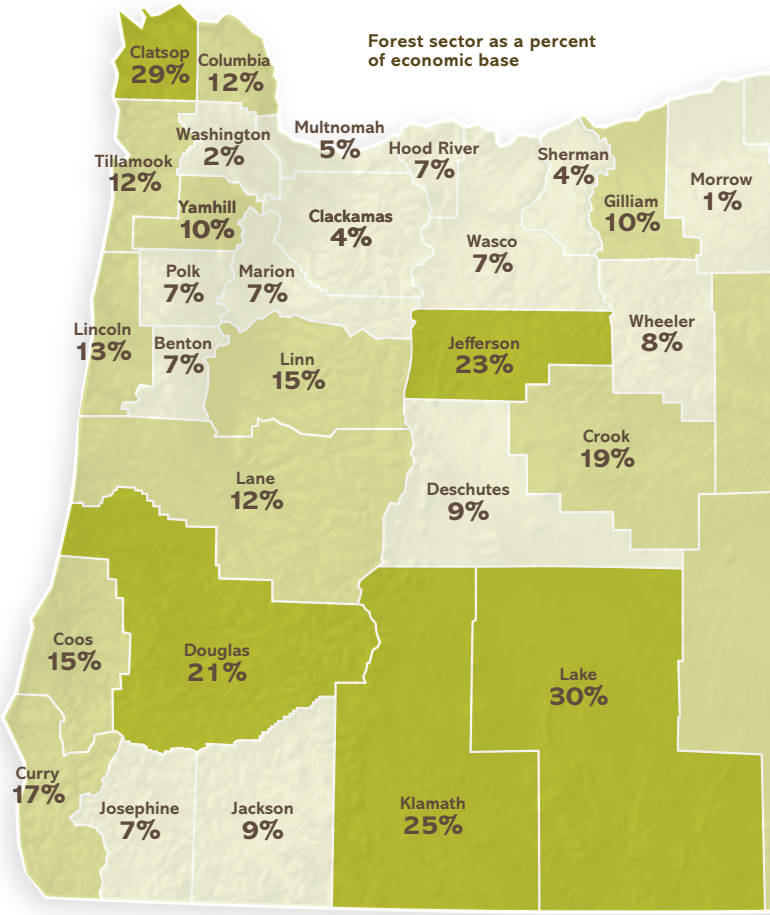
The charts above show how much of the annual growth in Oregon forests is harvested versus how much dies (mortality). Mortality is usually the result of fire, insects or disease. On private lands, much of the growth is harvested, a small portion dies, and about 20 percent contributes to increasing the standing timber volume. On federal lands, little is harvested, a large amount dies, and most goes to increasing the standing timber volume. In young forests in western Oregon, high growth can be considered positive. On overcrowded federal forests in eastern and interior southwest Oregon, high net growth increases fire risk and can weaken forest resiliency. (See the section on fire, page 19.)

Economics of the forest sector[5]

The forest sector – the part of Oregon's economy derived from forests – encompasses the harvest of trees and their conversion into consumer and construction products, such as lumber, plywood, poles, paper and energy. It includes value-added manufacturing, such as the production of doors, windows, packaging, treated wood and millwork.

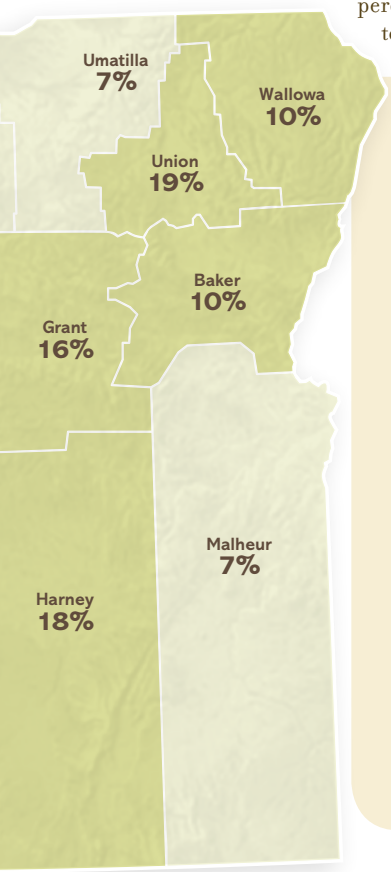
	Direct employment (jobs)	**Direct industrial output** (millions of dollars)	**Employee compensation** (millions of dollars)
Forestry support	**19,055**	**$2,204**	**$632**
Primary forest products manufacturing	**16,688**	**$5,762**	**$1,066**
Secondary and tertiary forest products manufacturing	**15,858**	**$2,527**	**$690**
Transportation and distribution of forest and wood products	**6,833**	**$634**	**$183**
Forest management	**12,613**	**$1,094**	**$778**
Forest dependent industries	**5,026**	**$432**	**$163**
TOTAL*	**76,073**	**$12,653**	**$3,513**

*Totals may be off because of rounding.


Forest sector as a percent of economic base
Clatsop 29%
Columbia 12%
Washington 2%
Multnomah 5%
Hood River 7%
Sherman 4%
Morrow 1%
Tillamook 12%
Yamhill 10%
Clackamas 4%
Gilliam 10%
Wasco 7%
Polk 7%
Marion 7%
Wheeler 8%
Lincoln 13%
Benton 7%
Linn 15%
Jefferson 23%
Crook 19%
Lane 12%
Deschutes 9%
Coos 15%
Douglas 21%
Lake 30%
Curry 17%
Josephine 7%
Jackson 9%
Klamath 25%

WHERE TIMBER MATTERS MOST [5]

While less evident in urban centers, the importance of forest sector economics is keenly felt in much of rural Oregon. In some rural counties – such as Clatsop and Lake – the sector is responsible for about 30 percent of the economic base and up to 18 percent of the jobs.



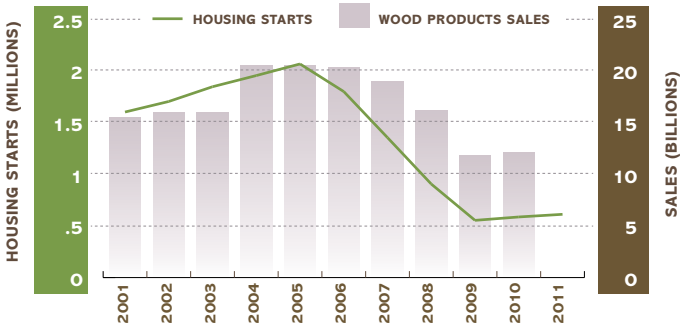
Forest sector as a percent of employment

Lake	18	Polk	7
Jefferson	14	Josephine	6
Crook	13	Umatilla	6
Yamhill	13	Marion	6
Douglas	12	Lincoln	5
Clatsop	11	Lane	5
Union	11	Jackson	5
Grant	11	Morrow	5
Linn	11	Deschutes	5
Klamath	10	Hood River	5
Harney	10	Wasco	5
Curry	10	Gilliam	4
Coos	9	Benton	4
Tillamook	9	Clackamas	4
Columbia	8	Wheeler	3
Baker	7	Multnomah	3
Wallowa	7	Washington	3
Malheur	7	Sherman	2

Lumber sales and housing starts[5]

U.S. housing starts peaked most recently in 2005, and began a severe decline as the housing bubble burst and the nation fell into recession in 2008 and 2009. The falloff in home construction was echoed in sales of Oregon wood products.

Sales value of Oregon wood products in relation to U.S. housing starts



The recession resulted in layoffs as well as mill closures and slowdowns. By 2012, there were 14,000 fewer jobs in Oregon's forest sector than there were in 2007. From 2003 to 2012, the number of forest product mills in Oregon fell from 249 to 200.

Forest product uses[6]

Wood products make up 47 percent of all the raw materials used for manufacturing in the United States. Wood has important environmental advantages over other building materials. Wood is renewable…it grows. Wood is reusable and recyclable. Wood stores carbon. Wood requires less energy and water to produce than concrete, steel or plastic. Wood can be sourced locally. Nearly 100 percent of a log can be used for wood and other products.

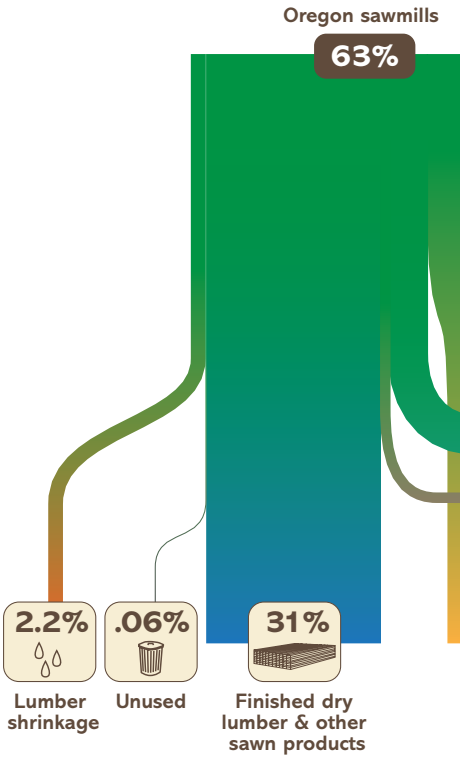
TYPES OF PRODUCTS MADE FROM TREES HARVESTED IN OREGON

- Structural lumber and other softwood products used in construction, such as dimensional lumber, solid beams, laminated beams, joists, laminated veneer lumber, finger-jointed lumber and other engineered structural softwood
- Plywood from softwood and hardwood veneer
- Reconstituted wood products such as particleboard, hardboard, fiberboard and heating pellets, made largely from residue generated by sawmills and plywood mills
- Posts, poles and timbers, such as utility poles, house logs, fence posts, pilings, treated timbers, cross-arms and railroad ties
- Pulp and paper products from wood fiber, including packaging, printing paper, newsprint, tissue, paper towels, absorbents, adhesives, fluff pulp and cellulose products such as rayon, cellophane, food additives and pharmaceuticals
- Biomass energy from mills burning wood waste to generate heat and electricity for manufacturing
- Millwork, including a variety of softwood and hardwood lumber for products such as doors, windows, cabinets, furniture, siding, flooring, moldings, fencing, lathe and other millwork (e.g., pencils, musical instruments)
- Other secondary wood products, such as pallets, kitchen cabinets and furniture
- Cross laminated timber (CLT), a strong, versatile engineered product, prefabricated and assembled into large multistory buildings

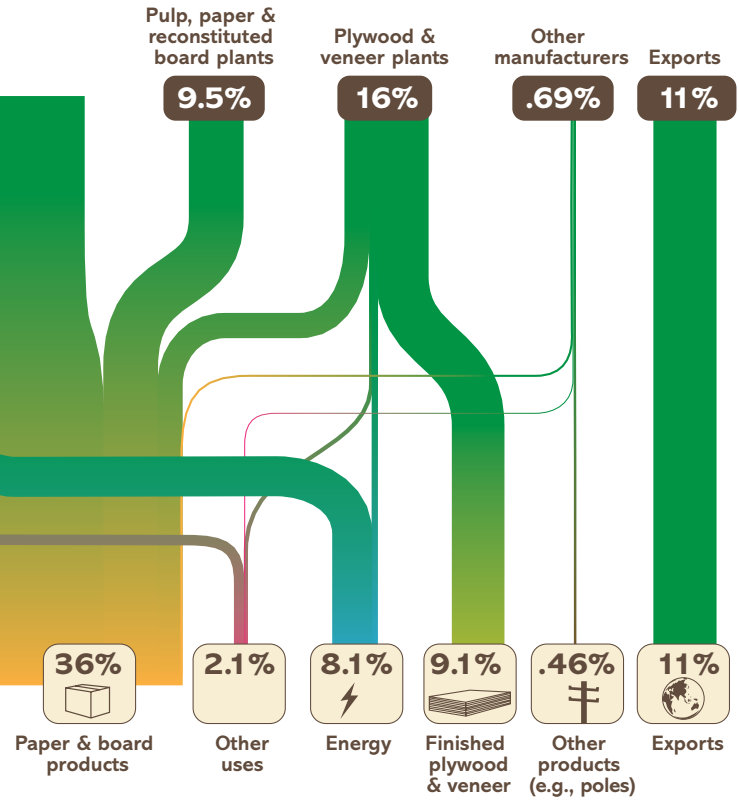
From forest to end product

This chart shows the flow of timber from its harvest in Oregon through various mills to the end product. For instance, 63 percent of harvested logs are initially sent to sawmills to be cut into lumber. Almost half of that material ends up as sawdust, chips and other residue, which is redirected and turned into paper products, energy and other saleable goods. Though some of the percentages will ebb and flow with the markets over time, the chart shows that nearly every fiber of wood harvested in Oregon is put to use.

How Oregon's timber harvest is used [5]



(Data from 2008)


Pulp, paper & reconstituted board plants
9.5%
Plywood & veneer plants
16%
Other manufacturers
.69%
Exports
11%
36%
Paper & board products
2.1%
Other uses
8.1%
Energy
9.1%
Finished plywood & veneer
.46%
Other products (e.g., poles)
11%
Exports

Wood products manufacturing

Oregon has consistently led the nation in the production of both softwood lumber and plywood panels. The state is also at the forefront in creating and manufacturing engineered wood products.

SOFTWOOD LUMBER *(7, 8)*

Oregon's lumber output in 2011 accounted for nearly 16 percent of total U.S. production, as the state continues to be the No. 1 U.S. producer of softwood lumber. The figures also show sawmill output rebounding from the recessionary low in 2009.

Top 10 lumber-producing states (in millions of board feet)

	2005	2006	2007	2008	2009	2010	2011	% of U.S. total for 2011
Oregon	**7,433**	**7,033**	**6,176**	**4,724**	**3,829**	**3,994**	**4,134**	**15.6%**
Washington	5,729	5,130	4,763	3,885	3,241	3,637	3,685	13.9%
Georgia	2,674	2,421	2,129	1,931	1,518	1,714	1,914	7.2%
Mississippi	2,400	2,224	1,998	1,598	1,446	1,532	1,708	6.4%
Arkansas	2,578	2,420	2,215	1,615	1,493	1,576	1,675	6.3%
Alabama	2,472	2,433	2,242	1,594	1,274	1,465	1,626	6.1%
California	2,688	2,590	2,309	1,920	1,442	1,435	1,623	6.1%
North Carolina	2,026	1,846	1,752	1,407	1,242	1,289	1,388	5.2%
Texas	1,622	1,788	1,652	1,261	1,356	1,251	1,374	5.2%
Idaho	2,026	1,846	1,752	1,344	1,105	1,258	1,353	5.1%
. . .								
TOTAL U.S.	40,457	38,726	35,158	29,177	23,420	24,802	26,505	

PLYWOOD [9]

Overall, U.S. plywood production has been in decline since 2004, well before the housing boom peaked, as cheaper strand-board products took market share. Oregon has no strand-board plants, yet its production of plywood, including both softwood construction panels and hardwood cabinetry panels, accounts for nearly a quarter of total U.S. output. Oregon is home to 16 of the 53 plywood mills in the United States, as of 2012. Plywood output, too, has rebounded from the 2009 low.

Top five plywood-producing states
(million square feet, 3/8" basis)

	2009	2010	2011	% of U.S. total for 2011
Oregon	**1,895**	**2,303**	**2,149**	**24%**
Louisiana	961	996	1,111	12%
Arkansas	857	867	837	9%
Texas	953	809	750	8%
Washington	651	777	706	8%
. . .				
TOTAL U.S.	8,608	9,131	8,986	

ENGINEERED WOOD PRODUCTS *(6, 9)*

Oregon companies apply innovation and technology to raw materials to produce engineered wood products. Turning raw timber or unfinished lumber into finished products increases the value of the wood. These value-added wood products typically mean more mills, more jobs and more money staying in Oregon. Innovation and technology are becoming more important to the future of the forest sector economy.

Glued laminated timber (Glulam) is a stress-rated engineered wood product made up of wood laminations, or "lams," that are bonded together with strong, waterproof adhesives. They are used in commercial and residential applications, from garage door headers to floor beams.

Laminated veneer lumber (LVL) is the most widely used structural composite lumber product. It is produced by bonding thin wood veneers together into a large board called a billet. The LVL billet is then sawed to desired dimensions depending on the construction application. The many uses of LVL include headers and beams, rafters, rim board, scaffold planking, studs, and flange material for prefabricated wood I-joists and truss components.

I-joists are "I"-shaped engineered-wood structural components made of top and bottom LVL flanges of various widths, united with webs of various depths. They offer strength, versatility and economy in residential and light commercial applications.

Oregon Board of Forestry[10]

A seven-member citizen board guides forest policy in Oregon. The Oregon Board of Forestry's mission is to "lead Oregon in implementing policies and programs that promote environmentally, economically and socially sustainable management of Oregon's 30 million acres of public and private forests." The board adopts rules that govern how the Oregon Forest Practices Act is implemented. It appoints the state forester and provides broad oversight of the Department of Forestry.

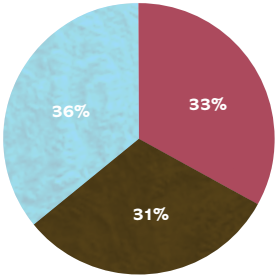
Board members are appointed by the governor and confirmed by the state Senate. No more than three of the seven members may receive any significant portion of their income from the forest products industry. Board members are not paid. The board meets about eight times per year, at different locations across the state, and meetings often include trips into the forest. The meetings are open to the public.

Up-to-date information about the board's meetings and actions can be found at: **www.oregon.gov/ODF/Pages/board/index.aspx.**

The balanced use of forestlands[11]

Oregon's forests are managed to reflect the interests and practices of different owners.

Forestland management classifications



WOOD PRODUCTION

MULTI-RESOURCE

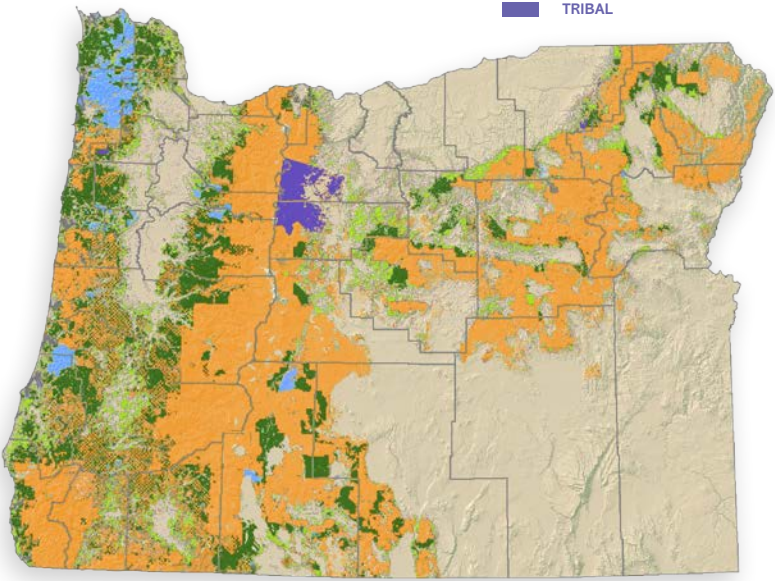
RESERVE

Wood production 36%
Forests managed mostly for income or timber production by large and small private owners and tribes. These forests supply 75 percent of the annual statewide timber harvest.

Multi-resource 33%
Forests managed for multiple uses, including recreation, water, wildlife habitat and timber production. These forestlands are primarily in public, tribal and small private ownership.

Reserve 31%
Forests managed and conserved mostly for environmental or cultural reasons, with limited timber harvest. These forests are largely owned by the federal government and may be set aside as parks or wilderness areas, or as riparian, old-growth or endangered species habitat.

Forestland ownership *(12)*



Oregon forest protection rules[13, 14]

Oregon was the first state to enact comprehensive rules governing forest practices and protecting forest resources including water, fish, wildlife, soil and air. With strong support from forest sector leaders, the Oregon Legislature enacted the Oregon Forest Practices Act in 1971. Applying to all state and private forestlands, the OFPA and its accompanying rules have been updated about two dozen times since 1971 to reflect new scientific research and changing citizen preferences, with most revisions targeting increased protection for water quality and habitat enhancement.

The Oregon Forest Practices Act requires:

- **Reforestation.** Landowners must complete replanting within two years after harvest. And within six years of harvest, enough young trees must be "free-to-grow" into a new forest, a much higher threshold. About 40 million new trees are planted each year in Oregon's forests. Reforestation success rate generally exceeds 95% on private land.
- **Protection of water resources.** Timber harvesting, road building and chemical use are restricted near streams, lakes and wetlands, to protect fish and water quality. Agencies including the Oregon Department of Agriculture, the Oregon Department of Forestry and the U.S. Environmental Protection Agency strictly regulate the application of chemicals in forests.
- **Protection of wildlife habitat.** To provide nesting sites and habitat for birds, mammals and other animals, foresters and loggers must leave live trees or snags and down logs in harvest units larger than 25 acres. Additionally, they must avoid or modify harvesting near sensitive bird nesting, roosting or watering sites.
- **Limits on clearcuts.** Clearcuts cannot exceed 120 acres within a single ownership, including the combined acreage of any clearcuts within 300 feet of each other. Once replanted trees reach four feet tall, the young forest is no longer considered a clearcut.
- **Proper road construction and maintenance.** Strict regulations govern the location, construction, maintenance and repair of roads on state and private forestland. This limits mud and sediment from washing into streams from roads.

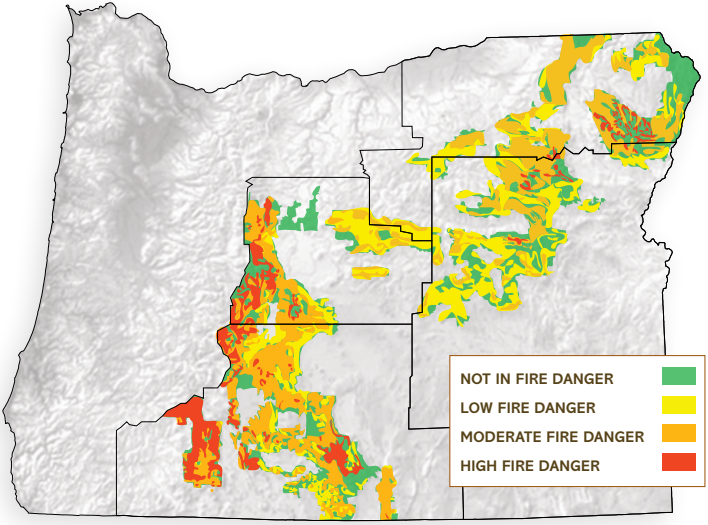
Forests at risk: fire and restoration *(15, 16)*

Fire is a natural force in the forest. But for decades, the natural cycle of fire has been suppressed to protect property values, forest resources and public safety. And for the past 20 years, fire suppression has been coupled with mostly passive management of federal forests. As a result, federal forests – especially in drier eastern and interior southwest Oregon – have grown uncharacteristically dense.

These forests are at risk for crown fires, which burn larger and hotter and spread faster than typical surface fires. If current management practices continue, conditions in the dry forests are expected to deteriorate further.

2012 crown fire potential in eastern Oregon national forests (acres) *(16)*

High	**5,069,000**
Moderate	**4,030,000**
Low	**2,269,000**
TOTAL	**11,368,000**



Crown fire potential in Oregon's dry-side national forests *(17)*

FIRES OF 2012 [18]

In 2012, wildfires burned more than 150,000 acres of forest in eastern and interior southwest Oregon. Among them was the Barry Point Fire, a clear example of the risk that has developed. At times becoming an explosive crown fire, it burned about 93,000 acres along the California-Oregon border, most of it in Oregon, and about 73 percent of it in federal forests. Fueled by uncharacteristically dense federal forests, the Barry Point Fire spread from its national forest origin, eventually burning 25,000 acres of private forest.

Total forest fires and forested acres burned in Oregon [19, 20]

(Includes Forest Service, state, private, tribal and BLM forestlands)

Year	Forest fires	Forest acres burned
2012*	1,317	168,581
2011	1,576	37,475
2010	1,625	32,667
2009	1,976	67,512
2008	2,380	67,199
2007	2,168	361,838
2006	2,679	79,093
2005	1,463	76,836
2004	1,878	11,631
2003	2,255	153,303

*Nonofficial figures as of December 31, 2012.

RESTORATION [16]

The state and federal government, as well as local collaborative groups, are working to accelerate the restoration of some of the overly dense federal forests, using selective harvest, thinning, prescribed burning and mechanical understory treatments. Restoration work can achieve two goals: returning the forests to something more historically typical and more resilient to fire, with more widely spaced trees and less underbrush; and bringing jobs and marketable timber to rural Oregon communities and the forest sector economy.

SHARED COST OF FOREST FIREFIGHTING [21, 22]

The Oregon Department of Forestry protects 16 million acres of forestland from wildfire. These forests are primarily private, but also include state and other non-federal public land and, by contract, U.S. Bureau of Land Management lands in western Oregon. For a century, Oregon's fire program has been recognized for its high degree of success, attributable to a higher level of private landowner participation in fire suppression, planning and prevention than in any other Western state. That cooperation includes sharing the cost of maintaining the program.

Private landowners and the state have equally shared basic infrastructure costs (e.g., ensuring readiness and initial attack response at the local district level) since 1991. Sharing these costs recognizes the number of fires caused by the public and by lightning, the public safety value of an effective system, and the protection of public resources such as air, water, habitat and recreation. Firefighting costs for large fires on non-federal forests are covered through a mix of state and landowner funds plus, if necessary, an insurance policy – an approach unique in the United States.

Whenever a wildfire becomes too large or complex for the capabilities of a local Department of Forestry district, private landowners and the state share the extra firefighting costs, using a formula determined by the Oregon Legislature. During severe fire danger, the Oregon Department of Forestry also draws on a special-purpose appropriation of state funds that provides for the availability of retardant-dropping air tankers, helicopters and other resources that can be placed where and when fire danger is highest.

Woody biomass strategy[23]

Woody biomass, a byproduct of milling and logging, includes material such as bark, chips, tree limbs and tops, and small trees. It also results from work that reduces hazardous fuels and restores overly dense forests, especially in eastern Oregon.

THE 2012 PLAN

Oregon's Forest Biomass Working Group – which includes government agencies, academic researchers, forest products companies and conservation groups – published a strategy in 2012 outlining the clean and sustainable use of biomass to improve forest health, create jobs and capture a local, renewable source of energy.

The plan calls for improving and developing markets for low-value, small-diameter trees and other woody biomass, which can add value to private forestlands and raise the cost-effectiveness of restoration work in federal forests.

USES OF BIOMASS

- Generate on-site heat for large facilities, such as manufacturing plants and schools
- Produce electricity from burned biomass
- Sell into existing markets such as landscape bark, shavings and bedding
- Support emerging markets such as the development of biofuels, biochar and cellulosic ethanol that can be used as transportation fuel

Sustainable forestry [24]

Oregon forest landowners meet some of the strictest environmental standards in the world through compliance with the Oregon Forest Practices Act. They may also voluntarily meet additional standards to gain recognition from forest sustainability certification systems.

These private programs apply independent, third-party standards to wood and manufactured wood products from the forest. This level of transparency gives consumers, architects, engineers and builders credible evidence that the products were produced through responsible forestry practices. Certified products earn the right to display an "ecolabel" seal of approval. Certification may also lead to acceptance by green-building architectural standards, such as the U.S. Green Building Initiative's Green Globes program and the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program.

America's three largest forest certification systems are the Sustainable Forestry Initiative (SFI), the American Tree Farm System (ATFS) and the Forest Stewardship Council (FSC). The internationally recognized European-based Programme for the Endorsement of Forest Certification endorses both SFI and ATFS.

Oregon acres certified by the three major forest certification systems*

Certification system	Acres
American Tree Farm System [25]	887,109
Forest Stewardship Council [26]	566,929
Sustainable Forestry Initiative [27]	3,228,813
TOTAL	4,682,851

*As of autumn 2012.

Protecting salmon and watersheds[28]

In response to listings of salmon species under the federal Endangered Species Act, the Oregon Legislature and governor joined with landowners in 1997 to create the Oregon Plan for Salmon and Watersheds. The Oregon Plan seeks to restore salmon runs, improve water quality and achieve healthy watersheds statewide through the joint efforts of government, landowners and citizen volunteers. It is unique among state protection plans for its emphasis on landowners voluntarily exceeding regulations, and for its engagement of communities to restore their watersheds. Combined efforts have restored more than 6,300 miles of stream banks and opened an additional 4,500 miles of streams to fish passage, due to stream-crossing improvements.

KEY ELEMENTS OF THE PLAN

- Voluntary restoration activities by private landowners (especially forest landowners), supported by local citizens, students, businesses and government
- Coordinated tribal, state and federal agency actions
- Continued monitoring of watershed health, water quality and salmon recovery
- Rigorous scientific oversight by independent scientists

Watershed restoration outcomes[29]	1997-2006
Riparian miles treated	4,045
Miles of road closures and decommissionings	2,198
Miles of road improvements	7,817
Fish passage: number of stream crossings improved	2,344
Miles made accessible to fish due to stream-crossing improvements	3,499
Funding for completed and reported restoration (in millions)	$437

Water quality from Oregon forests[30]

Streams originating on forestlands supply water for Oregonians to drink, use in their homes and businesses, irrigate their fields, and run industrial processes. Healthy forests promote soils that provide natural filtration to keep streams clean and water quality high. Some 35 Oregon municipal water systems source their drinking water supply from forested watersheds; more than 30 of those watersheds are actively managed using contemporary timber-harvest and resource-protection methods.

A 2008 U.S. Forest Service study found relatively minor effects of forest harvest activities on peak flows and channel form and structure in the Pacific Northwest. The study compared forest harvest activities with other human-caused changes to streams and watersheds such as dams, urbanization and other direct modification of channels.

OREGON WATER QUALITY INDEX[31]

The Oregon Department of Environmental Quality (DEQ) regularly measures water quality in major rivers and streams throughout the state. DEQ developed the Oregon Water Quality Index using eight measures to express water quality as a number between 10 (worst) and 100 (ideal). There are currently 144 monitoring sites in the DEQ network. Among all land uses, the highest water quality generally occurs in forested watersheds.

2007	2008	2009	2010*	2011*	Total
508	699	273	352	458	6,335
282	42	59	29	2	2,612
1,083	105	73	41	23	9,142
102	177	164	80	72	2,939
230	260	175	219	137	4,519
$79	$92	$59	$69	$38	$774

*Data from 2010 and 2011 are not final and likely underrepresent completed work.

Wildlife in managed forests [32, 33]

Forests continually change. They respond to fire, windstorms and disease. They also are affected by logging and residential development. For wildlife, any change creates winners and losers. Some species thrive in young, open stands, for instance. Others prefer old stands. Yet other species prefer middle-aged stands.

Forest landowners can create and enhance wildlife habitat through active management – including timber harvest – by keeping in mind the structural and compositional characteristics of the forest. Structure has to do with the size and spacing of trees, live and dead. Composition has to do with the variety of plant species. Studies have shown these characteristics are more important to habitat quality than the age of the forest.

Whether the main objective is timber harvest, recreation, aesthetic value or some mix, forest landowners use a number of techniques to attract a rich diversity of species:

- Plan work so as not to disturb wildlife during nesting season and other critical times
- Leave or create snags
- Leave down deadwood in various stages of decay
- Make sure there are some hardwood trees and fruiting shrubs
- Maintain clean water by minimizing disturbances to riparian areas
- Manage invasive plants
- Manage forest roads to address habitat needs and water quality
- Complete prompt reforestation and promote young forest vigor and diversity
- Use herbicides judiciously and avoid use during nesting and breeding season

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An array of jobs[5]

The 76,000 jobs in Oregon's forest sector represent a wide variety of work, from forestry, logging, millwork and cabinetmaking to engineering, hydrology, business management and academic research. Economists estimate that each million board feet of timber harvest creates or retains about 11 forest sector jobs.

Oregon's forest sector jobs	
Forestry support (includes nurseries, machinery manufacturing, firefighting)	8,884
Buying/selling standing timber	2,117
Logging	8,054
Subtotal Forestry Support	**19,055**
Sawmills	6,340
Pulp and paper making	5,387
Plywood/veneer manufacturing	4,899
Electrical generation	62
Subtotal Primary Forest Products	**16,688**
Windows, doors and millwork	5,078
Other manufacturing (furniture, manufactured homes, pallets, etc.)	4,333
Kitchen cabinet manufacturing	2,649
Residuals and reconstituted wood products	2,540
Engineered wood/truss manufacturing	1,258
Subtotal Secondary Forest Products	**15,858**
Transportation	**6,833**
Forestry and environmental consultants, researchers, academics	6,647
U.S. Forest Service	4,046
Company management	1,304
Oregon Department of Forestry	616
Subtotal Forest Management	**12,613**
Forest-dependent Industries	**5,026**
TOTAL	76,073

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