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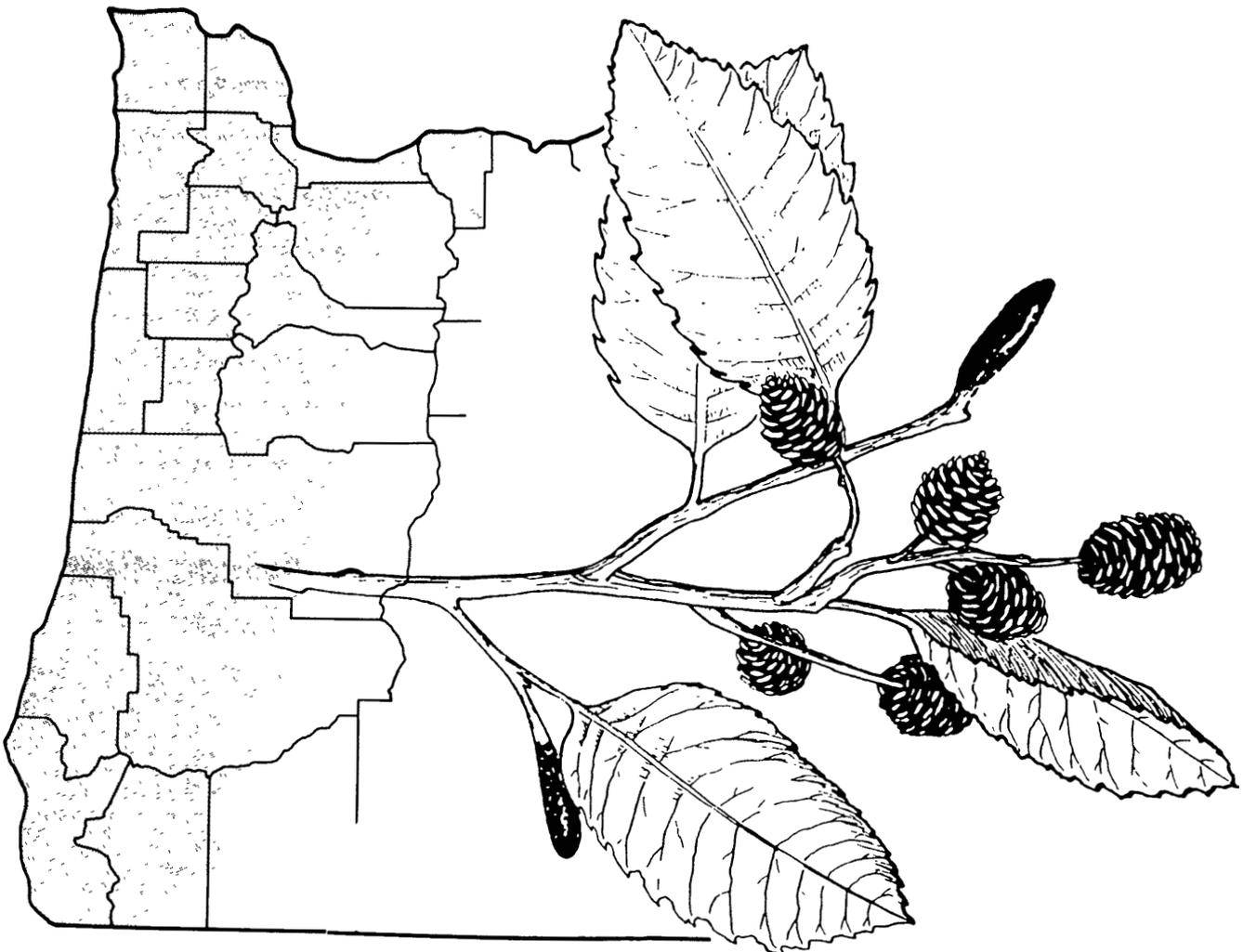
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Red Alder Harvesting Opportunities in Western Oregon

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Abstract

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This report presents statistics on the present distribution and ownership of merchantable stands of red alder in western Oregon and the character of these stands as they affect harvesting opportunities.

Keywords: Red alder (western Oregon), western Oregon timber resources (red alder), hardwoods (red alder).

Summary

Many individuals are seeking information on red alder (*Alnus rubra* Bong.) that will enable them to begin or expand their harvesting of red alder. This report describes the red alder resource in detail so that a broad understanding of the opportunities for capturing this resource can occur. The information presented is based on inventories by the National Forest System, the Bureau of Land Management, and the Forest Inventory and Analysis Unit of the Pacific Northwest Research Station, USDA Forest Service.

There are 9.3 billion board feet of red alder sawtimber in western Oregon. Red alder occurs in every major category of land ownership: National Forests have 15 percent of the red alder sawtimber volume, the Bureau of Land Management 11 percent, other public 15 percent, forest industry 38 percent, and farmer and miscellaneous private 21 percent. Most of the red alder in National Forests is in the Siuslaw National Forest. Counties with the greatest volume of red alder in forest industry ownership include Coos, Lincoln, Polk/Yamhill, and Clatsop/Columbia. Farmer and miscellaneous private ownership of red alder is greatest in Lincoln, Clatsop/Columbia, Multnomah/Washington, and Clackamas Counties.

Slightly more than one-third of the red alder sawtimber volume on non-Federal timberland is in trees 18.0 inches or larger in diameter at breast height. Red alder grows in pure stands and in mixture with other species. About 59 percent of the red alder sawtimber grows in stands with at least 5,000 board feet per acre of softwoods. Fifty-five percent of the red alder sawtimber occurs on relatively level land.

In addition to presenting inventory statistics, this report includes an appraisal of the impact riparian areas have on the red alder resource, and a method is presented for determining how many logs of specified dimensions can be produced from trees of given heights.

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Introduction

Prices paid for red alder (*Alnus rubra* Bong.) logs have increased sharply in recent years, thereby reflecting increased demand for a species previously little used and considered by many to be a weed. It is now actively pursued for both local and international markets.

Many individuals and corporations are actively seeking opportunities to either begin or expand the harvesting of red alder, and information about the red alder resource is important for identifying potential sources of raw material. This report is intended to supply information on the present distribution and ownership of merchantable stands of red alder and the character of these stands as they affect harvesting opportunities.

The data on red alder in this report are from inventories conducted on National Forest System lands by the USDA Forest Service, on Bureau of Land Management lands by that agency, and on non-Federal lands (mainly private, State, and county lands) by the Pacific Northwest Research Station of the USDA Forest Service. Information about red alder on non-Federal timberland is based on an inventory conducted in 1985 and 1986 by the Forest Inventory and Analysis Unit of the Research Station. National Forest data are from inventories done from 1969 to 1974. The Bureau of Land Management inventoried their lands between 1976 and 1980.

The information presented will be of most value to those interested in current red alder harvesting opportunities. Stumpage prices, logging and hauling costs, and prices paid at the mill are usually presented, compared, and evaluated in board feet, Scribner rule. To correspond to common usage, the volumes in this report are presented in Scribner rule.

The hardwood board-foot volumes shown in this report are the sound volume in trees 11.0 inches and larger diameter at breast height (d.b.h.) to a 6.0-inch minimum top diameter and 16-foot log length. For softwoods, board-foot volumes include the sound volume in trees 9.0 inches and larger d.b.h. to a 6.0-inch minimum top diameter and 32-foot log length.

Delivered Prices and Costs of Production

Prices and some costs for red alder were obtained from a telephone survey conducted by the Oregon State University Cooperative Extension Service in September 1988 of several mills that buy alder logs in Oregon. The log having the highest value was at least 9 inches in diameter at the small end and between 30 and 40 feet long. Prices for logs of this size ranged from \$235 to \$250 per thousand board feet (MBF) delivered at the mill. Prices were less for logs of smaller top diameter or length—generally between \$175 and \$225 per MBF delivered.

Logs bought by weight, instead of log scale, generally received a lower price. Prices ranged from \$23 to \$25 per ton for chip logs and \$28 to \$32 for saw logs. Chip logs bought by the ton were about \$140 to \$160 per thousand board feet, and saw logs were around \$180 per thousand board feet.

A lumber recovery study (Plank and others 1990) conducted in 1986 shows the value of lumber recovered from a typical 12-inch log to be just under \$300 per MBF, with values reaching \$500 per MBF for the larger study logs (up to 22 inches). Prices of alder lumber by grade in 1982 were (Oregon State Department of Forestry 1988a):

Grade	Price
	<i>\$MBF</i>
Select	710
#1 Shop	405
#2 Shop	295
#3 Shop	180
Frame	305
Pallet	215

Although softwood logs for export are in high demand and fetch premium prices, the demand for red alder logs for export is limited, and the prices paid are only nominally above domestic prices. Only the best **logs** are selected for export; these have a minimum 12-inch small-end diameter, are 30 to 40 feet in length, and are “nice clean logs.” Prices per log are generally \$20 to \$30 more than the domestic price. A benefit of exporting red alder is that maple, which is difficult to market domestically, can be included with the red alder. Unlike softwoods, red alder is usually exported in containers.

Demand is high for red alder pulp chips to export (fig. 1). The September 1988 export price for chips was \$111 per bone dry unit (2,400 lb) FOB shipped. This was an increase of \$7.50 over the price paid during the first half of 1988. In general, whole logs barked and chipped on site are desired for chips (fig. 2). Some additional chip volume is generated by mills sawing or peeling alder logs. These manufactured chips are not as desirable as chips from whole logs.



Figure 1—Red alder chips stored before being loaded onto freighters for overseas ports.



Figure 2—Stockpiled red alder logs to be barked and chipped for overseas destinations.

Costs of harvesting and transporting red alder logs to market are higher than for softwoods. Sixty to 70 percent of the delivered price for red alder represents costs of felling, limbing, bucking, yarding, and hauling. For Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), the estimated cost of logs delivered to the mill represents between 30 and 50 percent of the delivered price.

Reasons for the higher costs of logging and transporting red alder are the need to extend existing road networks to reach stands of red alder; the brushy conditions at hardwood logging sites; greater breakage for hardwoods than for softwoods; the time required to remove limbs; handling of additional pieces per thousand board feet; and higher hauling costs owing to the greater number of pieces per load and the heavier green weight of red alder compared to Douglas-fir.

Estimates of red alder lumber volume recovery, lumber grade recovery, and value for northwest Oregon will be available shortly (Plank and others 1990).

Occurrence

The range of red alder in Oregon includes all the coastal counties and the western portion of most interior counties in western Oregon (see cover, Little 1971). The range of red alder is defined by the Oregon Coast Ranges, which extend from the Columbia River to Coos Bay, and the Siskiyou Mountains just south of Coos Bay to the California border. "Of the two ranges, the Siskiyou Mountains have the highest peaks and steepest slopes. This southern section of the coastline frequently lacks any gently sloping to level 'coastal plain,' and precipitous mountain slopes plunge uninterrupted into the ocean. Mountain slopes in the Oregon Coast Ranges, on the other hand, are more gentle and, for the most part, not as immediately adjacent to the sea" (Maser and others 1981).

Red alder grows best on well-drained soils and grows well on upland sites and on bottom lands. Although red alder will grow on a wide range of sites, it does extremely well on the good Douglas-fir sites. Red alder also grows on dry sites but is not commercially important in such areas.



Figure 3—Red alder invades areas after logging as along this abandoned road in an area recently clearcut.

Red alder is a prolific seeder and invades areas that have been subject to fire, logging, or other disturbances such as slumps or slides (fig. 3). It grows rapidly in its early years and outstrips conifer growth. On good sites, red alder forms one main stem and a long length of clear bole: given enough time, it grows to 2 to 3 feet d.b.h. and to 65 to 100 feet high. The **1986** National Register of Big Trees (Hunt **1986**), maintained by the American Forestry Association, shows that the largest known red alder is in Clatsop County; this tree had a d.b.h. of 80 inches and was 104 feet tall!. Although some mature red alder trees come close to this height, few grow to a diameter similar to the record tree. The breast-high diameter of the largest merchantable red alder tree measured in the inventory of the non-Federal timberland in Oregon was 34 inches.

Herbicides or other control measures are tools that can be used at early stand age to remove red alder along with other competing vegetation to permit conifer seedlings or saplings room to grow. Whether red alder is going to be an important stand component in the future depends on several factors. One of these is the State of Oregon Forest Practices Act of **1971** that, although recognizing red alder conditionally, does not accept red alder as a commercial species; as a consequence, red alder may not be acceptable for restocking harvested timberland. In instances where red alder management is intended, foresters with the State of Oregon Department of Forestry can approve alternate plans allowing acceptable restocking of an area.

Red alder may be attractive to landowners because of its ability to fix nitrogen in the soil (Tarrant **1977**). As management tries to reduce costs and avoid environmental problems, use of nitrogen fertilizer is less attractive; and red alder may become a desirable alternative to the high cost of fertilization. Red alder is immune to laminated root rot (*Phellinus weirii*) and provides a potential crop in openings where softwoods have been killed.

Few guidelines are available to provide landowners with information on growing and managing red alder. In most cases red alder seeds itself and, with soil disturbance, germinates readily. Because of the ability of red alder to seed and restock areas and the low value of alder, only a few nurseries grow alder seedlings. Most timber producers favor softwoods in management over hardwoods, especially when hardwoods are growing on sites capable of producing softwoods.

Ownership and Distribution

There are about 9.3 billion board feet of red alder in western Oregon. The largest single owner class is forest industry with 38 percent of the alder sawtimber volume (fig. 4). Other major owners of red alder are farmer and miscellaneous private owners, other public—mainly the State, National Forests, and the Bureau of Land Management.

Although smaller in area than either southwest or west-central Oregon, northwest Oregon has 4.1 billion board, almost half of all red alder sawtimber volume in western Oregon (fig. 5). This concentration of red alder in northwest Oregon is the result of extensive areas of high site productivity, large areas burned in the past, logging, and past management practices. West-central and southwest Oregon have almost equal volumes of red alder—2.6 billion board feet.

The major owner of red alder in all three geographic areas is forest industry (fig. 6). In northwest Oregon, farmer and miscellaneous private and other public owners also have significant volumes of red alder. In west-central Oregon, National Forests—mainly the Siuslaw National Forest—and farmer and miscellaneous private owners are major owners of red alder. In southwest Oregon, no single owner class outside of forest industry dominates; the range of ownership is from 9 percent for National Forests to 18 percent for the Bureau of Land Management.

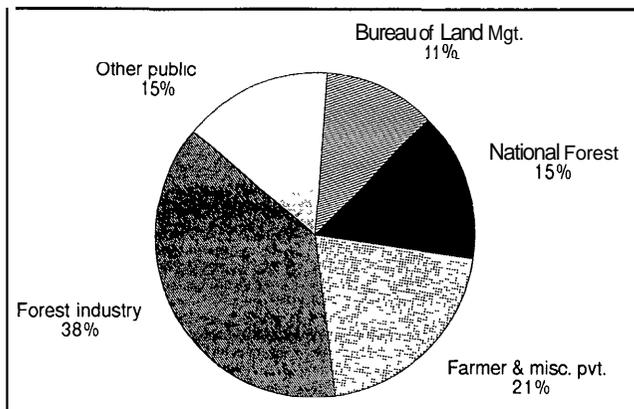


Figure 4—Distribution by owner class of red alder sawtimber volume in western Oregon, Scribner rule.

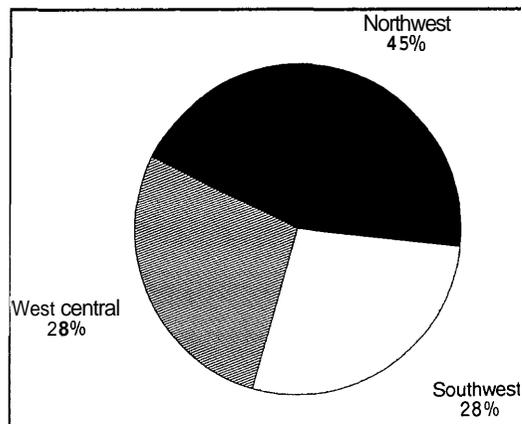


Figure 5—Distribution by area of red alder sawtimber volume in western Oregon, Scribner rule.

The private timberland ownerships in western Oregon, Coos, Clatsop/Columbia,¹ and Lincoln Counties each have red alder sawtimber volumes in excess of 800 million board feet (fig. 7 and table 1). Hood River, Marion, Linn, and Jackson Counties each have less than 100 million board feet of red alder; the remaining counties have amounts ranging from 100 to slightly over 500 million board feet. No red alder occurred on plots inventoried in Josephine County.

If counties with less than 100 million board feet of red alder in private ownership are excluded, forest industry is the dominant private owner of red alder in nine counties or county groupings. In two counties, farmer and miscellaneous private owners are the dominant owners.

¹ Some counties are combined because sample size is insufficient to assure reliable statistics for individual counties

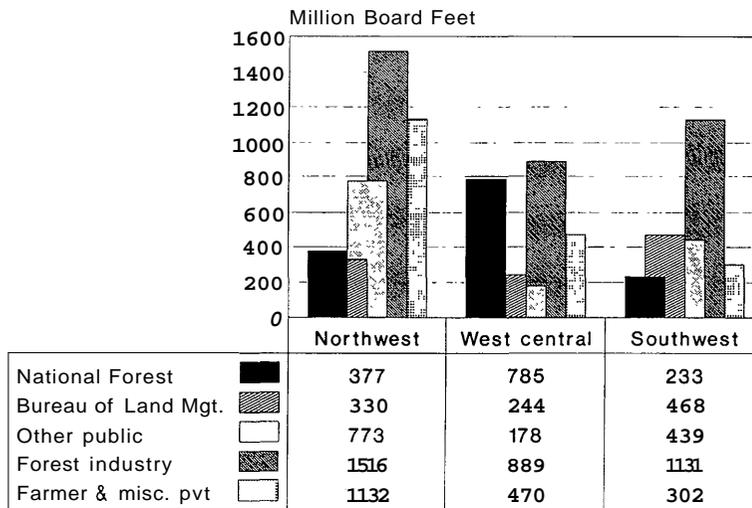


Figure 6—Red alder sawtimber volume in western Oregon by area and owner class, Scribner rule.

Owner class by county

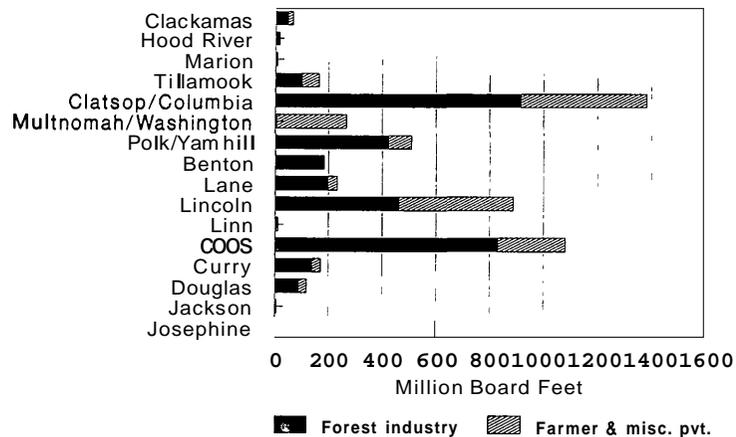


Figure 7—Red alder sawtimber volume in western Oregon by county and private owner class, January 1, 1987, Scribner rule.

Table 7—Red alder sawtimber volume on private timberland in western Oregon by owner class and county, Scribner rule, January 1, 1987

Area and county	Forest industry		Farmer and miscellaneous private	
	Volume	Confidence limits (68% probability)	Volume	Confidence limits (68% probability)
<i>Thousand board feet</i>				
Northwest:				
Clackamas	46,200	±32,700	179,800	±45,600
Hood River	15,000	±15,000	—	—
Marion	5,300	±5,300	20,000	±14,400
Tillamook	98,700	±55,600	65,200	±32,100
Clatsop/ Columbia	917,000	±198,800	465,600	±125,600
Multnomah/ Washington	49,900	±49,900	262,000	±108,100
Polk/Yamhill	422,300	±227,200	86,400	±61,600
West-central:				
Benton	180,600	±105,100	30,200	±21,300
Lane	196,600	±69,700	35,700	±16,600
Lincoln	462,100	±187,800	426,100	±211,900
Linn	49,500	±21,900	6,100	±6,100
Southwest:				
coos	832,200	±180,000	248,500	±52,300
Curry	137,800	±73,500	34,400	±16,200
Douglas	87,900	±46,500	30,600	±17,700
Jackson	6,400	±6,400	—	—
Josephine	—	—	—	—

Diameter Distribution

Largediameter red alder trees of good form fetch a premium price on the market. In western Oregon, slightly more than one-third of the red alder sawtimber volume in non-Federal ownership is in trees 18.0 inches or larger d.b.h. (fig. 8). Trees from 12.0 through 16.0 inches d.b.h. make up the remaining two-thirds of the volume.

The diameter classes shown in figure 5 are 2-inch classes and include trees in the next lower diameter class to the upper limit of the named class; for instance, the 12.0-inch diameter class includes trees from 11.0 inches to 12.9 inches.

For those seeking large red alder trees to harvest, there is no one area of western Oregon or one ownership where large trees dominate (figs. 9 and 10). There is uniformity by size of trees, between both areas and owner classes. Between 60 and 67 percent of the total sawtimber volume, regardless of area or owner, is in trees from 12.0 inches through 16.0 inches d.b.h.

Red alder trees are fairly uniform in size regardless of locale or owner. Red alder grows on good sites, so whether red alder grows in northwest, west-central, or southwest Oregon or in other public, industry, or farmer and miscellaneous private ownership, growth rates are similar. Red alder sawtimber grows at low elevations, and these areas are likely to be logged early and at about the same time. The potential for size differences within comparable sites is limited for red alder because it is a short-lived species.

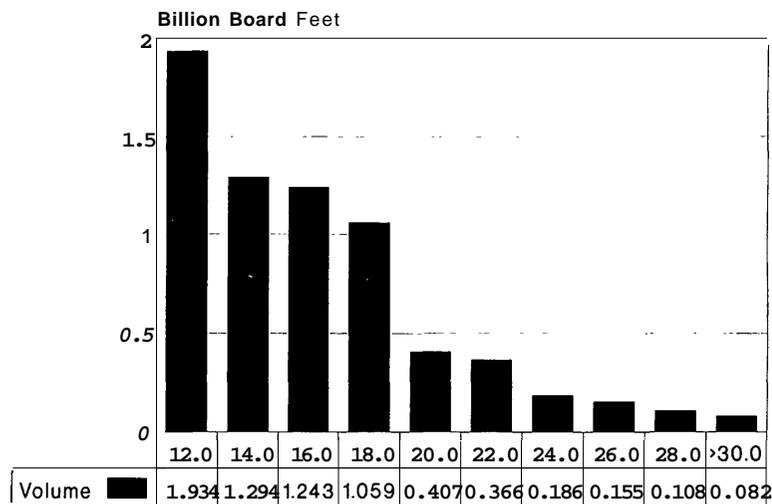


Figure 8—Distribution by diameter class of red alder sawtimber volume in western Oregon in non-Federal ownership, January 1, 1987, Scribner rule.

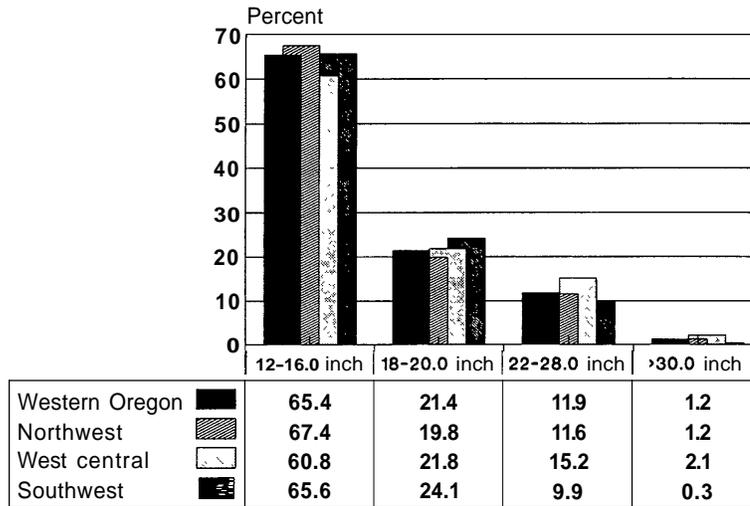


Figure 9—Distribution by diameter class and area of red alder sawtimber volume in western Oregon in non-Federal ownership, January 1, 1987, Scribner rule.

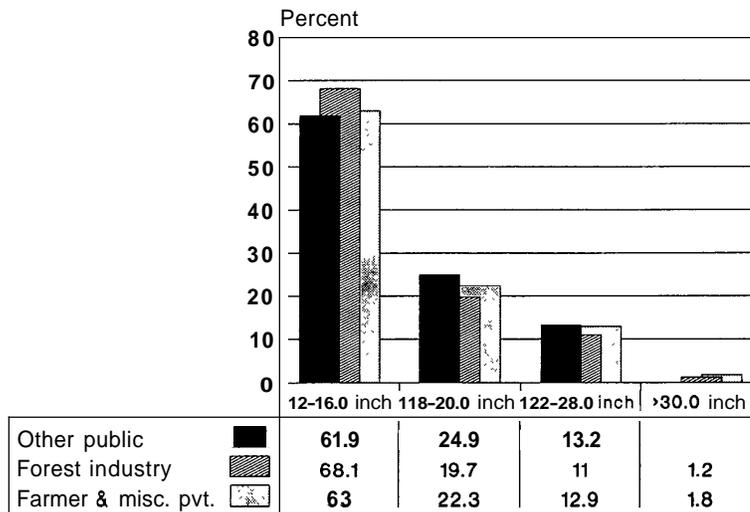


Figure 10—Distribution by diameter class and owner class of red alder sawtimber volume in western Oregon in non-Federal ownership, January 1, 1987, Scribner rule.

Harvesting

The timber industry in western Oregon is oriented to harvesting softwoods; until the recent increase in the demand for red alder, hardwoods were generally considered of little value. Even with the increased demand for red alder, the harvest of red alder remains a minor part of the total harvest and a small proportion of the total red alder sawtimber inventory. In 1987, the volume of red alder harvested was 98.3 million board feet or 1.7 percent of a total harvest of 5,866 million board feet in western Oregon, or 1.1 percent of the estimated 9.3 billion board feet of red alder inventoried in western Oregon.

Composition of Stands Containing Red Alder

Sixty percent of the total volume of red alder removed from non-Federal timberland came from industry-owned timberland, 20 percent from farm and miscellaneous privately owned forests, and the remaining 20 percent from State timberland. Eighty percent came from clearcutting, with most coming from the harvest of softwood stands; the remaining 20 percent came from salvage harvesting and cutting for firewood.

Red alder is the dominant hardwood species harvested; in 1987 red alder was 84.3 percent of the total volume of hardwoods harvested.

Red alder, an invasive species, grows in pure stands or in mixture with other species. The composition of stands where red alder grows is an important determinant of its availability. Where red alder is found in pure stands, it can occur in situations where logging is not economic. Where it is found growing with softwoods, it is secondary in importance and management; harvesting of these stands is primarily in terms of the softwood species (fig. 11). Maturity of softwood determines when these mixed stands are harvested, so harvesting of red alder becomes a function of the softwood harvest schedule.

In general, economies of scale make the greater concentration of red alder in stands with conifers more attractive to utilize. As figure 12 shows, 36 percent of the red alder grows in stands with at least 5,000 board feet per acre of red alder Sawtimber and at least 5,000 board feet of softwood sawtimber. Only 18 percent of the red alder sawtimber occurs in stands having less than 5,000 board feet per acre of red alder and less than 5,000 board feet of softwood sawtimber.

In both northwest and west-central Oregon, most red alder sawtimber volume occurs in stands with appreciable softwood volume (figs. 13 and 14). In northwest Oregon, 58 percent of the red alder volume is in stands having at least 5,000 board feet of softwoods; in west-central Oregon, it's 73 percent. Southwest Oregon (fig. 15) differs from the other west-side areas by having 51 percent of the red alder sawtimber volume in stands having less than 1,000 board feet of accompanying softwoods.



Figure 11 — Red alder frequently grows in mixture with softwoods.

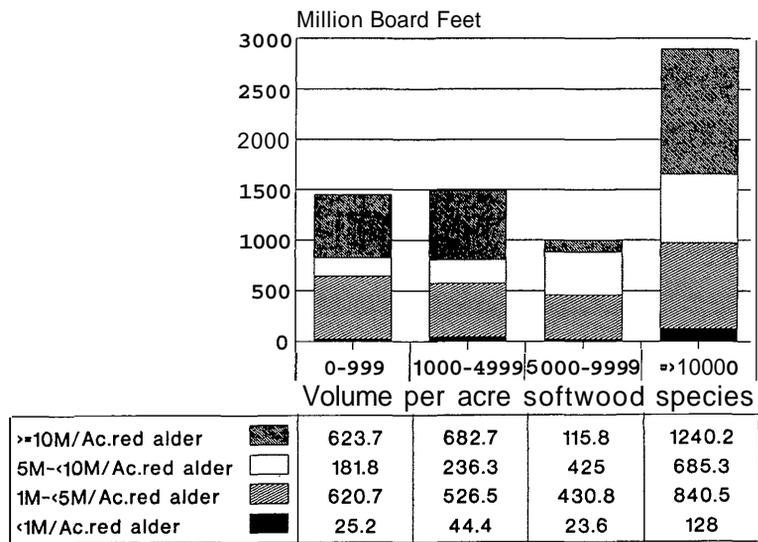


Figure 12—Red alder sawtimber volume in western Oregon on non-Federal timberland by volume per acre class of red alder and softwoods, January 1, 1987, Scribner rule.

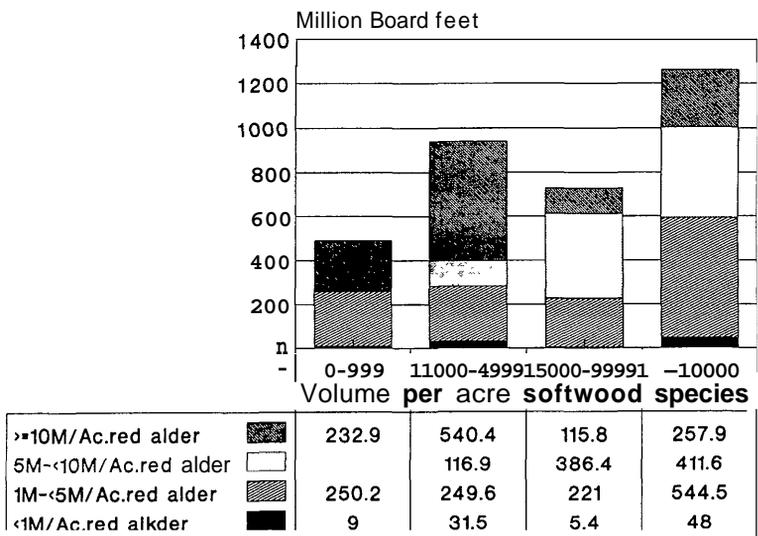
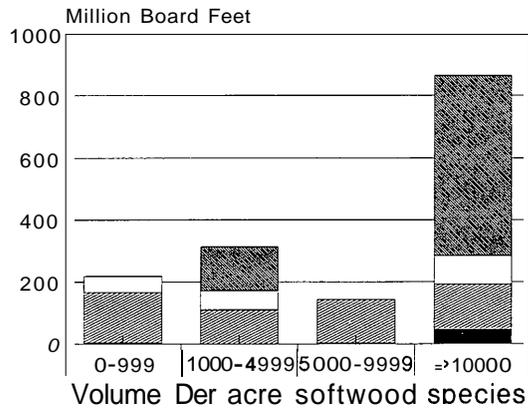
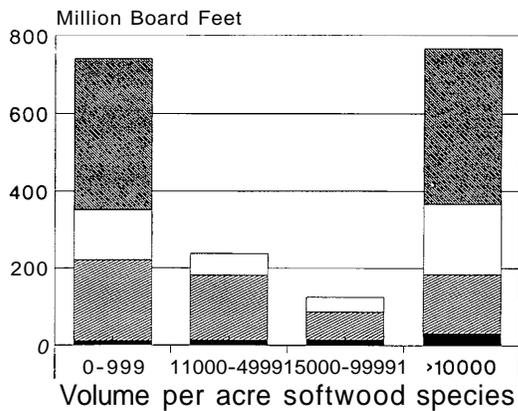


Figure 13—Red alder sawtimber volume in northwest Oregon on non-Federal timberland by volume per acre class of red alder and softwoods, January 1, 1987, Scribner rule.



Volume Der acre softwood species	>=10M/Ac.red alder	5M-<10M/Ac.red alder	1M-<5M/Ac.red alder	<1M/Ac.red alder
0-999	142.3	53	160.5	4.5
1000-4999	142.3	61.3	109.1	3.6
5000-9999	581.1	91.1	144.1	48.3
>=10000	581.1	91.1	144.1	48.3

Figure 14—Red alder sawtimber volume in west-central Oregon on non-Federal timberland by volume per acre class of red alder and softwoods, January 1, 1987, Scribner rule.



Volume per acre softwood species	>=10M/Ac.red alder	5M-<10M/Ac.red alder	1M-<5M/Ac.red alder	<1M/Ac.red alder
0-999	390.9	128.8	210.1	11.7
11000-49991	390.9	58.2	167.8	13
15000-99991	401.1	38.6	70.9	14.7
>10000	401.1	182.6	151.9	31.7

Figure 15—Red alder sawtimber volume in southwest Oregon on non-Federal timberland by volume per acre class of red alder and softwoods, January 1, 1987, Scribner rule.

Tractor and Cable Logging

The less steep the timberland is, the lower the harvesting costs are, and the less it costs to remove timber from the woods and move it to processing centers. Reasons for this include less expensive road building and maintenance, reduced felling costs, lower breakage, and less capital investment in heavy equipment. In western Oregon, red alder occurs more commonly on the flatter timberland, which makes logging easier and harvesting costs lower.

In western Oregon, **81** percent of the red alder sawtimber volume on non-Federal ownerships is on slopes of 40 percent or less, which are generally considered the upper limit for tractor logging (figs. **16** and **17**). Fifty-six percent of the red alder sawtimber volume occurs on slopes of 20 percent or less. The **19** percent of the volume on slopes over 40 percent is usually logged by cable or helicopter. The steepness of the terrain where red alder sawtimber occurs varies little among areas in western Oregon. Between **78** and **87** percent of red alder sawtimber volume occurs on areas that can be tractor logged.

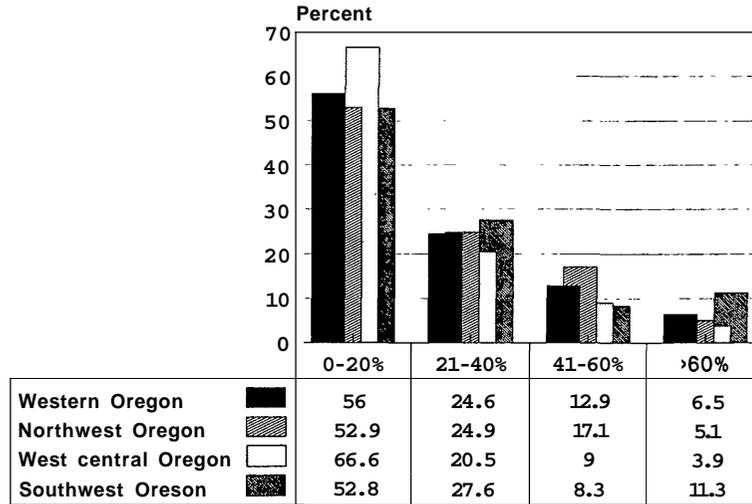


Figure 16—Distribution by slope class and area of red alder sawtimber volume in western Oregon on non-Federal ownership, January 1, 1987, Scribner rule.

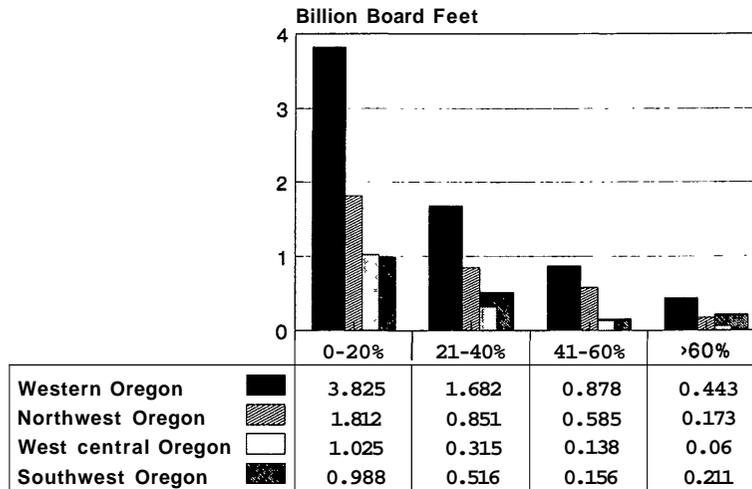


Figure 17—Red alder sawtimber volume in western Oregon on non-Federal ownership by slope class and area, January 1, 1987, Scribner rule.

Riparian Areas

Maintenance of vegetation on riparian areas has long been recognized as important to stream protection. Vegetative cover protects streambanks from erosion and minimizes increases in stream temperature. The protection is important where streams are used by many fish for spawning, rearing, or migration.

In 1987, the Board of Forestry approved rules providing for protection of riparian areas (Oregon State Department of Forestry 1988b). These rules require that enough hardwood and softwood canopy protection be left to provide fish and wildlife habitat, streambank protection, and stream temperature regulation. Riparian management area widths range from 25 to 100 feet on each side of class I streams. For class II streams and class II special protection waters, vegetative buffers of various widths necessary to protect downstream class I streamwater quality are to be maintained. Riparian management widths for natural lakes differ by the size of the lake.

An analysis made by the State Forester states that about 11 percent of the total hardwood sawtimber volume is located within class 1 riparian areas in western Oregon and about 5 to 7 percent of the total hardwood volume is left as riparian area cover to meet State harvesting regulations (Oregon State Department of Forestry 1988a and fig. 18). No similar evaluation has been made of the impact of riparian area management on class II streams on non-Federal lands.



Figure 18—Riparian areas contain 11 percent of the total hardwood sawtimber volume in western Oregon.

Height, Diameter, and Taper

To plan any timber harvesting activity, it is important to know how many logs will be produced and their dimensions. Logging and hauling costs and potential markets depend to differing degrees on tree and log size. If diameter, height, and taper are known, then data on number of logs, length of logs, and their small-end diameters can be developed.

Tree heights first need to be obtained. For our example, average tree heights by diameter class were developed from trees measured during the inventory by the Pacific Northwest Research Station of the non-Federal timberland (fig. 19). Tree heights increased rapidly as diameters increased to about 18 inches; thereafter, height increased slowly from 84 feet to a maximum of 93 feet.

Taper tables (Curtis and others 1968) show the taper for a range of red alder trees of different d.b.h.'s and heights; from them, a generalized taper table was prepared to show the diameter inside bark at various heights for the sample inventory trees (table 2 and fig. 20). For a tree 16 inches d.b.h. and 80 feet tall with a desired small-end log diameter of 9.8 inches, a log of 41.12 feet will be produced. Remaining in the tree will be an additional 24.88 feet to a small-end diameter of 4.6 inches. With diameter and height known and the use of taper tables, the length and dimensions of red alder logs can be produced.

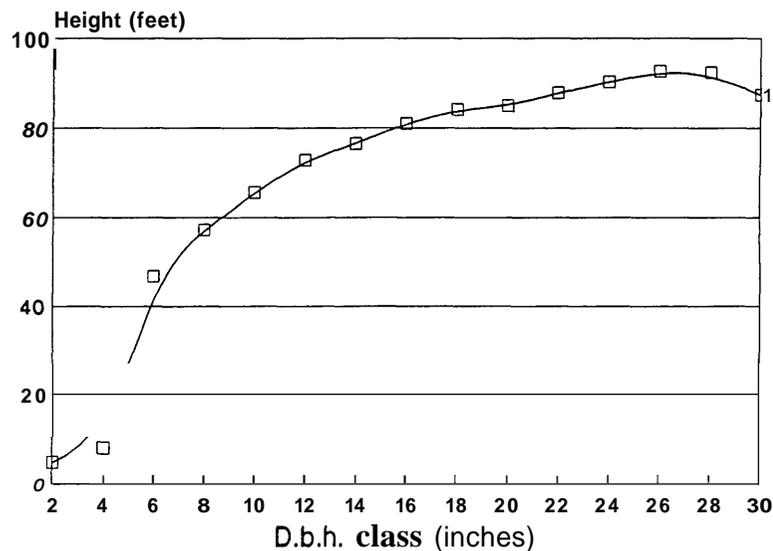


Figure 19—Height and diameter of red alder trees measured in the inventory of non-Federal timberland in western Oregon, January 1, 1987, Scribner rule.

Table 2—Taper table for red alder trees of average height in western Oregon, based on diameter outside bark at breast height (d.b.h.) and total height'

D.b.h.	Total tree height	Diameter inside bark at small end by height above stump (feet)							
		8.25	16.50	24.75	33.00	41.12	49.50	57.75	66.00
<i>Inches</i>	<i>Feet</i>	----- <i>Inches</i> -----							
12	70	10.8	10.0	9.0	7.9	6.6	5.2	4.4	—
14	80	12.5	11.8	10.9	9.8	8.7	7.3	5.8	4.1
16	80	14.2	13.8	12.3	11.1	9.8	8.2	6.5	4.6
18	80	15.9	14.8	13.6	12.3	10.8	9.1	7.2	5.0
20	90	17.5	16.5	15.4	14.2	12.9	11.3	9.6	7.7
22	90	19.2	17.9	16.8	15.4	13.9	12.2	10.4	8.3
24	90	20.7	19.4	18.0	26.5	14.9	13.1	11.1	8.9

Values are diameters inside bark in inches, at indicated height above stump.

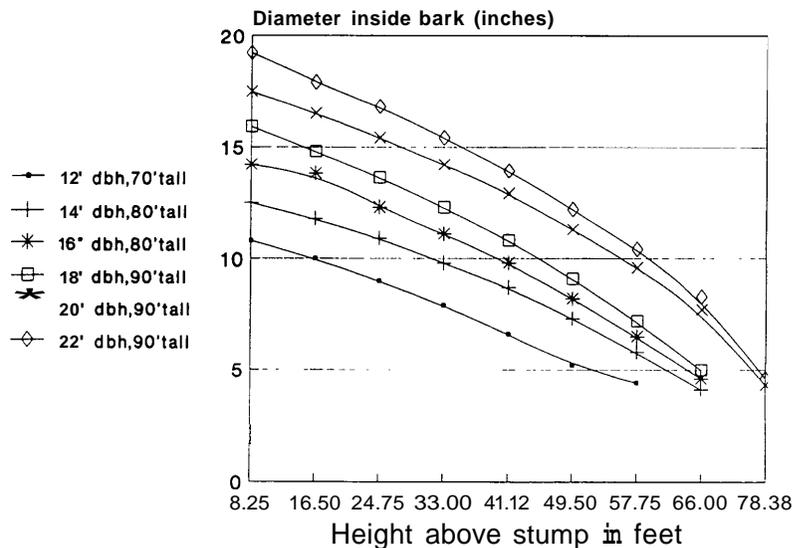


Figure 20—Estimated length of the tree bole (above stump) to various diameters inside bark for red alder trees of average diameter and height, inventory of non-Federal timberland in western Oregon, January 1, 1987.

Conclusion

There is considerable diversity in the ownership of red alder. Private owners with 5.4 billion board feet of red alder are the principal owner group. Forest industry has 3.5 billion board feet and miscellaneous private owners 1.9 billion board feet. Red alder in public ownership totals 3.8 billion board feet, of which 1.4 billion board feet is in National Forests, 1.0 billion board feet on Bureau of Land Management lands, and 1.4 billion board feet mainly in State ownership.

With 57 percent of the red alder sawtimber volume in stands having at least 5,000 board feet of softwoods, the harvest of red alder will have to be closely coordinated with owners of mixed stands. Many of these owners historically have been oriented toward management and usage of the softwood portion of the stands.

The 43 percent of the red alder sawtimber volume in stands having less than 5,000 board feet of softwoods is less readily available. The high costs of logging the low-volume stands, which are typical of hardwood stands, makes their profitable management less likely.

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This report presents statistics on the present distribution and ownership of merchantable stands of red alder in western Oregon and the character of these stands as they affect harvesting opportunities.

Keywords: Red alder (western Oregon), western Oregon timber resources (red alder), hardwoods (red alder).

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