U.S. Forest Service
Resource Report PNW-1

January 1963

1961 WASHINGTON LOG PRODUCTION

by John H. Beuter

Only the State and Indian ownerships showed increased log production in 1961 as total log production in Washington dropped 291 million board feet, or 6.1 percent, compared with 1960.

This was the second year of decreased production since the most recent peak of 1959. The decrease from 1960 to 1961 was twice that from 1959 to 1960.

The most significant drop from 1960's production was the 348 million board feet on private lands. This reduction was proportionately larger in eastern Washington where the private cut dropped 20 percent compared to 10.3 percent in western Washington.

National Forest ownership showed a negligible decrease of 873,000 board feet, as the 5.8 percent increase in production on eastern Washington National Forests was not enough to balance the 1.8 percent decrease on western Washington National Forests. Despite the overall decrease in production, National Forests' proportion of the total Washington cut increased from 25.0 percent in 1960 to 26.6 percent in 1961.

Table 1.--Comparison of Washington log production in 1960 and 1961 and net change, by ownership

Ownership	Year				Net change in production 1960-1961	
	1960		1961			
	M bd. ft.	Percent	M bd. ft.	Percent	M bd. ft.	Percent
Private	3,000,124	63.4	2,652,237	59.8	-347,887	-11.6
State	271,992	5.8	302,676	6.8	+30,684	+11.3
Bureau of Land Management	11,963	0.3	10,037	0.2	-1,926	-16.1
National Forest	1,180,976	25.0	1,180,103	26.6	-873	-0.1
Indian lands	255,859	5.4	286,843	6.5	+30,984	+12.1
Other Federal	5,866	0.1	3,834	0.1	-2,032	-34.6
Total	4,726,780	100.0	4,435,730	100.0	-291,050	-6.1

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
R. W. Cowlin, Director
Portland, Oregon

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

Table 2.--Timber Harvest by Ownership in State of Washington, 1961[1/]

(In thousands of board feet, Scribner log rule)

State and county	Private		State		Bureau of Land Mgmt.		National Forests		Indian lands		Other Federal		Total production		
	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live & dead
Western Washington															
Clallam	166,510	8,999	27,121	1,221	--	--	49,008	4,684	263	--	274	--	243,176	14,904	258,080
Clark	34,270	42	373	--	--	--	--	--	--	--	--	--	34,643	42	34,685
Cowlitz	297,984	13,106	70,831	439	--	--	25,562	666	--	--	--	--	394,377	14,211	408,588
Grays Harbor	176,665	17,387	3,521	326	--	--	75,009	3,822	114,342	2,359	--	--	369,537	23,894	393,431
Island	17,174	46	28	--	--	--	--	--	--	--	--	--	17,202	46	17,248
Jefferson	113,414	2,798	61,727	875	--	--	45,775	3,032	3,682	--	148	--	224,746	6,705	231,451
King	183,081	2,293	10,288	33	--	--	17,697	--	--	--	--	--	211,066	2,326	213,392
Kitsap	27,539	611	444	--	--	--	--	--	178	--	--	--	28,161	611	28,772
Lewis	243,193	13,900	17,347	316	--	--	118,567	6,316	--	--	585	--	379,692	20,532	400,224
Mason	82,569	485	3,591	--	--	--	36,576	1,984	--	--	577	--	123,313	2,469	125,782
Pacific	298,495	7,144	19,974	17	--	--	--	--	--	--	1,590	--	320,059	7,161	327,220
Pierce	222,357	1,936	14,808	124	--	--	29,506	3,879	--	--	585	--	267,256	5,939	273,195
San Juan	5,597	--	--	--	--	--	--	--	--	--	--	--	5,597	--	5,597
Skagit	63,606	2,899	10,937	220	--	--	53,047	1,089	849	--	--	--	128,439	4,208	132,647
Skamania	79,742	505	16,602	1,242	--	--	235,754	7,005	--	--	--	--	332,098	8,752	340,850
Snohomish	75,794	3,269	13,043	30	103	--	109,172	3,761	273	--	--	75	198,385	7,135	205,520
Thurston	38,685	168	1,689	--	--	--	--	--	--	--	--	--	40,374	168	40,542
Wahkiakum	92,235	1,044	2,247	125	--	--	--	--	--	--	--	--	94,482	1,169	95,651
Whatcom	39,005	441	5,842	--	--	--	57,700	2,035	292	--	--	--	102,839	2,476	105,315
Total	2,257,915	77,073	280,413	4,968	103	--	853,373	38,273	119,879	2,359	3,759	75	3,515,442	122,748	3,638,190
Eastern Washington															
Adams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Asotin	2,336	--	--	--	--	--	--	--	--	--	--	--	2,336	--	2,336
Benton	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chelan	8,394	--	911	--	355	--	58,882	1,810	--	--	--	--	68,542	1,810	70,352
Columbia	13,846	4,568	--	96	--	--	1,701	19	--	--	--	--	15,547	4,683	20,230
Douglas	1,252	--	--	--	--	--	--	--	--	--	--	--	1,252	--	1,252
Ferry	10,316	--	20	--	1,721	--	24,082	144	67,616	--	--	--	103,755	144	103,899
Franklin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Garfield	757	3,500	--	--	--	--	1,596	33	--	--	--	--	2,353	3,533	5,886
Grant	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Kittitas	87,771	217	2,450	50	--	--	37,492	1,046	--	--	--	--	127,713	1,313	129,026
Klickitat	51,445	60	3,710	47	--	--	431	--	7,612	--	--	--	63,198	107	63,305
Lincoln	2,801	--	560	--	--	--	--	--	--	--	--	--	3,361	--	3,361
Okanogan	20,759	--	6,461	161	5,136	--	54,758	1,948	7,786	--	--	--	94,900	2,109	97,009
Pend Oreille	11,678	2	--	--	--	--	50,740	56	--	--	--	--	62,418	58	62,476
Spokane	15,038	50	163	--	--	--	--	--	--	--	--	--	15,201	50	15,251
Stevens	47,307	--	1,133	--	2,722	--	22,011	268	6,791	--	--	--	79,964	268	80,232
Walla Walla	5,579	--	--	--	--	--	--	--	--	--	--	--	5,579	--	5,579
Whitman	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yakima	28,141	1,432	236	1,297	--	--	30,439	1,001	65,170	9,630	--	--	123,986	13,360	137,346
Total	307,420	9,829	15,644	1,651	9,934	--	282,132	6,325	154,975	9,630	--	--	770,105	27,435	797,540
Total Washington	2,565,335	86,902	296,057	6,619	10,037	--	1,135,505	44,598	274,854	11,989	3,759	75	4,285,547	150,183	4,435,730

1/ Includes volume in logs, poles, piling, cordwood, shingle bolts, etc. All production statistics, with exception of National Forests, compiled by State Division of Forestry.

2/ Includes snags and down material existing prior to initial logging. Salvage of this material does not constitute drain on the volume of the forest inventory of live trees.

U.S. Forest Service
Resource Bulletin PNW-2

April 1963

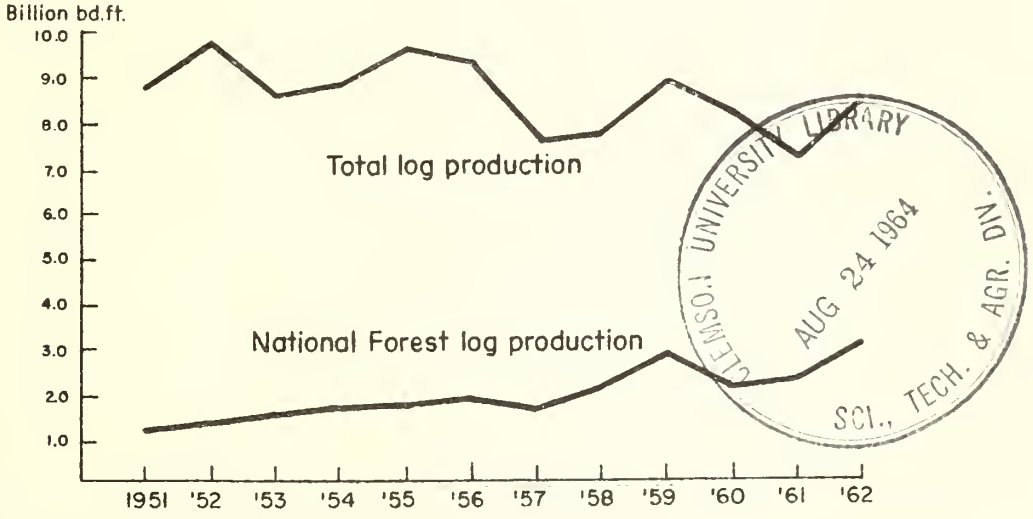
1962 OREGON LOG PRODUCTION

by M. E. Metcalf

Log production in Oregon for 1962 reached 8.5 billion board feet, the highest since 1959, with 41 percent of it coming from forest industry-owned lands. The proportion of the total cut coming from all private lands fell to 48 percent, the lowest ever, while the proportion from National Forest lands rose to 36 percent, the highest ever.

Total production for 1962 rose 1.08 billion board feet over 1961 due to increased production from all ownerships except State. Total production from National Forest lands reached 3.07 billion board feet, the highest ever, an increase of 633 million board feet over 1961. Production rose 244 million board feet on private lands and 209 million board feet on Bureau of Land Management lands.

The early release of this data as well as the addition of information on the production from lands owned by forest industry was made possible by the recent adoption by the State Forester's office of electronic data processing methods for compiling log harvest data.



Oregon log production 1951-62

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director Portland, Oregon

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

Table 1.--Log production by ownership in State of Oregon, 1962[1/]

(In thousands of board feet, Scribner log rule)

State and county	Private[2/]			Bureau of Land Mgt.[3/]	National Forest[4/]			Indian[5/]			State[2/]	Total production
	Forest industry	Other	Total		Live	Dead	Total	Live	Dead	Total		
Western Oregon												
Benton	22,830	21,793	44,623	33,001	5,980	120	6,100	--	--	--	4,376	88,100
Clackamas	108,556	11,393	119,949	38,314	200,700	7,900	208,600	--	--	--	175	367,038
Clatsop	206,050	6,049	212,099	--	--	--	--	--	--	--	24,340	236,439
Columbia	15,486	21,183	36,669	--	--	--	--	--	--	--	--	36,669
Coos	307,841	27,053	334,894	128,475	33,700	--	33,700	--	--	--	25,910	522,979
Curry	327,809	53,970	381,779	8,511	95,000	5,700	100,700	--	--	--	200	491,190
Douglas	517,057	81,260	598,317	340,196	329,100	24,400	353,500	--	--	--	26,686	1,318,699
Hood River	15,080	4,215	19,295	--	53,900	100	54,000	--	--	--	--	73,295
Jackson	199,466	17,796	217,262	74,552	140,940	15,660	156,600	--	--	--	--	448,414
Josephine	23,615	14,548	38,163	115,237	57,310	3,490	60,800	--	--	--	--	214,200
Lane	756,300	47,888	804,188	168,438	705,300	26,100	731,400	--	--	--	5,055	1,709,081
Lincoln	193,684	22,680	216,364	13,524	147,990	2,810	150,800	--	--	--	7,200	387,888
Linn	287,301	41,292	328,593	51,620	225,700	12,000	237,700	--	--	--	--	617,913
Marion	4,100	5,610	9,710	11,159	76,700	1,500	78,200	--	--	--	8,300	107,369
Multnomah	400	9,019	9,419	151	23,250	1,350	24,600	--	--	--	--	34,170
Polk	53,254	6,034	59,288	28,289	590	10	600	--	--	--	516	88,693
Tillamook	95,396	6,858	102,254	42,268	24,480	420	24,900	--	--	--	62,883	232,305
Washington	6,534	10,905	17,439	4,671	--	--	--	--	--	--	1,966	24,076
Yamhill	6,005	1,078	7,083	26,089	--	--	--	--	--	--	--	33,172
Total	3,146,764	410,624	3,557,388	1,084,495	2,120,640	101,560	2,222,200	--	--	--	167,607	7,031,690
Eastern Oregon												
Baker	--	6,540	6,540	5,858	58,860	40	58,900	--	--	--	--	71,298
Crook	12,383	1,134	13,517	2,464	94,750	4,150	98,900	--	--	--	--	114,881
Deschutes	10,266	613	10,879	1,610	58,530	1,870	60,400	--	--	--	--	72,889
Gilliam	--	--	--	--	--	--	--	--	--	--	--	--
Grant	16,843	20,737	37,580	1,784	131,670	2,430	134,100	--	--	--	--	173,464
Harney	--	--	--	14	49,120	980	50,100	--	--	--	--	50,114
Jefferson	2,305	--	2,305	--	42,830	1,370	44,200	10,904	201	11,105	--	57,610
Klamath	121,658	14,290	135,948	7,367	102,260	3,140	105,400	--	--	--	--	248,715
Lake	70,786	2,766	73,552	--	91,110	2,390	93,500	--	--	--	--	167,052
Malheur	--	--	--	--	--	--	--	--	--	--	--	--
Morrow	22,101	1,558	23,659	--	20,520	280	20,800	--	--	--	--	44,459
Sherman	--	--	--	--	--	--	--	--	--	--	--	--
Umatilla	50,253	60,833	111,086	--	32,810	590	33,400	--	--	--	--	144,486
Union	13,107	22,195	35,302	--	67,700	--	67,700	11,779	--	11,779	--	114,781
Wallowa	28,577	26,606	55,183	440	27,300	--	27,300	--	--	--	--	82,923
Wasco	14,640	10,180	24,820	5	39,180	3,120	42,300	30,143	--	30,143	1,380	98,648
Wheeler	8,302	3,121	11,423	5	15,180	520	15,700	--	--	--	--	27,128
Total	371,221	170,573	541,794	19,547	831,820	20,880	852,700	52,826	201	53,027	1,380	1,468,448
Total Oregon	3,517,985	581,197	4,099,182	1,104,042	2,952,460	122,440	3,074,900	52,826	201	53,027	168,987	8,500,138

1/ Includes volume removed as logs but not volume removed for poles, piling, and woodcutting operations.

2/ Compiled by State Forester. "Other" private includes small volume from county and municipal lands.

3/ Compiled by Bureau of Land Management.

4/ Compiled by U.S. Forest Service.

5/ Compiled by U.S. Bureau of Indian Affairs.

Prepared by Division of Forest Economics Research, Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture.

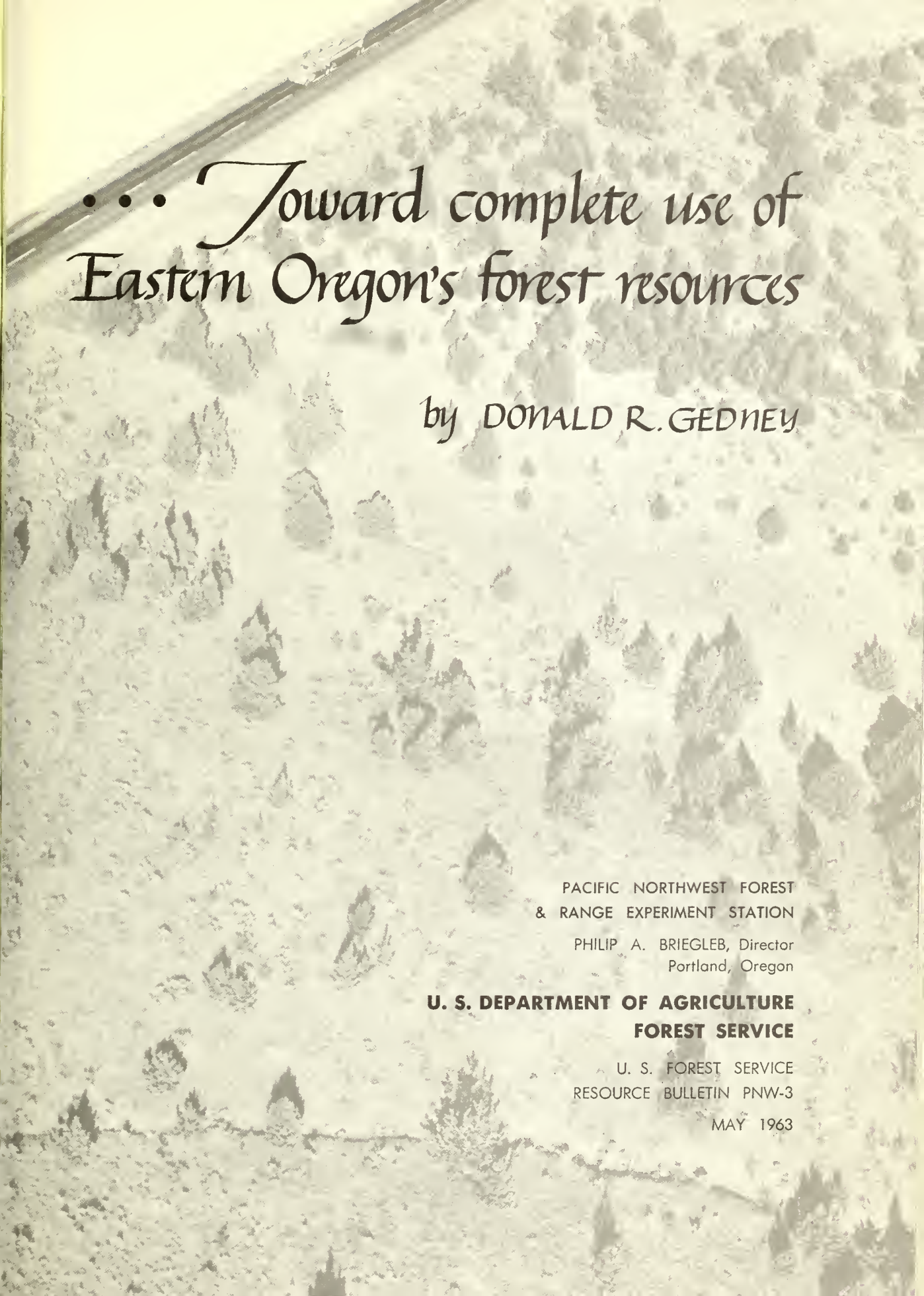
. . . toward complete use of Eastern Oregon's forest resources

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN PNW-3
MAY 1963

- Eastern Oregon contains 11½ million acres of forest land capable of yielding repeated crops of timber products.
- The 125 billion board feet of timber currently estimated to be growing on the commercial forest land is more than shown by any previous inventory.
- Forest industries are a very important part of eastern Oregon's economy; in the future these and new forest industries will be the basis for much of its economic growth.
- The manufacture of lumber is the major forest industry with 97 per cent of all harvested logs processed in sawmills.
- Eastern Oregon lumber serves distant markets and is facing increasingly strong competition from other products and other lumber-producing areas.
- Future growth of the forest economy of eastern Oregon will necessitate the production of many kinds of usable products. This will require a forest industry capable of increased product refinement and diversity.
- This growth will also depend upon an adequate source of raw material. Eastern Oregon now has such a source of raw material in its many species and sizes of trees.

FURTHERMORE, eastern Oregon forests can provide even more raw material in the future if a program of intensive management is undertaken. Such a program will require greater use of smaller size material and of secondary species than has been the case in the past.



. . . Toward complete use of Eastern Oregon's forest resources

by DONALD R. GEDNEY

PACIFIC NORTHWEST FOREST
& RANGE EXPERIMENT STATION

PHILIP A. BRIEGLEB, Director
Portland, Oregon

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN PNW-3

MAY 1963

PREFACE

Forestry shares with agriculture a dominant role in the economy of eastern Oregon. Eastern Oregon should look to both these resources for future growth and development. This report intends to take just such a look at one of these — the forest resource.

In 1942 the Pacific Northwest Forest and Range Experiment Station published "Forest Resources of the Ponderosa Pine Region"[1] in recognition of the need for a comprehensive report to assist in understanding the problems and opportunities of eastern Oregon. Now, 21 years later, this new report of the forests and forest industries of eastern Oregon will again review the past and explore the opportunities for the future.

During the decade of the 1950's, a reinventory of the forests of eastern Oregon was completed. This includes all the area east of the crest of the Cascades. The new estimate of the timber resources of the area adjusted to January 1, 1963, plus several supplementary studies of the forest industries, provides the foundation for this report. These new resource data in themselves are a valuable contribution to our forestry knowledge of eastern Oregon and are included in the appendix.

The new inventory has given a new perspective and offers encouragement for a bright future. The standing-timber volume now present in eastern Oregon is estimated to be 125 billion board feet;[2] this compares to an original estimate made in 1936 of 96 billion board feet. The difference between the inventory estimates is a result of the better and more complete new inventory. The increase might be considered just a "paper" increase because certain trees were counted in this inventory that were not considered as merchantable in the previous inventory; and, in many instances, more usable volume was credited to each tree. However, it also comes in the face of cutting which has generally exceeded timber growth over the same period of years.

This more accurate appraisal of the volume in all species that make up the forests provides eastern Oregon with the knowledge that a greater timber bank account is available as a basis for development. The importance of the increased volume is illustrated by the fact that the new inventories and the new growth information available from these inventories have already permitted an increase of about 50 percent in the allowable cut on National Forests in eastern Oregon.

This report, however, is based on something more than the new information mentioned above. It is based also on the premise that the future growth and development of eastern Oregon will depend to a very great extent upon the full utilization of the forest resource obtained through product diversification and refinement by the forest industry.

[1] Forest Resources of the Ponderosa Pine Region, Forest Service, U. S. Dept. Agr. Misc. Pub. 490, 99 pp., illus. 1942.

[2] International 1/4-inch rule. All timber-volume estimates in this report are expressed in this rule. Equivalent Scribner volumes can be approximated by dividing the International 1/4-inch volume by 1.091.

Experience in other areas shows that steady growth of a strong forest economy is directly associated with the development of a diversified industry. A single-product economy is limited in its ability to use the entire forest resource and is generally more subject to the whims of the market. Diversification provides the means of using all the potential harvest from the forest and of serving the needs of people on a much broader market.

The ultimate level this development can reach will be largely governed by the ability of the forests of eastern Oregon to produce timber products. In order to realize a high-level sustained output, an active management program geared toward this objective will be necessary. A program of intensive forest management will result in a greatly increased output of forest products, providing a firm basis for the economic growth of eastern Oregon.

This report is not an operating plan. Economic justification is not made for all the public and private investments required. Its purpose is to point up the opportunity for greater yields and the probable direction of effort as the forest lands of eastern Oregon are given more intensive management.

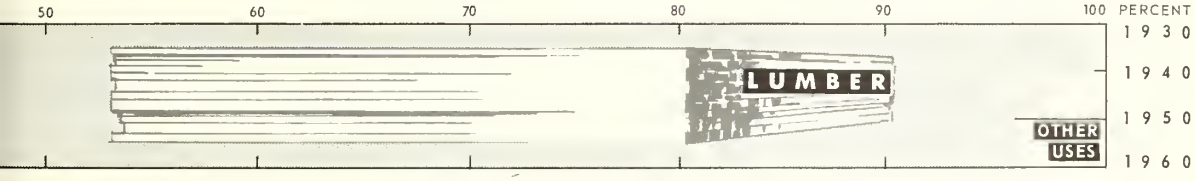
Contents

FORESTS and the Economy of Eastern Oregon

Eastern Oregon's economy is definitely timber oriented. Few other segments of its economy have contributed as much to its development or promise more for future growth. The greatest opportunity for expansion through use of its forest resources lies in the direction of greater product diversification and product refinement.

Eastern Oregon's timber economy has developed around the manufacture of a single product — lumber. This is not a desirable situation because it puts the economy at the mercy of a single market. Little leeway exists for weathering depressed periods by taking advantage of any increase in demand for other products made of wood. Furthermore, if the utilization of the trees is limited to lumber, it is impossible to realize the full potential of the forest.

Softwood sawtimber supplies are increasing in areas nearer to the Nation's principal lumber market. These pose a substantial threat to the demand for eastern Oregon's lumber. Something other than lumber must be marketed if eastern Oregon's forest economy is going to expand. The development of a diversified forest industry capable of making fuller use of the potential of the forest resource can lead the way to such expansion.



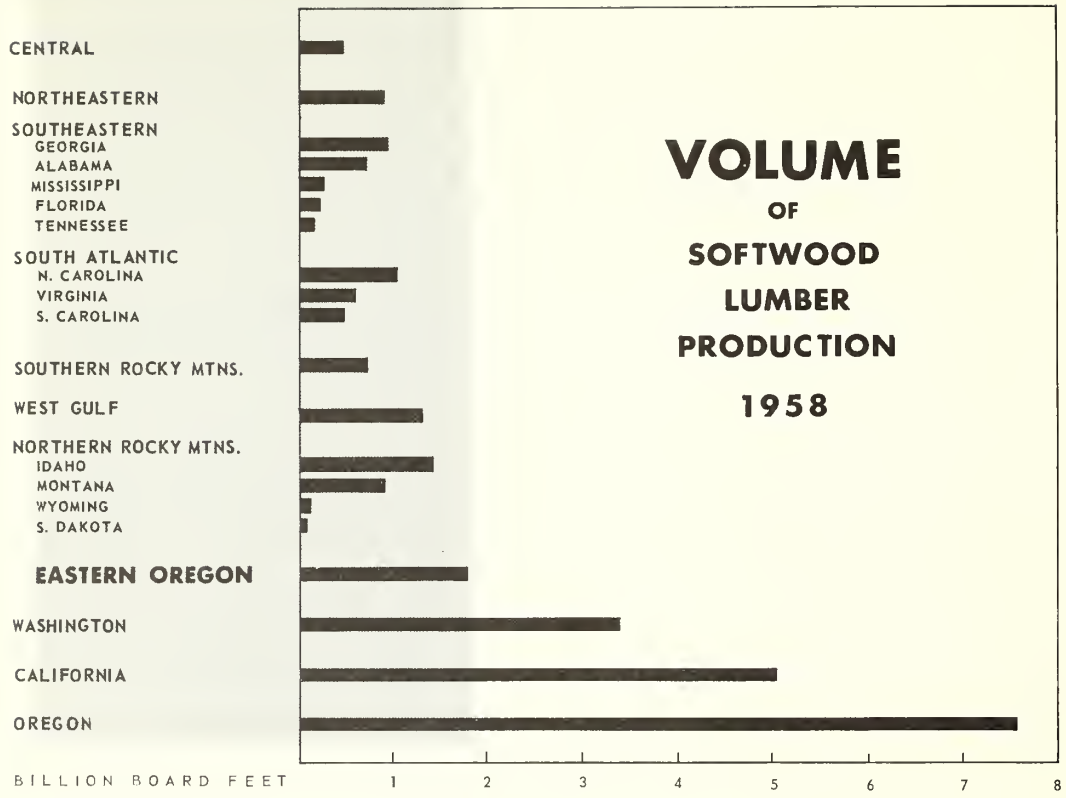
THE EASTERN OREGON ECONOMY

The forest resources of eastern Oregon are not only important locally but also nationally. Eastern Oregon contains 2.4 percent of all the Nation's commercial forest land; it has 4.7 percent of all softwood sawtimber volume; it currently produces 6.0 percent of the country's softwood lumber. This portion of Oregon has more softwood volume than 46 of the other 49 States in the country. The area has a potential of even greater contributions to the Nation's timber wealth than are currently evident (table 1). While this report is concerned with growth and development in the forest industries, let us first examine what can be expected of other parts of the present eastern Oregon economy.

Table 1. — The forest resources of eastern Oregon

Ownership class	Area of commercial forest land	Volume of live sawtimber [1]
	Acres	Board feet
National Forest	7,459,800	93,663,000,000
Other public	654,400	7,472,000,000
Forest industry	1,476,600	13,860,000,000
Farmer and miscellaneous private	1,940,600	10,477,000,000
Total	11,531,400	125,472,000,000

[1] International 1/4-inch rule.



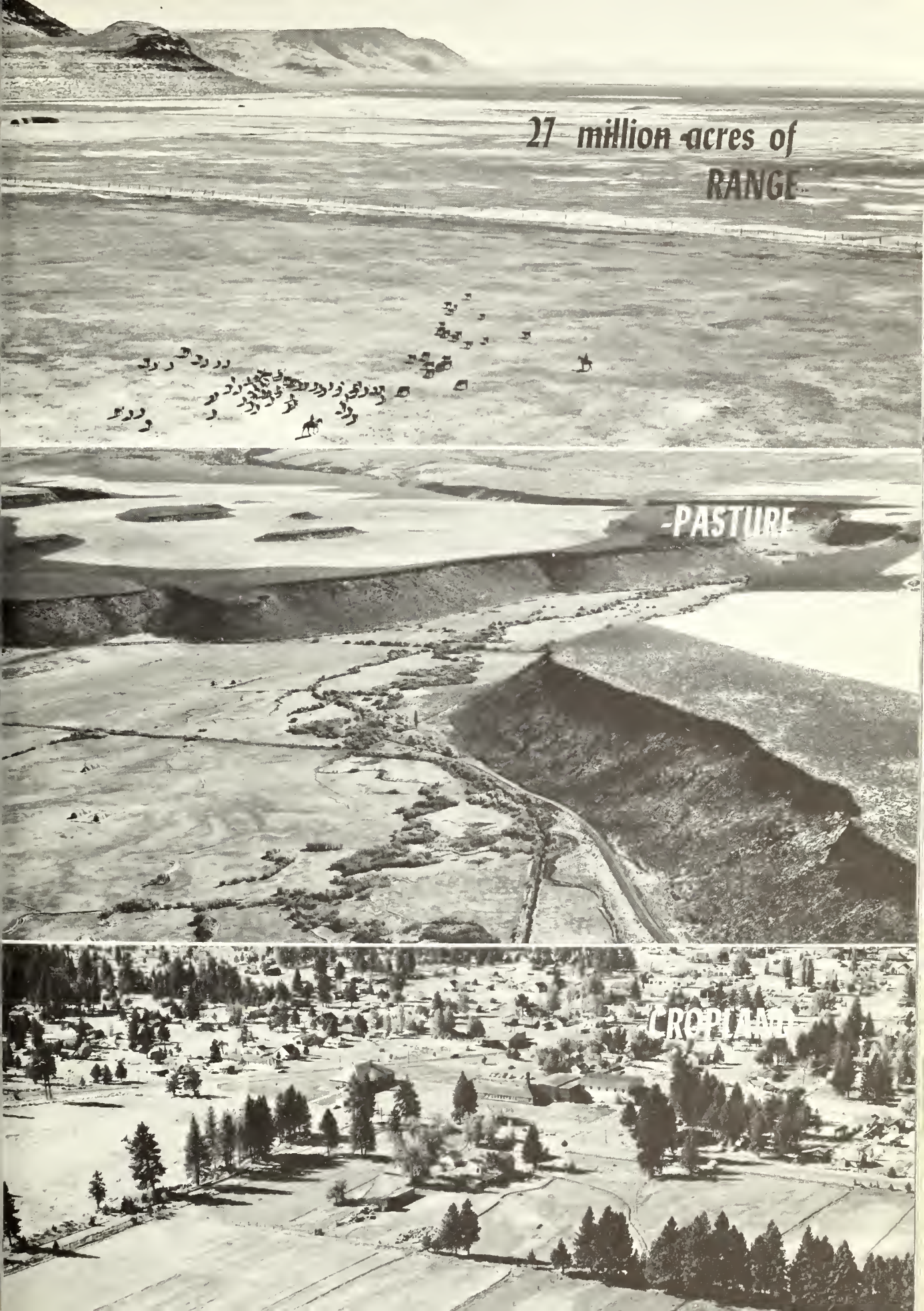
AGRICULTURAL EMPLOYMENT STIMULATED BY PRODUCT REFINEMENT. — A wide variety of agricultural crops is produced in eastern Oregon. These include beef cattle, sheep, sugar beets, alfalfa, fruit, melons, wheat, potatoes, and peas. Some of the major products currently undergo very little local processing. Cattle are largely shipped from eastern Oregon to packing houses or feeder lots for fattening; wheat goes from eastern Oregon to be converted to flour or reshipped to supply increasing world markets. But in recent years there has been an increasing emphasis on processing agricultural crops locally. Now a number of crops is made ready for table use — the pea crop is canned or frozen, potatoes are processed into various shapes and forms, and sugar is manufactured from sugar beets.

The agricultural labor force exclusive of the food processing plants amounted to 22,451 people in 1950 but decreased to 16,136 in 1960. About 2,000 more were employed in the food processing industries.

Agriculture is an important part of the overall eastern Oregon economy.[1] Growth of this important segment of the economy may occur in several ways. Some expansion of the agricultural resource base may occur by adding to the total agricultural cropland supply through irrigation or increasing the productivity of land already in agricultural use. Furthermore, food processing industries may expand in eastern Oregon as the American housewife depends more upon processed or partially prepared foods.

[1] Freemon, Otis W., ond Mortin, Howord H. The Pocific Northwest. Ed. 2, 540 pp., illus. New York: John Wiley & Sons, Inc. 1954.

Oregon Conservotion Needs Committee. Oregon soil ond woter conservotion needs inventory. 80 pp., illus. 1962.


27 million acres of
RANGE
-PASTURE
CROPLAND


Increasing Agricultural Resources
by irrigation
Ochoco Reservoir
by control of sagebrush

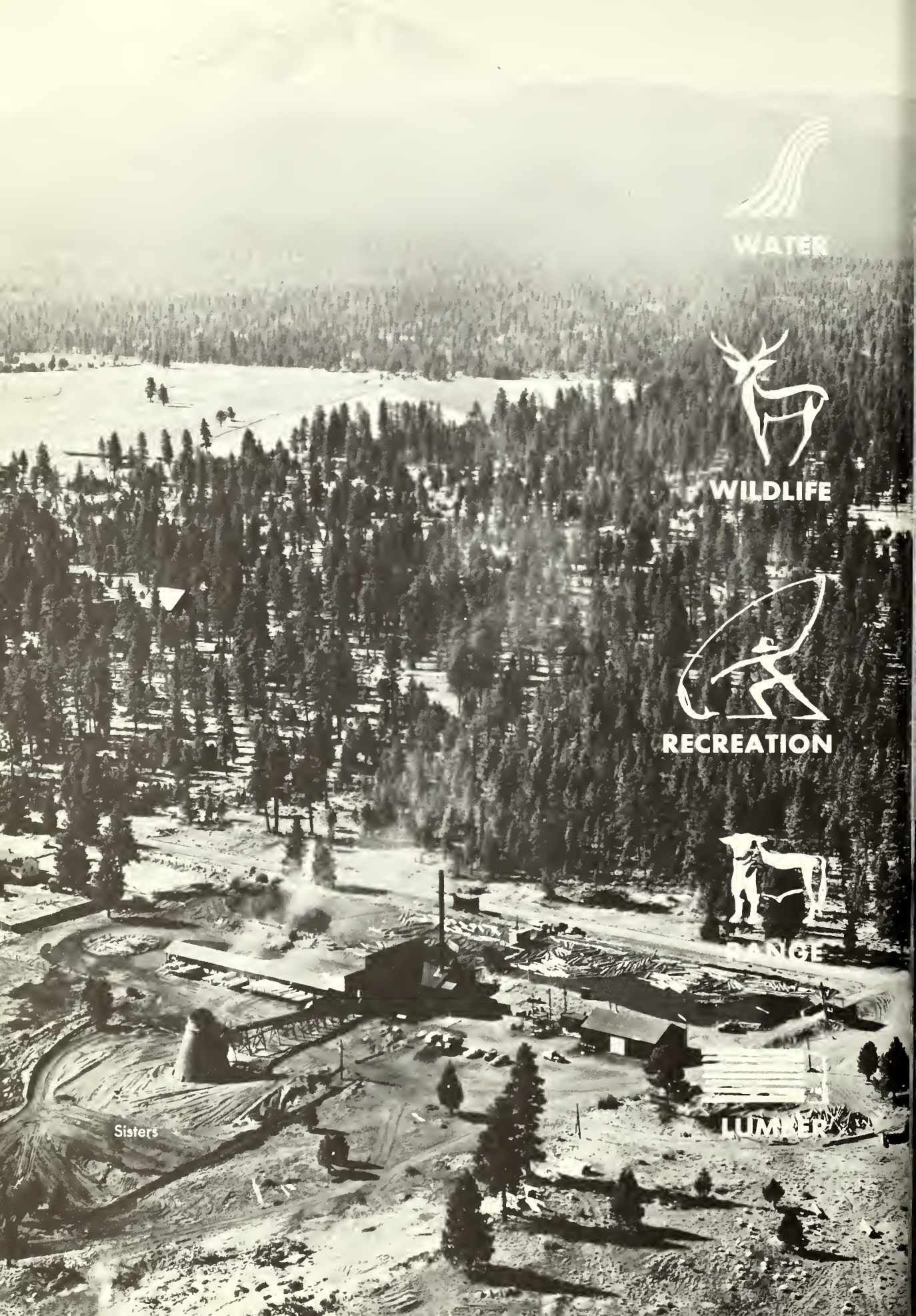
650,000 acres of forest land for RECREATION

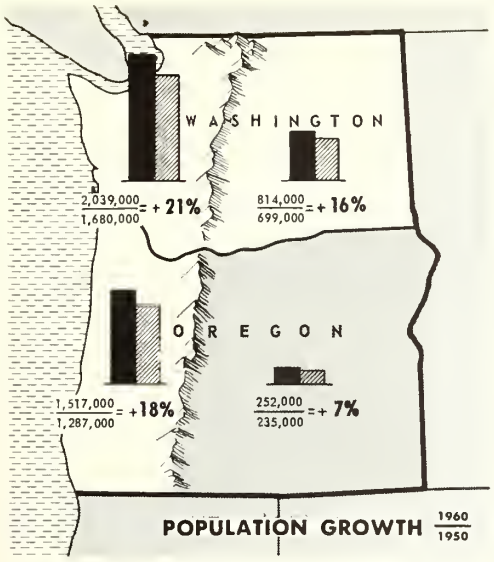
INCREASING USE WILL BE MADE OF RECREATIONAL ASSETS. — Outdoor recreation of all types has a tremendous potential in eastern Oregon — a potential that even now is beginning to be realized. Its benefits to the economy are being increasingly recognized as significant to the present and future regional development.

As one evidence of recreation's value, 650,000 acres of forest land have been set aside by public agencies for recreational use. This includes 503,000 acres on National Forests, 136,000 acres in Crater Lake National Park, and 11,000 acres in State or municipal parks.

Besides these areas, nearly all the remainder of eastern Oregon's wildlands are open to recreational use by campers, hunters, and fishermen in addition to serving other uses such as watershed, timber production, and grazing.

Obviously, what is said about growth of the forest economy in eastern Oregon is quite important to recreation. In the future both public and private forest owners will consider carefully the probable effects upon recreation of any plans for use of the timber resource.


WATER
WILDLIFE
RECREATION
RANGE
LUMBER
Sisters



GROWTH DEPENDS ON INDUSTRIAL EXPANSION. — If economic growth in eastern Oregon follows the pattern set by the rest of the Nation, it will come largely from industrial expansion. This has been the experience throughout the Nation and is the reason for the current emphasis on industrial development by so many communities. Generally, industrial growth depends on either concentrations of natural resources for raw material or of people for labor. Here in the West, industrial growth in the last decade has been substantial with most of it being linked directly to rapidly growing centers of population. However, there may be little opportunity for eastern Oregon to share in this type of industrial development.

Between 1950 and 1960 the Nation's population increased by 18 percent. Western Oregon and eastern and western Washington contributed much to this growth, increasing in population between 16 and 21 percent. But eastern Oregon increased only 7 percent. This slow rate of growth was even slower than any of the other 9 Western States which had increases ranging from 13 percent to almost 80 percent. Even with a more favorable rate of population growth, the total number of people living in eastern Oregon will not soon become very large. Each of the cities of Dayton, Ohio, Portland, Oreg., and Long Beach, Calif., has more people than eastern Oregon with 252,000 residents. Despite future low or high rates of population growth, the population of eastern Oregon is not likely to support or attract new types of industries dependent upon local markets or upon local supplies of labor.

Eastern Oregon, like many other Western States, has lots of elbow room. The vast empty spaces, exemplified by the photo below, may be put to use by industries that look for isolation as a desirable feature of plant location. Another example of this is the Boardman Bombing Range currently being developed for space-age research.

LUMBER IN THE ECONOMY

Forest industries provide two out of every three jobs in manufacturing industries[2] in eastern Oregon. These forest industries include logging, lumber, plywood, and fiberboard as well as remanufacturing. In 1961, of the 15,900 persons working in all types of manufacturing plants, 10,800 were directly employed by forest industries.

EASTERN OREGON FACES STIFF COMPETITION FOR LUMBER MARKETS. — Eastern United States softwood timber was greatly depleted during the early settlement of our Nation. These forests are gradually being restored through planting and improved forest practices. According to the report "Timber Resources for America's Future" (pages 56-57), "The most significant of all growth-cut relationships is that growth of eastern softwood sawtimber exceeded cut in 1952 by 20 percent . . . . The southern yellow pines, which, of course, dominate the eastern picture, show growth to be 22 percent in excess of cut of sawtimber".[3] The impact of these increasing volumes of softwood timber may be expected to affect western lumber producing areas primarily because the eastern markets now served by the West will be more easily served by eastern softwood producers.

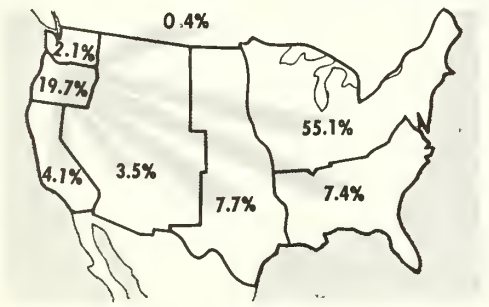
No one area can be assured of continuing markets because of past historical experience. This can be illustrated by comparing the Rocky Mountain area with eastern Oregon. In the Rocky Mountain area lumber production has been increasing at a rate more rapid than in eastern Oregon. Between 1947 and 1960 lumber production in the Rocky Mountain area increased 71 percent while at the same time production in eastern Oregon increased only 18 percent.[4]

	Thousands of baard feet		
	1947	1960	Increase (Percent)
Racky Mountain area	2,117,910	3,626,175	71
Eastern Oregan	1,400,787	1,650,380	18

The increased volume of lumber being produced in the Rocky Mountain area has apparently had serious effects in eastern Oregon. Located nearer to eastern, southern, and Great Plains markets, it has been successful in capturing markets formerly held by eastern Oregon. This is shown by the relative shifts in the lumber markets of eastern Oregon and the Rocky Mountain area over the 11 years between 1947 and 1958.

Between 1947 and 1958, eastern Oregon increased its ratio of shipments to the South four times; but at the same time, the Rocky Mountain region increased its ratio 27 times.[5] Eastern Oregon shipped a smaller proportion to the North in 1958 compared to 1947, and the Rocky Mountain region increased its proportion to the North by 50 percent. The Rocky Mountain region is a growing factor in supplying the Nation's softwood lumber needs.

LUMBER PRODUCED IN EASTERN OREGON GOES COUNTRYWIDE



[2] The Technical Cammittee an Industrial Classitication. Standard industrial classification manual. Exec. Office af Pres. U. S. Bur. Budget Office Statis. Standards, 433 pp. 1957.

[3] U. S. Farest Service. Timber Resaurces far America's Future. U. S. Dept. Agr. Farest Resaurce Rpt. 14, 713 pp., illus. 1958.

[4] Western Pine Assaciatian. Praductian by states and species 1949 ta 1960. Cir. 483, 4 pp. 1961.

Many af the ather lumber praductian statistics used in the tables and figures in this repart are based an data campiled by the Western Pine Assaciatian. We here express aur gratitude ta the Assaciatian far their assistance.

[5] Fram Western Pine Assaciatian data an shipments by States.

In addition to the competition facing eastern Oregon from within the Nation, an increasing amount of lumber is coming into this country from Canada. This imported lumber is replacing Western States lumber in the important Atlantic coast markets. In 1951, of all waterborne shipments of lumber from the west coast (British Columbia, Washington, Oregon, and California) to the Atlantic coast, 93 percent came from the three Western States. But by 1961 this proportion had dropped to 43 percent. Or in other words, British Columbia has been increasing its share of the Atlantic coast markets from less than a tenth in 1951 to more than half in 1961. During the same period, production of lumber from mills in interior British Columbia almost doubled, with a substantial part of this increase moving by rail into the Central United States area.

EASTERN OREGON FALLING BEHIND IN LUMBER MARKET. — Most forecasts of lumber's future indicate that demand will increase. But the immediate question facing eastern Oregon is whether it will share in this increased demand for softwood lumber or be replaced by other areas. This depends on many factors — including the future level of forest management, population shifts, total demand, costs, prices, and transportation problems.

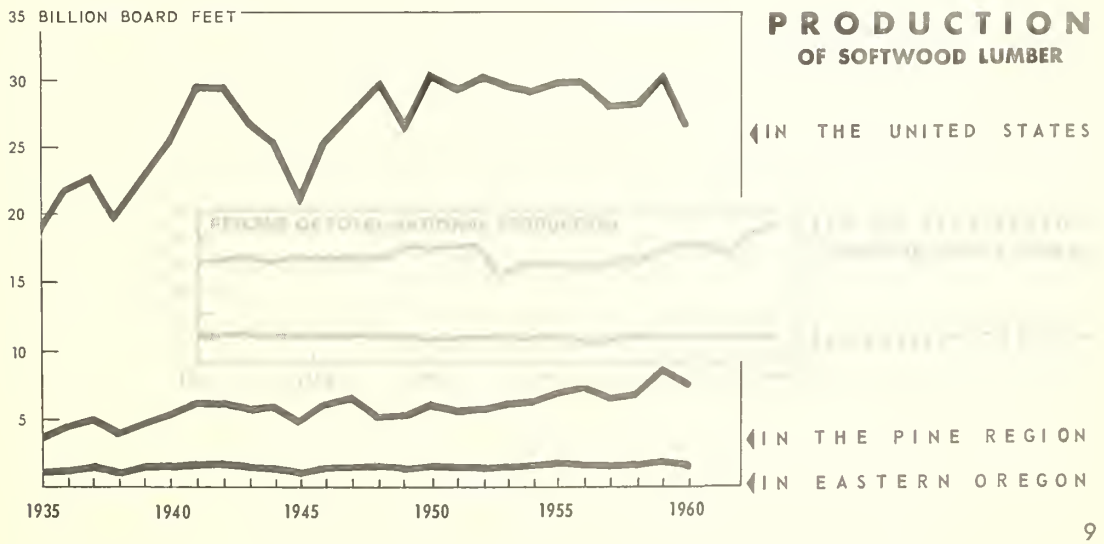
Some important relationships which provide clues can be determined by examining the past and present patterns of production in Oregon in relation to other areas.

The chart shows softwood lumber consumption in the United States since 1935 and softwood lumber production in the western pine region[6] (except for eastern Oregon), and in eastern Oregon.

The total United States consumption of softwood lumber since 1935, although subject to fluctuations, showed a gradual increase to 1950. Then production leveled off and remained generally stable. In both eastern Oregon and the remainder of the western pine region, production increased in recent years. However, the gain has been more consistent and at a greater rate in the western pine region exclusive of eastern Oregon than in eastern Oregon.

The production from eastern Oregon and the rest of the western pine region is also shown as a percentage of total United States lumber production. These trends indicate that eastern Oregon has not kept its place in the Nation's softwood lumber market. Production in eastern Oregon amounted to

[6] This is an area defined by the Western Pine Association and includes Arizona, California (except for the 11 coastal redwood counties), Nevada, Colorado, Idaho, Montana, New Mexico, eastern Oregon, South Dakota, Utah, eastern Washington, and Wyoming.



6.5 percent of United States softwood lumber production in 1939. This was the peak year. Since 1939, the percentage has been less with the general shape of the curve downward. But at the same time, the rest of the western pine region has been showing an almost constant increase.

Apparently there is an increasing demand for western pine region lumber. While the rest of the pine region is making the most of this opportunity, eastern Oregon is barely holding its own. This may be due to many reasons — but for our purposes, the single fact that eastern Oregon has not been able to capture its share of the expanding market is important.

One might wonder whether eastern Oregon is making use of all the softwood species that other parts of the pine region use. From 1947 to 1960 the cut from species other than ponderosa pine shifted from 15 percent of the total eastern Oregon output to 37 percent, a change of 22 percent. During this same period, the proportion of other species in the output of the rest of the pine region went from 37 percent to 61 percent. This was a change of 24 percent. Apparently both eastern Oregon and the rest of the pine region are increasing their use of other species at about the same rate.

Table 2. — Relative change in species used for lumber between 1947 and 1960 (in percent)

Species	Eastern Oregon			The rest of the western pine region		
	1947	1960	Difference	1947	1960	Difference
Ponderosa, sugar, and white pine	85	63	−22	63	39	−24
Douglas-fir and larch	11	25	+14	21	32	+11
True firs	4	11	+7	10	18	+8
Other species	--	1	+1	6	11	+5

GROWTH THROUGH DIVERSIFICATION AND PRODUCT REFINEMENT

In the previous section we have questioned whether increased lumber production could be counted on for economic growth. It appears that if past trends continue, growth through increased lumber production in eastern Oregon is by no means certain.

If the forest economy in eastern Oregon is to grow, it will have to be based on the potential of the region for producing many kinds of usable wood. The forest industry has grown around a single product — lumber. Although substantial benefits have been realized, serious handicaps have arisen.

The demand for lumber, particularly boards, has been the controlling factor in the economic health of the area. Periods of prosperity and depression depend upon whether lumber does or doesn't sell. Further discouragement comes from a sharply dropping nationwide per capita consumption of lumber even though total production is steady or increasing. Substitutes of other construction materials and the use of wood in forms other than lumber have cut sharply into the domain once ruled by lumber, particularly boards.

With all of the forest industry "eggs in one basket," eastern Oregon can expect continued economic hills and hollows, depending on the demand for lumber. Much greater wood product diversification would lead to less severe fluctuations in the overall economy and the means to move ahead to higher levels.

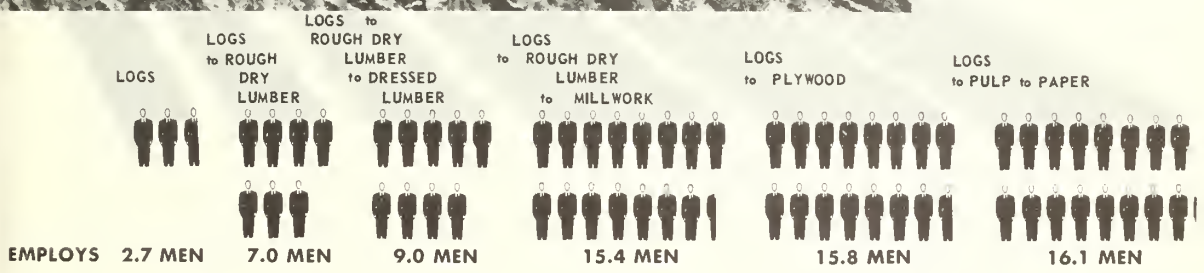
Products other than lumber provide the opportunity for using wood not now used by the lumber industry. As long as trees are round and lumber is rectangular, unused residue results. As long as lumber is best produced from larger trees, the total harvest is limited. The many millions of trees available for cutting, but too small for saw logs, are yet an untapped potential of wood fiber.

Achieving diversification is not simple. To many it means breaking with tradition and venturing capital into new lines of endeavor. This requires solving not only the technical aspects of product development but also problems of marketing new products and of financing new investments.

CONVERSION

IN ONE YEAR OF ONE MILLION BOARD FEET OF STANDING TIMBER

TO



GAINS IN EMPLOYMENT ARE POSSIBLE FROM DIVERSIFICATION. — Only limited benefits result from limited use of logs; obviously if logs are shipped outside a region, the local economy benefits little. But if the logs were sawn into rough lumber, the rough lumber dried and planed, and the lumber made into fabricated products, then local and regional employment and income would be increased. In addition, diversification which would allow the use of the peeler grade logs for plywood veneer, then plywood, and residue material for pulp, then paper, would further strengthen the forest economy.

The benefits of product refinement can be measured by gains in employment. When logs are the only product, a million board feet of timber provides employment for about three men for 1 year. But if logs are converted to rough-dry lumber and this to millwork, 15 men could secure employment for 1 year from the same volume of timber. Similarly, the production of dressed lumber, plywood, or paper produces employment in varying amounts but always greater than a forest economy that produces only logs or rough-dry lumber as end products.

EASTERN OREGON EMPLOYMENT IN FOREST INDUSTRIES CAN BE INCREASED. — In eastern Oregon the lack of diversification of forest industries is indicated by the fact that 90 percent of all forest industry workers is engaged in either logging or sawmilling. This results in employment for only eight or nine men per year for every million board feet of timber harvested.

Western Washington has one of the most industrially advanced forest economies in the West with a complex of differing industries including pulp and paper, veneer and plywood, and fiberboard, as well as lumber. The extent of this development is illustrated by the fact that only 35 percent of all forest industry workers is employed in logging or sawmilling. This plus many other ways to utilize the forest resource results in employment for 20 men for every million board feet of log harvest.

Western Oregon is becoming increasingly diversified. Here, 60 percent of forest industry workers is employed in logging and sawmilling, and 10 men secure employment for every million board feet of timber cut.

Eastern Washington, with a wider industrial base than eastern Oregon, boasts two pulpmills and has only 70 percent of forest industry workers employed in logging or sawmilling. There 11 to 12 men are employed for every million board feet of timber harvested.

While these figures are subject to some error because of the movement of logs and pulp chips between areas and different degrees of mechanization, the general conclusions are valid. The wider the industrial base, with more plants utilizing different forms of wood, the greater is the economic activity and stability stemming from the use of a given volume of wood.

If eastern Oregon could secure greater diversification and more product refinement in forest industries, at least to the same extent as eastern Washington, jobs in forest industries could be increased by 30 percent, resulting in employment of 14,000 instead of the current 10,800. These jobs in turn would increase allied and supporting industries and benefit the entire economy.

PROGRESS TOWARD DIVERSIFICATION OF FOREST INDUSTRIES HAS BEEN SLOW. — Eastern Oregon has been slow to diversify and to increase product refinement. Nonlumber forest industries use only 3 percent of the log harvest and account for less than 7 percent of forest industry employment.

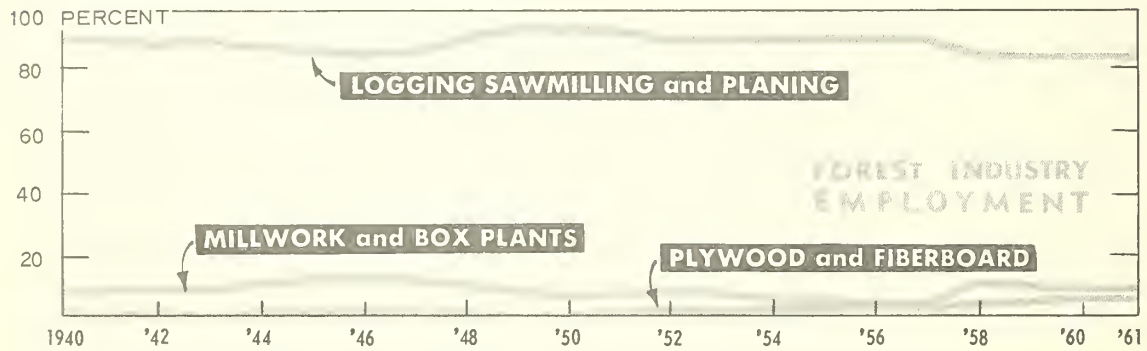
Logging, sawmilling, planing, millwork, and the container box industry as a group have never provided less than 90 percent of total forest industry employment.

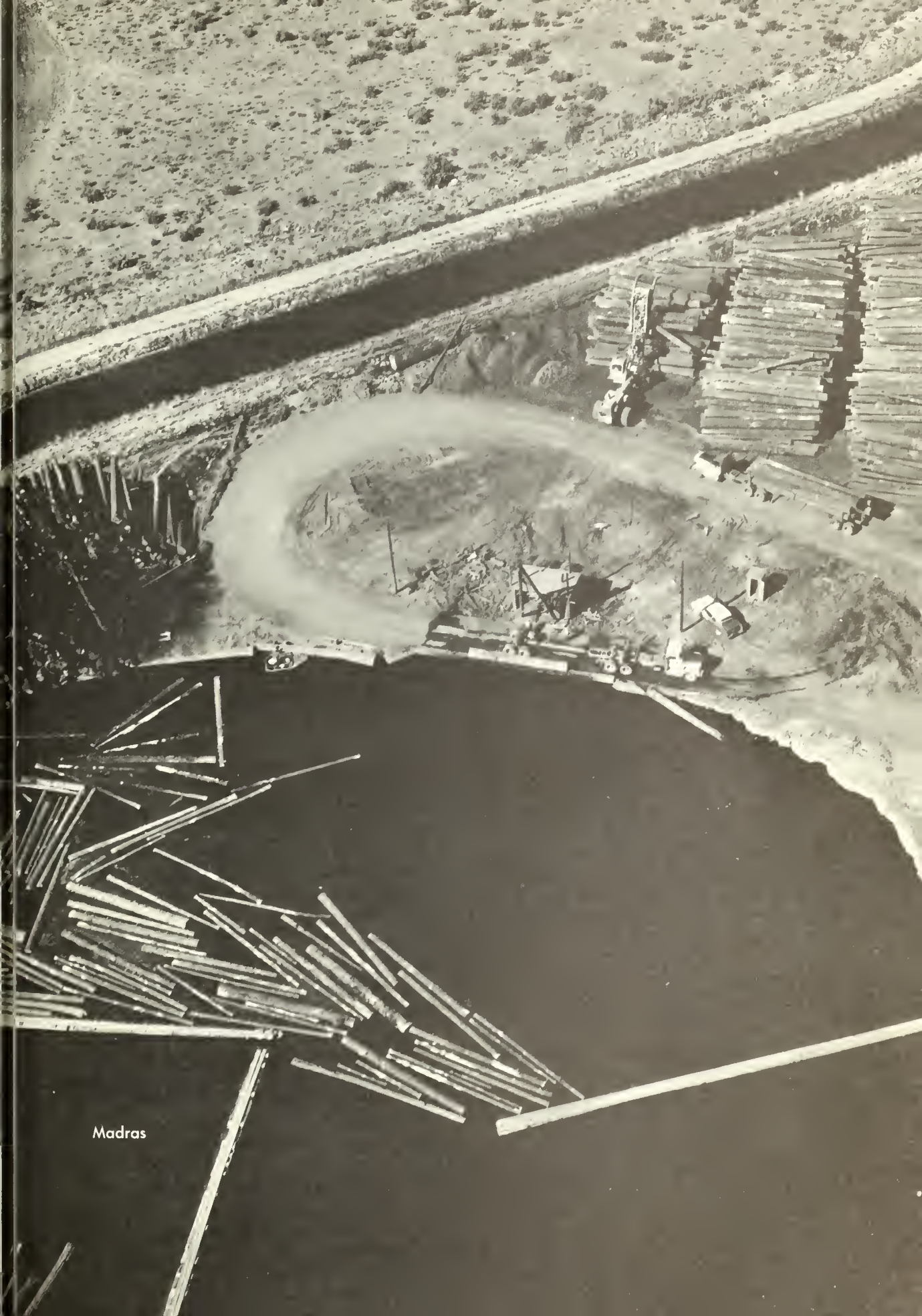
In 1950, less than 1 percent of all forest industry workers was employed in other than the logging-sawmill group. Since then a small but encouraging start has been made in broadening the industrial base through the development of plywood and fiberboard plants. In 1959, employment in these plants reached almost 7 percent of the total forest industry employment.

There are a number of other forest industries that have developed around the production of minor products. These include fence posts and poles for power and telephone lines. Some juniper is manufactured into novelty items. Although these may be of importance to a community, they are not of sufficient magnitude to be considered as a significant part of a regional forest industry base.

THE FUTURE LOOKS ENCOURAGING. — Demand for lumber, plywood, fiberboard, pulp and paper, and other forest products is expected to increase as a result of the continuing increase in the Nation's population and productivity. Per capita demand for all of these products except lumber is expected to increase.

The success of eastern Oregon in capturing part of the expected increase in demand depends upon the ability of the region to grow economically competitive timber and upon a diverse forest industry that will meet the need.





Madras


Warm Springs


WEYERHAEUSER LUMBER COMPANY
Klamath Falls

Achieving Growth of Forest Industries in Eastern Oregon

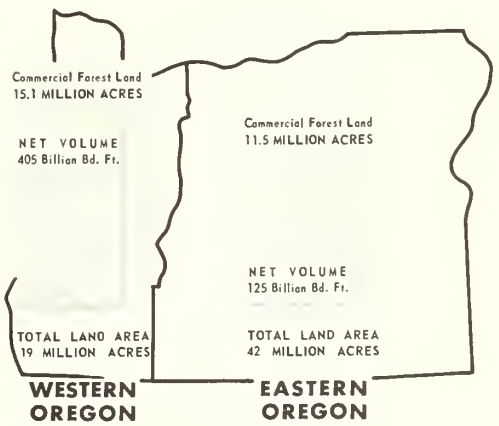
The factors that influence development may be placed in several complex groups. First are geographical features; these include the present distribution of the industrial components, location of current markets for timber products, and characteristics and problems of transportation. The second group encompasses characteristics of the timber and includes ownership of the resource, the increasing importance of species other than ponderosa pine, and the quality of the remaining ponderosa pine. The next group has to do with the lumber industry. This industry will be an important factor in the development of new forest industries and has within it a substantial potential for growth. The last group of factors is that of raw material supply including mill and logging residue and mortality salvage. These are supplementary sources of raw material. The harvest of live sound trees will be discussed in the final section of this report.

A PROBLEM OF GEOGRAPHY

To realize full value from each log, from each species, and from the residue material from the various manufacturing processes, a diversified industry must have sufficient raw material in adequate concentrations for economical use.

Modern transportation methods have done much to make the world seem smaller. High-powered trucks, high-speed highways, and access roads have brought the more distant timber supplies closer. Intervening mountain ranges are no longer insurmountable barriers to movement of logs or products. Despite all the advantages of increased mobility, distance still remains a deterrent to fuller utilization. Long hauls, whether from the woods to the mills, between mills, or to the ultimate consumer, create problems and impede development.

Eastern Oregon includes all the land area of the State east of the crest of the Cascades. This is a large area, about equal in size to the entire State of Washington. Within these 42 million acres are 11.5 million acres of commercial forest containing 125 billion board feet of timber. The widespread character of this resource can be appreciated by contrasting it to the more concentrated forest resources of western Oregon. Western Oregon has slightly less than half as much total land area as eastern Oregon, a fourth more commercial timber area, and three times the timber volume.



The relatively low volumes per acre characteristic of much of eastern Oregon's forests have been an important factor in the development of a widely scattered industry. In eastern Oregon, 43 communities have only

1 or 2 mills, while only 6 have 3 or more sawmills:

33 communities	—	1 mill
10 "	—	2 mills
6 "	—	3 or more mills

Sixty-two percent of the lumber is produced in the 43 towns having only 1 or 2 mills; 38 percent in 6 towns having 3 or more mills:

Towns with 1 mill — 37 percent of lumber production
Towns with 2 mills — 25 percent of lumber production
Towns with 3 mills — 12 percent of lumber production
Towns with 5 mills — 26 percent of lumber production

These towns are distributed widely, spread between Enterprise in Wallowa County, which borders Idaho, and Klamath Falls in Klamath County, which borders California.

This wide scattering of production facilities acts as a barrier to realizing the fullest value from the occasional special kind of log. Some grades of logs and some species could be used for veneer rather than lumber and some species for pulp. The assembly of enough of a special kind of logs at one place would be costly.

The lack of concentration of sawmills also makes it difficult and costly to assemble an adequate supply of chips for a fiber industry at one location.

SAWMILLS ARE DISTANT FROM TIMBERED AREAS. — Another aspect of this same problem is that mills are relatively far from sources of timber. Most eastern Oregon communities have developed in response to agricultural needs and are therefore in agricultural areas. Location of sawmills in timbered areas is generally impractical; instead they locate in established communities having a labor force, better climatic conditions, and transportation facilities. These conditions generally exist only at some distance from the forests. Thus forest industries, grain elevators, and stockyards are common characteristics of many eastern Oregon towns.


Madras

In 1958, the small stationary mills sawing up to 39,000 board feet per day had an average maximum log haul of 29 miles; for mills sawing from 40,000 to 79,000 board feet per day this distance was 49 miles, while for mills larger than these the distance increased to 60 miles. As the more accessible timber resources are cut, these current maximums will probably become more nearly average haul distances.

Length of haul has a direct effect on the cost of logs to the mill. With hauling costs of about 19 cents per thousand board feet per mile, the average maximum haul of 29 miles for the small mills adds almost $6 per thousand board feet to the cost of logs. For the larger mills, transportation costs for hauls of 49 to 60 miles are $9 to $11 per thousand board feet.

As hauling distances become greater and transportation costs go up, it becomes more important to achieve fuller use of the increasingly higher cost wood that is brought to the mill. Additional product refinement and more profitable use of mill residues can offset these higher costs.

PRODUCTS MUST MOVE LONG DISTANCES TO MARKETS. — Nationwide markets are reached from inland eastern Oregon mainly by rail. Use of trucks is limited to that volume used locally or sold in nearby States. Some mills truck their rough lumber to larger mills where it is remanufactured and reshipped by rail. Only 7 percent of total production is shipped by truck while 93 percent moves via rail transportation. Almost all of the larger mills have rail facilities, but a substantial number of the smaller mills are also on rail lines.

Current rail rates to the East for western timber products are not proportional to distance; this favors eastern Oregon over other areas nearer important eastern markets. The favorable rate structure has developed over a long period and appears to be reasonably permanent. In a statement by the Great Northern Railway, the favorable structure is explained as follows:

> The eastbound transcontinental rate structure on lumber which has been depressed to move the forest products of the Pacific Northwest is vital to the producers and shippers and to the railroads alike. If the lumber rate structure from the Pacific Northwest was not so depressed, the forest products industry in the Pacific Northwest, which is the keystone of the whole economy would be seriously damaged. This rate adjustment was not created by the Mountain-Pacific railroads but is the natural and compelled results of more than sixty years of experience in testing and evaluating the requirements of the economy of the situation.

Costs of shipping forest products from eastern Oregon to Chicago were the same as those from western Montana to Chicago until 1960.

A recent study[7] of freight rates showed the following:

"The actual lumber haul distance from the Pacific Coast States to the Northeast was 18 percent longer . . . than from Montana and Idaho, but the rail freight cost per 100 pounds was identical.

The actual Pacific Coast haul to the Central States was 35 percent longer, but the shipping cost was only 9 percent higher than from Montana and Idaho.

The actual Pacific Coast haul to the Plains States was 36 percent longer, but the shipping cost was only 7 percent higher than from Montana and Idaho."

[7] Hutchison, S. Blair. Production-distribution trends and freight rates as they affect Mountain States lumber producers. U. S. Forest Serv. Intermountain Forest & Range Expt. Sta. Res. Paper 59, 13 pp., illus. 1959.

In 1960 a slight adjustment was made in these rail rates to Chicago, and shipments from eastern Oregon were charged 3 cents more per 100 pounds than those shipments originating in western Montana. However, the amount of the increase was only minor in proportion to the distance between the two areas. Average rates per hundredweight to Chicago were:

From:	1930	1940	1950	1960
Eastern Oregon	$0.685	$0.720	$1.08	$1.37
Western Montana	.685	.720	1.08	1.34

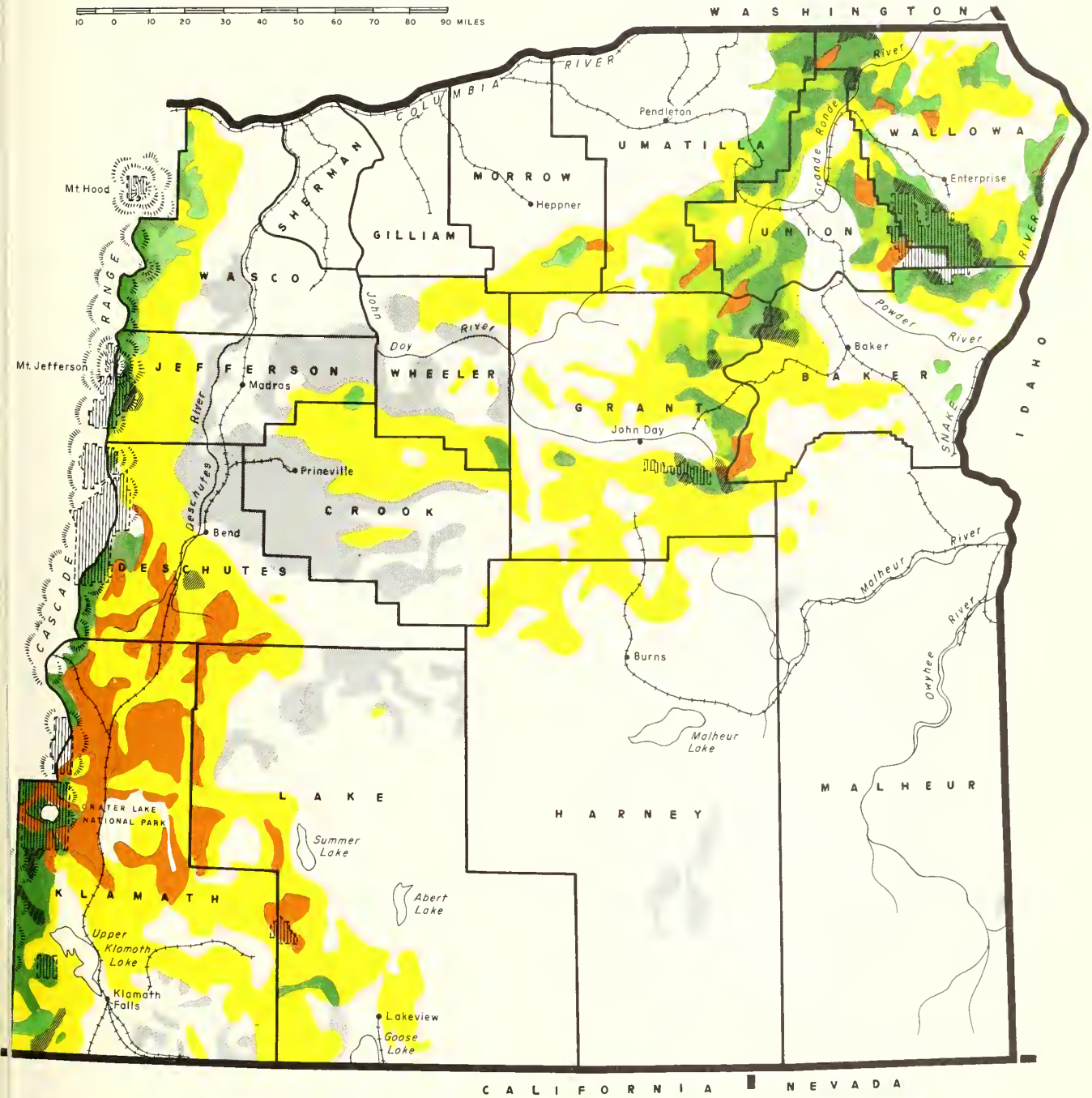
A recent stimulus to the establishment of diversified wood industries in eastern Oregon has been the extension of the favorable rates for certain lumber products to include a major portion of all products. These include plywood, poles, insulating board, and hardboard.

LUMBER INDUSTRY IS BASIC TO DIVERSIFICATION

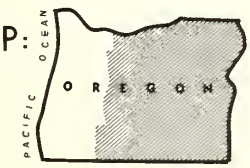
Undoubtedly the lumber industry will continue to be an important part of the wood products industry in eastern Oregon, and any growth through diversification will be closely allied to it. For instance, the ability of sawmills to furnish residue suitable for use by the pulp and composition board industries will be important to the development of the latter. Similarly, close working relations will have to be developed with sawmills to allow for diversion of peeler quality logs to the veneer and plywood industry.

Growth possibilities exist within the lumber industry itself in addition to its central role in providing residue and log concentrations for other industries. The very magnitude of the lumber industry in eastern Oregon assures that any improvement would contribute substantial benefits to the total economy. Most of the possibilities lie in the direction of increased product refinement.

Major Forest Cover Types in Eastern Oregon



INDEX MAP:



LEGEND:

- Douglas-fir
- Ponderosa pine
- Lodgepole pine
- Unproductive forest land
- Western larch
- Fir, Spruce
- Juniper
- Reserved from timber cutting

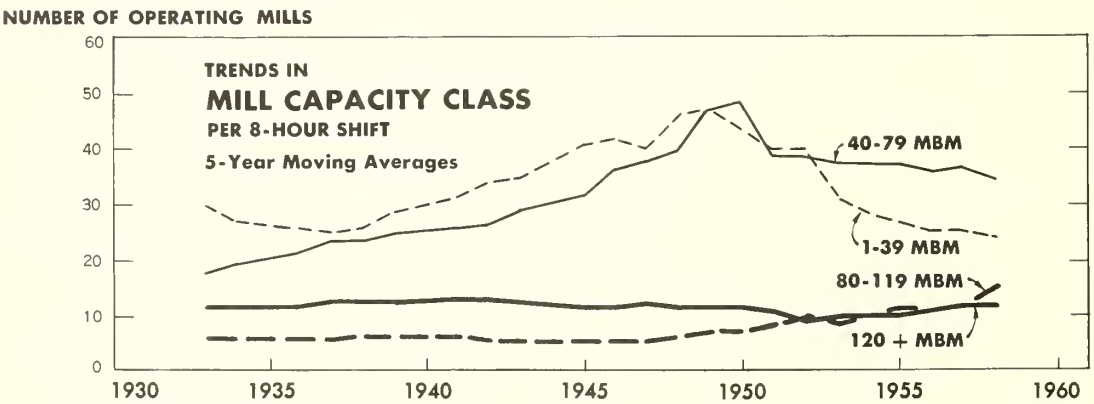
FOREST SURVEY, PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION -- 1963

Generally, the larger the mill the more processing is done to the product before shipment. Large mills, sawing 120,000 board feet or more per 8-hour shift, dry and surface 96 percent of their lumber; and for every million board feet of lumber produced, 6.6 men secure employment. Mills sawing between 80,000 and 119,000 board feet dry and surface 86 percent of their output, and 5.2 men are employed for every million board feet of lumber produced. The mills sawing 40,000 to 79,000 board feet and 1,000 to 39,000 board feet dry and surface 69 percent and 17 percent of their output, respectively. Employment opportunities reflect these different levels of manufacturing, with 4.6 and 3.2 men per million board feet, respectively, employed by the two size classes of mills.

Not all of the differences in employment are due solely to the drying and surfacing of lumber. Edge and end gluing, finger jointing, and the manufacture of a number of small items also add employment. There is also some additional employment created when the rough-green output of other mills is purchased and remanufactured into molding and other products by the larger mills. But the fact that the bigger mills employ twice as many men per thousand board feet of lumber produced indicates the potential gain through more product refinement.

As growth of the forest economy will undoubtedly depend on the lumber industry, it is important to know how stable it is. The smallest size class of mill, sawing up to 39,000 board feet per 8-hour shift, has the least stable ownership, shows greater fluctuations in number of mills over time, and produces a relatively small proportion of the total lumber production. Shortly after the start of the Great Depression, the number of small mills decreased from around 42 to a low of about 12 mills. In the post-World War II boom, the number of small mills reached a peak of almost 70. Following this boom period, the number decreased to about 30. Only 21 percent of the mills in 1958 had been in the same ownership for 10 years or more; the rest less than 10 years — usually less than 5 years. Mills in the 0- to 39,000-board-foot class accounted for only 5 percent of the total 1958 lumber production.

The mills sawing from 40,000 to 79,000 board feet have been gradually increasing since 1930 when there were only 10 or 11 mills of this size. Now the number has stabilized at almost 40. In 1958, 35 percent of this size of mill had been in the same ownership for more than 10 years, 65 percent less than 10 years. This size class of mill produced 39 percent of the total 1958 lumber production. This was the largest production among mills of any size class. Mills of this size class are sawing slightly more than their installed capacity would indicate. They have an installed capacity amounting to about 36 percent of all sawmills; but in terms of lumber production, they are producing 39 percent.



The number of mills in the size class from 80,000 to 119,000 board feet per 8-hour shift has varied, and now it appears to be increasing. These mills produced a volume of lumber second only to the 40,000- to 79,000-board-foot size class of mill. In 1958, they produced 29 percent of the total lumber production with 22 percent of the total installed capacity. These mills — with more than half of them in the same ownership for more than 10 years — have a greater history of stability of ownership than smaller mills.

The mills sawing 120,000 board feet or more per 8-hour shift appear to be fairly well stabilized. More than half of the mills have been in the same ownership for more than 10 years. These mills have about 36 percent of the total installed capacity of all mills but in 1958 produced only 24 percent of the lumber.

Apparently both stability in numbers of mills and continuity of ownership come with increasing mill size. Of increasing consequence are the mills within the 40,000- to 79,000-board-foot daily capacity mill size. The concentration of lumber production in these mills makes them important in considering future developments. Although some increase may take place in numbers of larger mills, the difficulty in developing assured raw material supplies appears likely to limit this.

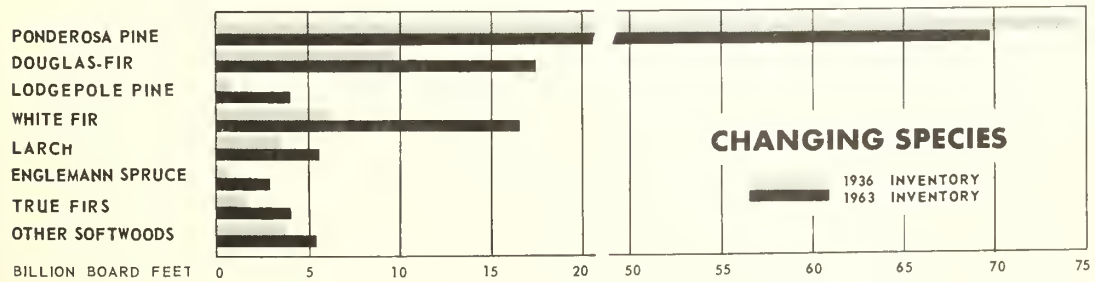
THE RAW MATERIAL SUPPLY

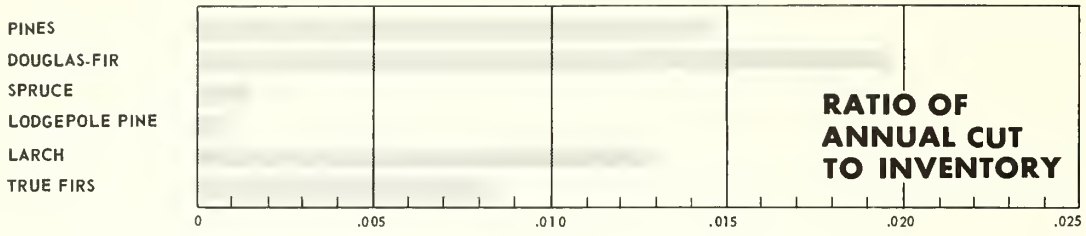
IMPORTANCE OF SPECIES OTHER THAN PONDEROSA PINE IS INCREASING. — The increase in available volume indicated by the recent reinventory of eastern Oregon is of great significance to its economy. One result has been an increase in allowable cuts on National Forest lands.

If full use is to be made of this new inventory of 125 billion board feet, we must recognize that an increasing amount of this volume is in species other than ponderosa pine. In 1936, the inventory showed that 75 percent of the available volume was ponderosa pine. In the new inventory, ponderosa pine is only slightly more than half of the volume. The available volume of lodgepole pine is now estimated to be 3 percent of the total inventory instead of the 1 percent estimated in 1930. Similarly, the proportion of the volume in Douglas-fir, true firs, and Engelmann spruce is twice that estimated earlier.

The lumber industry is to a considerable extent meeting the challenge of the changing species composition (table 2, page 10). In 13 years the ponderosa pine portion of the cut has decreased from 85 percent in 1947 to 63 percent in 1960. The use of true firs for lumber has increased from 4 percent in 1947 to 11 percent. The use of larch and Douglas-fir has increased from 11 to 25 percent.

The species distribution shown by the new inventory presents real problems. Changes in the use of species must be achieved if managed forests are to be attained. Disproportionate use of a species may lead to its early depletion. On the other hand, little use of a species prevents the replacement of older, slower growing trees with younger, more rapidly growing trees. At the present time in eastern Oregon, the ratio of the cut of some species to their inventory volume

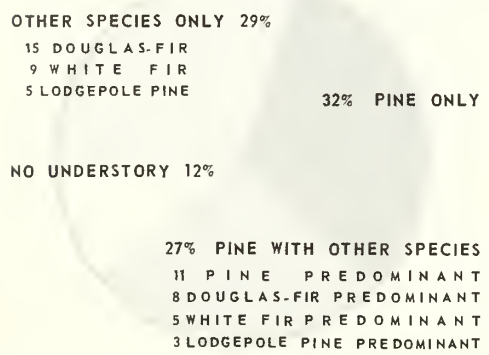




is 20 times as great as the ratio for other species. Even though inherent differences in growth rates require differing cutting rates for various species under management, the use of each species should be more in proportion to its inventory volume than now is the case.

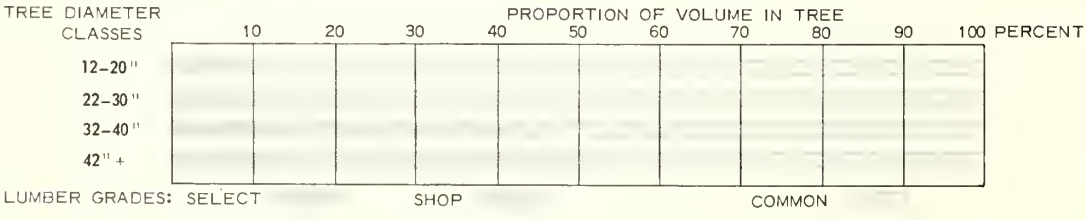
CONTROL MEASURES ARE NECESSARY TO KEEP PONDEROSA PINE IN THE FOREST. — The distribution of species now found in eastern Oregon will change unless definite measures are taken. If present trends continue, the proportion of ponderosa pine will be less in the future than at present. This could have an adverse effect on the forest economy.

UNDERSTORY STOCKING



The maintenance of ponderosa pine in the forest depends upon the replacing of cut or dead pine trees with young pine trees. But in 29 percent of all the pine sawtimber types, there is no understory of pine, only other species — Douglas-fir, white fir, and lodgepole pine. In another 27 percent of the pine sawtimber stands, the understory is a mixture of young ponderosa pine and other species. On more than half of this area, species other than pine predominate. Unless something happens to change this relationship, or unless more intensive forest management is undertaken, about 40 percent of the pine sawtimber type is likely to shift to some other type.

PONDEROSA PINE QUALITY IS HIGH. — Eastern Oregon has an advantage over most other pine producing areas in its ability to produce high-quality pine lumber. This is due primarily to the large diameter of trees in eastern Oregon. Generally, the larger the tree the greater proportion of its volume is clear wood. Pine trees over 40 inches d.b.h. in eastern Oregon have about half their volume in wood capable of sawing out select or shop grades of lumber. In contrast, trees 12 to 20 inches d.b.h. have only 10 percent of their volume in this higher grade material.



The East, with its smaller trees, is not competitive in producing high-quality lumber. Eastern Oregon leads most of the ponderosa pine area in its potential for producing high-quality lumber. In the Rocky Mountain region the volume in pine trees over 31 inches d.b.h. amounts to 24 percent of the total volume; this compares to 43 percent in eastern Oregon. Only California with 63 percent in trees over 31 inches d.b.h. has a more favorable quality potential (table 3).

Table 3 — The distribution of the sawtimber volume of ponderosa pine trees on commercial forest land by diameter classes (in percent)

Diameter class (Inches)	Eastern Oregon	California	Rocky Mountain
11.0-20.9	16	11	34
21.0-30.9	41	26	42
31.0 and larger	43	63	24
Total	100	100	100

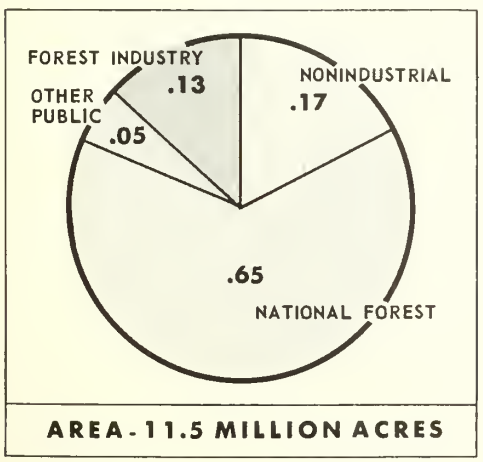
In eastern Oregon the present total stand of ponderosa pine trees contains almost 6 billion board feet in selects and 13 billion board feet of shop-grade lumber. The remaining 50 billion board feet is in common grades of lumber. Much of the quality material comes from old-growth trees; in the more distant future, when old-growth trees are gone, much smaller trees will be harvested. Under these conditions the quality advantage of eastern Oregon will be lessened.

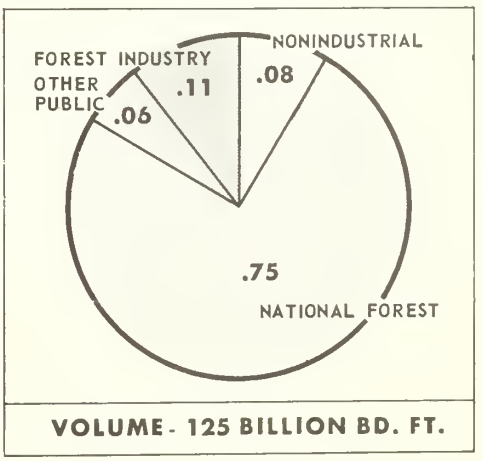
MOST OF THE TIMBER IS SOLD ON THE OPEN MARKET. — The availability of timber supply is largely governed by timber ownership. Both public and nonindustrially owned timber can be bought by those able to outbid competition. In contrast to these two broad ownership groups is industrially owned forest land on which the timber is usually held for conversion by the specific industry owner.

The timber resource of eastern Oregon in public ownership contains almost 81 percent of the total available volume. There is an additional 8 percent in nonindustrial ownership. The total of these two ownerships amounts to 112 billion board feet or 89 percent of the total available timber. Only 11 percent of the timber volume is in industrial ownership.

Practically all mills in eastern Oregon are dependent upon purchase of timber for their operation. Mills sawing over 40,000 board feet per shift (representing about 95 percent of all lumber produced) obtain about half their timber supply from public lands. The smallest mills obtain most of their timber from the nonindustrial ownership.

According to the current pattern of bidding for National Forest timber, competition is not great. Sales records of timber sold during most of 1960 show that about 55 percent of all the timber sold had only one bidder. The remaining 45 percent of the volume





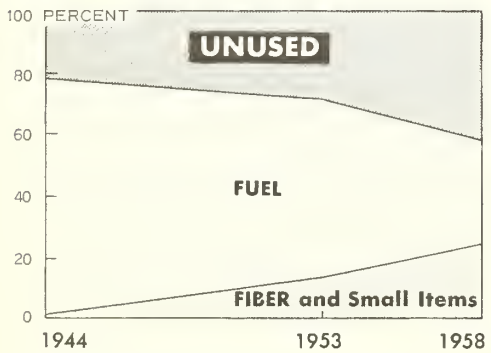
sold had two, three, and four bidders with most of these sales having three bidders. The successful bids on all National Forest sales averaged 5 percent more than the appraised price.

UNUSED MILL RESIDUES ARE ABUNDANT BUT SCATTERED. — The wood available as sawmill residue is a most logical first place to seek additional volume of wood for industrial growth. It is the most immediate, relatively abundant, and least costly of the potential sources of increased supply.

Only half of the volume of a log is sawn into lumber. The other half is residue from the squaring of round logs to rectangular lumber.

In 1958, 1.1 million tons of residue exclusive of bark were developed from the 1.6 billion board feet of lumber sawn by stationary mills. Of this residue, 534,000 tons were classed as coarse. In addition, there were 430,000 tons of sawdust and 177,000 tons of shavings.

Coarse residue, because of its suitability for making chips for pulp and composition board, is the most important segment of residue for industrial expansion. Fine residue, consisting of sawdust and shavings, currently is used for fuel, bedding for livestock, or as agricultural mulch.



More coarse residue is unused now than at any previous time because its use for fuel has decreased rapidly. In 1944, 77 percent of the coarse residue was used for fuel and the remaining volume remained unused. In 1958, the proportion used for fuel dropped to 34 percent while new uses accounted for 24 percent, of which 20 percent is manufactured into pulp, mainly in Washington and Idaho, and 4 percent is used for miscellaneous items including small wooden parts and boxes. The remaining available 42 percent, or 225,000 tons, is almost twice the 123,000 tons that were available in 1944.

The assurance of an adequate supply of pulp chips rather than roundwood is a major requirement for pulp plant development. Many new pulpmills use chips exclusively as a supply of raw material. The volume of coarse residue potentially available for chipping for pulp in eastern Oregon is considered to include that not used for fuel and that sold as chips for pulping elsewhere. Presumably, a new local pulpmill would find that pulp chips now being sold elsewhere would be available locally because of decreased hauling distances. Pooling the 225,000 tons not used for fuel and the 105,000 tons sold makes a total of 330,000 tons potentially available for pulping annually. If all of this residue were available, it could support a pulp industry having a daily pulp capacity of 400 tons.

Current utilization practices require that pulp chips be bark free. Mills have two choices in order to produce this bark-free wood; logs may be barked prior to sawing so that all residue is free of bark, or clean residue wood may be picked out of the conveyor belt. Picking wood is expensive, inefficient, and generally not a satisfactory method for recovering the considerable portion of the log not converted to lumber. But barkers which provide for the most efficient recovery of residue volume are few in eastern Oregon.

Mill size class (board feet):	Mills having barkers and chippers (Percent)	Total unused residue (Thousand tons)
120,000+	50	6.5
80,000 to 119,000	31	84.2
40,000 to 79,000	8	114.7
0 to 39,000	0	19.8

225 Thousand tons Lost Annually

The largest volume of unutilized coarse residue is produced by the mills in the 40,000- to 79,000-board-foot size class. The 115,000 tons from this group of mills are about half of the total volume of unused coarse residue. Barking facilities are needed at these mills to provide for efficient utilization of this residue. But at the present time only 1 out of 12 mills of this class has barkers. Mills in the 80,000- to 119,000-board-foot size class with 84,000 tons of unused coarse residue produce 37 percent of all the unused residue. Only one out of three mills in this class has barkers.

Obviously this unused residue must be debarked before it can be used by pulp plants. If pulpmills develop locally, some sawmills will be able to install barkers. There may be a possibility of a common barker for groups of mills; other mills may have to wait the development of lower cost barking equipment.

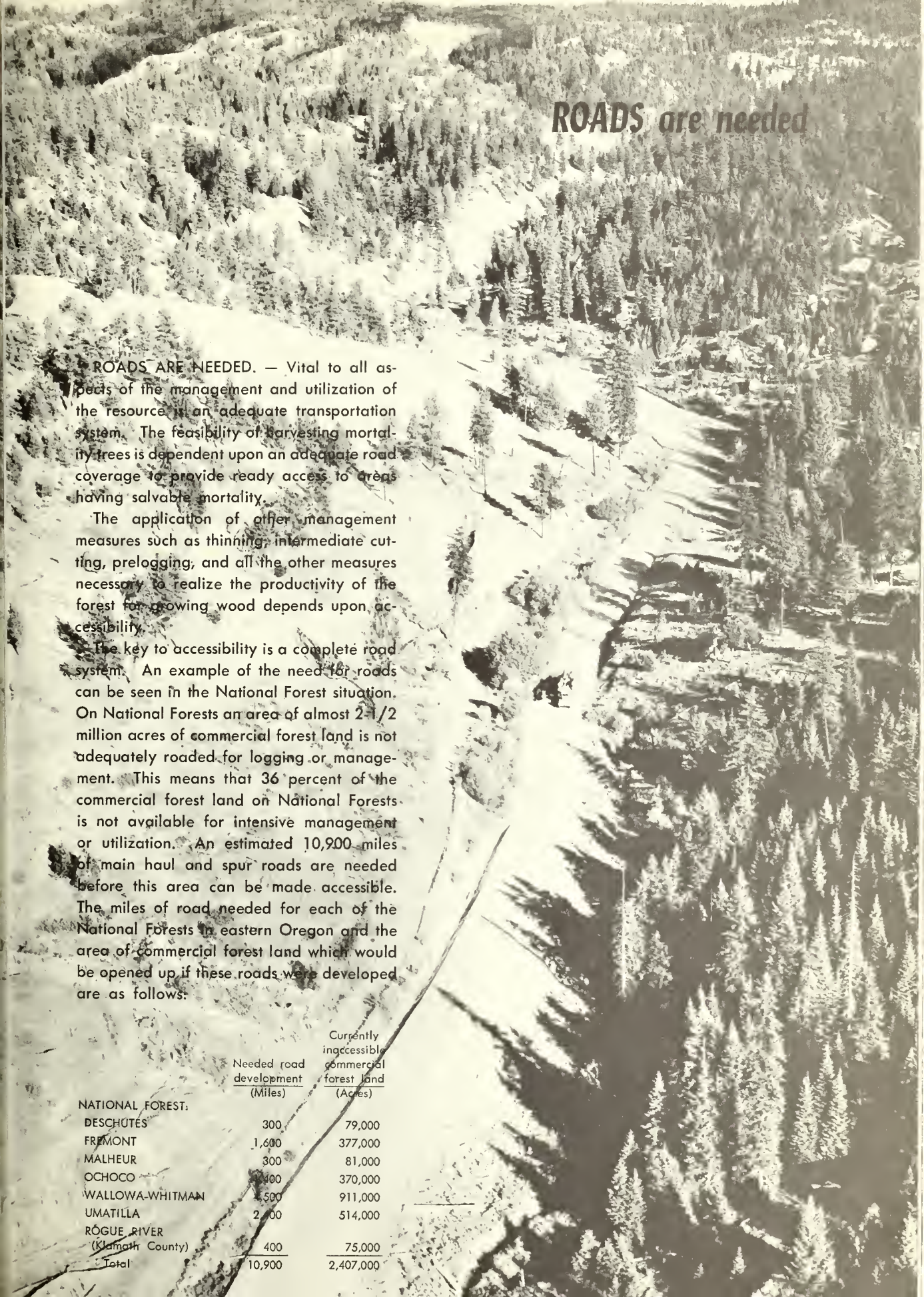
LOGGING RESIDUES SHOW LITTLE PROMISE DUE TO LOW QUALITY AND SMALL VOLUME. — In 1961 about 16 million board feet of logging residue was left on the ground following removal of the harvest of 1.5 billion board feet of timber. Much of this material was unmerchantable by present day standards. Of the volume of logs left as residue, 54 percent was in logs containing less than 30 board feet; 40 percent was in logs less than 10 feet in length. Other undesirable characteristics included excessive knots, splits, shake, and rot.

Per-acre volumes of residue material are low after the light harvest cutting that is common to eastern Oregon. This, along with the inherent poor quality of residue material, leaves little prospect in the foreseeable future for salvage of an appreciable amount of this material. Under greatly improved market conditions, some of the sound material may be recovered during regular logging operations.

MORTALITY CAN BE AN IMPORTANT SOURCE OF WOOD. — Growth of a more diversified forest industry will result in a greater overall consumption of raw material. In part, this increase will come about through more use of residue material. But most likely it will also require an increased log harvest.

The most immediate opportunity for increasing the total volume of logs available for use is by salvage of mortality trees. The current rate of mortality is 1260 million board feet per year. Salvage of these dead trees could be used to maintain or even increase the total harvest of timber without any additional drain on the live timber inventory.

The annual loss of volume in mortality amounted to 87 percent of the live timber volume harvested in 1962. Current harvest of mortality is limited. In 1961, only 21 million board feet of dead trees were harvested. Over 60 times that much is potentially available each year. If only the annual volume of mortality that occurred in concentrations of at least 500 board feet per acre could have been salvaged, it would have increased the 1961 cut by 360 million board feet. Whether this degree of concentration is economically salvable depends upon local factors such as roads, logging costs, and markets. Mortality is concentrated in the more desirable species with 80 percent of the mortality volume in ponderosa pine, Douglas-fir, and larch.



ROADS are needed

ROADS ARE NEEDED. — Vital to all aspects of the management and utilization of the resource is an adequate transportation system. The feasibility of harvesting mortality trees is dependent upon an adequate road coverage to provide ready access to areas having salvable mortality.

The application of other management measures such as thinning, intermediate cutting, prelogging, and all the other measures necessary to realize the productivity of the forest for growing wood depends upon accessibility.

The key to accessibility is a complete road system. An example of the need for roads can be seen in the National Forest situation. On National Forests an area of almost 2-1/2 million acres of commercial forest land is not adequately roaded for logging or management. This means that 36 percent of the commercial forest land on National Forests is not available for intensive management or utilization. An estimated 10,900 miles of main haul and spur roads are needed before this area can be made accessible. The miles of road needed for each of the National Forests in eastern Oregon and the area of commercial forest land which would be opened up if these roads were developed are as follows:

	Needed road development (Miles)	Currently inaccessible commercial forest land (Acres)
NATIONAL FOREST:		
DESCHUTES	300	79,000
FREMONT	1,600	377,000
MALHEUR	300	81,000
OCHOCO	1,400	370,000
WALLOWA-WHITMAN	4,500	911,000
UMATILLA	2,000	514,000
ROGUE RIVER (Klamath County)	400	75,000
Total	10,900	2,407,000

WATER IS AVAILABLE. — Availability of industrial water is a major limiting factor to pulp plant establishment. Despite the general arid appearance of eastern Oregon, there is water available for industrial use. Comprehensive data for all streams are not yet available, but investigation of the Deschutes and Grande Ronde River basins by the State of Oregon Water Resource Board[8] indicates areas where streamflow of unallocated water is adequate to support a pulp plant or other water-demanding industrial development. Both the Snake and Columbia Rivers have sufficient flow to support new industrial development. Obviously, specific plant location including problems of waste disposal will require detailed study, but water is not an exclusively limiting factor in eastern Oregon.

SUSTAINED TIMBER HARVEST IS KEY TO INDUSTRIAL GROWTH. — A number of the factors influencing the industrial development of eastern Oregon has been discussed. Some of these were the spatial pattern of the area both in terms of the resource and the industry, transportation problems, the character of the lumber industry, species distribution, and ownership of the forest resource. In addition, the more critical subject of the potential raw material supply from logging and milling residue and from mortality was discussed. All these must be considered in arriving at a comprehensive view of opportunities in eastern Oregon. But these items do not complete the evaluation. The major controlling item necessary for all development is the ability of the forest resource to produce a continuing harvest of timber for use by present and future industries. Although other conditions must be considered, industrial development will most readily occur when the supply of raw material is both adequate for the present and reasonably assured for the future. Now let us examine the forest and question its ability to produce useful raw materials now and in the future.

[8] Data obtained from the Oregon State Water Resaurce Board on the Deschutes River basin are shown in table 44 in the oppendix. The water situation in the Grande Ronde basin is detailed in a recent Baard publication "Grande Ronde River Basin," 208 pp., Salem, 1960.


The Three Sisters

Balancing TODAY'S needs with TOMORROW'S

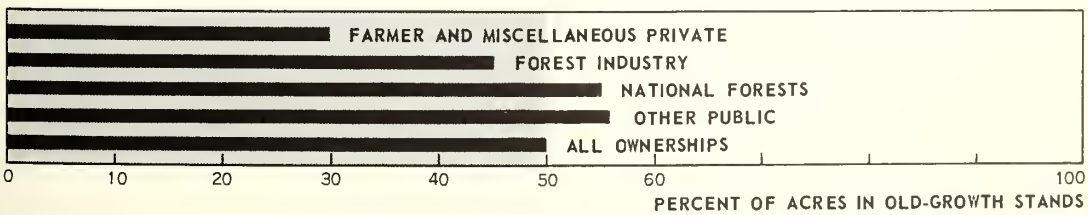
During the transition from the unregulated forest, the management of forest for sustained timber production would have two primary purposes: to supply current needs for wood products and to convert the unregulated forest into a regulated producer of the kind of wood needed in the future. Too much emphasis on current needs might delay or make impossible the achieving of a regulated forest. On the contrary, too much emphasis on achieving a regulated forest could seriously disrupt the flow of timber into the current economy. The most desirable management is that which aims at a reasonable balance between the two purposes: today's needs for wood products and tomorrow's needs for a regulated forest from which wood products will flow continuously in the future.

In this section of the report we will first suggest a model of what the regulated forest condition might reasonably be like and compare it with the existing forest conditions. Then we will estimate what a continuation of current and prospective cutting practices might produce in the way of current and short-run future needs and whether such cutting would result in a regulated forest some time in the future. Finally, we will estimate what levels of cutting and what other practices will be needed to smoothly and reasonably attain a regulated forest condition in the future.

THE FOREST MODEL -- A BASIS FOR EVALUATING THE FOREST CONDITION

Eastern Oregon is now in the process of conversion from an old-growth virgin forest to a young-growth forest. The cutting that has been occurring in eastern Oregon for the past 100 years has removed some of the old growth and converted part of the forest to stands of young trees. About half of the commercial forest area at present is classed as either young-growth sawtimber, poletimber, or seedling and sapling stands. The other half is in old-growth sawtimber stands — the virgin forest. The problem ahead is to change the forest from a mixture of young and old into a forest of young rapidly growing trees adequately utilizing the site and providing a continuous flow of desired products.

For the purpose of comparison in this report, the model for the future regulated forest is based on three assumptions. These set goals for the size of tree to be grown and harvested; they prescribe the diameter distribution believed necessary to produce a continuing flow of timber; and they set a level of growing stock to be maintained. These specifications have been made as practical and realistic as possible. They may not



be the most desirable conditions which could be specified, but they are suitable for the evaluation of past accomplishments and future possibilities for eastern Oregon forests in this report. These specifications in detail are:

1. The development of an integrated forest economy will continue to require an output of saw logs. For all types, except lodgepole pine, crop trees should average 26 inches d.b.h.; for lodgepole pine, 16 inches d.b.h. The actual harvest would include many trees smaller and larger than average.

2. The level of growing stock which should be maintained is estimated to be 95 square feet of basal area per acre.

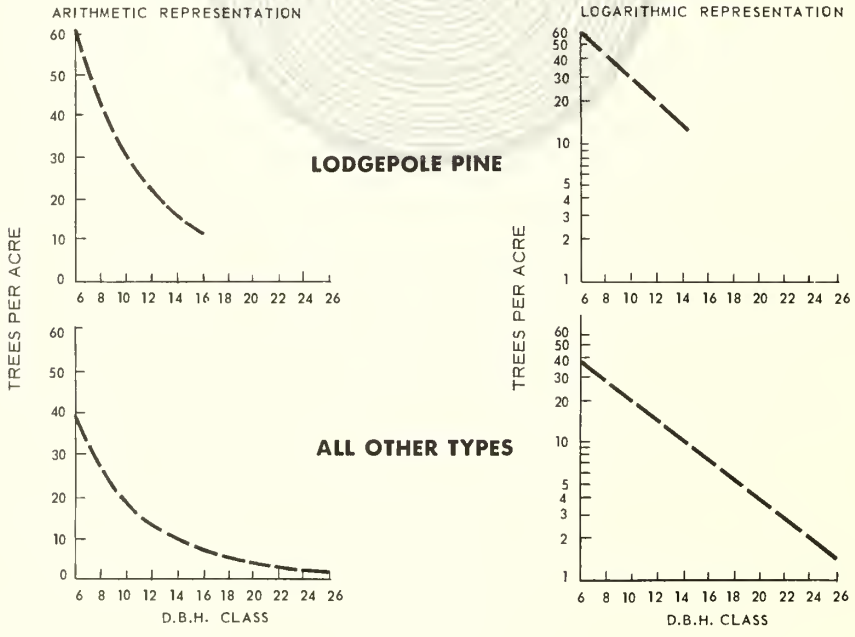
3. The arrangement of trees, i.e., the stand structure, based on this level of growing stock, must be capable of yielding a continuous flow of mature trees. This distribution in numbers of trees per acre by diameter class is shown below.[9]

The graphs used throughout this section of the report are representations of the actual and desired number of trees by size. In these graphs solid (———) lines will be used to show the present forest structure; dashed (— — —) lines, the forest after 30 years; and a heavy dashed (▬ ▬) line, the forest model.

[9] Technical details are given in the appendix, pages 53, 54.

STAND STRUCTURE OF FOREST MODEL

	6	8	10	12	14	16	18	20	22	24	26	INCHES D.B.H.
LODGEPOLE PINE												Total
TREES/ACRE	61.4	43.8	31.3	22.4	16.0	11.4						186.3
ALL OTHER TYPES												
TREES/ACRE	38.8	27.7	19.8	14.1	10.1	7.2	5.2	3.7	2.6	1.9	1.3	132.4



THE FUTURE WITH CURRENT CUTTING CONTINUED

If current cutting rates and practices continue, what will future forest conditions be? Will there be a decrease in the potential of the forest? Will they lead to a desired forest structure? Will the impact be the same for all ownerships and for all forest types?

In order to allow enough time for the effect brought about through the continuation of current rates, we will compare the present stand structure with those expected 30 years from now. These comparisons are made for four type groups and two major ownership classes. The types are ponderosa pine (ponderosa, white, and sugar), lodgepole pine, Douglas-fir and larch, and all other types. The ownership groups are public and private.

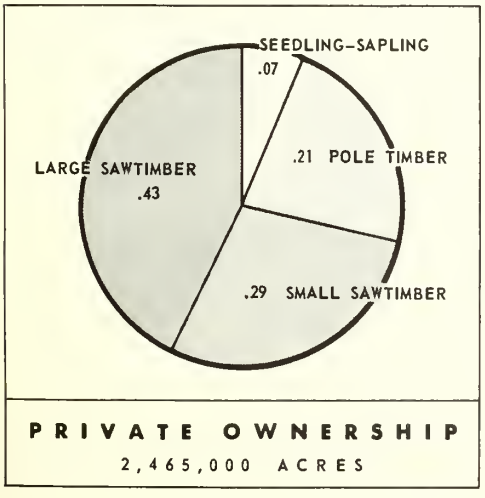
The stand structure for each type is based on its principal species. Thus lodgepole pine is used to describe the stand structure of the lodgepole pine type and Douglas-fir and larch trees are used to describe the structure of the combined Douglas-fir and larch types. For the ponderosa pine type the stand structure is described by the ponderosa, sugar, and white pine trees. All of the remaining species are grouped to describe the stand structure of the remaining types and are classed "other."

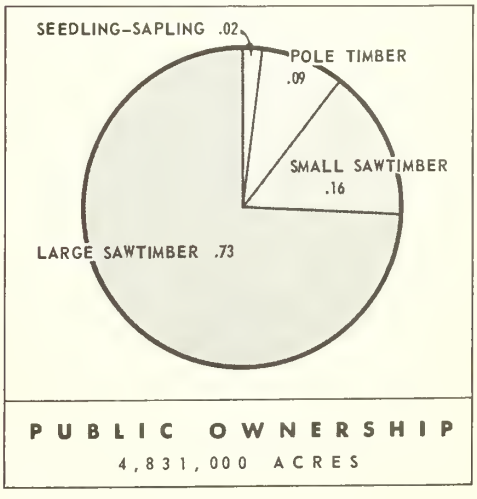
This use of a single species or group of species to describe the stand structure of a type is not wholly accurate. Within each type other species may also occur. However, this simplification was accepted because by far the greater proportion of trees within a designated type are those indicated by the type name.

The stand structure after 30 years of cutting was determined by projecting the present stand structure to the year 1993. This was done by adding to the present diameters the appropriate increment for growth and subtracting the number of trees removed due to cutting and mortality. The rates of growth, mortality, and cutting were established from present conditions and were not changed in the projection.

IN THE PONDEROSA PINE TYPE, TREND TOWARD DESIRED CONDITIONS IS SLOW. — The ponderosa pine type is of greater significance to eastern Oregon than any other forest type. It covers 63 percent, or 7.3 million acres, of the total commercial forest land area. It is the principal type on both

THE PONDEROSA PINE TYPE





public and private ownerships, since it covers 60 percent of the area of commercial forest land in public holdings and 72 percent of the private ownership.

Between 1950 and 1961, the 30 percent of commercial forest land in private ownership produced about 48 percent of the total log production. At the same time, the 70 percent of the commercial forest land which is publicly owned was producing an average of 52 percent of the total log production. Most of this cutting, on both public and private lands, was in the ponderosa pine type.

These different rates of cutting have produced forests with considerably different characteristics. The proportion of large ponderosa pine sawtimber on private land is much less than on public lands. Poletimber and seedling and sapling stands occur on about 1 out of every 4 acres in private commercial forest land compared to 1 out of every 9 acres on public lands.

Another more revealing way of looking at the effects of past cutting rates on today's forests is by examining the present stand structure of the ponderosa pine type in each ownership group. A comparison of this with the stand structure of the forest model allows evaluating the effects of past practices.

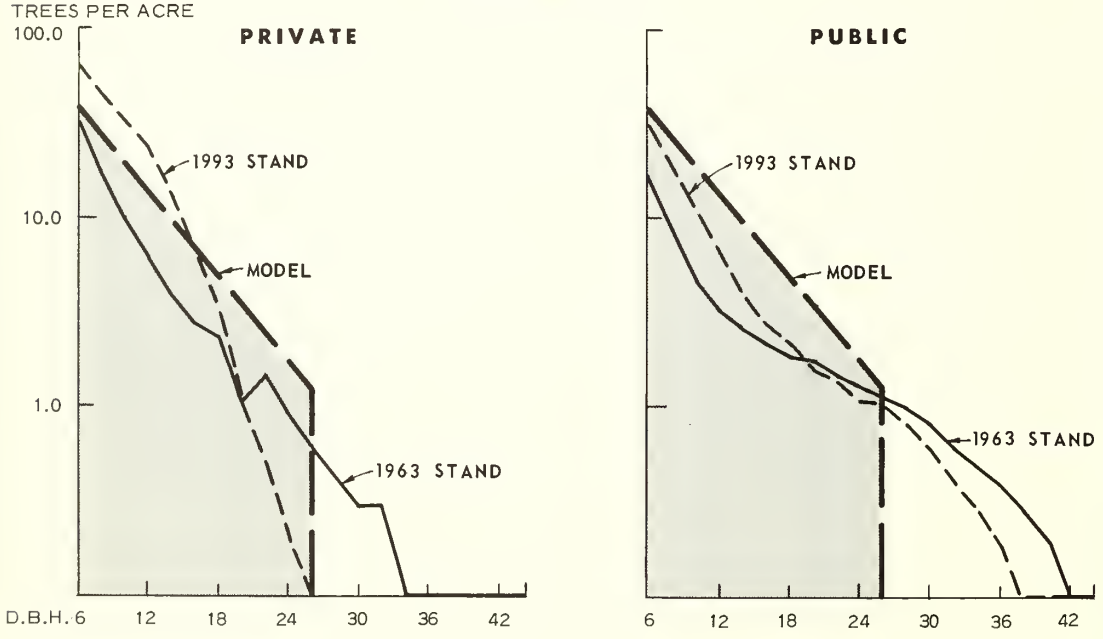
Past cutting on both private and public land has resulted in a forest that differs considerably from our model. There are too few poletimber trees (6 to 10 inches d.b.h.) and sawtimber trees (12 to 26 inches d.b.h.). However, public ownership has a large number of sawtimber trees over 26 inches, almost 10 percent, and private lands have 1 percent. A comparison of forest ownerships with the model reveals the following:

Present diameter class (Inches)	Private	Public	Forest model
	(Number of trees per acre)		
6-10	61	31	86
12-26	20	16	46
Over 26	1	5	--
Total	82	52	132

If the current rate of cutting on private ponderosa pine land was to continue, by

STAND STRUCTURE - THE PONDEROSA PINE TYPE

AVERAGE ACRE



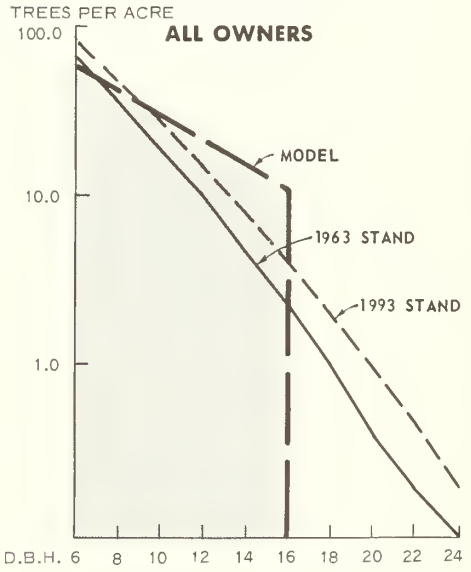
1993 the number of ponderosa pine sawtimber trees 16 to 26 inches d.b.h. would be reduced to half the required 22 trees per acre of the model. By the same future date, the number of poletimber and small sawtimber size trees would be in excess of the forest model.

On public lands the effects of another 30 years of the current type of cutting are more difficult to evaluate. Continued cutting will reduce the number of trees over 26 inches d.b.h., and at the same time the number of smaller sizes will gradually increase. Both of these trends are in the right direction. However, achieving a regulated forest condition will take a long time. At the end of 30 years, a gap will still exist between the number of small trees proposed by the model and those actually on the ground, and there will still be trees larger than desired.

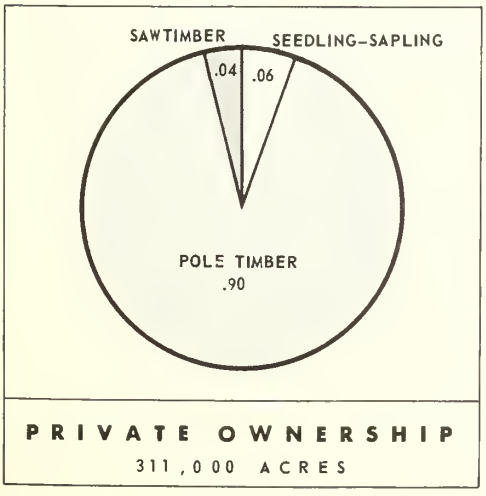
LACK OF MARKETS FOR LODGEPOLE PINE RESTRICTS MANAGEMENT. — There is considerably more lodgepole pine available than is currently used. In 1961 less than 1 percent of the total log production was lodgepole pine. This very low level of production came from 9 percent of the total commercial forest area in private ownership (311,000 acres) and 13 percent of the public holdings (1,091,000 acres).

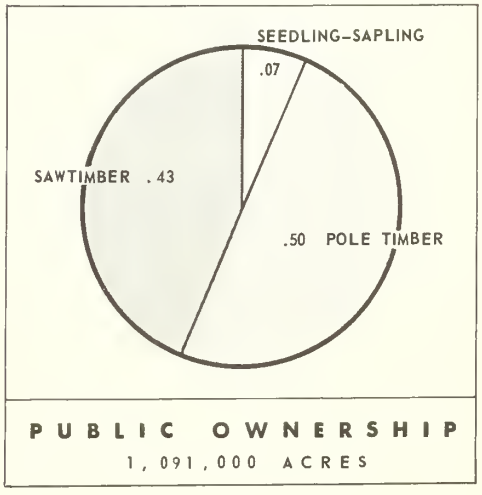
This production is far short of the lodgepole pine type's potential for producing annual crops. The sustained yield capacity in private ownership is estimated to be 15 times greater than the present rate of cutting, and in public ownership it is estimated at 50 times greater. Our inability to find enough additional uses for lodgepole pine results in a considerable loss now and in the future.

STAND STRUCTURE
LODGEPOLE PINE TYPE
AVERAGE ACRE



THE LODGEPOLE PINE TYPE





The available information on lodgepole pine is inadequate to develop stand tables for each ownership group. Because of this, the data for all owners are shown here in terms of numbers of trees per acre by size:

Present diameter class (Inches)	All owners (Number of trees per acre)	Forest model (Number of trees per acre)
6-10	124	136
12-16	18	50
Over 16	2	--
Total	144	186

A comparison of the present stand with the desired stand indicates fewer trees than in the model in all except the 6-inch diameter class. There is also a surplus of trees larger than the maximum diameter used in the model. The light rate of cutting over the 30-year period is insufficient to control the stand and the general result is an increase in numbers of trees of all diameters.

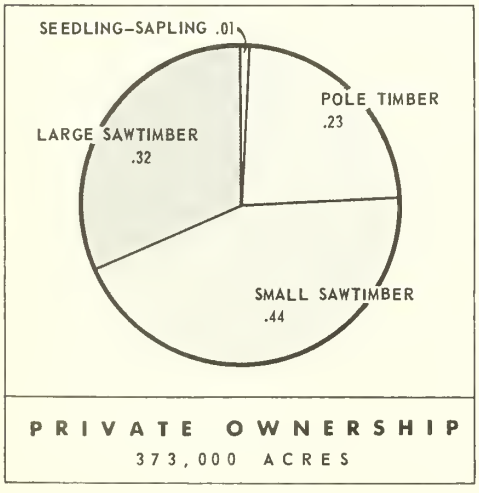
CURRENT CUTTING IN THE DOUGLAS-FIR AND LARCH TYPES LEAVES UNBALANCED GROWING STOCKS. — The forests in Douglas-fir and larch types are an important part of both the private and public ownership of commercial forest land. They cover 11 percent of the commercial forest land in private ownership and 14 percent in public ownership.

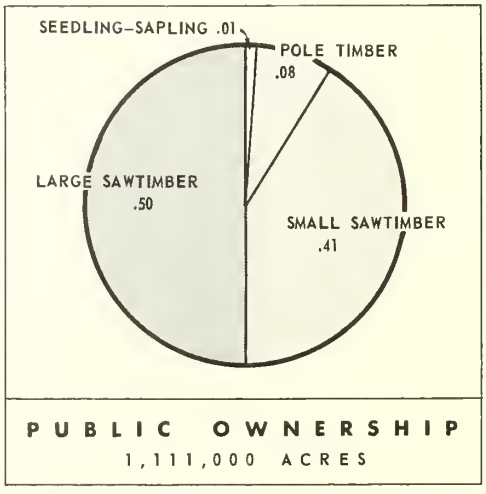
Considerable differences exist between stand conditions on private lands and those on public lands in these types. Three-quarters of the area in private ownership is classed as sawtimber compared to the nine-tenths in public ownership. These differences are also revealed in a comparison of the distribution of trees per acre:

Present diameter class (Inches)	Private (Number of trees per acre)	Public (Number of trees per acre)	Forest model (Number of trees per acre)
6-10	196	82	86
12-26	50	42	46
Over 26	1	5	--
Total	247	129	132

Continuance of the present rate of cutting on private holdings for the next 30 years will reduce the number of sawtimber trees over 20 inches d.b.h. to an undesirable volume and at the same time, the small sawtimber and poletimber trees will increase over the already present excess. Currently on public lands the number of trees 26 inches d.b.h. and under approximates that of the forest model. However, there is a considerable excess of sawtimber over 26 inches. After 30 years of cutting on public lands, the number of trees over 26 inches will be reduced slightly and the number of all others will increase.

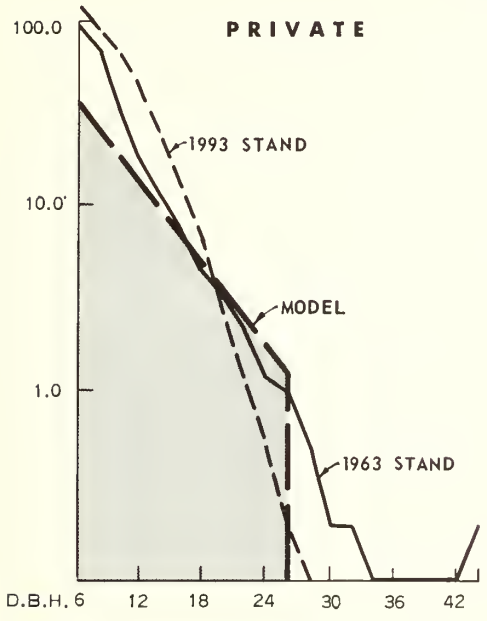
THE DOUGLAS-FIR AND LARCH TYPES

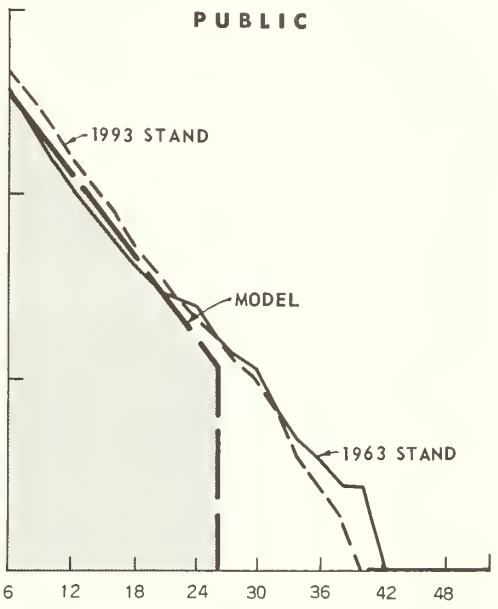




STAND STRUCTURE - DOUGLAS FIR AND LARCH TYPES

AVERAGE ACRE





THE "OTHER" TYPES ARE MOSTLY AT HIGH ELEVATIONS. — The combined area of the "other" types amounts to almost 10 percent of the total commercial forest land area. Most of these types occur at the higher elevations of the commercial forest land zone. Because more public ownership of forest land occurs at these elevations, the "other" types represent a correspondingly greater proportion of public than private lands, 13 percent and 5 percent, respectively. White fir and hardwoods are exceptions and occur generally at lower elevations. White fir makes up 78 percent of the "other" types in private ownership; in public ownership it is only 48 percent. Hardwood type makes up 7 percent of the "other" types in private ownership but less than 1 percent of the public ownership. The proportion of the higher elevation types such as the true fir-mountain hemlock, spruce, and true fir types in public ownership is almost four times that in private ownership.

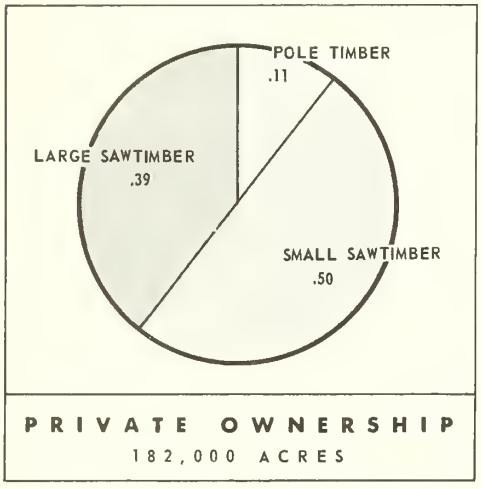
There are only small differences in the distribution of area by stand size class between ownerships. In public ownership 93 percent of the area is in sawtimber size classes, whereas on private ownership it is 89 percent. The two owner classes also have a generally similar stand structure, marked by an excess number of trees at all diameter levels in comparison with the forest model:

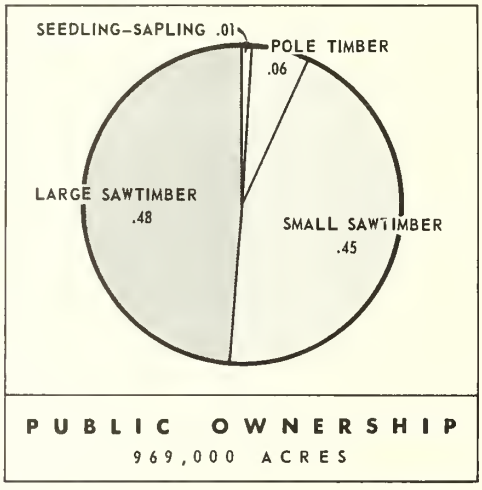
Present diameter class	Private	Public	Forest model
(Inches)	(Number of trees per acre)		
6-10	237	144	86
12-26	64	66	46
Over 26	5	5	--
Total	306	215	132

A continuation of current cutting rates and practices on private land will lead to a substantial reduction of sawtimber trees over 26 inches d.b.h. in 30 years. However, if there continues to be little or no cutting in poletimber or smaller size sawtimber trees, the present excess of trees in these sizes will become even greater.

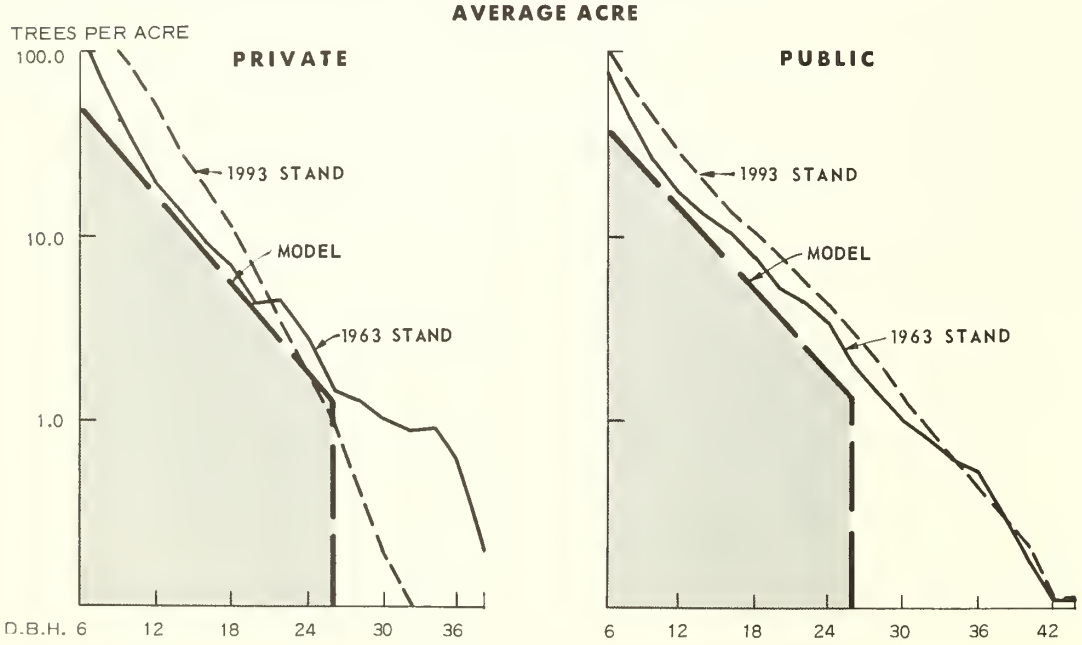
On public lands the current light cutting of species common to these "other" types, if continued, is not sufficient to achieve the desired stand structure and the present excess of trees will persist. The lack of roads into much of the higher elevation country is a handicap to the use of these species. Road construction and an active effort to promote use of these species are needed to facilitate the management of these stands.

THE "OTHER" TYPES





STAND STRUCTURE - THE "OTHER" TYPES



CONTINUATION OF PRESENT CUTTING SCHEDULE IN ALL TYPES IS NOT ENOUGH TO ACHIEVE DESIRED CONDITIONS. — The consequences of a continuation of current cutting practices on the stand structure of the forest have been discussed. Some of the results are expected to be undesirable. Principal among these is that continuation of present cutting practices fails to lead toward development of a desirable stand structure. In general, poletimber trees in all ownerships are expected to form a disproportionately large part of the stand. In some types on private lands, the heavier rate of sawtimber cutting will reduce the number of sawtimber trees to less than desirable. On public lands, the slow rate of cutting in some forest types, due to the absence of markets for the material which should be removed, is expected to result in an undesirable stand structure.

WORKING TOWARD THE FOREST MODEL

What can reasonably be done to achieve the desired stand structure and also provide the forest industry with sufficient raw material? In this section, an estimate is made of the annual harvest possible during a reasonably realistic conversion of the currently unregulated forest stands to a regulated condition. An estimate is also made of the sustained yield possible after the forests are fully regulated.[10] In determining these yields, some assumptions were made concerning the forest owners' objectives and the changing availability of commercial forest land. These are discussed under the next two headings.

OWNERS' OBJECTIVES VARY. — Each owner, whether an individual, corporation, or a public agency, has specific objectives. Each is limited by factors such as the amount of capital he is willing or able to invest in future yields. Some owners may have certain product objectives tailored to dependent industries. Specific owners may want to grow pulp-size material, others saw-log-size material. Some owners may have a different concept of the regulated forest than the one used here. For small owners with a limited acreage, periodic rather than annual crops of trees may be a more logical goal. For public owners a policy of even flow of high-quality timber products may have a large influence on the type of forest management. But despite the manifold opportunities for variations, the level and type of management selected here as a standard does serve in making useful estimates (1) of the interim cuts possible while converting the forests of eastern Oregon to a regulated condition and (2) of the sustained output possible once the desired stand structure has been attained.

OTHER USES OF FOREST LAND MUST BE CONSIDERED. — As the Nation feels the full impact of the expanding and increasingly affluent population, competition for the use of land will continue to increase. In the past, the principal competitor for commercial forest land has been agriculture. But from now on other nontimber uses will have an even greater influence on the acreage available for timber production.

The loss of commercial forest land to other uses has been a matter of serious concern in many areas of the West. But in eastern Oregon serious losses are not anticipated. From 1945 to 1953, extension of powerlines took an estimated 2,500 acres of commercial forest land, the building of reservoirs reduced the commercial forest land area by another 10,000 acres, and road development accounted for 2,500 acres. Continuation of this rate of loss would reduce the commercial forest land area by 19,000 acres every 10 years. However, it is unlikely that this rate will be maintained as reservoir sites become more limited, the net of transmission lines becomes more nearly developed, and road development becomes adequate to meet

[10] The technical details of the projection method are given in the appendix, pages 53, 54.


Wickiup Reservoir
and powerlines
South of Bend

needs. In this study, future loss of commercial forest land to these three uses was considered negligible.

Just as eastern Oregon's timber products serve the entire Nation, the beauty and uniqueness of its forest land offers recreation opportunities to the entire country. Under multiple-use management, almost all of the National Forest area is available for recreation. A total of 503,000 acres of primitive, wild, wilderness, or natural areas have been set aside on the National Forests by the Secretary of Agriculture for recreation or scientific study. In eastern Oregon these include the Eagle Cap Wilderness Area, Strawberry Mountain Wild Area, Mount Jefferson Primitive Area, Mount Washington Wild Area, Three Sisters Wilderness Area, and several natural areas.

Studies of land-use management are being made on the Anthony Lakes, Snake River, and Sky Lakes areas to determine final classification. The decision as to their use rests on a number of factors. These include their value for recreation and timber and the needs of the Nation and local economy for these uses, as well as other multiple-use factors. In recent years decisions have been made both ways. For example, the former Mount Washington Limited Area has been declared a wild area, while the former Waldo Lake and Diamond Lake Limited Areas will have road development and multiple-use management with emphasis on recreation.

In addition to these special areas on the National Forests, there are 136,000 acres of forest land in Crater Lake National Park, 10,220 in State ownership, and 1,010 in municipal holdings devoted primarily to recreation.

Under multiple-use management, not all of the land classed as commercial forest will be used to its full capabilities for the production of timber. On the National Forests this is true of areas having a high recreation value; these areas are classed as Landscape Management Areas. They include " . . . areas which now receive heavy public use or which will be heavily used in the future. . . . The Landscape Management Area varies in size, depending on such factors as topography, timber type, and quality of the recreational attraction — for example, a narrow strip just wide enough to provide a natural beauty along small streams. On the other hand, a primary foreground area may extend for a considerable distance back from a heavy public use area, with various graduations in modification of resource uses."[11] On these areas timber management practices normally applied to commercial forest land are modified to the extent necessary to provide for continuing scenic enjoyment. This consists chiefly of lengthening the rotation, employing very light cuts, and giving special attention to logging methods so as to maintain an attractive forest.

CONVERTING A PUBLIC FOREST TO A FULLY REGULATED CONDITION

Under current rates of growth and mortality, it is estimated that 145 years will be necessary to convert the public forest to the model. During this time, the annual cut is estimated at 1.5 billion board feet. This volume of cut is 77 percent more than the average annual volume that was harvested on public lands during the 5 years from 1957 to 1961 and is 40 percent more than the total 1962 public allowable cut. However, only 75 percent of this 1.5 billion cut is directly comparable to the sizes and species included in the present allowable cut calculations of the public agencies; and this 75 percent is essentially equal to the total 1962 public allowable cut in eastern Oregon. In the year 2108, when a fully regulated condition similar to our forest model is expected to be achieved, the sustained yield could be 1.8 billion board feet a year. This volume assumes all mortality will be harvested.

To increase to these levels, the material harvested will have to be considerably different than at present. It will be necessary to harvest more of the currently less desirable species and trees of smaller diameter. The current harvest by species, the cut recommended during the conversion period, and the cut estimated from the fully regulated forest may be compared in table 4.

Table 4. — The estimated average annual sawtimber harvest on public lands by type at present, during the first 70 years of conversion and when fully regulated

Type	At present		During conversion period		Fully regulated	
	Million bd. ft.	Percent	Million bd. ft.	Percent	Million bd. ft.	Percent
Ponderosa pine	573	64	742	47	1,052	59
Douglas-fir, larch	223	25	328	21	248	14
Lodgepole pine	3	--	109	7	158	9
Other	99	11	407	25	321	18
Total	898	100	1,586	100	1,779	100

Although the total volume of all species cut during conversion can be greater, the greatest increase is possible in the currently little-used lodgepole pine and in the true firs, spruce, mountain hemlock, cedar, and associated species comprising the "other" types. The cut of lodgepole pine can be increased 36 times and that of "other" species 4 times.

The fully regulated forest can yield more lodgepole pine and ponderosa pine than at present or during the conversion period.

[11] U. S. Forest Service. Basic objectives and policy to guide multiple use management, Region 6. 33 pp., illus. 1962.

The sustained-yield cut of Douglas-fir and larch would be somewhat less than the present or the conversion cut. The sustained-yield cut of species in the "other" types can be more than the present cut but less than the conversion-period cut. Of greater interest is the proportion of the cut estimated to come from each type group. Notably, Douglas-fir and larch drop from 25 percent now to 14 percent under full regulation, and lodgepole pine increases from less than 1 percent to 9 percent of the total cut under full regulation.

The distribution of the harvest by diameter classes must also be materially different from that at present if the possible gains in harvest volume are to be realized (table 5).

Table 5 — A comparison of the diameter distribution of the present cut of sawtimber to the average estimated during the conversion of each type on public lands (in percent[1])

Type	Diameter class (in inches)			
	12-18	20-28	30-38	40+
Ponderosa pine:				
Present cut	1	16	45	38
Conversion cut	21	49	22	8
Douglas-fir, larch:				
Present cut	7	34	30	29
Conversion cut	16	51	23	10
Lodgepole pine:				
Present cut	84	16	--	--
Conversion cut	88	12	--	--
Other species:				
Present cut	7	50	39	4
Conversion cut	18	51	24	7

[1] Percentages are of total cut in each species.

At the present time, most of the timber cut is from trees 30 inches d.b.h. and larger. During the conversion period, it is estimated that most of the cut should come from smaller trees. For ponderosa pine the present 83 percent of the cut coming from trees over 30 inches d.b.h. would be reduced to 30 percent. The cut of trees less than 30 inches d.b.h. would be increased from 17 percent to 70 percent. Similarly, the cut of Douglas-fir and larch trees over 30 inches d.b.h. would decrease from 59 to 33 percent, and for the "other" species from 43 to 31 percent. Only in lodgepole pine, where most of the trees are of small size, would the future diameter distribution of the cut be similar to that at present. When sustained yield is reached, the average size of the crop trees, with the exception of lodgepole pine, would be 26 inches d.b.h. For lodgepole pine the average size would be 16 inches d.b.h.

In addition to the board-foot volumes harvestable from sawtimber trees, an estimated 35 million cubic feet in trees 6 to 10 inches d.b.h. would be available annually during conversion. These estimated volumes of species are:

	Million cubic feet
Ponderosa pine	18
Douglas-fir, larch	5
Lodgepole pine	7
Other	5

This projection of public forests to a regulated condition presents a promising picture of the future. But to achieve these results, action must be taken. Much greater emphasis must be placed on the harvest of species not now being fully used, i.e., lodgepole pine and the species in the "other" types. Unless ways are found to utilize these species, the estimated cuts cannot be achieved. Furthermore, for each species group the potential can only be achieved if more use is made of the smaller sizes of material. At the present time only 30 percent of total annual harvest is in materials from 12 to 28 inches. This has to be increased to more than 70 percent during the conversion period if the potential harvest from the public ownerships is to be attained.

CONVERTING PRIVATE FORESTS TO A FULLY REGULATED CONDITION

The past heavy cutting on private lands in eastern Oregon has resulted in conditions differing from our fully regulated model.

The current annual cutting rate must be reduced, and the nature of the cut changed.

The average annual cut on private forest land between 1957 and 1961 was 718 million board feet. During the entire conversion period of 145 years, the cut would average 853 million board feet a year. However, for the first 30 years of the period, the cut should be lowered to an average of 597 million board feet a year.

When a fully regulated forest is achieved, the annual sustained-yield cut is estimated to be 1,064 million board feet from both live and dead trees.

The cut now, that during the first 30 years of the conversion period, and from the fully regulated forest is shown in table 6. During conversion, the volume of cut for ponderosa pine is estimated at 70 percent of the current cut; Douglas-fir and larch 63 percent. The cut of species in "other" types could increase 12 million and the cut of lodgepole pine could increase 15 million.

Table 6. — The estimated average annual sawtimber harvest on private lands by type at present, during first 30 years of conversion, and when fully regulated

Type	At present		During conversion		Fully regulated	
	Million bd. ft.	Percent	Million bd. ft.	Percent	Million bd. ft.	Percent
Ponderosa pine	479	62	337	56	785	74
Douglos-fir, larch	169	22	107	18	116	11
Lodgepole pine	3	--	18	3	45	4
Other	123	16	135	23	118	11
Total	774	100	597	100	1064	100

When the fully regulated forest is achieved, the cut of ponderosa pine can be 64 percent more than at present and the cut of lodgepole pine can increase from 3 to 45 million board feet. The estimated cut of Douglas-fir, larch, and "other" species will be less than at present.

Besides the reduction of total cut during the first part of the conversion period, it is estimated that an increasing proportion must come from smaller diameter trees. In the following tabulation the proportion of the present cut by diameter classes is compared to the average proportion estimated during conversion:

D.b.h. (inches):	Present cut (Percent)	Conversion cut (Percent)
12-18	3	25
20-28	25	52
30-38	41	20
40 and larger	31	3
Total	100	100

At the present time, almost three-quarters of the total volume of the cut on private land comes from trees 30 inches d.b.h. and larger; during conversion, this will drop to about 24 percent.

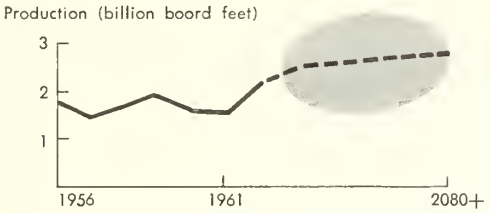
Besides the harvest of sawtimber-size trees, an additional 32 million cubic feet from trees 6 to 10 inches d.b.h. would be available annually during conversion. The estimated volumes by species are:

	Million cubic feet
Ponderoso pine	8
Douglos-fir, lorch	13
Lodgepole pine	3
Other	8

ADEQUATE RAW MATERIAL AVAILABLE FOR A DIVERSIFIED INDUSTRY. — The sustained annual cut estimated for all ownerships in eastern Oregon can be greater than the annual harvest has ever been. The estimated decrease in the private cut during the conversion period is exceeded by the increase possible from public timber.

Although the average annual cut obtainable from all lands during the entire span of the conversion period is estimated at 2,380 million board feet, the cut might reach as low as 2,175 million board feet during the early part of the conversion. Even at this low point, the annual harvest would equal the highest cut yet attained. The estimated sustainable cut of 2,840 million board feet to be reached at about the year 2108 would be about 70 percent more than the present

cut. The following graph presents actual production from 1956 to 1961 and an estimate of production during the conversion of the forests of eastern Oregon to a fully regulated condition:



A program of more intensive management plus changes in the nature of the harvest is required to achieve the high estimated sustained yield. This report assumes that the trends already underway toward intensive management can and will be accelerated.

Certain important aspects can be mentioned. Any program of sustained-yield forest production needs effective regeneration of desirable species, and this one is no exception. Economical thinning procedures must be developed soon and placed into wide use. Additional investments must be made for roads in advance of regeneration cut to facilitate thinning and timely harvest, including prompt mortality salvage.

The character of harvested trees has been described for the present cut, for the estimated conversion cut, and for the projected sustained-yield cut. During the conversion, a greater proportion of the total cut must come from species other than ponderosa pine, and more of the smaller trees must be used than are being used now. These changes in the cut can be made smoothly throughout the transition period but must be started promptly if regulated conditions are to be attained in the future.

Furthermore, there must be recognition that the production potential estimated for private lands can be achieved only if the present cut from these lands is reduced in order to allow buildup of size class and growing stock.

As was pointed out at the beginning of this chapter, the increases in management intensity required to reach the desired forest conditions must concurrently provide the forest industry with its raw material. The estimated cut during the conversion and after sustained regulated yield is reached will provide lots of the same kind of wood that is now required by industry. However, it can and will also provide material not now being used. The full realization of the productive capacity of eastern Oregon's timber resources not only permits but requires that the industry become diversified in the material it uses and the products it manufactures.

Davis Lake
Deschutes N. F.


Century Drive
near Bend

Juniper forest

APPENDIX

TECHNICAL ASPECTS OF THE STAND PROJECTION METHOD

In order to meet the objective of this report, a projection system had to be used that would provide estimates of timber yields in sufficient detail so that future harvests could be defined by size and species. The generally accepted procedure for determining level of cut is by formula methods which are useful mainly in developing total volumes. Consequently, another technique had to be used. Since a primary consideration in the choice of method was separation of the cut into size of tree and species, a stand projection method seemed most suitable.

Basic to our needs in the stand projection method was the development of a stand representative of a regulated forest. This regulated forest, or model, provides a basis against which present conditions can be compared and toward which future management can be directed. Conditions needed to define the forest model are stand structure, level of growing stock, and average diameter of crop tree.

In developing the desired stand structure of the forest model, we noted that research by others has shown that the distribution of trees by diameter classes could be expressed in terms of the average of the ratios obtained by dividing the number of trees in each 2-inch diameter class by the number in the next larger class.

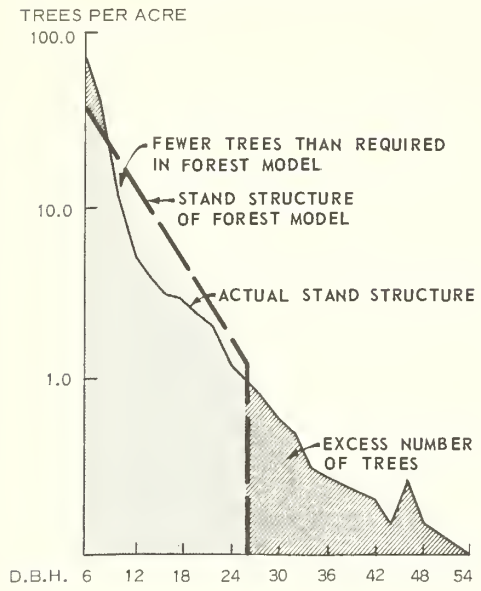
This constant ratio to express a stand structure has been the object of considerable research. The concept is one developed in the latter part of the 19th century by a French forester named DeLiocourt. Additional work has been done on it by both European and American foresters. Most notable among the American foresters has been H. Arthur Meyer, who referred to this method in "Methods of Forest Growth Determination" (Pennsylvania Agricultural Experiment Station Bulletin 435, December 1942) and "The Structure and Growth of Virgin Beech-Birch-Maple-Hemlock Forests in Northern Pennsylvania" (Journal of Agricultural Research, volume 67, number 12, December 15, 1943).

The desired structure of trees in the forest model used here was based on the current Forest Survey standards in eastern Oregon. Using these, we found the recommended structure produced an average overall ratio of 1.4. That is, on the average each 2-inch diameter class should have 1.4 times more trees than the next larger diameter class.

Next, it was necessary to define the level of growing stock and average size of crop tree. Here choices were made that appeared reasonable in the light of the available information. These, as previously described in the text, are a growing-stock level of 95 square feet of basal area in trees in the 6- to 26-inch diameter classes for all species, except for lodgepole pine where the upper limit was 16 inches d.b.h.

Estimates of annual cut were made for the period required to convert the forest to a managed condition and for the sustained yield obtainable thereafter. The volume of cut during the conversion period comes from those trees that, at any time during the conversion period, will exceed the stand structure defined by the forest model. These, as shown below, occur as excessive numbers of trees within the established diameter range of the forest model or as trees larger than the diameter of the crop tree. The length of the conversion period is established by the time it takes for the trees to close the gaps between the existing stand and the forest model. In those instances where the present stand had a greater number of trees than

HYPOTHETICAL STAND STRUCTURE



desired in the forest model, a reasonable conversion harvest period was chosen in which the excess numbers of trees could be reduced to those of the model. The annual sustained-yield cut is the gross forest growth of the forest model. This was developed, using growth rates of the present forest under the assumption that all mortality would be salvaged and included in the annual cut.

SURVEY PROCEDURES AND ACCURACY OF DATA

The forest acreage and timber volume statistics in this report are based on the most recently published Forest Survey statistics adjusted to January 1, 1963. The updating procedure took into account area and volume changes occurring since the latest available field inventory.

The dates the counties were last inventoried by Forest Survey range from 1946 to 1958. Specific dates and the methods of inventory used are as follows:

County	Date of inventory	Type map with rondom sample plots	Systematic field plot sample
Boker	1956	x	--
Crook	1952	x	--
Deschutes	1953	x	--
Gilliam	1954	x	--
Grant	1958	x	x
Harney	1953	x	--
Jefferson	1953	x	--
Klamath	1946	[1]x	--
Lake	1947	x	--
Malheur	1956	x	--
Morrow	1954	x	--
Umatillo	1957-58	x	x
Union	1957-58	x	x
Wallowo	1957	x	x
Wasco	1954	x	--
Wheeler	1953	x	--

[1] Volume estimates obtained through o compilation of cruise data.

In Klamath and Lake Counties, new inventories have been made on the major portion of the public lands within these counties. All of the National Forests were inventoried during the period 1950-59. The volume and area statistics for that part of the Winema National Forest, formerly part of the Klamath Indian Reservation, were based on a 1956 inventory. These data were used in place of or to update the older Forest Survey inventories. These inventories were made to an accuracy comparable to Forest Survey standards.

No new inventory data were available for either private or the public ownerships other than those mentioned in the above paragraph. These were adjusted by determining the percentage change that had occurred in the same ownerships in the more recently inventoried counties in eastern Oregon and applying these changes to the same ownerships in Klamath and Lake Counties.

The statistics were adjusted to January 1, 1963, by modifying the area and volume statistics to account for major changes in ownership. The volume data were adjusted by the addition of gross growth and of depletion due to cutting and mortality.

All of eastern Oregon was reinventoried by the type map method except for Grant,

Wallowa, Union, and Umatilla Counties where the type map method was used for lands outside the National Forests and a systematic grid of field plots was used for the National Forests. All land area was classified and mapped on aerial photos, except for a part of Klamath County where photos were not available and type mapping was done directly through ground recconaissance. Where aerial photos were used, a type map was prepared by mapping on aerial photos in the field and then transferring the delineations on the photos to a base map. The area of each map class was determined from the type map. As the type map included all the area, the area estimates had no sampling error.

In the systematic field plot sample method, a grid of ground plots was established and each was classified according to land and forest classes. The total area was proportioned into land and forest classes according to the ratio developed from the number of field plots in each class to the total number of plots. The area statistics determined in this method are subject to sampling error.

In the type map method of inventory, volume estimates were obtained through a sampling procedure in which stands were measured on sample plots located at random within given forest types. In the systematic sample, the volume estimates from the field plots were expanded to the total acreage to provide total volume estimates.

The methods of calculation of the basic data, including updating of older inventory data, precluded use of all 14 forested counties in eastern Oregon for development of sampling errors.

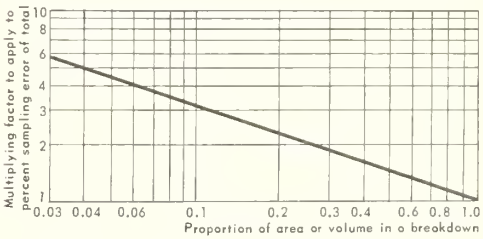
Thus the standard error estimates for area and volume were based on the 12 counties reinventoried by Forest Survey since 1952.

Growth estimates were based on radial growth measurements from field data taken in the 12 most recently inventoried counties. These were applied to the appropriate stand tables to develop estimates of gross growth by ownership group. Mortality ratios were obtained from these 12 counties by relating plot mortality by ownership group to inventory volume. Mortality was subtracted from gross growth to obtain estimates of net growth. This method precluded a direct calculation of error; instead, the estimate of error was based on plot growth and mortality in six sample counties.

The standard error of timber cut was developed from a 1958 study of logging utilization in eastern Oregon.

	Estimate	Standard error	
		Units	Percent
Commercial forest land	11,531 Macres	± 21 Macres	± 0.2
Noncommercial forest land	3,349 Macres	± 1 Macres	± 0
Growing stock	25,603 MM cu. ft.	± 410 MM cu. ft.	± 1.6
Sawtimber	112,107 MM bd. ft.	± 2,354 MM bd. ft.	± 2.1
Growth	314 MM cu. ft.	± 56 MM cu. ft.	± 17.7
Timber cut	253 MM cu. ft.	± 3 MM cu. ft.	± 1.2

As the estimates of total area, volume, or cut are subdivided, the sampling errors will become larger. Thus the statistics on area by stand-size class, or by forest type, or of volume by species are less accurate than the estimates of the totals. An approximation of the sampling precisions of any specific item can be obtained from the following chart.



For example, assume that the sampling error reported for a total is ± 5 percent, and an estimate of the sampling error for an item which is only 0.25 of this total is desired. Reading from the chart, the multiplying factor for a proportion of 0.25 is 2. The estimated sampling error for the item is then 2 times ± 5 percent, the sampling error of the total, or ± 10 percent.

The information on forest industries was obtained from a 100-percent field canvass of all primary forest industries in eastern Oregon. The statistics obtained from this survey describe the industry in the year 1958.

DEFINITION OF TERMS

LAND AREA

TOTAL LAND AREA. — The area of dry land and land temporarily or partially covered by water. Includes streams less than one-eighth of a statute mile in width, and lakes, reservoirs, and ponds less than 40 acres in area.

FOREST LAND AREA. — Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use.

NONFOREST LAND AREA. — Land that does not qualify as forest land.

COMMERCIAL FOREST LAND AREA. — Forest land which is producing or capable of producing crops of industrial wood and not withdrawn from timber utilization.

NONCOMMERCIAL FOREST LAND AREA. — Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

OWNERSHIP

NATIONAL FOREST LANDS. — Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

OTHER FEDERAL LANDS. — Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies.

STATE, COUNTY, AND MUNICIPAL LANDS — Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

FOREST INDUSTRY LANDS. — Lands owned by companies or individuals operating wood-using plants.

FARMER-OWNED LANDS. — Lands owned by operators of farms.

MISCELLANEOUS PRIVATE LANDS. — Privately owned lands other than forest industry or farmer-owned lands.

STAND-SIZE CLASSES

SAWTIMBER STAND. — Stand at least 10 percent stocked with growing-stock trees, with sawtimber trees making up a plurality of this stocking, and having a minimum per-acre net volume of 1,500 board feet (International 1/4-inch rule).

> LARGE SAWTIMBER STAND. — Stand in which the majority of the volume is in trees 21.0 inches d.b.h. and larger.
>
> SMALL SAWTIMBER STAND. — Stand in which the majority of the volume is in trees 11.0 to 20.9 inches d.b.h.

POLETIMBER STAND. — Stand failing to meet sawtimber specifications but at least 10 percent stocked with growing-stock trees, and with poletimber trees making up a plurality of this stocking.

SAPLING AND SEEDLING STAND.—Stand failing to meet poletimber specifications but at least 10 percent stocked with growing-stock trees and with saplings and/or seedlings making up a plurality of this stocking.

NONSTOCKED AREAS. — Commercial forest land less than 10 percent stocked with growing-stock trees.

TREE CLASSES

SAWTIMBER TREES. — Trees of commercial species 11.0 inches d.b.h. and larger which contain at least one 16-foot conifer saw log or one 8-foot hardwood saw log to a variable top diameter never less than 8.0 inches inside bark. Also, 25 percent or more of the

gross board-foot volume must be free from rot or defect.

SAW-LOG PORTION. — That part of the bole of sawtimber trees between the stump and the merchantable top, that is, the point on the bole above which any specified grade of saw log cannot be obtained.

UPPER-STEM PORTION. — That part of the bole of sawtimber trees above the merchantable top to a minimum top diameter of 4.0 inches outside bark, or to the point where the central stem breaks into limbs.

POLETIMBER TREES. — Trees of commercial species 5.0 to 10.9 inches d.b.h.

SAPLING AND SEEDLING TREES. — Live trees of commercial species less than 5.0 inches d.b.h. and of good form and vigor.

GROWING-STOCK TREES. — Growing-stock trees include sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live trees except cull trees.

CULL TREES. — Live trees of sawtimber or poletimber size that are unmerchantable for saw logs, now or prospectively, because of defect, rot, or species.

SOUND CULL TREES. — Live trees 5.0 inches and larger in diameter at breast height that do not contain a saw log now or prospectively, primarily because of roughness and poor form or species (that is, noncommercial species).

ROTTEN CULL TREES. — Live trees 5.0 inches and larger in diameter at breast height that do not contain a saw log now or prospectively, primarily because of rot.

MORTALITY TREE. —Tree which has died from natural causes and which was not a cull tree at the time of death.

SALVABLE DEAD TREES. — Standing or down dead trees of commercial species with at least 25 percent of their volume in board feet International 1/4-inch rule, free from defect or rot.

VOLUME

VOLUME OF GROWING STOCK. — Volume of sound wood in the bole of sawtimber and poletimber trees from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

VOLUME OF SAWTIMBER. — Net volume of the saw-log portion of live sawtimber trees, in board feet International 1/4-inch rule.

VOLUME OF SALVABLE DEAD SAWTIMBER-SIZE TREES. — Net volume of salvable dead sawtimber-size trees, standing or down, in board feet International 1/4-inch rule.

NET ANNUAL GROWTH OF GROWING STOCK. — The annual change in volume of sound wood in live sawtimber and poletimber trees during a specified period resulting from natural causes.

ANNUAL MORTALITY OF GROWING STOCK. — The volume of sound wood in live sawtimber and poletimber trees dying annually from natural causes during a specified period.

ANNUAL MORTALITY OF SAWTIMBER. — The net board-foot volume of sawtimber trees dying annually from natural causes during a specified period.

OUTPUT OF TIMBER PRODUCTS. — The volume of timber products, including both roundwood products and byproducts of wood manufacturing plants.

ANNUAL TIMBER CUT. — The volume of sound wood in live sawtimber and poletimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

ANNUAL TIMBER CUT FROM SAWTIMBER. — The net board-foot volume of live sawtimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

VOLUME OF PLANT RESIDUES. — Plant residues include wood materials from primary manufacturing plants that are not utilized for some product.

MISCELLANEOUS

SITE CLASSES. — Site classes represent a classification of forest land in terms of inherent capacity to grow crops of industrial woods.

FOREST TYPES. — A classification of forest land based upon the predominant species in the present tree cover.

STOCKING. — Stocking is the extent to which growing space is effectively utilized by all trees of commercial species. "Degree of stocking" is synonymous with "percent of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criterion or combination of criteria.

WELL-STOCKED STANDS. — Stands that are 70 percent or more stocked with growing-stock trees.

MEDIUM-STOCKED STANDS.—Stands that are 40 to 70 percent stocked with growing-stock trees.

POORLY STOCKED STANDS. — Stands that are 10 to 40 percent stocked with growing-stock trees.

NONSTOCKED AREAS. — Forest land less than 10 percent stocked with growing-stock trees.

TREE SPECIES

Tree species found in eastern Oregon include:

SOFTWOODS:

Alaska-cedar *(Chamaecyparis nootkatensis)*

Douglas-fir *(Pseudotsuga menziesii)*

Engelmann spruce *(Picea engelmannii)*

Grand fir *(Abies grandis)*

Incense-cedar *(Libocedrus decurrens)*

Lodgepole pine *(Pinus contorta)*

Mountain hemlock *(Tsuga mertensiana)*

Noble fir *(Abies procera)*

Pacific silver fir *(Abies amabilis)*

Ponderosa pine *(Pinus ponderosa)*

Subalpine fir *(Abies lasiocarpa)*

Sugar pine *(Pinus lambertiana)*

Western hemlock *(Tsuga heterophylla)*

Western juniper *(Juniperus occidentalis)*

Western larch *(Larix occidentalis)*

Western redcedar *(Thuja plicata)*

Western white pine *(Pinus monticola)*

White fir *(Abies concolor)*

Whitebark pine *(Pinus albicaulis)*

HARDWOODS:

Bigleaf maple *(Acer macrophyllum)*

Black cottonwood *(Populus trichocarpa)*

Northwestern paper birch *(Betula papyrifera* var. *subcordata)*

Oregon white oak *(Quercus garryana)*

Quaking aspen *(Populus tremuloides)*

Red alder *(Alnus rubra)*

STATISTICS

Table 7. — Area by land classes in eastern Oregon, January 1, 1963
(In acres)

Land class	Area
Commercial forest	11,531,400
Unproductive forest	2,929,500
Productive-reserved forest	419,700
Total forest	14,880,600
Nonforest	27,543,800
All land	42,424,400

Table 8. — Area (in acres) of commercial forest land by ownership classes in eastern Oregon, January 1, 1963

Ownership class	Area
National Forest	[1]7,459,800
Other Federal:	
Bureau of Land Management	250,400
Indian	345,500
Miscellaneous Federal	3,100
Total other Federal	599,000
State	38,300
County and municipal	17,100
Forest industry:	
Pulp and paper	[2]
Lumber	1,476,600
Total forest industry	1,476,600
Farmer-owned	1,652,100
Miscellaneous private	288,500
All ownerships	11,531,400

[1] Includes both operable and inoperable forest land.

[2] As there is only one company classed as a pulp and paper industry owning forest land in eastern Oregon, its commercial forest land area is included in the lumber industry statistics to avoid disclosure.

Table 10. — Area (in acres) of commercial forest land by stand volume classes for sawtimber and other stand-size classes in eastern Oregon, January 1, 1963

Stand volumes per acre[1]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	2,608,500	--	2,608,500
1,500 to 5,000 board feet	2,592,200	2,592,200	--
More than 5,000 board feet	6,330,700	6,330,700	--
All classes	11,531,400	8,922,900	2,608,500

[1] Net volume, International 1/4-inch rule.

Table 9. — Area of commercial forest land by stand-size and ownership classes in eastern Oregon, January 1, 1963
(In acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Former and miscelloneous private
Sawtimber stands:					
Old-growth[1]	5,782,600	4,169,400	360,400	660,700	592,100
Young-growth[2]	3,140,300	2,008,600	145,400	314,700	671,600
Total	8,922,900	6,178,000	505,800	975,400	1,263,700
Poletimber stands	2,044,500	1,032,400	110,600	366,800	534,700
Sapling and seedling stands	365,400	155,100	20,500	88,400	101,400
Nonstocked areas	198,600	94,300	17,500	46,000	40,800
All classes	11,531,400	7,459,800	654,400	1,476,600	1,940,600

[1] Includes stands having a predominance of volume in trees 21.0 inches d.b.h. and larger.

[2] Includes stands having a predominance of volume in trees 11.0 to 20.9 inches d.b.h.

Table 11. — Land area (in acres) by cover type, ownership class, and land-use class in eastern Oregon, January 1, 1963

Cover type or land use	Total unreserved and reserved	Unreserved									Reserved				
		Total	Private	State	County	Municipal	Federal				Total	State	Municipal	Federal	
							Indian	Bureau of Land Mgt.	Bureau of Reclamation	National Forest				National Park	Natianal Forest
PRODUCTIVE FOREST LAND															
	Total	Commercial									Noncommercial (productive-reserved)				
Ponderosa pine, large sawtimber	4,572,600	4,531,000	1,052,100	7,100	2,600	300	195,600	94,000	1,000	3,178,300	41,600	3,300	300	8,800	29,200
Ponderosa pine, small sawtimber	1,497,400	1,494,900	719,400	14,900	2,400	100	31,200	28,600	--	698,300	2,500	500	100	300	1,600
Ponderosa pine, poletimber	969,700	969,400	517,500	5,100	3,100	400	20,100	30,400	--	392,800	300	100	--	--	200
Ponderosa pine, sapling and seedling	248,700	248,500	165,100	2,000	1,800	300	1,600	10,300	--	67,400	200	100	--	100	--
Lodgepole pine, large sawtimber	1,700	1,100	--	--	--	--	--	--	--	1,100	600	--	--	--	600
Ladgepole pine, small sawtimber	494,400	481,800	12,600	100	200	--	3,800	8,800	300	456,000	12,600	--	--	4,800	7,800
Lodgepole pine, poletimber	896,600	820,100	279,300	2,600	1,400	--	5,000	28,700	1,700	501,400	76,500	200	--	44,000	32,300
Lodgepole pine, sapling and seedling	103,800	98,900	18,900	300	100	--	500	2,500	100	76,500	4,900	--	--	3,000	1,900
Douglas-fir, large sawtimber	557,900	543,300	113,300	300	300	200	26,500	10,400	--	392,300	14,600	300	100	100	14,100
Douglas-fir, small sawtimber	422,800	408,200	129,900	800	100	1,000	22,500	7,900	--	246,000	14,600	500	--	--	14,100
Douglas-fir, paletimber	139,600	135,100	65,100	700	200	300	1,700	2,900	--	64,200	4,500	100	--	--	4,400
Douglas-fir, sapling and seedling	9,600	9,500	3,200	--	--	--	100	100	--	6,100	100	100	--	--	--
Western larch, large sawtimber	138,000	136,100	7,600	--	100	--	300	100	--	128,000	1,900	--	--	--	1,900
Western larch, small sawtimber	224,900	213,900	32,900	300	200	--	1,100	1,400	--	178,000	11,000	--	--	--	11,000
Western larch, paletimber	38,300	35,600	18,900	--	100	--	100	500	--	16,000	2,700	--	100	--	2,600
Western larch, sapling and seedling	2,800	2,600	2,000	--	--	--	--	100	--	500	200	--	--	--	200
White fir, large sawtimber	348,600	336,500	50,900	1,800	100	--	200	3,400	--	280,100	12,100	--	400	2,400	9,300
White fir, small sawtimber	243,800	239,400	77,000	400	600	--	1,600	600	--	159,200	4,400	300	--	--	4,100
White fir, poletimber	35,700	34,900	13,800	100	300	--	--	100	--	20,600	800	100	--	300	400
White fir, sapling and seedling	1,700	1,700	300	--	--	--	--	--	--	1,400	--	--	--	--	--
Western white pine, large sawtimber	31,600	29,600	100	--	--	--	--	--	--	29,500	2,000	--	--	--	2,000
Western white pine, small sawtimber	11,000	10,800	1,300	--	--	--	--	--	--	9,500	200	--	--	--	200
Western white pine, poletimber	2,700	2,700	--	--	--	--	--	--	--	2,700	--	--	--	--	--
True fir—mountain hemlock, large sawtimber	245,500	135,700	17,100	400	--	--	2,200	6,200	--	109,800	109,800	--	--	44,700	65,100
True fir—mauntain hemlock, small sawtimber	269,200	193,300	2,100	100	--	--	6,700	--	--	184,400	75,900	--	--	--	75,900
True fir—mountain hemlock, poletimber	42,300	30,000	2,600	--	--	--	2,200	900	--	24,300	12,300	--	--	1,100	11,200
True fir—mountain hemlock, sapling and seedling	2,400	2,000	100	--	--	--	400	--	--	1,500	400	--	--	--	400
Engelmann spruce, large sawtimber	30,900	28,600	700	--	--	--	--	--	--	27,900	2,300	--	--	--	2,300
Engelmann spruce, small sawtimber	77,400	71,200	3,500	--	--	--	--	--	--	67,700	6,200	--	--	--	6,200
Engelmann spruce, poletimber	3,500	3,500	100	--	--	--	--	--	--	3,400	--	--	--	--	--
Engelmann spruce, sapling and seedling	100	100	100	--	--	--	--	--	--	--	--	--	--	--	--
Cedar, large sawtimber	1,500	1,500	--	--	--	--	--	--	--	1,500	--	--	--	--	--
Cedar, small sawtimber	600	600	--	--	--	--	--	--	--	600	--	--	--	--	--

Table 11. (Continued) — Land area (in acres) by cover type, ownership class, and land-use class in eastern Oregon, January 1, 1963

Cover type or land use	Total unreserved and reserved	Unreserved									Reserved				
		Total	Private	State	County	Municipal	Federal				Total	State	Municipal	Federal	
							Indian	Bureau of Land Mgt.	Bureau of Reclamation	National Forest				National Park	National Forest
PRODUCTIVE FOREST LAND															
	Total	Commercial									Noncommercial (productive-reserved)				
Sugar pine, large sawtimber	9,800	9,300	9,300	--	--	--	--	--	--	--	500	--	--	--	500
Western hemlock, large sawtimber	12,200	11,600	--	--	--	--	--	--	--	11,600	600	--	--	--	600
Western hemlock, small sawtimber	3,200	3,200	--	--	--	--	--	--	--	3,200	--	--	--	--	--
Western hemlock, poletimber	300	300	--	--	--	--	--	--	--	300	--	--	--	--	--
Western hemlock, sapling and seedling	100	100	--	--	--	--	--	--	--	100	--	--	--	--	--
True firs, large sawtimber	16,600	16,600	400	--	--	--	7,200	--	--	9,000	--	--	--	--	--
True firs, small sawtimber	13,400	13,400	100	--	--	--	8,400	--	--	4,900	--	--	--	--	--
True firs, poletimber	6,400	6,400	--	--	--	--	1,500	--	--	4,900	--	--	--	--	--
True firs, sapling and seedling	1,900	1,900	--	--	--	--	300	--	--	1,600	--	--	--	--	--
Hardwoods, large sawtimber	1,800	1,700	1,300	--	--	--	100	--	--	300	--	100	--	--	--
Hardwoods, small sawtimber	9,600	9,600	7,500	--	--	100	1,200	--	--	800	100	--	--	--	--
Hardwoods, poletimber	6,600	6,500	4,200	--	--	--	200	300	--	1,800	100	--	--	--	100
Hardwoods, sapling and seedling	100	100	100	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked area	201,800	198,600	86,800	1,300	800	--	3,200	12,200	--	94,300	3,200	--	--	900	2,300
Total	11,951,100	11,531,400	3,417,200	38,300	14,400	2,700	345,500	250,400	3,100	7,459,800	419,700	5,700	1,000	110,500	302,500
NONCOMMERCIAL UNPRODUCTIVE FOREST LAND															
Subalpine	229,800	77,800	3,300	--	--	--	5,000	500	--	69,000	152,000	--	--	24,500	127,500
Noncommercial, rocky	252,500	178,200	28,000	1,200	100	--	3,100	31,100	--	114,700	74,300	300	--	1,200	72,800
Oak—madrone	46,400	46,400	38,200	--	100	900	2,800	1,900	--	2,500	--	--	--	--	--
Juniper	2,400,800	2,396,600	1,186,200	36,800	24,600	--	81,100	898,000	4,600	165,300	4,200	4,200	--	--	--
Total	[1] 2,929,500	2,699,000	1,255,700	38,000	24,800	900	92,000	931,500	4,600	351,500	230,500	4,500	--	25,700	200,300
NONFOREST LAND															
Vegetative land (cultivated, grass, or brush)															
Nonvegetative land (barrens and cities)															
Total	[1]27,543,800														
ALL LAND															
Forest land:															
Commercial	11,531,400	11,531,400	3,417,200	38,300	14,400	2,700	345,500	250,400	3,100	7,459,800	--	--	--	--	--
Noncommercial (productive-reserved and unproductive)	3,349,200	2,699,000	1,255,700	38,000	24,800	900	92,000	931,500	4,600	351,500	650,200	10,200	1,000	136,200	502,800
Total forest land	14,880,600	14,230,400	4,672,900	76,300	39,200	3,600	437,500	1,181,900	7,700	7,811,300	650,200	10,200	1,000	136,200	502,800
Nonforest land	[1] 27,543,800														
Total all land	42,424,400														

[1] Unclassified as to ownership.

Table 12. — Area (in acres) of commercial forest land by stocking classes of growing-stock trees and by stand-size classes in eastern Oregon, January 1, 1963

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked stands
70 percent or more	6,142,600	5,110,400	895,400	136,800	--
40 to 70 percent	4,144,200	3,327,400	713,600	103,200	--
10 to 40 percent	1,046,000	485,100	435,500	125,400	--
Less than 10 percent	198,600	--	--	--	198,600
All classes	11,531,400	8,922,900	2,044,500	365,400	198,600

Table 13. — Area (in acres) of commercial forest land, by site and ownership classes in eastern Oregon, January 1, 1963

Site class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
120 cubic feet or more	176,200	59,700	24,200	35,400	56,900
85 to 120 cubic feet	1,069,500	552,000	54,300	169,800	293,400
50 to 85 cubic feet	7,388,400	4,804,100	413,600	993,800	1,176,900
Less than 50 cubic feet	2,897,300	2,044,000	162,300	277,600	413,400
All classes	11,531,400	7,459,800	654,400	1,476,600	1,940,600

Table 14. — Area (in acres) of commercial forest land by stocking classes of growing-stock trees and by ownership classes in eastern Oregon, January 1, 1963

Stocking class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
70 percent or more	6,142,600	4,312,200	361,700	554,800	913,900
40 to 70 percent	4,144,200	2,532,800	183,800	647,700	779,900
10 to 40 percent	1,046,000	520,500	91,400	228,100	206,000
Less than 10 percent	198,600	94,300	17,500	46,000	40,800
All classes	11,531,400	7,459,800	654,400	1,476,600	1,940,600

Table 15. — Area of commercial forest land by forest types and ownership classes in eastern Oregon, January 1, 1963

(In acres)

Type	All ownerships	Public ownerships	Private ownerships
Douglas-fir	1,096,100	784,600	311,500
Western hemlock	15,200	15,200	--
Ponderosa pine	7,245,900	4,791,800	2,454,100
Western white pine	52,400	41,700	10,700
Lodgepole pine	1,401,900	1,091,100	310,800
Western larch	388,200	326,800	61,400
Fir—spruce	1,115,200	946,400	168,800
Hardwoods	17,900	4,800	13,100
Nonstocked	198,600	111,800	86,800
All types	11,531,400	8,114,200	3,417,200

Table 16. — Area of noncommercial forest land by forest types in eastern Oregon, January 1, 1963

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	33,800	33,800	--
Western hemlock	600	600	--
Ponderosa pine	44,600	44,600	--
Western white pine	2,700	2,700	--
Lodgepole pine	94,600	94,600	--
Western larch	15,800	15,800	--
Fir—spruce	224,200	224,200	--
Hardwoods	200	200	--
Nonstocked	3,200	3,200	--
Pinyon—juniper	2,400,800	--	2,400,800
Other	528,700	--	528,700
All types	3,349,200	419,700	2,929,500

Table 17. — Number (in thousands of trees) of growing-stock trees on commercial forest land by diameter classes and by softwoods and hardwoods in eastern Oregon, January 1, 1963

D.b.h. class (inches)	All species	Softwoods	Hardwoods
5.0- 6.9	431,867	429,880	1,987
7.0- 8.9	247,989	247,394	595
9.0-10.9	141,160	140,850	310
11.0-12.9	87,003	86,794	209
13.0-14.9	60,298	60,268	30
15.0-16.9	43,467	43,454	13
17.0-18.9	31,785	31,779	6
19.0-28.9	83,594	83,552	42
29.0-38.9	21,805	21,803	2
39.0 and larger	3,694	3,691	3
All classes	1,152,662	1,149,465	3,197

Table 18. — Number (in thousands of trees) of cull and salvable dead trees on commercial forest land by diameter groups and by softwoods and hardwoods in eastern Oregon, January 1, 1963

D.b.h. class (inches)	Cull trees	Salvable dead trees[1]
Softwoods:		
5.0- 6.9	10,306	--
7.0- 8.9	5,378	--
9.0-10.9	4,290	--
11.0-18.9	5,216	2,078
19.0 and larger	4,095	2,347
Total	29,285	4,425
Hardwoods:		
5.0- 6.9	420	--
7.0- 8.9	174	--
9.0-10.9	18	--
11.0-18.9	36	--
19.0 and larger	9	--
Total	657	--
All species	29,942	4,425

[1] Dead trees less than 11.0 inches d.b.h. are not included in the count of salvable dead trees.

Table 19. — Volume (in million cubic feet) of timber on commercial forest land by class of timber and by softwoods and hardwoods in eastern Oregon, January 1, 1963

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	19,603	19,594	9
Upper-stem portion	1,476	1,475	1
Total	21,079	21,069	10
Poletimber trees	4,522	4,499	23
All growing-stock trees	25,601	25,568	33
Sound cull trees:			
Sawtimber-size trees	66	55	11
Poletimber-size trees	8	7	1
Total	74	62	12
Rotten cull trees:			
Sawtimber-size trees	84	84	--
Poletimber-size trees	3	3	--
Total	87	87	--
Salvable dead trees:			
Sawtimber-size trees	278	278	--
Total, all timber	26,042	25,995	45

Table 20. — Volume of growing stock and sawtimber on commercial forest land by ownership classes and by softwoods and hardwoods in eastern Oregon, January 1, 1963

Ownership class	All species	Softwoods	Hardwoods
	GROWING STOCK (Million cubic feet)		
Growing stock:			
National Forest	18,474	18,467	7
Other public	1,476	1,474	2
Forest industry	2,898	2,898	--
Farmer and misc. private	2,753	2,729	24
All ownerships	25,601	25,568	33
	SAWTIMBER (Million board feet)[1]		
Sawtimber (International 1/4-inch rule):			
National Forest	93,663	93,645	18
Other public	7,472	7,457	15
Forest industry	13,860	13,860	--
Farmer and misc. private	10,477	10,415	62
All ownerships	125,472	125,377	95

[1] International 1/4-inch rule.

Table 21. — Volume of growing stock and sawtimber on commercial forest land by stand-size classes and by softwoods and hardwoods in eastern Oregon, January 1, 1963

Stand-size class	All species	Softwoods	Hardwoods
	GROWING STOCK (Million board feet)		
Growing stock:			
Sawtimber stands	23,837	23,806	31
Poletimber stands	1,741	1,739	2
Sapling and seedling stands	15	15	--
Nonstocked areas	8	8	--
Total	25,601	25,568	33
	SAWTIMBER (Million board feet)[1]		
Sawtimber (International 1/4-inch rule):			
Sawtimber stands	122,427	122,335	92
Poletimber stands	2,970	2,967	3
Sapling and seedling stands	50	50	--
Nonstocked areas	25	25	--
Total	125,472	125,377	95

[1] International 1/4-inch rule.

Table 22. — Volume (in millions of cubic feet) of growing stock on commercial forest land by species and diameter classes in eastern Oregon, January 1, 1963

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:											
Ponderosa pine	11,653	261	343	413	442	539	615	711	4,331	3,092	906
Douglas-fir	3,821	166	275	276	285	266	269	238	1,149	560	337
Western white pine	142	2	4	6	10	15	20	12	52	13	8
Lodgepole pine	2,000	336	468	411	308	211	132	67	66	1	--
Sugar pine	143	--	--	--	24	7	7	9	49	14	33
White fir	4,092	221	308	317	309	336	333	290	1,242	590	146
Western larch	1,146	70	92	107	90	98	100	96	357	104	32
Western redcedar	8	2	1	1	--	--	--	--	4	--	--
Western hemlock	94	1	1	3	5	10	11	12	41	8	2
Engelmann spruce	639	71	50	57	57	62	61	58	175	37	11
True firs	1,069	29	33	39	68	100	99	123	397	177	4
Other softwoods	761	36	46	53	58	56	55	44	247	128	39
Total	25,568	1,195	1,621	1,683	1,656	1,700	1,702	1,660	8,110	4,724	1,517
Hardwoods:											
Quaking aspen	5	3	1	1	--	--	--	--	--	--	--
Black cottonwood	20	9	1	1	4	--	--	--	4	--	1
Red alder	2	2	--	--	--	--	--	--	--	--	--
Oregon white oak	1	1	--	--	--	--	--	--	--	--	--
Other hardwoods	5	2	1	1	1	--	--	--	--	--	--
Total	33	17	3	3	5	--	--	--	4	--	1
All species	25,601	1,212	1,624	1,686	1,661	1,700	1,702	1,660	8,114	4,724	1,518

Table 23. — Volume (in millions of board feet) of sawtimber on commercial forest land by species and diameter classes in eastern Oregon, January 1, 1963 (International 1/4-inch rule)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Ponderosa pine	69,509	2,197	2,709	3,290	4,066	28,149	22,275	6,823
Douglas-fir	17,049	949	1,107	1,257	1,203	6,574	3,592	2,367
Western white pine	824	48	70	116	79	350	96	65
Lodgepole pine	4,023	1,398	1,095	738	389	399	4	--
Sugar pine	567	5	2	5	8	123	67	357
White fir	16,618	1,125	1,474	1,656	1,493	6,871	3,230	769
Western larch	5,789	372	479	557	588	2,602	893	298
Western redcedar	24	--	--	--	--	24	--	--
Western hemlock	330	11	20	34	47	174	32	12
Engelmann spruce	2,942	258	317	375	372	1,265	279	76
True firs	4,058	306	388	370	298	1,635	788	273
Other softwoods	3,644	66	195	188	420	1,518	1,203	54
Total	125,377	6,735	7,856	8,586	8,963	49,684	32,459	11,094
Hardwoods:								
Quaking aspen	4	4	--	--	--	--	--	--
Black cottonwood	84	18	3	1	--	51	--	11
Other hardwoods	7	2	--	2	--	--	2	1
Total	95	24	3	3	--	51	2	12
All species	125,472	6,759	7,859	8,589	8,963	49,735	32,461	11,106

Table 24. — Volume (in millions of board feet) of sawtimber on commercial forest land by species and quality classes in eastern Oregon, January 1, 1963 (International 1/4-inch rule[1])

Species	Quality classes						
	All classes	1	2	3	4	5	6
Softwoods:							
Ponderosa pine	69,509	2,829	2,736	8,432	2,961	48,633	3,918
Douglas-fir	17,049	154	955	9,155	6,785	--	--
True firs	20,676	--	352	12,199	8,125	--	--
Western larch	5,789	440	1,066	2,639	1,644	--	--
Total	113,023	3,423	5,109	32,425	19,515	48,633	3,918
Hardwoods	--	--	--	--	--	--	--
All species	113,023	3,423	5,109	32,425	19,515	48,633	3,918

[1] Currently only log grades are available for the species shown. For ponderosa pine the log grades used are national forest, Region 6 log grades for ponderosa pine and June 1958 Log Grades for Associated Species for other species shown.

Table 25. — Volume (in millions of board feet) of salvable dead sawtimber-size trees on commercial forest land by softwoods and hardwoods in eastern Oregon, January 1, 1963 (International 1/4-inch rule)

Species group	Volume
Softwoods	1,551
Hardwoods	--
All species	1,551

Table 26. — Net annual growth and annual cut (in millions of cubic feet) of growing stock on commercial forest land by species in eastern Oregon, 1962[1]

Species	Net annual growth	Annual timber cut
Softwoods:		
Douglas-fir	46	56
Panderosa pine	93	169
Western white pine	2	1
Western hemlock	1	--
Engelmann spruce	9	1
True firs	72	29
Other softwoods	55	13
Total	278	269
Hardwoods	1	--
All species	279	269

[1] Trend level estimates.

Table 27. — Net annual growth and annual cut (in millions of cubic feet) of growing stock on commercial forest land by ownership classes and by softwoods and hardwoods in eastern Oregon, 1962[1]

Species groups	All owner-ships	National Forest	Other public	Forest industry	Farmer and misc. private
Net annual growth:					
Softwoods	278	149	7	53	69
Hardwoods	1	--	--	--	1
All species	279	149	7	53	70
Annual timber cut:					
Softwoods	269	156	14	68	31
Hardwoods	--	--	--	--	--
All species	269	156	14	68	31

[1] Trend level estimates.

Table 28. — Net annual growth and cut (in millions of board feet) of sawtimber on commercial forest land by species in eastern Oregon, 1962 (International 1/4-inch rule)[1]

Species	Sawtimber	
	Net annual growth	Annual timber cut
Softwoods:		
Douglas-fir	150	334
Ponderosa pine	363	1,018
Western white pine	4	4
Western hemlock	4	--
Engelmann spruce	34	5
True firs	239	174
Other softwoods	159	80
Total	953	1,615
Hardwoods	2	--
All species	955	1,615

[1] Trend level estimates.

Table 29. — Net annual growth and cut (in millions of board feet) of sawtimber on commercial forest land by ownership classes and by softwoods and hardwoods in eastern Oregon, 1962 (International 1/4-inch rule)[1]

Species groups	All owner-ships	National Forest	Other public	Forest industry	Farmer and misc. private
Net annual growth:					
Softwoods	953	455	22	219	257
Hardwoods	2	--	--	--	2
All species	955	455	22	219	259
Annual timber cut:					
Softwoods	1,615	938	81	408	188
Hardwoods	--	--	--	--	--
All species	1,615	938	81	408	188

[1] Trend level estimates.

Table 30. — Annual mortality of growing stock and sawtimber on commercial forest land by species in eastern Oregon, 1962[1]

Species	Growing stock	Sawtimber[2]
	Million cu. ft.	Million bd. ft.
Softwoods:		
Douglas-fir	60	323
Ponderosa pine	108	595
Western white pine	2	6
Western hemlock	1	3
Engelmann spruce	2	5
True firs	29	124
Other softwoods	59	203
Total	261	1,259
Hardwoods	--	1
All species	261	1,260

[1] Trend level estimates.
[2] International 1/4-inch rule.

Table 31. — Annual mortality of growing stock and sawtimber on commercial forest land by ownership classes and by softwoods and hardwoods in eastern Oregon, 1962[1]

Ownership	Growing stock			Sawtimber[2]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.
National Forest lands	195	195	--	965	965	--
Other public lands	18	18	--	90	90	--
Forest industry lands	24	24	--	110	110	--
Former & miscellaneous private lands	24	24	--	95	94	1
All ownerships	261	261	--	1,260	1,259	1

[1] Trend level estimates.
[2] International 1/4-inch rule.

Table 32. — Annual mortality of growing stock and sawtimber on commercial forest land by causes, and by softwoods and hardwoods in eastern Oregon, 1962[1]

Cause of death	Growing stock			Sawtimber[2]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.
Fire	5	5	--	23	23	--
Insects	126	126	--	610	610	--
Disease	23	23	--	111	111	--
Other	72	72	--	346	346	--
Unknown	35	35	--	170	169	1
All couses	261	261	--	1,260	1,259	1

[1] Trend level estimates.
[2] International 1/4-inch rule.

Table 33. — Total output of timber products by products, by type of material used, and by softwoods and hardwoods in eastern Oregon, 1958

Product and species group	Total output in standard units		Output from roundwood		Output from plant byproducts (standard units)
	Unit	Number	Standard units	M cubic feet	
Saw logs:					
Softwoods	M bd. ft.[1]	1,617,568	1,617,568	272,384	40
Hardwoods	M bd. ft.[1]	--	--	--	--
Total	M bd. ft.[1]	1,617,568	1,617,568	272,384	40
Veneer logs and bolts:					
Softwoods	M bd. ft.[1]	36,760	36,760	6,093	--
Hardwoods	M bd. ft.[1]	--	--	--	--
Total	M bd. ft.[1]	36,760	36,760	6,093	--
Pulpwood:					
Softwoods	Std. cords[2]	105,725	3,724	309	102,001
Hardwoods	Std. cords[2]	--	--	--	--
Total	Std. cords[2]	105,725	3,724	309	102,001
Poles:					
Softwoods	M pieces	9	9	189	--
Hardwoods	M pieces	--	--	--	--
Total	M pieces	9	9	189	--
Posts (round and split):					
Softwoods	M pieces	2,000	2,000	1,701	--
Hardwoods	M pieces	--	--	--	--
Total	M pieces	2,000	2,000	1,701	--
Fuelwood:					
Softwoods	Std. cords	546,280	19,795	1,643	526,485
Hardwoods	Std. cords	--	--	--	--
Total	Std. cords	546,280	19,795	1,643	526,485

[1] International 1/4-inch rule.
[2] Rough-wood basis (for example, chips converted to equivalent standard cords).

Table 34. — Total output (in thousands of cubic feet) of roundwood products by source, and by softwoods and hardwoods in eastern Oregon, 1958

Source	All species	Soft-woods	Hard-woods
Growing-stock trees:[1]			
Sawtimber trees	274,025	274,025	--
Poletimber trees	1,020	1,020	--
Total	275,045	275,045	--
Cull trees[1]	821	821	--
Salvable dead trees[1]	3,931	3,931	--
Other sources[2]	2,522	2,522	--
All sources	282,319	282,319	--

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land such as fence rows, trees less than 5.0 inches in diameter, and treetops and limbs.

Table 35. — Annual timber cut from growing stock (in thousands of cubic feet) on commercial forest lands by products and logging residues, and by softwoods and hardwoods in eastern Oregon, 1958

Products and residues	All species	Soft-woods	Hard-woods
Roundwood products:			
Saw logs	268,120	268,120	--
Veneer logs and bolts	6,093	6,093	--
Pulpwood	309	309	--
Poles	189	189	--
Posts	170	170	--
Fuelwood	164	164	--
All products	275,045	275,045	--
Logging residues	15,953	15,953	--
Timber cut	290,998	290,998	--

Table 36. — Annual timber cut from live sawtimber (in thousands of board feet, International 1/4-inch rule) on commercial forest lands by products and logging residues, and by softwoods and hardwoods in eastern Oregon, 1958

Products and residues	All species	Soft-woods	Hard-woods
Roundwood products:			
Saw logs	1,601,556	1,601,556	--
Veneer logs and bolts	36,396	36,396	--
Pulpwood	162	162	--
Fuelwood	98	98	--
All products	1,638,212	1,638,212	--
Logging residues	17,226	17,226	--
Timber cut	1,655,438	1,655,438	--

Table 37. — Volume of plant residues (in thousands of cubic feet) by industrial source and type of residue, and by softwoods and hardwoods in eastern Oregon, 1958

Industrial source	Species and character of residues[1]								
	All species			Softwoods			Hardwoods		
	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coorse	Fine
Lumber industry	32,903	16,160	16,743	32,903	16,160	16,743	--	--	--
Veneer and plywood industry	813	813	--	813	813	--	--	--	--
All industries	33,716	16,973	16,743	33,716	16,973	16,743	--	--	--

[1] Coarse — unused material suitable for chipping, such as slabs, edgings, and veneer cores; fine — unused material not suitable for chipping, such as sawdust and shavings.

Table 38. — Timber growth projections in eastern Oregon, 1963-91[1]

Timber and period	Assumed cut			Projected growth		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.
Growing stock:						
1963	268	268	--	268	268	--
1971	270	269	1	320	319	1
1981	286	285	1	369	368	1
1991	303	302	1	412	411	1
	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.
Sowtimber (Internotionol 1/4-inch rule):						
1963	1,615	1,615	--	955	953	2
1971	1,767	1,765	2	1,174	1,172	2
1981	1,816	1,814	2	1,463	1,461	2
1991	1,866	1,864	2	1,755	1,753	2

[1] Bosed on ossumptions thot the allowoble cut on public lands will be horvested, thot the cut on privote londs will grodually be increosed, ond thot forestry progress will continue at the rote indicoted by recent trends.

Table 39. — Production and disposition (in thousands of tons, dry weight) of sawmill residue by capacity class of mill in eastern Oregon, 1958

Residue and disposition	Eight-hour-copocity closs			
	120+ M b.m.	80-119 M b.m.	40-79 M b.m.	0-39 M b.m.
Coarse residue:				
Pulp	62	20	23	--
Small items	20	--	3	--
Fuel	68	43	69	--
Unused	6	84	115	20
Totol	156	147	210	20
Fine residue:				
Fuel	109	53	102	--
Unused	15	67	67	17
Totol	124	120	169	17
Shovings:				
Agriculturol and misc. uses	13	--	--	1
Fuel	31	49	47	--
Unused	6	10	14	5
Totol	50	59	61	6
Bork	125	131	179	19

Table 40. — Production (in millions of board feet, International 1/4-inch rule) of logs in eastern Oregon, 1952-62[1]

Yeor	Logs produced	Yeor	Logs produced
1925	1,045	1944	[2]
1926	1,059	1945	1,168
1927	826	1946	1,369
1928	986	1947	1,382
1929	1,162	1948	1,300
1930	947	1949	1,006
1931	738	1950	1,184
1932	429	1951	1,409
1933	690	1952	1,241
1934	673	1953	1,356
1935	1,108	1954	1,552
1936	1,324	1955	1,644
1937	1,448	1956	1,771
1938	1,121	1957	1,490
1939	1,610	1958	1,635
1940	1,614	1959	1,878
1941	1,745	1960	1,589
1942	1,848	1961	1,521
1943	1,627	1962	1,602

[1] Source: Timber Horvest by Ownership in Stote of Oregon, prepared by Division of Forest Economics Reseorch, Pocific Northwest Forest & Range Experiment Stotion, Forest Service, U. S. Deportment of Agriculture, Portlond, Oregon.
[2] Not avoiloble.

Table 41. — Source of logs (in millions of board feet, International 1/4-inch rule) consumed by forest industries in eastern Oregon, 1958

Industry	Eostern Oregon	Western Oregon	Colifornio	Woshington	Idoho	Totol
Stotionary sowmills:						
120+ M b.m.	439	10	6	--	--	455
80-119 M b.m.	470	1	10	17	2	500
40-79 M b.m.	638	--	39	1	--	678
0-39 M b.m.	66	1	--	1	--	68
Totol	1,613	12	55	19	2	1,701
Portoble sowmills	11	--	--	--	--	11
Veneer, fiberboord and misc. plonts	39	5	2	--	--	46
All industries	1,663	17	57	19	2	1,758

Table 42. — Ownership (in millions of board feet, International 1/4-inch rule) of logs from eastern Oregon consumed by its forest industries, 1958

Industry	Private			Public	Total
	In-dustry	Other	Total		
Stationary sawmills:					
120+ M b.m.	190	7	197	242	439
80-119 M b.m.	112	132	244	226	470
40-79 M b.m.	150	138	288	350	638
0-39 M b.m.	1	51	52	14	66
Total	453	328	781	832	1,613
Portable sawmills	3	6	9	2	11
Veneer, fiberboard and misc. plants	--	--	--	39	39
All industries	456	334	790	873	1,663

Table 43. — Number of sawmills by capacity class of mill, and production by degree of manufacture in eastern Oregon, 1958[1]

Eight-hour capacity class	Sawmills	Volume[2] of lumber by degree of manufacture				
		Rough green	Surface green	Rough dry	Surface dry	Total
	Number	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.	Million bd. ft.
Stationary mills:						
120+ M b.m.	6	14	1	5	451	471
80-119 M b.m.	17	32	34	6	446	518
40-79 M b.m.	38	77	44	85	467	673
0-39 M b.m.	17	19	32	--	15	66
Total	78	142	111	96	1,379	1,728
Portable mills	11	11	--	--	--	11
All mills	89	153	111	96	1,379	1,739

[1] Includes 103 MM b.m. of purchased lumber receiving additional manufacturing.
[2] Lumber tally.

Table 44. — Availability of industrial water of 20-30 cfs (cubic feet per second) in the Deschutes River Basin

Years	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Meon monthly	Notes
Deschutes River at 8enham Falls (1906-14, 24-58)														
1918-58	1,260	1,050	1,060	1,050	1,110	1,170	1,350	1,630	1,710	1,790	1,710	1,510	1,370	1
Deschutes River below 8end (1915-58)														
1918-58	412	790	913	938	964	982	595	322	283	170	185	266	566	2
Deschutes River at Cline Falls (1910-13, 28-46)														
1918-58	412	823	971	1,015	1,043	1,046	649	353	309	173	183	266	601	2
Deschutes River near Culver (1952-58)														
1918-58	844	1,300	1,540	1,500	1,520	1,500	1,110	844	835	636	600	687	1,080	3
Deschutes River near Madras (1924-58)														
1918-58	3,820	4,320	4,640	4,860	5,210	5,510	5,630	4,570	4,200	3,770	3,610	3,680	4,480	3, 4
Deschutes River at Moody, near 8iggs (1897-99, 1906-58)														
1918-58	4,360	4,940	5,890	6,330	6,940	6,980	7,360	6,290	5,360	4,410	4,150	4,170	5,590	3, 4
Crooked River above Hoffman Dam (1909-14, 41-58)														
1918-58	25	57	140	173	409	740	1,200	422	106	23	8	11	274	5
Crooked River near Culver (1918-58)														
1918-58	1,270	1,310	1,400	1,460	1,740	2,090	2,570	1,730	1,360	1,230	1,220	1,250	1,550	6
Lake Creek near Sisters (1911-58)														
1918-58	32	40	57	62	59	53	63	82	69	39	32	30	51	7
Metolius River near Grandview (1912-14, 22-58)														
1922-58	1,330	1,380	1,450	1,480	1,500	1,490	1,530	1,610	1,620	1,500	1,400	1,350	1,470	8
Shitike Creek at Warm Springs (1911-17, 23-58)														
1918-58	69	99	125	123	146	130	139	167	156	101	58	55	113	9
Warm Springs River near Warm Springs (1911-19)														
1918-58	283	323	528	551	691	631	686	738	487	280	236	222	461	9
White River below Tygh Valley (1918-58)														
1918-58	157	277	502	566	616	565	752	828	497	208	138	130	435	10

Notes

Flows are average monthly discharges in cfs and are shown only for streams where gaging records exist and where 20 to 30 cfs of water for industrial use is available. Figures in parentheses indicate years of actual gaging records, figures in first column indicate years for which monthly average discharges were computed. This includes correlated values in several instances.

[1] The Deschutes River and its tributaries above Bend are fully appropriated for irrigation.

[2] All new water rights are subject to maintaining a minimum conservation flow of 50 cfs to 17 cfs consumptive water rights and a power right for 90 cfs of the Cline Falls power plant downstream. Monthly flows have been lower than 50 cfs several times in past years.

[3] Flows below river mile 120.0 withdrawn from industrial use by Oregon State Water Resources Board.

[4] Monthly flow pattern different since 1958 due to regulation by Pelton Dam.

[5] Industrial water available from unassigned space of Prineville Reservoir, average annual unassigned yield = 46,200 acre-feet. Monthly flow pattern will change after completion of Prineville Dam.

[6] Availability of industrial water dependent mainly on power rights of 1,275 cfs of Cove power plant. Flows below river mile 6.5 withdrawn from industrial use by Oregon State Water Resources Board. About 1,000 cfs of flows shown originate from springs below river mile 18.

[7] Availability of industrial water subject to 8 cfs consumptive and 6 cfs nonconsumptive water rights. Monthly flows have been below 20 cfs several times in past years.

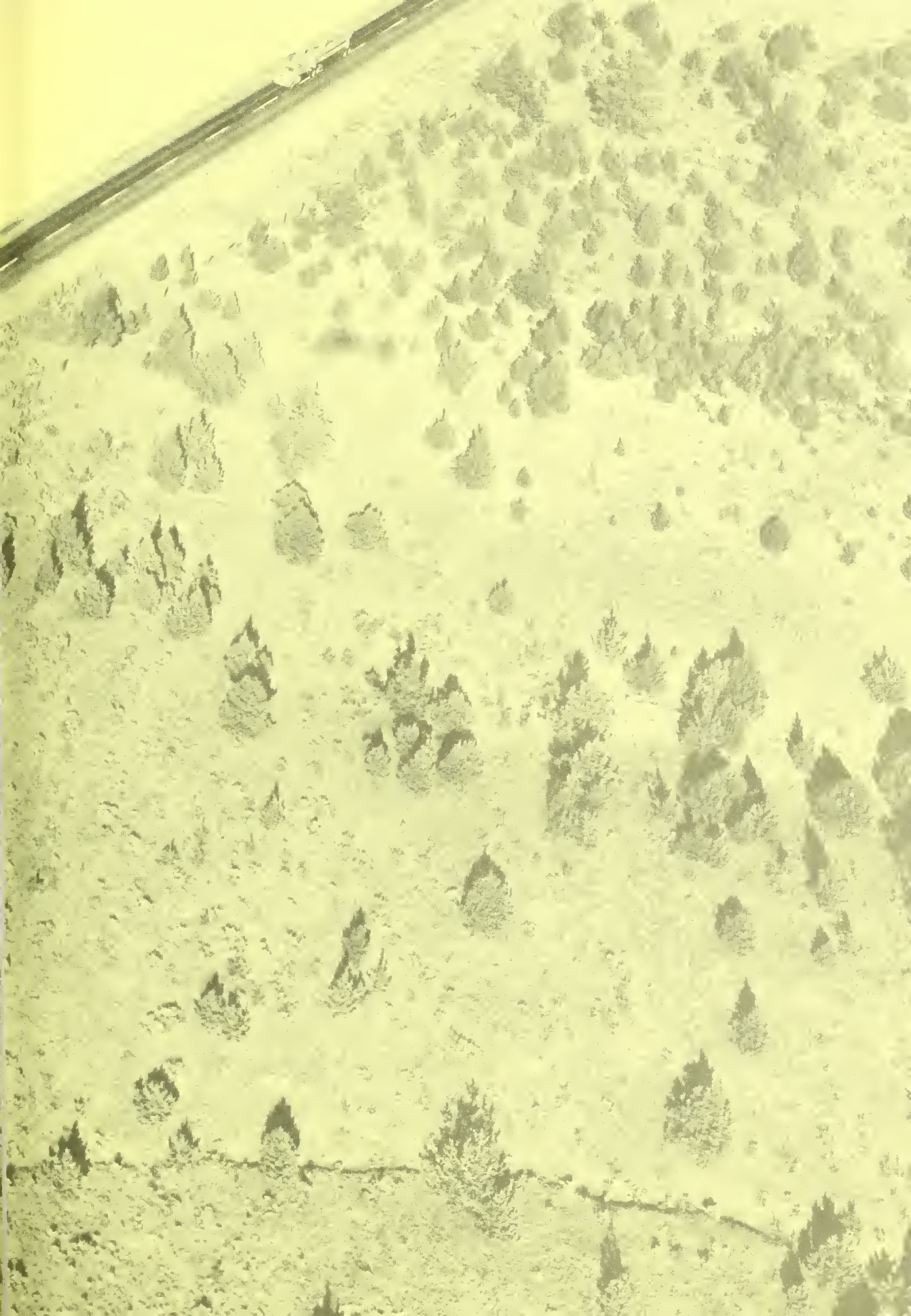
[8] Flows below river mile 13-0 withdrawn from industrial use by Oregon State Water Resources Board. Sufficient industrial water available on main stem.

[9] Present water use in Warm Springs Indian Reservation not investigated.

[10] Availability of industrial water subject to 232 cfs consumptive water rights in the whole watershed and to a power right for 250 cfs of the Tygh Valley power plant.

Source: This table was furnished by the Oregon State Water Resource Board, Salem, Oreg., for use in this report.

GPO 999605



Forest Statistics for

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

WOOD · WATER · FORAGE · WILDLIFE · RECREATION

U. S. FOREST SERVICE
RESOURCE BULLETIN PNW-4
MAY 1963

PREPARED BY

THE DIVISION OF FOREST ECONOMICS RESEARCH

Carl A. Newport, Chief

FOREST SURVEY

Melvin E. Metcalf, In Charge

Field and Office Work in Northeast Washington, by

Benjamin Spada, Field Supervisor

John M. Berger
Charles L. Bolsinger
Bud F. S. Broerman
Russel G. Dix
John C. Gordon
John W. Hazard
Richard L. Nielsen
Colin D. MacLean
Charles W. Philpot
Marlin E. Plank
James L. Rhyno
Donald E. Stikkers
Charles K. Wakida
Margaret C. O'Mara
Marian E. Simons
Mable A. Northrup
Carmen V. Wilson

Acknowledgment is made of the cooperation of the Division of Timber Management, Region 1, U.S. Forest Service, in supplying resource data for National Forest lands, and of the assistance of the Department of Natural Resources, State of Washington, and other public agencies in furnishing ownership and timber cut information.

U.S. Forest Service
Resource Bulletin PNW-4
May 1963

FOREST STATISTICS FOR NORTHEAST WASHINGTON

by

John W. Hazard

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director Portland, Oregon

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

PREFACE

This publication summarizes the results of the third inventory of six northeast Washington counties: Ferry, Lincoln, Pend Oreille, Spokane, Stevens, and Whitman. The collection of field data was made during the years 1957 to 1961 in three separate inventory projects.[1/]

The original inventory of Pend Oreille, Spokane, and Stevens Counties was made in 1934 and 1935 by the Northern Rocky Mountain Forest and Range Experiment Station. Results of this inventory appear in survey reports: "Forest Statistics, Pend Oreille County, Washington," March 1937, Forest Survey Release No. 2; "Forest Statistics, Spokane County, Washington," May 1937, Forest Survey Release No. 4; and "Forest Statistics, Stevens County, Washington," June 1937, Forest Survey Release No. 5.

During the same period, the Pacific Northwest Forest and Range Experiment Station inventoried the remaining counties: Ferry, Lincoln, and Whitman. Results of this inventory were published as "Forest Statistics for Ferry County, Washington," April 1937, and "Forest Statistics for Douglas, Lincoln, and Whitman Counties, Washington," January 1936.

The second inventory of northeast Washington was made during the period 1946 to 1948. A report of this inventory was published by the Northern Rocky Mountain Forest and Range Experiment Station as "Forest Resources of Northeast Washington," May 1949, Station Paper No. 21.

Such inventories are a part of the Forest Survey--a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other forest products on them, to determine rates of forest growth and depletion, to estimate present consumption of timber products and probable future trends in timber requirements, to analyze and make available survey information needed in the formulation of forest policies and programs, and to make resurveys as necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the regional Experiment Stations of the U.S. Forest Service. In the States of Oregon and Washington, it is the responsibility of the Pacific Northwest Forest and Range Experiment Station at Portland, Oreg.

1/ See "Forest Survey Procedures," p. 23.

CONTENTS

NORTHEAST WASHINGTON'S FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

Covers 3,626,000 acres or 46 percent of the area;
Has decreased 82,000 acres since 1948; and
Is 59 percent publicly owned.

GROWING STOCK VOLUME--

Amounts to 5,429 million cubic feet;
Is 99 percent softwoods; and
Is 68 percent publicly owned.

SAWTIMBER VOLUME--

Totals 19,642 million board feet, International 1/4-inch rule
(17,224 million board feet, Scribner rule);
Is 74 percent publicly owned;
Is 90 percent in trees less than 29 inches in diameter; and
Is 32 percent greater than in 1948.

NATIONAL FOREST OWNERSHIP--

Has 30 percent of the commercial forest area;
Controls 32 percent of the sawtimber area; and
Holds 38 percent of the sawtimber volume.

OTHER PUBLIC OWNERSHIP--

Has 30 percent of the commercial forest area;
Controls 41 percent of the sawtimber area; and
Holds 36 percent of the sawtimber volume.

FOREST INDUSTRY OWNERSHIP--

Has 4 percent of the commercial forest area;
Controls 4 percent of the sawtimber area; and
Has 6 percent of the sawtimber volume.

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

Has 36 percent of the commercial forest area;
Controls 23 percent of the sawtimber area; and
Holds 20 percent of the sawtimber volume.

Table 1.--Area by land classes, by county, northeast Washington, 1960

(In acres)

Land class	Total	County					
		Ferry	Lincoln	Pend Oreille	Spokane	Stevens	Whitman
Commercial forest	3,626,000	1,123,000	60,000	812,000	365,000	1,256,000	10,000
Unproductive forest	119,000	63,000	1,000	30,000	2,000	23,000	--
Productive-reserved forest	28,000	--	--	1,000	27,000	--	--
Total forest	3,773,000	1,186,000	61,000	843,000	394,000	1,279,000	10,000
Nonforest	1/ 4,111,000	220,000	1,411,000	57,000	734,000	312,000	1,377,000
All land	2/ 7,884,000	1,406,000	1,472,000	900,000	1,128,000	1,591,000	1,387,000

1/ Includes 14,551 acres of water according to Survey standards of area classification but defined by Bureau of the Census as land.

2/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2.--Area of commercial forest land, by county and ownership classes, northeast Washington, 1960

(In acres)

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Ferry	1,123,000	381,000	598,000	10,000	134,000
Lincoln	60,000	--	--	--	60,000
Pend Oreille	812,000	486,000	45,000	48,000	233,000
Spokane	365,000	--	29,000	23,000	313,000
Stevens	1,256,000	208,000	395,000	80,000	573,000
Whitman	10,000	--	--	--	10,000
All counties	3,626,000	1,075,000	1,067,000	161,000	1,323,000

Table 3.--Area of commercial forest land, by stand-size and ownership classes, northeast Washington, 1960

(In acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands	1,948,000	623,000	793,000	89,000	443,000
Poletimber stands	1,023,000	180,000	168,000	56,000	619,000
Sapling and seedling stands	529,000	253,000	77,000	12,000	187,000
Nonstocked areas	126,000	19,000	29,000	4,000	74,000
All classes	3,626,000	1,075,000	1,067,000	161,000	1,323,000

Table 4.--Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, northeast Washington, 1960

(In acres)

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked stands
70 percent or more	1,987,000	1,042,000	644,000	301,000	--
40 to 70 percent	1,027,000	584,000	286,000	157,000	--
10 to 40 percent	486,000	322,000	93,000	71,000	--
Less than 10 percent	126,000	--	--	--	126,000
All classes	3,626,000	1,948,000	1,023,000	529,000	126,000

Table 5.--Area of commercial forest land, by forest types and ownership classes, northeast Washington, 1960

(In acres)

Type	All ownerships	Public ownerships	Private ownerships
Douglas-fir	1,413,000	898,000	515,000
Ponderosa pine	1,163,000	664,000	499,000
Western white pine	75,000	63,000	12,000
Lodgepole pine	427,000	233,000	194,000
Grand fir	53,000	11,000	42,000
Subalpine fir	3,000	1,000	2,000
Engelmann spruce	47,000	44,000	3,000
Western hemlock	36,000	31,000	5,000
Western redcedar	24,000	10,000	14,000
Western larch	234,000	129,000	105,000
Black cottonwood[1/]	18,000	5,000	13,000
Other hardwoods	7,000	5,000	2,000
Nonstocked	126,000	48,000	78,000
All types	3,626,000	2,142,000	1,484,000

[1/] Includes quaking aspen.

Table 6.--Area of noncommercial forest land, by forest types, northeast Washington, 1960

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	12,000	12,000	--
Ponderosa pine	6,000	6,000	--
Western white pine	(1/)	--	--
Lodgepole pine	5,000	5,000	--
True fir—mountain hemlock	1,000	1,000	--
Grand fir	1,000	1,000	--
Western larch	(1/)	--	--
Hardwoods	1,000	1,000	--
Nonstocked	2,000	2,000	--
Noncommercial rocky	119,000	--	119,000
All types	147,000	28,000	119,000

1/ Less than 500 acres.

Table 7.--Volume of growing stock and sawtimber on commercial forest land by counties, northeast Washington, 1960

County	Growing stock	Sawtimber (International 1/4-inch rule)	Sawtimber (Scribner rule)
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Ferry	1,944	8,121	7,236
Lincoln	36	102	89
Pend Oreille	1,372	4,836	4,163
Spokane	387	1,110	958
Stevens	1,677	5,423	4,735
Whitman	13	50	43
Total	5,429	19,642	17,224

Table 8.--Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, northeast Washington, 1960

Class of timber	All species	Softwoods	Hardwoods
	Million cubic feet		
Sawtimber trees:			
Saw-log portion	3,389	3,373	16
Upper-stem portion	255	254	1
Total	3,644	3,627	17
Poletimber trees	1,785	1,745	40
All growing-stock trees	5,429	5,372	57
Sound cull trees:			
Sawtimber-size	12	12	--
Poletimber-size	12	6	6
Total	24	18	6
Rotten cull trees:			
Sawtimber-size	152	152	--
Poletimber-size	--	--	--
Total	152	152	--
Salvable dead trees:			
Sawtimber-size	151	150	1
Poletimber-size	--	--	--
Total	151	150	1
Total, all timber	5,756	5,692	64

Table 9.--Volume of growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, northeast Washington, 1960

Timber and ownership classes	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.
Growing stock:			
National Forest[1/]	1,881	1,876	5
Other public	1,804	1,788	16
Forest industry	301	297	4
Farmer and miscellaneous private	1,443	1,411	32
All ownerships	5,429	5,372	57
	Million bd. ft.	Million bd. ft.	Million bd. ft.
Sawtimber (International 1/4-inch rule):			
National Forest[1/]	7,449	7,434	15
Other public	7,110	7,068	42
Forest industry	1,209	1,202	7
Farmer and miscellaneous private	3,874	3,846	28
All ownerships	19,642	19,550	92
Sawtimber (Scribner rule):			
National Forest[1/]	6,448	6,433	15
Other public	6,361	6,320	41
Forest industry	1,065	1,059	6
Farmer and miscellaneous private	3,350	3,323	27
All ownerships	17,224	17,135	89

1/ Data for National Forest based on National Forest working circle inventories.

Table 10.--Volume of growing stock on commercial forest land by species and diameter classes, northeast Washington, 1960

Species	All Classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million cubic feet										
Softwoods:											
Douglas-fir	1,774	139	193	192	248	212	182	135	383	77	13
Ponderosa pine	1,245	61	67	88	120	128	120	110	391	145	15
Western white pine	148	4	15	21	56	37	14	(1/)	1	--	--
Lodgepole pine	595	139	197	128	72	44	11	4	--	--	--
Grand fir	280	35	38	47	44	36	30	15	33	2	--
Subalpine fir	83	12	18	6	33	11	1	1	1	--	--
Engelmann spruce	193	35	12	16	75	49	1	2	3	--	--
Western hemlock	104	6	9	4	63	19	2	1	--	--	--
Western redcedar	134	12	17	11	22	27	17	12	13	3	--
Western larch	816	58	74	91	122	115	104	83	145	22	2
Total	5,372	501	640	604	855	678	482	363	970	249	30
Hardwoods:											
Quaking aspen	20	5	6	4	2	2	1	--	--	--	--
Western paper birch	23	11	6	3	1	2	(1/)	--	--	--	--
Black cottonwood	12	1	(1/)	2	2	2	(1/)	(1/)	4	1	--
Other hardwoods	2	2	--	--	--	--	--	--	--	--	--
Total	57	19	12	9	5	6	1	--	4	1	--
All species	5,429	520	652	613	860	684	483	363	974	250	30

1/ Less than 500,000 cubic feet.

Table 11.--Volume of sawtimber on commercial forest land, by species and diameter classes, northeast Washington, 1960 (International 1/4-inch rule)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million board feet							
Softwoods:								
Douglas-fir	6,304	1,129	1,051	784	669	2,077	467	127
Ponderosa pine	5,780	559	607	607	591	2,325	975	116
Western white pine	625	264	97	91	164	9	--	--
Lodgepole pine	620	314	223	64	19	--	--	--
Grand fir	910	204	201	167	102	222	14	--
Subalpine fir	148	87	38	12	5	6	--	--
Engelmann spruce	755	421	304	8	7	15	--	--
Western hemlock	455	241	120	94	--	--	--	--
Western redcedar	495	89	136	93	80	80	15	2
Western larch	3,458	553	615	609	536	976	157	12
Total	19,550	3,861	3,392	2,529	2,173	5,710	1,628	257
Hardwoods:								
Quaking aspen	28	13	11	4	--	--	--	--
Western paper birch	7	2	4	1	--	--	--	--
Black cottonwood	57	9	13	(1/)	3	28	4	--
Total	92	24	28	5	3	28	4	--
All species	19,642	3,885	3,420	2,534	2,176	5,738	1,632	257

1/ Less than 500,000 board feet.

Table 12.--Volume of sawtimber on commercial forest land, by species and diameter classes, northeast Washington, 1960 (Scribner rule)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million board feet							
Softwoods:								
Douglas-fir	5,599	925	885	675	597	1,918	478	121
Ponderosa pine	5,119	459	510	522	522	2,128	869	109
Western white pine	531	217	82	78	146	8	--	--
Lodgepole pine	517	257	188	55	17	--	--	--
Grand fir	787	167	169	144	90	204	13	--
Subalpine fir	124	72	32	10	4	6	--	--
Engelmann spruce	628	346	256	7	6	13	--	--
Western hemlock	380	198	101	81	--	--	--	--
Western redcedar	427	73	114	80	71	73	14	2
Western larch	3,023	452	517	525	474	896	147	12
Total	17,135	3,166	2,854	2,177	1.927	5,246	1,521	244
Hardwoods:								
Quaking aspen	27	12	11	4	--	--	--	--
Western paper birch	7	2	4	1	--	--	--	--
Black cottonwood	55	9	12	(1/)	3	27	4	--
Total	89	23	27	5	3	27	4	--
All species	17,224	3,189	2,881	2,182	1,930	5,273	1,525	244

1/ Less than 500,000 board feet.

Table 13.--Volume of salvable dead sawtimber-size trees on commercial forest land, by softwoods and hardwoods, northeast Washington, 1960

Species group	Volume	
	International 1/4-inch rule	Scribner rule
	Million board feet	
Softwoods	537	467
Hardwoods	7	7
All species	544	474

Table 14.--Annual mortality of growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, northeast Washington, 1960

Ownership class	Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	--- Million cu. ft. ---			--- Million bd. ft. ---			--- Million bd. ft. ---		
National Forest	12	12	--	55	55	(1/)	48	48	--
Other public	9	9	--	35	34	1	31	30	1
Forest industry	1	1	--	3	3	--	2	2	--
Farmer and miscellaneous private	6	6	--	17	16	1	15	14	1
All ownerships	28	28	(1/)	110	108	2	96	94	2

1/ Less than 500,000 board feet.

Table 15.--Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, northeast Washington, 1960

Diameter class (inches d.b.h.)	All species	Softwoods	Hardwoods
5.0 - 6.9	156,498,000	152,015,000	4,483,000
7.0 - 8.9	88,209,000	86,554,000	1,655,000
9.0 - 10.9	47,179,000	46,457,000	722,000
11.0 - 12.9	35,968,000	35,702,000	266,000
13.0 - 14.9	21,609,000	21,372,000	237,000
15.0 - 16.9	10,959,000	10,934,000	25,000
17.0 - 18.9	6,165,000	6,156,000	9,000
19.0 - 28.9	9,403,000	9,353,000	50,000
29.0 - 38.9	1,064,000	1,060,000	4,000
39.0 and larger	68,000	68,000	--
All classes	377,122,000	369,671,000	7,451,000

Table 16.--Number of cull and salvable dead trees on commercial forest land, by diameter groups and by softwoods and hardwoods, northeast Washington, 1960

Diameter class (inches d.b.h.)	Cull trees	Salvable dead trees
Softwoods:		
5.0 - 10.9	10,723,000	--
11.0 - 18.9	11,379,000	5,886,000
19.0 and larger	1,821,000	1,040,000
Total	23,923,000	6,926,000
Hardwoods:		
5.0 - 10.9	1,280,000	--
11.0 - 18.9	--	12,000
19.0 and larger	--	12,000
Total	1,280,000	24,000
All species	25,203,000	6,950,000

Table 17.--Timber harvest by ownership class, northeast Washington, 1950-60 (Scribner rule)

Year[1/]	Private	State	National Forest	Other public	Total
	Thousand board feet				
1950	42,323		41,839	48,119	132,281
1951	111,839		42,267	48,185	202,291
1952	107,333		50,798	54,599	212,730
1953	117,287		35,783	58,434	211,504
1954	134,874		52,112	50,990	237,976
1955	151,564	5,733	49,814	59,567	266,678
1956	156,018	508	65,390	73,568	295,484
1957	130,780	2,504	66,245	54,196	253,725
1958	127,175	899	73,564	72,725	274,363
1959	139,798	2,291	86,007	105,433	333,529
1960	134,727	3,293	68,584	69,894	276,498

1/ For the years 1950-54, data for private and State ownerships were not separated.

ACCURACY OF THE 1960 REINVENTORY DATA

Forest Area and Timber Volume

Estimates of forest land area for National Forest and Indian ownerships were obtained from the most recent inventories. These estimates were based on complete enumeration by means of a forest type map, thus no sampling error was involved. Volume estimates for these areas and both volume and area estimates for the remaining portion of the six-county area were derived by sampling and thus have sampling errors. Sampling errors were calculated for total commercial and noncommercial forest land and total board-foot and cubic-foot volume only. In all cases an effort was made to hold errors due to techniques or judgment to a minimum by close supervision and frequent checks of all phases of the work.

Table 18 presents the estimated sampling errors as a percent of the total estimate at the 68-percent and 95-percent probability levels.

Table 18.--Sampling error of estimates of forest area and timber volume

Item	Estimated total	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land	3,626,000 acres	0.9	1.7
Noncommercial forest land	147,000 acres	1.9	3.6
Volume (Scribner)	17,224 million board feet	3.3	6.4
Volume	5,429 million cubic feet	2.6	5.0

The sampling error of a portion of the total area or volume estimate may be approximated by obtaining its proportion of the total estimate and referring to figure 1, page 20. The multiplying factor applied to the percent sampling error of the total estimate will give an approximation of the sampling error of the portion.

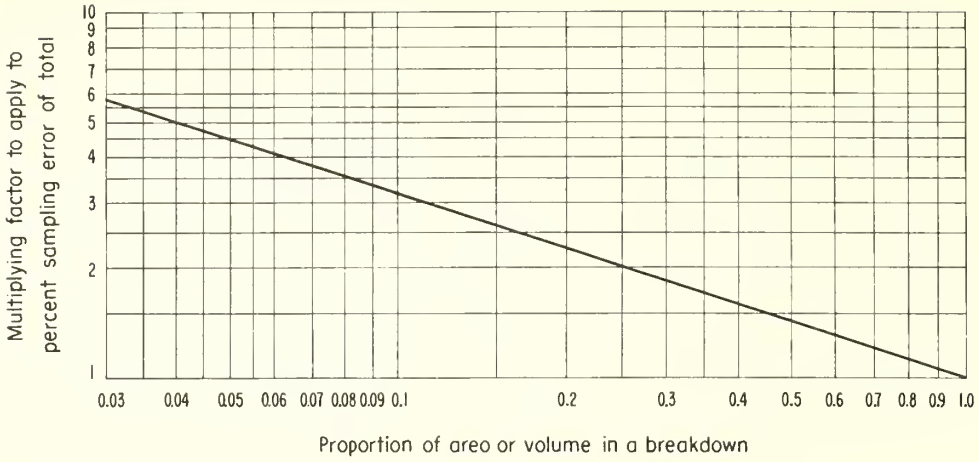


Figure 1.--Ratio of sampling error of an area or volume breakdown to sampling error of total area or volume.

For example, assume that the sampling error reported for a total is ±5 percent, and an estimate of the sampling error for an item which is only 0.25 of this total is desired. Reading from figure 1, the multiplying factor for a proportion of 0.25 is 2. The estimated sampling error for the item is then 2 times ±5 percent, the sampling error of the total, or ±10 percent.

DIFFERENCES IN RESULTS OF INVENTORIES

Tables 19 and 20 show area and volume estimates for the 1960 and 1946-48 inventories. Some of the differences between forest-area and timber-volume estimates for the two inventories are due to physical changes, such as cutting and growth of stands, restocking of deforested area, and the shift of forest land to other uses such as urban development. Some of the differences are due to changes in the inventory procedures used, some to the changes in the standards of utilization recognized, and some to changes in Forest Survey standards and definitions. These variations make it difficult to draw meaningful conclusions from the comparison of the two sets of statistics.

It seems likely, however, that the change in the area of commercial forest land since 1948 is largely due to physical changes such as urban development, withdrawal of forest land for powerline and highway rights-of-way, and for agricultural and industrial uses.

The considerable increase in volume, however, is mostly due to better estimates resulting from improved inventory techniques and, to some extent, the effect of changed utilization standards.

Table 19.--Comparison of forest-area statistics for northeast Washington

(In acres)

Land-use class	1946-48 reinventory	1960 reinventory
Commercial forest	3,708,000	3,626,000
Noncommercial forest:		
Productive-reserved	7,000	28,000
Unproductive	215,000	119,000
Total noncommercial forest	222,000	147,000
Total forest	3,930,000	3,773,000
Nonforest	4,016,000	4,111,000
All land	1/ 7,946,000	2/ 7,884,000

1/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1940. This figure includes the area of Franklin D. Roosevelt Lake behind Grand Coulee Dam and other areas of water which have since been removed from the Bureau of the Census figures for land area.

2/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 20.--Comparison of timber-volume statistics for northeast Washington

(In million board feet, International 1/4-inch rule)

Species	1946-48 reinventory	1960 reinventory
Softwoods:		
Douglas-fir	4,696	6,304
Ponderosa pine	5,582	5,780
Western white pine	418	625
Lodgepole pine	420	620
Grand fir	329	910
Subalpine fir	61	148
Engelmann spruce	156	755
Western hemlock	261	455
Western redcedar	373	495
Western larch	2,533	3,458
Total	14,829	19,550
Hardwoods:		
Black cottonwood	52	57
Other	10	35
Total	62	92
All species	14,891	19,642

FOREST SURVEY PROCEDURES

This inventory contains the data from a group of separate subinventories: the Spokane Indian Reservation, 1957; the Colville National Forest, 1957; the Kaniksu National Forest, 1961; the Colville Indian Reservation, 1958; the remaining area outside the National Forests and Indian reservations, 1960.

The Colville and Kaniksu National Forests were inventoried by National Forest personnel of Forest Service Region 1. All other units were inventoried by the Pacific Northwest Forest and Range Experiment Station.

The Indian reservations and the National Forest inventory designs were similar in that they both used a forest type map prepared from aerial photos to obtain area statistics and a field sample for volume estimates. In contrast, the remaining area was inventoried with a two-stage sampling design using photo and field plots to obtain both area and volume estimates.

The basic field sample of the Indian reservations and the remaining area outside the National Forests consisted of field plots located on systematic grids with intervals of 1.7 and 3.4 miles, respectively. In the area outside the National Forest and Indian reservations, these field plots were supplemented by a systematic grid of photo plots. All the photo plots and field plot locations were examined on aerial photographs and classified into one of three land-use classes: Nonforest, noncommercial forest, or commercial forest land.

The field plots, consisting of a cluster of three 1/5-acre circular subplots spaced at 6-chain intervals, were located, established, and measured in the field. These plots provided a check on the accuracy of the photo interpretation of land-use class and were combined with the photo plots to provide an adjusted estimate of the proportion of area by land-use classes. The field plots also provided data on ownership, forest type, stocking, etc., for use in subdividing the adjusted gross commercial forest land area into area by ownership class, forest type, stand-size class, and stocking class.

Tree measurement data obtained on the field plots, expanded by the total adjusted acreage of commercial forest land represented by each field plot, provided estimates of volume and mortality by species and size class as well as by ownership.

DEFINITION OF TERMS

Land Area

Total Land Area

Includes dry land and unmeandered water surfaces.

Forest Land Area

Land at least 10 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized in reinventory was 10 acres where type maps were used and 1 acre where sampling procedures were used.

Nonforest Land Area

Land that does not qualify as forest land.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Types

Commercial Forest Land Type

Forest land is typed on the basis of the predominant species, as indicated by cubic volume for sawtimber and poletimber stands and number of trees for sapling and seedling stands, or on the basis of forest condition, such as nonstocked cutover or burned-over land. Where none of the indicated species comprise 50 percent or more of a given stand, the stand is classified on the basis of plurality of cubic volume or number of trees. In classifying forest land by type, the minimum area recognized is 1 acre.

Noncommercial Forest Land Types

Productive-reserved. Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land. Types designated the same as for commercial forest land.

Unproductive. Forest land incapable of yielding crops of industrial wood products (usually sawtimber) because of adverse site conditions.

Subalpine. Forest stands at the upper elevational limits of tree growth.

Noncommercial rocky. Areas within the commercial forest zone but so steep and rocky that they are incapable of producing usable wood products.

Nonforest Land Types

Vegetative. Cultivated land, stump pasture, grass, or brush on nonforest land.

Nonvegetative. Includes barrens and towns.

Unmeandered water. Includes unmeandered streams and lakes, and tideflats.

Tree Classes

Sawtimber Tree

Tree of commercial species, 11.0 inches d.b.h. and larger, that contains at least one 16-foot coniferous saw log or one 8-foot hardwood saw log to a variable top diameter never less than 8.0 inches inside the bark. Also, 25 percent or more of the gross board-foot volume must be free from rot or defect.

Poletimber Tree

Tree of commercial species, 5.0 to 10.9 inches d.b.h., in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Sapling and Seedling Trees

Live trees of commercial species, less than 5.0 inches d.b.h., and of good form and vigor.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable for saw logs, now or prospectively, because of defect, rot, or species.

Sound cull tree. Live tree of sawtimber or poletimber size that contains 25 percent or more of sound volume but will not make at least one merchantable saw log, now or prospectively, because of roughness, poor form, or species.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Mortality Tree

Tree which has died from natural causes and which was not a cull tree at the time of death.

Salvable Dead Tree

Standing or down dead tree that contains 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 8-foot hardwood saw log.

Stand-Size Classes

Sawtimber Stand

Stand of sawtimber trees having a minimum per-acre net volume of 1,500 board feet (International 1/4-inch rule).

Large sawtimber stand. Stand in which the majority of the volume is in trees 21.0 inches d.b.h. and larger.

Small sawtimber stand. Stand in which the majority of the volume is in trees from 11.0 to 20.9 inches d.b.h.

Poletimber Stand

Stand failing to meet sawtimber stand specifications but at least 10 percent stocked with poletimber and larger (5.0 inches d.b.h. and larger) trees and with at least half the minimum stocking in poletimber trees.

Sapling and Seedling Stand

Stand not qualifying as either a sawtimber or poletimber stand but at least 10 percent stocked with trees of commercial species and with at least half the minimum stocking in sapling and seedling trees.

Nonstocked Area

An area less than 10 percent stocked with present or potential growing-stock trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and

stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criterion or combination of criteria.

Well-Stocked Stand

A stand that is 70 percent or more stocked with present or potential growing-stock trees.

Medium-Stocked Stand

A stand that is 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly Stocked Stand

A stand that is 10 to 39 percent stocked with present or potential growing stock trees.

Nonstocked Area

An area less than 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species:

Scribner rule. The common board-foot log rule used in determining volume of sawtimber in the Pacific Northwest.

International 1/4-inch rule. The standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top outside bark.

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other Federal Lands

Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies.

State, County, and Municipal Lands

Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

Privately owned lands other than forest industry or farmer-owned lands.

TREE SPECIES

Tree species found in northeast Washington include:

Softwoods:

- Douglas-fir (*Pseudotsuga menziesii*)
- Engelmann spruce (*Picea engelmannii*)
- Grand fir (*Abies grandis*)
- Lodgepole pine (*Pinus contorta*)
- Ponderosa pine (*Pinus ponderosa*)
- Subalpine fir (*Abies lasiocarpa*)
- Western hemlock (*Tsuga heterophylla*)
- Western larch (*Larix occidentalis*)
- Western redcedar (*Thuja plicata*)
- Western white pine (*Pinus monticola*)

Hardwoods:

- Black cottonwood (*Populus trichocarpa*)
- Quaking aspen (*Populus tremuloides*)
- Red alder (*Alnus rubra*)
- Western paper birch (*Betula papyrifera* var. *commutata*)

RECENT FOREST SURVEY REPORTS

Number	Title	Date
PNW-1	1961 Washington Log Production	January 1963
146	1961 Oregon Log Production	December 1962 (rev.)
145	Forest Statistics for Clallam County, Washington	July 1962
144	Forest Statistics for Jefferson County, Washington	June 1962
143	Forest Statistics for King County, Washington	June 1962
142	Forest Statistics for Island and Kitsap Counties, Washington, 1959; San Juan County, Washington, 1960	May 1962
141	Forest Statistics for Pierce County, Washington	May 1962
140	1960 Washington Log Production	March 1962
139	Forest Statistics for Okanogan County, Washington	March 1962
138	1960 Oregon Log Production	January 1962
137	Forest Statistics for Grant County, Oregon	November 1960
136	Forest Statistics for Southeast Washington	July 1960

Available from:
Pacific Northwest Forest & Range Experiment Station
P. O. Box 3141
Portland 8, Oregon

Forest Statistics for

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U. S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN PNW-5

MAY 1963

PREPARED BY

THE DIVISION OF FOREST ECONOMICS RESEARCH

Carl A. Newport, Chief

FOREST SURVEY

Melvin E. Metcalf, In Charge

Field and Office Work in Chelan

and Douglas Counties, Washington, by:

Benjamin Spada, Field Supervisor

Charles C. Avery
John M. Berger
Hoyt H. Hall
Charles C. Hawks, Jr.
James P. King
Colin D. MacLean
Don Minore
Richard L. Nielsen
Marlin E. Plank
Richard D. Schimel
Robert G. Weinberger
John W. Hazard
Margaret C. O'Mara
Mable A. Northrup
Marian E. Simons
Carmen V. Wilson

Acknowledgment is made of the cooperation of the Division of Timber Management, Region 6, and the Timber Management staff, Wenatchee National Forest, U.S. Forest Service, in supplying resource data for National Forest lands and of the assistance of other public agencies in furnishing ownership and timber cut information.

U.S. Forest Service
Resource Bulletin PNW-5
May 1963

FOREST STATISTICS FOR

CHELAN AND DOUGLAS COUNTIES, WASHINGTON, 1959-60

by

John W. Hazard

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director Portland, Oregon

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

PREFACE

This publication summarizes the results of the second forest inventory of Chelan and Douglas Counties, Washington. The collection of field data outside the National Forest was initiated in Chelan County in 1959, in Douglas County in 1960, and completed in both counties in 1960. National Forest resource data were collected during the period 1952 to 1958, and revised to include the recent withdrawal of the Glacier Peak Wilderness Area.

The original inventories of Chelan and Douglas Counties were completed in 1935. The results of the Chelan County inventory were published as "Forest Statistics for Chelan County, Washington," May 1936. The results of the Douglas County inventory appear in the office report, "Forest Statistics for Douglas, Lincoln and Whitman Counties, Washington," January 1936.

Such inventories are a part of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the amount and kind of timber volume on them; to determine rates of forest growth and depletion; to estimate timber cut and future trends in timber requirements; to analyze and make available survey information needed in the formulation of forest policies and programs; and to make resurveys as necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the Experiment Stations of the U. S. Forest Service. In the States of Oregon and Washington, it is the responsibility of the Pacific Northwest Forest and Range Experiment Station at Portland, Oreg.

CONTENTS

CHELAN AND DOUGLAS COUNTIES' FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

Covers 756,000 acres or 25 percent of the land area of which 76 percent is stocked with sawtimber-size stands; 80 percent is publicly owned.

GROWING-STOCK VOLUME--

Amounts to 2,485 million cubic feet of which 99 percent is softwood volume; 86 percent is publicly owned.

SAWTIMBER VOLUME--

Totals 10,880 million board feet, International 1/4-inch rule (9,720 million board feet, Scribner rule), of which 84 percent is publicly owned; 71 percent is in trees less than 29 inches in diameter.

NATIONAL FOREST OWNERSHIP--

Includes 74 percent of the total commercial forest area, 76 percent of the sawtimber area, and 79 percent of the total sawtimber volume.

OTHER PUBLIC OWNERSHIP--

Includes 6 percent of the commercial forest area, 5 percent of the sawtimber acreage, and 6 percent of the sawtimber volume.

FOREST INDUSTRY OWNERSHIP--

Includes 10 percent of the commercial forest area, 11 percent of the sawtimber acreage, and 11 percent of the sawtimber volume.

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

Includes 10 percent of the commercial forest area, 8 percent of the sawtimber acreage, and 4 percent of the sawtimber volume.

Table 1.--Area by land classes, Chelan and Douglas Counties, 1959-60

(In acres)

Land class	Area
Commercial forest	756,000
Unproductive forest	462,000
Productive-reserved forest	36,000
Total forest	1/ 1,254,000
Nonforest	2/ 1,799,000
All land	3/ 3,053,000

1/ The total forest land in Douglas County is 7,900 acres.

2/ Includes 25,000 acres of water according to Survey standards of area classification but defined by Bureau of the Census as land.

3/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2.--Area of commercial forest land, by ownership classes, Chelan and Douglas Counties, 1959-60

(In acres)

Ownership class	Area
National Forest	561,000
Other Federal:	
Bureau of Land Management	13,000
Indian	--
Miscellaneous Federal	4,000
Total other Federal	17,000
State	20,000
County and municipal	7,000
Forest industry:	
Pulp and paper	--
Lumber	74,000
Other	--
Total forest industry	74,000
Farmer owned	53,000
Miscellaneous private	24,000
All ownerships	756,000

Table 3.--Area of commercial forest land, by stand-size and ownership classes, Chelan and Douglas Counties, 1959-60

(In acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands:					
Large	277,000	210,000	23,000	30,000	14,000
Small	299,000	225,000	8,000	36,000	30,000
Total	576,000	435,000	31,000	66,000	44,000
Poletimber stands	147,000	106,000	11,000	4,000	26,000
Sapling and seedling stands	22,000	12,000	2,000	4,000	4,000
Nonstocked areas	11,000	8,000	--	--	3,000
All classes	756,000	561,000	44,000	74,000	77,000

Table 4.--Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, Chelan and Douglas Counties, 1959-60

(In acres)

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked stands
70 percent or more	271,000	197,000	66,000	8,000	(1/)
40 to 70 percent	240,000	195,000	38,000	7,000	(1/)
10 to 40 percent	234,000	184,000	43,000	7,000	(1/)
Less than 10 percent	11,000	(1/)	(1/)	(1/)	11,000
All classes	756,000	576,000	147,000	22,000	11,000

1/ Not applicable.

Table 5.--Area of commercial forest land, by forest types and ownership classes, Chelan and Douglas Counties, 1959-60

(In acres)

Type	All ownerships	Public ownerships	Private ownerships
Douglas-fir	235,000	192,000	43,000
Ponderosa pine	289,000	221,000	68,000
Western white pine	14,000	13,000	1,000
Lodgepole pine	47,000	46,000	1,000
White fir[1/]	38,000	29,000	9,000
Engelmann spruce	22,000	19,000	3,000
Western hemlock	20,000	17,000	3,000
Western redcedar	2,000	2,000	--
Western larch	10,000	10,000	--
True fir—mountain hemlock	62,000	46,000	16,000
Black cottonwood[2/]	5,000	1,000	4,000
Other hardwoods	1,000	1,000	--
Nonstocked	11,000	8,000	3,000
All types	756,000	605,000	151,000

1/ White fir type includes both white and grand fir species.
2/ Includes quaking aspen.

Table 6.--Area of noncommercial forest land, by forest types, Chelan and Douglas Counties, 1959-60

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	8,000	8,000	--
Ponderosa pine	(1/)	(1/)	--
Lodgepole pine	1,000	1,000	--
True fir—mountain hemlock	15,000	15,000	--
Subalpine fir	1,000	1,000	--
Engelmann spruce	6,000	6,000	--
Western hemlock	2,000	2,000	--
Nonstocked	3,000	3,000	--
Noncommercial rocky	387,000	--	387,000
Noncommercial subalpine	75,000	--	75,000
All types	498,000	36,000	462,000

1/ Less than 500 acres.

Table 7.--Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, Chelan and Douglas Counties, 1959-60

Class of timber	All species	Softwoods	Hardwoods
	Million cubic feet		
Growing-stock trees:			
Live sawtimber trees:			
Saw-log portion	1,683	1,677	6
Upper-stem portion	127	127	--
Total	1,810	1,804	6
Poletimber trees	675	668	7
Total	2,485	2,472	13
Sound cull trees:			
Sawtimber-size trees	3	3	--
Poletimber-size trees	6	1	5
Total	9	4	5
Rotten cull trees:			
Sawtimber-size trees	1	1	(1/)
Poletimber-size trees	--	--	--
Total	1	1	(1/)
Salvable dead trees:			
Sawtimber-size trees	2/ 32	2/ 32	--
Poletimber-size trees	--	--	--
Total	2/ 32	2/ 32	--
Total all timber	2,527	2,509	18

1/ Less than 500,000 cubic feet.

2/ Softwoods--193 million board feet (International ¼-inch rule), 172 million board feet (Scribner rule).

Table 8.--Volume of growing stock and live sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, Chelan and Douglas Counties, 1959-60

Timber and ownership classes	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.
Growing stock:[1/]			
National Forest	2,018	2,017	1
Other public	110	110	--
Forest industry	248	246	2
Farmer and miscellaneous private	109	99	10
All ownerships	2,485	2,472	13
	Million bd. ft.	Million bd. ft.	Million bd. ft.
Live sawtimber (International ¼-inch rule):[2/]			
National Forest	8,557	8,556	1
Other public	623	623	--
Forest industry	1,237	1,231	6
Farmer and miscellaneous private	463	432	31
All ownerships	10,880	10,842	38
Live sawtimber (Scribner rule):[2/]			
National Forest	7,616	7,615	1
Other public	572	572	--
Forest industry	1,116	1,110	6
Farmer and miscellaneous private	416	386	30
All ownerships	9,720	9,683	37

[1/] Trees 5.0 inches d.b.h. and larger.

[2/] Trees 11.0 inches d.b.h. and larger.

Table 9.--Volume of growing stock on commercial forest land, by species and diameter classes, Chelan and Douglas Counties, 1959-60

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million cubic feet										
Softwoods:											
Douglas-fir	698	24	32	45	44	60	67	63	232	96	35
Ponderosa pine	417	10	10	15	14	20	24	34	166	98	26
Western white pine	55	3	4	4	5	5	5	6	13	7	3
Lodgepole pine	168	38	50	35	20	10	7	4	4	--	--
Whitebark pine	7	2	2	1	1	(1/)	(1/)	(1/)	1	--	--
Grand fir	510	87	83	75	22	31	25	38	103	40	6
Pacific silver fir	88	6	8	6	6	5	5	6	38	7	1
Noble fir	7	1	1	1	1	(1/)	1	1	1	(1/)	--
Subalpine fir	142	15	17	20	16	17	12	12	23	10	--
Engelmann spruce	134	3	4	7	6	8	10	8	42	34	12
Mountain hemlock	57	7	10	7	1	2	1	2	21	6	--
Western hemlock	116	4	6	17	7	7	5	8	22	18	22
Alaska-cedar	3	--	--	--	1	(1/)	1	(1/)	1	--	--
Western redcedar	49	--	1	2	2	4	2	3	16	15	4
Western larch	20	1	2	2	1	2	3	2	4	3	--
Subalpine larch	1	--	--	--	(1/)	--	1	--	--	(1/)	--
Total	2,472	201	230	237	147	171	169	187	687	334	109
Hardwoods:											
Quaking aspen	1	--	--	1	--	(1/)	--	--	--	--	--
Black cottonwood	8	--	1	1	--	1	1	(1/)	2	1	1
Other hardwoods	4	3	1	--	--	(1/)	--	--	--	--	--
Total	13	3	2	2	--	1	1	--	2	1	1
All species	2,485	204	232	239	147	172	170	187	689	335	110

1/ Less than 500,000 cubic feet.

Table 10.--Volume of live sawtimber on commercial forest land by species and diameter classes, Chelan and Douglas Counties, 1959-60 (International ¼-inch rule)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million board feet							
Softwoods:								
Douglas-fir	3,465	180	275	385	339	1,396	642	248
Ponderosa pine	2,489	65	101	145	217	1,069	694	198
Western white pine	321	26	28	42	47	103	54	21
Lodgepole pine	229	86	55	43	23	22	--	--
Whitebark pine	16	3	1	5	1	6	--	--
Grand fir	1,527	90	138	163	203	621	276	36
Pacific silver fir	413	23	24	25	31	251	51	8
Noble fir	26	4	2	6	4	6	4	--
Subalpine fir	485	61	78	59	66	149	72	--
Engelmann spruce	718	25	31	54	43	238	224	103
Mountain hemlock	205	5	8	9	11	129	43	--
Western hemlock	566	27	32	28	44	133	130	172
Alaska-cedar	12	1	1	3	1	6	--	--
Western redcedar	258	6	18	14	13	88	91	28
Western larch	110	6	9	22	19	30	24	--
Subalpine larch	2	1	(1/)	1	--	--	--	--
Total	10,842	609	801	1,004	1,062	4,247	2,305	814
Hardwoods:								
Quaking aspen	1	--	1	--	--	--	--	--
Black cottonwood	35	--	1	3	2	13	8	8
Other hardwoods	2	(1/)	2	--	--	--	--	--
Total	38	--	4	3	2	13	8	8
All species	10,880	609	805	1,007	1,064	4,260	2,313	822

1/ Less than 500,000 board feet.

Table 11.--Volume of live sawtimber on commercial forest land, by species and diameter classes, Chelan and Douglas Counties, 1959-60 (Scribner rule)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million board feet							
Softwoods:								
Douglas-fir	3,081	148	231	291	298	1,272	604	237
Ponderosa pine	2,260	54	85	116	190	974	651	190
Western white pine	281	21	24	30	42	94	50	20
Lodgepole pine	191	71	47	34	20	19	--	--
Whitebark pine	14	3	1	4	1	5	--	--
Grand fir	1,337	74	116	108	178	566	260	35
Pacific silver fir	375	19	20	22	27	231	48	8
Noble fir	22	3	1	5	4	6	3	--
Subalpine fir	429	51	65	51	58	136	68	--
Engelmann spruce	652	20	27	40	37	218	211	99
Mountain hemlock	186	5	6	7	10	118	40	--
Western hemlock	516	22	27	19	39	122	122	165
Alaska-cedar	10	1	1	2	1	5	--	--
Western redcedar	233	5	15	9	12	80	86	26
Western larch	95	4	8	16	17	27	23	--
Subalpine larch	1	(1/)	(1/)	1	--	--	--	--
Total	9,683	501	674	755	934	3,873	2,166	780
Hardwoods:								
Quaking aspen	1	--	1	--	--	--	--	--
Black cottonwood	34	--	1	3	2	13	8	7
Other hardwoods	2	(1/)	2	--	--	--	--	--
Total	37	--	4	3	2	13	8	7
All species	9,720	501	678	758	936	3,886	2,174	787

1/ Less than 500,000 board feet.

Table 12.--Annual mortality of growing stock and sawtimber on commercial forest land, by ownership classes and including both softwoods and hardwoods, Chelan and Douglas Counties, 1959-60

Ownership class	Growing stock, all species[1/]	Sawtimber, all species[1/] (International ¼-inch rule)	Sawtimber, all species[1/] (Scribner rule)
	Million cu. ft.	Million bd. ft.	Million bd. ft.
National Forest	3	14	13
Other public	--	--	--
Forest industry	3	17	16
Farmer and miscellaneous private	1	2	1
All ownerships	7	33	30

[1/] All softwoods; only negligible amount of hardwood mortality recorded.

Table 13.--Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, Chelan and Douglas Counties, 1959-60

Diameter class (inches d.b.h.)	All species	Softwoods	Hardwoods
5.0 - 6.9	57,415,000	56,747,000	668,000
7.0 - 8.9	30,859,000	30,554,000	305,000
9.0 - 10.9	18,287,000	18,154,000	133,000
11.0 - 12.9	7,553,000	7,536,000	17,000
13.0 - 14.9	6,018,000	5,990,000	28,000
15.0 - 16.9	4,279,000	4,265,000	14,000
17.0 - 18.9	3,621,000	3,614,000	7,000
19.0 - 28.9	7,479,000	7,465,000	14,000
29.0 - 38.9	1,647,000	1,640,000	7,000
39.0 and larger	295,000	288,000	7,000
All classes	137,453,000	136,253,000	1,200,000

Table 14.--Number of cull and salvable dead trees on commercial forest land, by diameter groups and by softwoods and hardwoods, Chelan and Douglas Counties, 1959-60

Diameter class (inches d.b.h.)	Cull trees	Salvable dead trees
Softwoods:		
5.0 - 10.9	291,000	--
11.0 - 18.9	107,000	771,000
19.0 and larger	43,000	213,000
Total	441,000	984,000
Hardwoods:		
5.0 - 10.9	1,151,000	--
11.0 - 18.9	7,000	--
19.0 and larger	--	--
Total	1,158,000	--
All species	1,599,000	984,000

Table 15.--Timber harvest by ownership class, Chelan and Douglas Counties, 1950-60 (Scribner rule)

Year[1/]	Private	State	National Forest	Other public	Total
	Thousand board feet				
1950	22,768		31,300	--	54,068
1951	20,838		22,900	--	43,738
1952	10,470		27,900	--	38,370
1953	11,248		38,100	--	49,348
1954	10,134		33,700	--	43,834
1955	27,736	--	24,169	--	51,905
1956	19,822	1,073	43,500	--	64,395
1957	18,736	1,845	43,385	66	64,032
1958	9,328	--	48,108	1,374	58,810
1959	12,267	507	61,961	697	75,432
1960	13,032	--	56,636	--	69,668

[1/] For the years 1950-54, data for State and private ownerships were not separated.

ACCURACY OF 1960 REINVENTORY DATA

Forest Area and Timber Volume

Estimates of forest-land area for National Forest lands were obtained from the most recent inventories available. Area estimates for the Wenatchee Working Circle were based on complete type map coverage, thus no sampling error was involved. Volume estimates for the Wenatchee Working Circle and both area and volume estimates for the Chelan and Entiat Working Circles and the remaining portion of Chelan and Douglas Counties were derived by sampling and thus have sampling errors associated with them.

Sampling errors were calculated for total commercial and noncommercial forest land and total board-foot and cubic-foot volumes only. In all cases, errors due to technique or judgment were held to a minimum by close supervision and frequent checking of all phases of work.

Table 16 presents the estimated sampling errors as a percent of the total estimate at the 68-percent and 95-percent probability levels.

Table 16.--Sampling error of estimates of forest area and timber volume

Item	Estimated totals	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land	755,862 acres	±2.2	±4.4
Noncommercial forest land	498,093 acres	±3.5	±6.9
Volume (Scribner)	9,721 million board feet	±4.8	±9.3
Volume	2,485 million cubic feet	±3.9	±7.6

The sampling error of a portion of the total area or volume estimate may be approximated by obtaining its proportion of the total estimate and referring to figure 1, page 18. The multiplying factor applied to the percent sampling error of the total estimate will give an approximation of the sampling error of that portion.

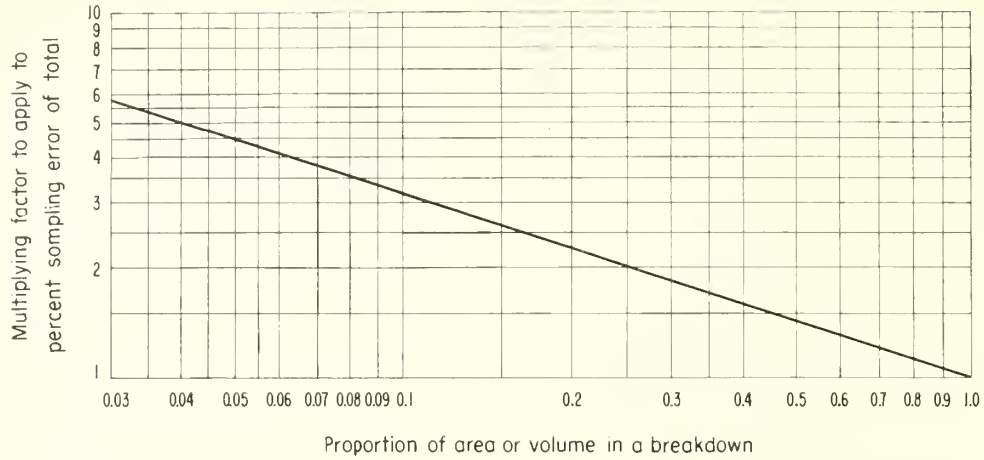


Figure 1.--Ratio of sampling error of an area or volume breakdown to sampling error of total area or volume.

For example, assume that the sampling error reported for a total is ±5 percent and an estimate of the sampling error for an item which is only 0.25 of this total is desired. Reading from figure 1, the multiplying factor for a proportion of 0.25 is 2. The estimated sampling error for the item is then 2 times ±5 percent, the sampling error of the total, or ±10 percent.

DIFFERENCES IN RESULTS OF INVENTORIES

Tables 17 and 18 show area and volume statistics for the 1960 and 1936 inventories. Some of the differences between forest-area and timber-volume estimates for the two inventories are due to actual physical changes, such as cutting and growth of stands, restocking of deforested areas, and the shift of forest land to other uses. However, during the period between the two inventories there have been changes in the standards of utilization recognized, changes in Forest Survey definitions and standards, and improvements in inventory techniques, including more accurate base maps and the use of aerial photographs. Also during this period, the Glacier Peak Wilderness Area was established with a gross area of 236,000 acres in Chelan County, an increase of 132,000 acres in reserved area since 1935.

Of the total decrease in commercial forest land area, 16,000 acres are due to this increase in reserved area. The remaining 78,000-acre decrease is due to modern inventory methods using aerial photos. These have permitted a more intensive examination of the land area resulting in a further reduction in commercial forest, most of which shifted to noncommercial forest land. At the same time a large portion of the former noncommercial forest land area was reclassified as nonforest, i.e., rock, grass, water, and ice or snow fields.

Table 17.--Comparison of forest-area statistics for Chelan and Douglas Counties, previous and current reinventories

(In acres)

Land-use class	1936	1960
Commercial forest	850,000	756,000
Noncommercial forest:		
Productive-reserved	20,000	36,000
Unproductive	630,000	462,000
Total noncommercial forest	650,000	498,000
Total forest	1,500,000	1,254,000

Table 18.--Comparison of timber-volume statistics for Chelan and Douglas Counties, previous and current reinventories

(In million board feet, Scribner rule)

Species	1936	1960
Softwoods:		
Douglas-fir	1,245	3,081
Ponderosa pine	1,753	2,260
Western white pine	161	281
Lodgepole pine	49	191
Grand fir	87	1,337
Pacific silver fir	855	375
Subalpine fir	17	429
Engelmann spruce	315	652
Mountain hemlock	223	186
Western hemlock	362	516
Alaska-cedar	1	10
Western redcedar	117	233
Western larch	78	95
Other	--	37
Total	5,263	9,683
Hardwoods:		
Quaking aspen	1	1
Black cottonwood	20	34
Other	--	2
Total	21	37
All species	5,284	9,720

In spite of the decrease in commercial forest land area, the 1960 inventory indicates a very substantial increase in total volume. This increase is primarily due to more intensive sampling methods, greater recognition of species formerly considered of little value, and changed utilization standards which accept trees of lower quality than was the case at the time of the previous inventory.

These changes make it difficult, if not impossible, to draw meaningful conclusions as to trends in the timber resources between the two inventories. The most that can be said is that the 1960 inventory data are the best estimates of the timber resources currently available and reflect current standards and definitions, utilization practices, and inventory techniques.

FOREST SURVEY PROCEDURES

The second inventory of Chelan and Douglas Counties combines data from four separate subinventories: the Wenatchee Working Circle--1952-54; Chelan Working Circle--1958, and the Entiat Working Circle--1957, all in the Wenatchee National Forest, and the remaining area outside the National Forest, 1959-60.

Area data for the Wenatchee Working Circle was determined by a dot count on a forest type map prepared from aerial photos. Estimates of volume per acre were made by means of temporary plots taken at intervals within forest type islands. The average of these plots provided the estimate of volume per acre for each type. Acreages from the type maps applied to the per-acre volumes produced the total type-volume estimates. The Entiat and Chelan Working Circles used a systematic grid of field plots taken on a 1.7-mile interval to provide data for volume estimates. The proportions of field plots by the various area breakdowns provided area estimates, and the expansion of volume per plot by the area represented by each plot provided the volume estimates.

The remaining area of Chelan and Douglas Counties was sampled with a two-stage sampling design using photo and field plots to obtain both area and volume estimates. Photo plots located on a systematic grid were used as an initial means of proportioning total land area in the unit into major land classes. The field plots, consisting of three 1/5-acre circular subplots, were then used as a check on accuracy and were combined with the photo plots to provide an adjusted estimate of the proportion of area by land-use classes.

The field plots also provided data on ownership, forest type, stocking, etc., for use in subdividing the adjusted gross commercial forest land area into area by ownership class, forest type, stand-size class, and stocking class.

Tree measurement data, obtained on the field plots expanded by the total adjusted acreage of commercial forest land represented by each field plot, provided estimates of volume and mortality by species and size class as well as by ownership.

DEFINITIONS OF TERMS

Land Area

Total Land Area

Includes dry land and unmeandered water surfaces.

Forest Land Area

Land at least 10 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized in reinventory was 10 acres where type maps were used, and 1 acre where sampling procedures were used.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the counties was 10 acres where type maps were used and 1 acre where sampling procedures were used.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Types

Commercial Forest Land Type

Forest land is typed on the basis of the predominant species, as indicated by volume for sawtimber and poletimber stands and number of trees for sapling and seedling stands, or on the basis of forest conditions, such as nonstocked cutover or burned-over land. Where none of the indicated species comprise 50 percent or more of a given stand, the stand is classified on the basis of plurality of volume or number of trees. In classifying forest land by type, the minimum area recognized is 1 acre.

Noncommercial Forest Land Types

Productive-reserved. Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land. Types designated the same as for commercial forest land.

Unproductive. Forest land incapable of yielding crops of industrial wood products (usually sawtimber) because of adverse site conditions.

Subalpine. Forest stands at the upper elevational limits of tree growth.

Noncommercial rocky. Areas within the commercial forest zone but so steep and rocky that they are incapable of producing usable wood products.

Tree-Size Classes

Sawtimber Tree

Tree of commercial species, 11.0 inches d.b.h. and larger, that contains at least one 16-foot coniferous saw log or one 8-foot hardwood saw log to a variable top diameter never less than 8.0 inches inside the bark. Also, 25 percent or more of the gross board-foot volume must be free from rot or defect.

Poletimber Tree

Tree of commercial species, 5.0 to 10.9 inches d.b.h., in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Sapling and Seedling Trees

Live trees of commercial species, less than 5.0 inches d.b.h., and of good form and vigor.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable for saw logs, now or prospectively, because of defect, rot, or species.

Sound cull tree. Live tree of sawtimber or poletimber size that contains 25 percent or more of sound volume but will not make at least one merchantable saw log, now or prospectively, because of roughness, poor form, or species.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Mortality Tree

Tree which has died from natural causes and which was not a cull tree at the time of death.

Salvable Dead Tree

Standing or down dead tree that contains 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 8-foot hardwood saw log.

Stand-Size Classes

Sawtimber Stand

Stand of sawtimber trees having a minimum per-acre net volume of 1,500 board feet (International 1/4-inch rule).

Large sawtimber stand. Stand in which the majority of the volume is in trees 21.0 inches d.b.h. and larger.

Small sawtimber stand. Stand in which the majority of the volume is in trees from 11.0 to 20.9 inches d.b.h.

Poletimber Stand

Stand failing to meet sawtimber stand specifications but at least 10 percent stocked with poletimber and larger (5.0 inches d.b.h. and larger) trees and with at least half the minimum stocking in poletimber trees.

Sapling and Seedling Stand

Stand not qualifying as either a sawtimber or poletimber stand but at least 10 percent stocked with trees of commercial species and with at least half the minimum stocking in sapling and seedling trees.

Nonstocked

An area less than 10 percent stocked with present or potential growing-stock trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of

stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criteria.

Well-Stocked Stand

A stand that is 70 percent or more stocked with present or potential growing-stock trees.

Medium-Stocked Stand

A stand that is 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly Stocked Stand

A stand that is 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked

An area less than 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species:

Scribner rule. The common board-foot log rule used in determining volume of sawtimber in the Pacific Northwest.

International 1/4-inch rule. The board-foot log rule adopted nationally by the Forest Service as the standard for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark or to where central stem breaks into limbs.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from

stump to a minimum 4.0-inch top outside bark or to where central stem breaks into limbs.

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other Federal Lands

Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies.

State, County, and Municipal Lands

Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

Privately owned lands other than forest industry or farmer-owned lands.

TREE SPECIES

Tree species found in Chelan and Douglas Counties include:

Softwoods:

- Alaska-cedar (Chamaecyparis nootkatensis)
- Douglas-fir (Pseudotsuga menziesii)
- Engelmann spruce (Picea engelmannii)
- Grand fir (Abies grandis)
- Incense-cedar (Libocedrus decurrens)
- Lodgepole pine (Pinus contorta)
- Mountain hemlock (Tsuga mertensiana)
- Noble fir (Abies procera)
- Pacific silver fir (Abies amabilis)
- Ponderosa pine (Pinus ponderosa)
- Subalpine fir (Abies lasiocarpa)
- Subalpine larch (Larix lyallii)
- Western hemlock (Tsuga heterophylla)
- Western larch (Larix occidentalis)
- Western redcedar (Thuja plicata)
- Western white pine (Pinus monticola)
- Whitebark pine (Pinus albicaulis)

Hardwoods:

- Bigleaf maple (Acer macrophyllum)
- Black cottonwood (Populus trichocarpa)
- Quaking aspen (Populus tremuloides)
- Red alder (Alnus rubra)

RECENT FOREST SURVEY REPORTS

Number	Title	Date
PNW-4	Forest Statistics for Northeast Washington	May 1963
PNW-3	Toward Complete Use of Eastern Oregon's Forest Resources	May 1963
PNW-2	1962 Oregon Log Production	April 1963
PNW-1	1961 Washington Log Production	January 1963
146	1961 Oregon Log Production	December 1962 (rev.)
145	Forest Statistics for Clallam County, Washington	July 1962
144	Forest Statistics for Jefferson County, Washington	June 1962
143	Forest Statistics for King County, Washington	June 1962
142	Forest Statistics for Island and Kitsap Counties, Washington, 1959; San Juan County, Washington, 1960	May 1962
141	Forest Statistics for Pierce County, Washington	May 1962
140	1960 Washington Log Production	March 1962
139	Forest Statistics for Okanogan County, Washington	March 1962

Available from:

Pacific Northwest Forest & Range Experiment Station
P. O. Box 3141
Portland 8, Oregon

U.S. Forest Service
Resource Bulletin PNW-6 December 1963

1962 WASHINGTON LOG PRODUCTION

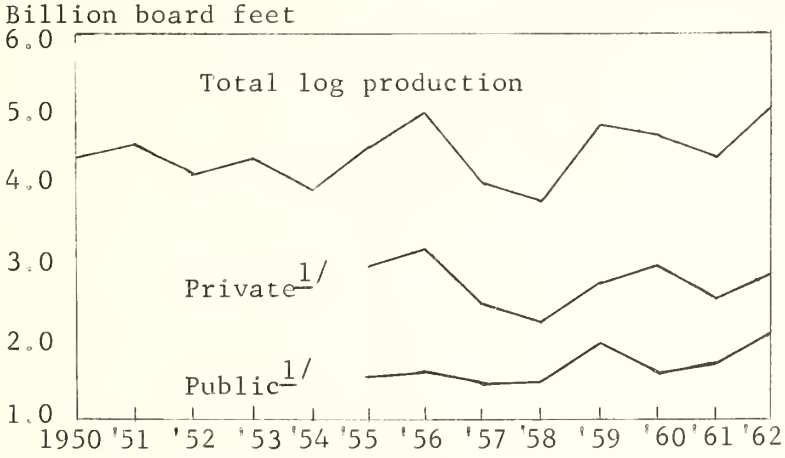
by Richard L. Nielsen

Washington's 1962 log production reached 5.05 billion board feet. This is an increase of 14 percent, or 616 million board feet, over 1961 and the highest total log production since the 1941 figure of 5.14 billion board feet.

Total log production increased on all lands in 1962, except Bureau of Land Management which produced only 5.4 million board feet as compared with 10 million board feet in 1961.

Although production from private lands rose 266 million board feet compared with 1961, its proportion of the total declined from 60 percent in 1961 to 58 percent in 1962. On the other hand, production from public lands rose 350 million board feet, or from 40 to 42 percent of the total. National Forests were the largest public producers with 30 percent of the total, 3 percent more than in 1961.

The total volume of dead material reported rose 15 million board feet, or 10 percent, over 1961, a 69-million-board-foot increase from National Forests more than offsetting a 54-million-board-foot drop for all other lands.



Washington log production, 1950-62

1/ Separate data for public and private not available prior to 1955.

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director Portland, Oregon

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

Table 1.--Timber harvest by ownership in State of Washington, 1962[1/]

(In thousands of board feet, Scribner log rule)

State and county	Private		State		Bureau of Land Mgmt.		National Forests		Indian lands		Other Federal		Total production		
	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live & dead
Western Washington															
Clallam	127,998	2,230	25,855	183	--	--	65,800	5,200	1,602	--	1,396	15	222,651	7,628	230,279
Clark	72,385	316	2,342	--	--	--	--	--	--	--	--	--	74,727	316	75,043
Cowlitz	357,876	9,172	39,426	155	--	--	5,200	500	--	--	--	--	402,502	9,827	412,329
Grays Harbor	215,898	4,856	3,420	100	--	--	66,600	5,400	116,444	596	--	--	402,362	10,952	413,314
Island	12,518	19	--	--	--	--	--	--	--	--	--	--	12,518	19	12,537
Jefferson	95,052	227	75,511	108	--	--	65,800	5,200	1,650	--	1,073	25	239,086	5,560	244,646
King	209,028	753	18,075	30	--	--	18,100	2,200	--	--	180	--	245,383	2,983	248,366
Kitsap	19,496	540	84	--	--	--	--	--	--	--	1,000	--	20,580	540	21,120
Lewis	380,613	4,282	15,126	2,528	--	--	129,500	13,100	--	--	--	31	525,239	19,941	545,180
Mason	71,701	1,297	7,497	--	--	--	55,000	4,300	14	--	--	--	134,212	5,597	139,809
Pacific	357,099	6,325	20,669	11	--	--	--	--	--	--	--	--	377,768	6,336	384,104
Pierce	257,410	4,187	12,994	84	--	--	35,900	4,300	--	--	526	--	306,830	8,571	315,401
San Juan	5,591	--	--	--	--	--	--	--	--	--	--	--	5,591	--	5,591
Skagit	60,090	2,019	19,198	46	--	--	53,700	8,900	550	--	--	--	133,538	10,965	144,503
Skamania	92,361	173	5,255	--	--	--	304,700	27,600	--	--	--	--	402,316	27,773	430,089
Snohomish	99,983	4,587	5,991	459	--	--	131,700	19,600	533	--	--	--	238,207	24,646	262,853
Thurston	47,587	602	1,989	--	--	--	--	--	--	--	--	--	49,576	602	50,178
Wahkiakum	86,024	1,837	14,414	44	--	--	--	--	--	--	--	--	100,438	1,881	102,319
Whatcom	32,510	235	20,941	--	--	--	58,100	9,700	550	--	--	--	112,101	9,935	122,036
Total	2,601,220	43,657	288,787	3,748	--	--	990,100	106,000	121,343	596	4,175	71	4,005,625	154,072	4,159,697
Eastern Washington															
Adams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Asotin	23,848	--	--	--	--	--	1,000	--	--	--	--	--	24,848	--	24,848
Benton	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chelan	6,497	--	203	--	1,163	--	70,100	1,100	--	--	--	--	77,963	1,100	79,063
Columbia	7,445	--	--	--	312	--	5,100	200	--	--	--	--	12,857	200	13,057
Douglas	465	--	--	--	--	--	--	--	--	--	--	--	465	--	465
Ferry	11,800	--	3,852	--	1,609	--	42,638	1,500	78,743	115	--	--	138,642	1,615	140,257
Franklin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Garfield	--	1,150	--	--	--	--	6,600	300	--	--	--	--	6,600	1,450	8,050
Grant	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Kittitas	49,753	193	1,385	50	--	--	65,400	1,200	--	--	--	--	116,538	1,443	117,981
Klickitat	47,166	571	802	264	--	--	--	--	9,157	--	--	--	57,125	835	57,960
Lincoln	1,130	120	--	--	--	--	--	--	--	--	--	--	1,130	120	1,250
Okanogan	11,284	--	6,034	--	286	--	83,100	--	20,350	--	--	--	121,054	--	121,054
Pend Oreille	16,135	--	326	--	--	--	49,030	1,139	--	--	--	--	65,491	1,139	66,630
Spokane	13,573	818	--	--	--	--	--	--	--	--	--	--	13,573	818	14,391
Stevens	45,671	94	3,645	--	1,351	--	17,555	400	6,890	--	--	--	75,112	494	75,606
Walla Walla	5,961	--	--	--	--	--	--	--	--	--	--	--	5,961	--	5,961
Whitman	65	--	--	--	--	--	--	--	--	--	--	--	65	--	65
Yakima	29,522	--	15,185	30	662	--	52,200	1,500	65,714	196	--	--	163,283	1,726	165,009
Total	270,315	2,946	31,432	344	5,383	--	392,723	7,339	180,854	311	--	--	880,707	10,940	891,647
Total Washington	2,871,535	46,603	320,219	4,092	5,383	--	1,382,823	113,339	302,197	907	4,175	71	4,886,332	165,012	5,051,344

1/ Includes volume in logs, poles, piling, cordwood, shingle bolts, etc., as compiled by Washington State Department of Natural Resources.

2/ Includes snags and down material existing prior to initial logging. Salvage of this material does not constitute drain on the volume of the forest inventory of live trees.

Forest Statistics for

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U.S. FOREST SERVICE
RESOURCE BULLETIN PNW-7
1964

PREPARED BY

THE DIVISION OF FOREST ECONOMICS RESEARCH

Carl A. Newport, Chief

FOREST SURVEY

Melvin E. Metcalf, In Charge

Field and Office Work in Northwest Oregon, by

Benjamin Spada, Project Leader

John M. Berger and John W. Hazard, Field Supervisors

John H. Beuter
Charles L. Bolsinger
Eric L. Burbano
Thomas C. Christian
Donald D. Connally
Donald L. Doyle
Barry K. Ford
Lewin R. Gordon
Herbert D. Hahn
Nicholai P. Iliinsky
Marvin P. Johnson
Ronald Johnson
Richard A. Koppe
James F. Koons
Robert P. Latham
James A. Moorhouse
Colin D. MacLean
Kai T. Petersen
Thomas E. Rogers
Ronald V. Rydberg
Charles K. Wakida
Robert G. Weinberger
Margaret C. O'Mara
Mable A. Northrup
Marian E. Simons
Carmen V. Wilson

Acknowledgment is made of the cooperation of the Division of Timber Management, Region 6, U.S. Forest Service, in supplying resource data for National Forest lands; of the assistance of the Oregon State Board of Forestry in furnishing ownership information; and of other public and private agencies in making aerial photography available to Forest Survey for interpretation.

U.S. Forest Service
Resource Bulletin PNW-7
July 1964

FOREST STATISTICS FOR NORTHWEST OREGON

by

Melvin E. Metcalf

and

John W. Hazard

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director Portland, Oregon

FOREST SERVICE U. S. DEPARTMENT OF AGRICULTURE

PREFACE

This publication summarizes the results of the latest reinventory of 10 counties in northwest Oregon: Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, Polk, Tillamook, Washington, and Yamhill. This block of counties is one of 10 such blocks set up in the States of Oregon and Washington by the Forest Survey to facilitate orderly reinventories of the timber resources. Each block will be reinventoried at 10-year intervals and the results published in a single report for the block. The five blocks in Oregon are northwest Oregon, west-central Oregon, southwest Oregon, central Oregon, and northeast Oregon.

Field data for northwestern Oregon were collected in 1961 for all areas except the Siuslaw National Forest, for which the most recent data available were collected in 1956. Volume data have been adjusted for growth and cutting to January 1, 1963, but not for the effects of the windstorm of October 12, 1962. The results of this latest reinventory are presented with a minimum of interpretation to permit more rapid publication of the timber resource statistics.

The 10 counties covered by this report were previously inventoried in the years shown below:

County	Initial inventory	Second inventory	Third inventory
Clackamas	1931-32	1944	--
Clatsop	1930	1937	1952
Columbia	1930	1938	1954
Hood River	1932	1954	--
Marion	1933	1944	--
Polk	1930	1940	--
Tillamook	1930-31	1942	1955
Washington	1930	1939	--
Yamhill	1930	1942	--

The results of the initial inventory of these counties were published in 1934 as a series of pamphlets containing forest statistics for each individual county.

The results of the second and third inventories were also released in a series of individual county reports within 1 to 2 years following completion of the field inventory.

Such inventories are a part of the Forest Survey--a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other forest products on them, to determine rates of forest growth and depletion, to estimate present consumption of timber products and probable

future trends in timber requirements, to analyze and make available survey information needed in the formulation of forest policies and programs, and to make resurveys as necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the regional Experiment Stations of the U.S. Forest Service. In the States of Oregon and Washington, it is the responsibility of the Pacific Northwest Forest and Range Experiment Station at Portland, Oreg.

CONTENTS

NORTHWEST OREGON'S FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

Covers 3,954,000 acres or 71 percent of the land area;
Has sawtimber stands on 53 percent of its area; and
Is composed of 55 percent Douglas-fir type, 26 percent other softwood types, and 19 percent hardwood types.

GROWING-STOCK VOLUME--

Totals 15,772 million cubic feet;
Is 90 percent softwoods; and
Is 84 percent in trees of sawtimber size.

SAWTIMBER VOLUME--

Totals 82,821 million board feet, International 1/4-inch rule (65,567 million board feet, Scribner rule);
Is 71 percent publicly owned;
Is 38 percent in trees over 29 inches in diameter; and
Is 6 percent greater than in the 1940's.

NATIONAL FOREST OWNERSHIP--

Has 27 percent of the commercial forest area;
Controls 39 percent of the sawtimber area; and
Holds 52 percent of the sawtimber volume.

OTHER PUBLIC OWNERSHIP--

Has 22 percent of the commercial forest area;
Controls 18 percent of the sawtimber area; and
Holds 20 percent of the sawtimber volume.

FOREST INDUSTRY OWNERSHIP--

Has 24 percent of the commercial forest area;
Controls 18 percent of the sawtimber area; and
Holds 16 percent of the sawtimber volume.

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

Has 27 percent of the commercial forest area;
Controls 25 percent of the sawtimber area; and
Holds 12 percent of the sawtimber volume.

NET ANNUAL GROWTH--

Totals 224 million cubic feet (860 million board feet, International 1/4-inch rule, 698 million board feet, Scribner);
Is 1.4 percent of growing-stock volume; and
Is 80 percent softwood.

AVERAGE ANNUAL CUT OVER THE PAST 5 YEARS--

Has been 1,306 million board feet, Scribner rule, of which 55 percent has been from private timber; and
Has been 87 percent greater than average net annual growth.

Table 1.--Area by land classes, by county, northwest Oregon, 1963

(In acres)

County	Land class					
	Commercial forest	Unproductive forest	Productive-reserved forest	Total forest	Nonforest[1/]	All land[2/]
Clackamas	945,000	11,000	(3/)	956,000	254,000	1,210,000
Clatsop	465,000	19,000	4,000	488,000	37,000	525,000
Columbia	336,000	7,000	--	343,000	70,000	413,000
Hood River	258,000	20,000	10,000	288,000	50,000	338,000
Marion	384,000	12,000	7,000	403,000	348,000	751,000
Multnomah	128,000	3,000	1,000	132,000	139,000	271,000
Polk	279,000	(3/)	1,000	280,000	193,000	473,000
Tillamook	646,000	--	4,000	650,000	64,000	714,000
Washington	255,000	--	(3/)	255,000	203,000	458,000
Yamhill	258,000	--	--	258,000	196,000	454,000
Total	3,954,000	72,000	27,000	4,053,000	1,554,000	5,607,000

1/ Includes 12,000 acres of water according to Forest Survey standards of area classification but defined as land by the Bureau of the Census.

2/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

3/ Less than 500 acres.

Table 2.--Area of commercial forest land, by ownership classes, northwest Oregon, 1963

(In acres)

Ownership class	Area
National Forest	1,075,000
Other Federal:	
Bureau of Land Management	252,000
Indian	8,000
Miscellaneous Federal	--
Total other Federal	260,000
State	545,000
County and municipal	78,000
Forestry industry:	
Pulp and paper	715,000
Lumber	230,000
Other	--
Total forest industry	945,000
Farmer owned	655,000
Miscellaneous private	396,000
All ownerships	3,954,000

Table 3.--Area of commercial forest land, by county and ownership classes, northwest Oregon, 1963

(In acres)

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Clackamas	945,000	532,000	89,000	115,000	209,000
Clatsop	465,000	--	144,000	221,000	100,000
Columbia	336,000	--	19,000	195,000	122,000
Hood River	258,000	177,000	43,000	23,000	15,000
Marion	384,000	183,000	50,000	36,000	115,000
Multnomah	128,000	68,000	4,000	--	56,000
Polk	279,000	1,000	43,000	132,000	103,000
Tillamook	646,000	91,000	353,000	125,000	77,000
Washington	255,000	--	95,000	8,000	152,000
Yamhill	258,000	23,000	43,000	90,000	102,000
All counties	3,954,000	1,075,000	883,000	945,000	1,051,000

Table 4.--Area of commercial forest land, by stand-size and ownership classes, northwest Oregon, 1963

(In acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands:					
Large	1,145,000	580,000	232,000	165,000	168,000
Small	936,000	230,000	131,000	217,000	358,000
Total	2,081,000	810,000	363,000	382,000	526,000
Poletimber stands	539,000	172,000	89,000	138,000	140,000
Sapling and seedling stands	1,127,000	75,000	319,000	382,000	351,000
Nonstocked areas	207,000	18,000	112,000	43,000	34,000
All classes	3,954,000	1,075,000	883,000	945,000	1,051,000

Table 5.--Area of commercial forest land, by stand volume classes for sawtimber and other stand-size classes, northwest Oregon, 1963

(In acres)

Stand volume class[1/]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	1,155,000	13,000	1,142,000
1,500 to 5,000 board feet	602,000	119,000	483,000
More than 5,000 board feet	2,197,000	1,949,000	248,000
All classes	3,954,000	2,081,000	1,873,000

1/ Net volume per acre, International 1/4-inch rule.

Table 6.--Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, northwest Oregon, 1963

(In acres)

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked stands
70 percent or more	2,211,000	1,492,000	336,000	383,000	(1/)
40 to 70 percent	914,000	415,000	120,000	379,000	(1/)
10 to 40 percent	622,000	174,000	83,000	365,000	(1/)
Less than 10 percent	207,000	(1/)	(1/)	(1/)	207,000
All classes	3,954,000	2,081,000	539,000	1,127,000	207,000

1/ Not applicable.

Table 7.--Area of commercial forest land, by yield and ownership classes, northwest Oregon, 1963

(In acres)

Yield class[1/]	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
120 cubic feet or more	2,568,000	373,000	760,000	699,000	736,000
85 to 120 cubic feet	556,000	258,000	50,000	102,000	146,000
50 to 85 cubic feet	626,000	361,000	52,000	104,000	109,000
Less than 50 cubic feet	204,000	83,000	21,000	40,000	60,000
All classes	3,954,000	1,075,000	883,000	945,000	1,051,000

[1/] A classification in terms of capacity for cubic-foot annual growth per acre.

Table 8.--Area of commercial forest land, by forest types and ownership classes, northwest Oregon, 1963

(In acres)

Type	All ownerships	Public ownerships	Private ownerships
Douglas-fir	1,993,000	1,022,000	971,000
Ponderosa pine	6,000	6,000	--
Hemlock—Sitka spruce	725,000	364,000	361,000
Spruce—fir	237,000	201,000	36,000
Western larch	4,000	4,000	--
Lodgepole pine	28,000	28,000	--
Western white pine	5,000	5,000	--
Hardwoods	749,000	198,000	551,000
Nonstocked	207,000	130,000	77,000
All types	3,954,000	1,958,000	1,996,000

Table 9.--Area of noncommercial forest land, by forest types, northwest Oregon, 1963

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	12,000	12,000	--
Hemlock—Sitka spruce	7,000	7,000	--
Lodgepole pine	1,000	1,000	--
Spruce—fir	5,000	5,000	--
Hardwoods	4,000	2,000	2,000
Nonstocked	(1/)	(1/)	--
Subalpine	7,000	--	7,000
Noncommercial rocky	36,000	(2/)	36,000
Noncommercial other	27,000	(2/)	27,000
All types	99,000	27,000	72,000

1/ Less than 500 acres.

2/ Not applicable.

Table 10.--Volume of all growing stock and sawtimber on commercial forest land by counties, northwest Oregon, 1963[1/]

County	All growing stock	Sawtimber (International 1/4-inch rule)	Sawtimber (Scribner rule)
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Clackamas	4,962	27,119	21,297
Clatsop	2,048	9,918	7,789
Columbia	794	2,719	2,120
Hood River	1,198	6,237	4,817
Marion	1,798	9,797	7,768
Multnomah	641	3,826	3,174
Polk	713	3,508	2,952
Tillamook	2,426	14,462	11,490
Washington	369	1,321	1,014
Yamhill	823	3,914	3,146
All counties	15,772	82,821	65,567

1/ In this and all subsequent tables, conifer volumes are in terms of 32-foot logs for Scribner rule and 16-foot logs for International 1/4-inch rule. All hardwood volumes are in terms of 8-foot logs.

Table 11.--Volume of all growing stock and sawtimber on commercial forest land by county and ownership class, northwest Oregon, 1963

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
	Million cubic feet				
All growing stock:					
Clackamas	4,962	3,635	509	355	463
Clatsop	2,048	--	517	1,186	345
Columbia	794	--	54	423	317
Hood River	1,198	971	91	95	41
Marion	1,798	1,283	271	43	201
Multnomah	641	448	31	--	162
Polk	713	14	317	184	198
Tillamook	2,426	786	879	427	334
Washington	369	--	123	--	246
Yamhill	823	150	255	188	230
Total	15,772	7,287	3,047	2,901	2,537
	Million board feet[1/]				
Sawtimber:					
Clackamas	27,119	20,732	2,660	1,744	1,983
Clatsop	9,918	--	2,249	5,979	1,690
Columbia	2,719	--	67	1,506	1,146
Hood River	6,237	5,138	448	500	151
Marion	9,797	7,246	1,634	85	832
Multnomah	3,826	2,872	211	--	743
Polk	3,508	98	2,289	651	470
Tillamook	14,462	5,634	4,916	2,209	1,703
Washington	1,321	--	486	--	835
Yamhill	3,914	942	1,462	864	646
Total	82,821	42,662	16,422	13,538	10,199

[1/] International 1/4-inch rule.

Table 12.--Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, northwest Oregon, 1963

(Thousands of trees)

Diameter class (inches d.b.h.)	All species	Softwoods	Hardwoods
5.0 - 6.9	147,861	116,648	31,213
7.0 - 8.9	101,165	77,041	24,124
9.0 - 10.9	69,119	51,791	17,328
11.0 - 12.9	49,095	38,146	10,949
13.0 - 14.9	32,553	26,847	5,706
15.0 - 16.9	26,357	22,220	4,137
17.0 - 18.9	17,176	15,237	1,939
19.0 - 28.9	38,196	35,707	2,489
29.0 - 38.9	9,874	9,592	282
39.0 and larger	3,928	3,901	27
All classes	495,324	397,130	98,194

Table 13.--Number of cull and salvable dead trees on commercial forest land, by diameter groups and by softwoods and hardwoods, northwest Oregon, 1963

(Thousands of trees)

Diameter class (inches d.b.h.)	Cull trees	Salvable dead trees
Softwoods:		
5.0 - 10.9	6,519	--
11.0 - 18.9	1,132	2,981
19.0 and larger	6,229	1,486
Total	13,880	4,467
Hardwoods:		
5.0 - 10.9	21,293	--
11.0 - 18.9	6,140	282
19.0 and larger	2,687	--
Total	30,120	282
All species	44,000	4,749

Table 14.--Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, northwest Oregon, 1963

Class of timber	All species	Softwoods	Hardwoods
	Million cubic feet		
Growing-stock trees:			
Live sawtimber:			
Saw-log portion	12,372	11,541	831
Upper-stem portion	931	869	62
Total	13,303	12,410	893
Poletimber	2,469	1,762	707
Total	15,772	14,172	1,600
Sound cull trees:			
Sawtimber-size	25	12	13
Poletimber-size	103	19	84
Total	128	31	97
Rotten cull trees:			
Sawtimber-size	22	19	3
Poletimber-size	1	--	1
Total	23	19	4
Salvable dead trees:			
Sawtimber-size	301	297	4
Total	301	297	4
Total, all timber	16,224	14,519	1,705

Table 15.--Volume of all growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, northwest Oregon, 1963

Timber and ownership classes	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.
All growing stock:			
National Forest	7,287	7,070	217
Other public	3,047	2,753	294
Forest industry	2,901	2,637	264
Farmer and miscellaneous private	2,537	1,712	825
All ownerships	15,772	14,172	1,600
	Million bd. ft.	Million bd. ft.	Million bd. ft.
Sawtimber (International 1/4-inch rule):			
National Forest	42,662	41,843	819
Other public	16,422	15,555	867
Forest industry	13,538	12,806	732
Farmer and miscellaneous private	10,199	7,660	2,539
All ownerships	82,821	77,864	4,957
Sawtimber (Scribner rule):			
National Forest	33,863	33,065	798
Other public	12,925	12,082	843
Forest industry	10,488	9,777	711
Farmer and miscellaneous private	8,291	5,826	2,465
All ownerships	65,567	60,750	4,817

Table 16.--Volume of all growing stock and sawtimber on commercial forest land, by stand-size classes and by softwoods and hardwoods, northwest Oregon, 1963

Stand-size class	All species	Softwoods	Hardwoods
	Million cu. ft.	Million cu. ft.	Million cu. ft.
All growing stock:			
Sawtimber stands	13,883	12,814	1,069
Poletimber stands	1,224	906	318
Sapling and seedling stands	661	448	213
Nonstocked areas	4	4	(1/)
Total	15,772	14,172	1,600
	Million bd. ft.	Million bd. ft.	Million bd. ft.
Sawtimber (International 1/4-inch rule):			
Sawtimber stands	79,095	74,925	4,170
Poletimber stands	1,722	1,412	310
Sapling and seedling stands	1,990	1,513	477
Nonstocked areas	14	14	(1/)
Total	82,821	77,864	4,957
Sawtimber (Scribner rule):			
Sawtimber stands	62,544	58,491	4,053
Poletimber stands	1,389	1,088	301
Sapling and seedling stands	1,624	1,161	463
Nonstocked areas	10	10	(1/)
Total	65,567	60,750	4,817

1/ Less than 0.5 million.

Table 17.--Volume of all growing stock on commercial forest land, by species and diameter classes, northwest Oregon, 1963

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million cubic feet										
Softwoods:											
Douglas-fir	7,548	186	315	391	505	531	602	521	2,005	1,262	1,230
Ponderosa pine	32	(1/)	2	1	(1/)	1	1	1	14	6	6
Western white pine	80	2	4	6	6	7	7	7	25	10	6
Sugar pine	(1/)	--	--	--	(1/)	--	--	--	(1/)	--	--
Lodgepole pine	68	14	19	12	10	6	4	1	2	--	--
Whitebark pine	1	--	--	--	--	--	--	--	1	--	--
White and grand fir	168	7	10	15	12	16	19	14	58	13	4
Pacific silver fir	560	41	45	68	46	57	59	55	144	40	5
Noble fir	328	10	9	11	16	14	17	16	101	72	62
Subalpine fir	37	5	5	5	4	3	4	4	6	1	--
Engelmann spruce	105	2	3	3	4	5	4	1	11	7	65
Sitka spruce	812	38	46	20	59	40	80	65	209	122	133
Mountain hemlock	377	11	16	22	28	37	43	42	119	18	41
Western hemlock	3,638	57	113	174	177	201	258	270	1,367	704	317
Alaska-cedar	5	(1/)	1	1	(1/)	1	1	(1/)	1	--	--
Western redcedar	375	20	28	22	27	25	25	19	93	57	59
Incense-cedar	2	(1/)	(1/)	(1/)	--	--	(1/)	--	(1/)	1	1
Western larch	36	(1/)	1	1	2	2	2	3	15	6	4
Total	14,172	393	617	752	896	946	1,126	1,019	4,171	2,319	1,933
Hardwoods:											
Red alder	1,040	113	130	165	155	128	120	76	124	27	2
Oregon ash	41	8	5	5	5	4	9	--	5	--	--
Black cottonwood	15	--	2	--	2	2	3	2	2	--	2
Bigleaf maple	264	34	35	43	41	29	17	11	38	12	4
Oregon white oak	239	46	69	51	29	8	7	4	16	7	2
Golden chinkapin	1	1	(1/)	(1/)	(1/)	--	(1/)	--	--	--	--
Total	1,600	202	241	264	232	171	156	93	185	46	10
All species	15,772	595	858	1,016	1,128	1,117	1,282	1,112	4,356	2,365	1,943

1/ Less than 500,000 cubic feet.

Table 18.--Volume of sawtimber on commercial forest land, by species and diameter classes, northwest Oregon, 1963 (International 1/4-inch rule)

Species	All classes	Diameter class (inches at breast height) 11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million board feet							
Softwoods:								
Douglas-fir	42,525	1,961	2,465	3,140	2,960	13,050	9,193	9,756
Ponderosa pine	172	1	3	4	5	87	41	31
Western white pine	412	20	28	31	45	166	72	50
Sugar pine	1	(1/)	--	--	--	1	--	--
Lodgepole pine	100	36	26	19	5	14	--	--
Whitebark pine	5	--	--	--	--	5	--	--
White and grand fir	861	91	93	109	88	363	87	30
Pacific silver fir	2,229	213	265	301	302	856	255	37
Noble fir	1,796	53	65	83	81	605	489	420
Subalpine fir	107	20	17	20	16	32	2	--
Engelmann spruce	217	14	22	23	10	76	52	20
Sitka spruce	3,439	115	114	243	253	1,065	687	962
Mountain hemlock	2,062	115	167	219	237	731	120	473
Western hemlock	21,815	817	1,055	1,495	1,628	9,197	5,020	2,603
Alaska-cedar	14	2	3	2	(1/)	7	--	--
Western redcedar	1,834	124	115	125	99	548	375	448
Incense-cedar	8	--	--	--	--	1	4	3
Western larch	267	12	11	19	25	135	57	8
Total	77,864	3,594	4,449	5,833	5,754	26,939	16,454	14,841
Hardwoods:								
Red alder	3,467	660	652	668	453	824	195	15
Oregon ash	126	20	19	54	--	33	--	--
Black cottonwood	80	9	9	19	15	15	--	13
Bigleaf maple	871	173	147	97	67	263	92	32
Oregon white oak	413	129	44	38	25	108	51	18
Total	4,957	991	871	876	560	1,243	338	78
All species	82,821	4,585	5,320	6,709	6,314	28,182	16,792	14,919

1/ Less than 500,000 board feet.

Table 19.--Volume of sawtimber on commercial forest land, by species and diameter classes, northwest Oregon, 1963 (Scribner rule)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million board feet							
Softwoods:								
Douglas-fir	33,383	1,228	1,612	2,157	2,122	10,074	7,629	8,561
Ponderosa pine	140	1	2	3	4	70	33	27
Western white pine	316	13	18	22	31	128	60	44
Sugar pine	1	(1/)	--	--	--	1	--	--
Lodgepole pine	67	22	17	13	4	11	--	--
Whitebark pine	4	--	--	--	--	4	--	--
White and grand fir	630	57	60	73	62	278	73	27
Pacific silver fir	1,633	133	174	206	216	662	211	31
Noble fir	1,432	34	42	58	58	468	405	367
Subalpine fir	75	12	11	14	12	24	2	--
Engelmann spruce	165	8	15	16	7	59	42	18
Sitka spruce	2,744	70	75	168	183	831	569	848
Mountain hemlock	1,581	72	110	150	171	565	100	413
Western hemlock	16,953	500	693	1,034	1,175	7,139	4,158	2,254
Alaska-cedar	10	1	2	2	(1/)	5	--	--
Western redcedar	1,405	77	72	81	68	410	307	390
Incense-cedar	7	--	--	--	--	(1/)	4	3
Western larch	204	8	7	13	18	104	47	7
Total	60,750	2,236	2,910	4,010	4,131	20,833	13,640	12,990
Hardwoods:								
Red alder	3,366	631	628	647	441	811	193	15
Oregon ash	122	19	19	52	--	32	--	--
Black cottonwood	78	8	9	19	15	14	--	13
Bigleaf maple	849	165	141	94	65	260	92	32
Oregon white oak	402	123	42	37	24	107	51	18
Total	4,817	946	839	849	545	1,224	336	78
All species	65,567	3,182	3,749	4,859	4,676	22,057	13,976	13,068

1/ Less than 500,000 board feet.

Table 20.--Volume of all growing stock on commercial forest land, by species and county, northwest Oregon, 1963

Species	County										
	Total	Clackamas	Clatsop	Columbia	Hood River	Marion	Multnomah	Polk	Tillamook	Washington	Yamhill
	Million cubic feet										
Softwoods:											
Douglas-fir	7,548	2,773	315	492	541	1,039	289	466	784	260	589
Pines	181	84	--	--	70	26	1	--	--	--	--
True firs	1,093	509	5	--	337	147	80	--	(1/)	11	4
Sitka spruce	812	--	389	--	--	--	--	3	419	--	1
Western hemlock	3,638	969	1,066	23	83	361	156	65	899	9	7
Western redcedar	375	182	53	56	16	23	25	(1/)	15	5	--
Other softwoods	525	280	--	--	131	113	1	--	--	--	--
Total	14,172	4,797	1,828	571	1,178	1,709	552	534	2,117	285	601
Hardwoods:											
Red alder	1,040	85	197	201	8	12	64	33	305	49	86
Black cottonwood	15	(1/)	--	--	1	9	--	--	--	--	5
Bigleaf maple	264	74	23	20	6	51	25	7	4	26	28
Other hardwoods	281	6	--	2	5	17	--	139	(1/)	9	103
Total	1,600	165	220	223	20	89	89	179	309	84	222
All species	15,772	4,962	2,048	794	1,198	1,798	641	713	2,426	369	823

1/ Less than 500,000 cubic feet.

Table 21.--Volume of sawtimber on commercial forest land by species and county, northwest Oregon, 1963 (International 1/4-inch rule)

Species	Total	County									
		Clackamas	Clatsop	Columbia	Hood River	Marion	Multnomah	Polk	Tillamook	Washington	Yamhill
	Million board feet										
Softwoods:											
Douglas-fir	42,525	16,299	1,353	1,799	3,001	6,008	1,939	2,815	5,129	1,060	3,122
Pines	690	269	--	--	303	110	8	--	--	--	--
True firs	4,993	2,287	24	--	1,549	664	399	--	1	45	24
Sitka spruce	3,439	--	1,303	--	--	--	--	18	2,114	--	4
Western hemlock	21,815	5,670	6,054	113	455	2,098	1,010	361	5,958	49	47
Western redcedar	1,834	870	318	158	139	95	162	2	77	13	--
Other softwoods	2,568	1,321	--	--	753	492	2	--	--	--	--
Total	77,864	26,716	9,052	2,070	6,200	9,467	3,520	3,196	13,279	1,167	3,197
Hardwoods:											
Red alder	3,467	228	720	532	10	19	216	90	1,171	106	375
Black cottonwood	80	(1/)	--	--	1	64	--	--	--	--	15
Bigleaf maple	871	162	146	117	9	205	90	--	12	36	94
Other hardwoods	539	13	--	--	17	42	--	222	--	12	233
Total	4,957	403	866	649	37	330	306	312	1,183	154	717
All species	82,821	27,119	9,918	2,719	6,237	9,797	3,826	3,508	14,462	1,321	3,914

1/ Less than 500,000 board feet.

Table 22.--Volume of sawtimber on commercial forest land by species and county, northwest Oregon, 1963 (Scribner rule)

Species	County										
	Total	Clackamas	Clatsop	Columbia	Hood River	Marion	Multnomah	Polk	Tillamook	Washington	Yamhill
	Million board feet										
Softwoods:											
Douglas-fir	33,383	12,918	969	1,303	2,367	4,803	1,605	2,346	3,886	791	2,395
Pines	528	202	--	--	235	84	7	--	--	--	--
True firs	3,770	1,741	15	--	1,146	508	313	--	--	31	16
Sitka spruce	2,744	--	1,053	--	--	--	--	15	1,673	--	3
Western hemlock	16,953	4,355	4,644	84	355	1,618	819	288	4,718	36	36
Western redcedar	1,405	649	263	104	114	74	132	1	60	8	--
Other softwoods	1,967	1,042	--	--	565	359	1	--	--	--	--
Total	60,750	20,907	6,944	1,491	4,782	7,446	2,877	2,650	10,337	866	2,450
Hardwoods:											
Red alder	3,366	222	701	514	10	19	209	86	1,141	102	362
Black cottonwood	78	--	--	--	--	63	--	--	--	--	15
Bigleaf maple	849	156	144	115	8	199	88	--	12	35	92
Other hardwoods	524	12	--	--	17	41	--	216	--	11	227
Total	4,817	390	845	629	35	322	297	302	1,153	148	696
All species	65,567	21,297	7,789	2,120	4,817	7,768	3,174	2,952	11,490	1,014	3,146

Table 23.--Net annual growth of all growing stock and sawtimber on commercial forest land, by species, northwest Oregon, 1962[1/]

Species	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	Thousand cu. ft.	Thousand bd. ft.	Thousand bd. ft.
Softwoods:			
Douglas-fir	112,907	452,062	354,877
Ponderosa pine	353	866	705
Western hemlock	41,080	170,452	132,463
True firs	8,731	26,864	20,284
Spruce	8,220	49,767	39,599
Western redcedar	7,208	22,327	17,104
Other softwoods	1,419	7,448	5,685
Total	179,918	729,786	570,717
Hardwoods	43,761	130,683	126,992
All species	223,679	860,469	697,709

[1/] Based on measurements of radial growth for the preceding 10-year period and estimates of long-term average annual mortality including both enphytotic and catastrophic losses.

Table 24.--Annual mortality of all growing stock and sawtimber on commercial forest land by species, northwest Oregon, 1962[1/]

Species	All growing stock	Sawtimber (International 1/4-inch rule)	Sawtimber (Scribner rule)
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Softwoods:			
Douglas-fir	43	224	175
True firs	13	55	42
Western hemlock	23	132	104
Other softwoods	10	48	38
Total	89	459	359
Hardwoods	3	5	5
All species	92	464	364

[1/] Estimate of long-term average annual mortality including both enphytotic and catastrophic losses.

Table 25.--Volume of salvable dead sawtimber-size trees on commercial forest land, by softwoods and hardwoods, northwest Oregon, 1963

Species group	Volume	
	International 1/4-inch rule	Scribner rule
	Million board feet	
Softwoods	1,925	1,562
Hardwoods	16	15
All species	1,941	1,577

Table 26.--Timber harvest by ownership class, northwest Oregon, 1950-62 (Scribner rule)

Year[1/]	Total	Private	State	National Forest	Other public
	Thousand board feet				
1950	1,820,569	1,652,269		167,300	1,000
1951	1,860,799	1,687,999		172,800	--
1952	1,908,200	1,711,900		196,300	--
1953	1,651,879	1,374,192		277,600	87
1954	1,504,386	1,283,086		221,300	--
1955	1,628,234	1,370,985		257,249	--
1956	1,747,996	1,433,621		260,300	54,075
1957	1,279,822	987,668		206,700	85,454
1958	1,348,709	865,279	89,102	308,198	86,130
1959	1,530,990	863,803	99,840	448,409	118,938
1960	1,341,137	780,908	121,579	334,748	103,902
1961	1,075,728	518,316	108,917	339,030	109,465
1962	1,233,226	593,205	98,180	390,900	150,941

1/ For the years 1950-57, data for private and State ownerships were not separated, and for the years 1950-56 data for Bureau of Land Management lands were included with private and State ownerships.

Source: Reports of the State Forester, U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and Division of Timber Management, Region 6, U.S. Forest Service.

ACCURACY OF THE CURRENT INVENTORY DATA

Forest Area and Timber Volume

Estimates of forest land area for the Siuslaw National Forest were based on complete enumeration by means of a forest type map and thus have no sampling error. Area estimates for all the remaining area, both National Forest and other lands, were derived by sampling. Sampling errors were computed separately for each of these subunits, then combined into a single estimate for the entire inventory unit. Thus, the sampling errors for total commercial and noncommercial forest land express the combined errors from the sampled units as a percent of the total estimate from all units.

Total volume estimates for northwest Oregon were derived by sampling and thus have sampling errors associated with them. Sampling errors were calculated for total board-foot and cubic-foot volume only.

In all cases, an effort was made to hold errors due to techniques or judgment to a minimum by close supervision and frequent checks of all phases of the work.

Table 27 presents the estimated sampling errors as a percent of the total estimate at the 68-percent and 95-percent probability levels.

Table 27.--Sampling errors of estimates of forest area and timber volume

Item	Estimated total	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land	3,954,000 acres	±0.8	± 1.5
Noncommercial forest land	99,000 acres	±14.3	±28.0
Volume:			
All growing stock	15,772 million cubic feet	± 3.3	± 6.5
Sawtimber (Scribner)	65,567 million board feet	± 4.0	± 7.7

The sampling error of any breakdown of these totals will be substantially greater than for the total, and the smaller the breakdown the larger the sampling error.

DIFFERENCES IN RESULTS OF INVENTORIES

Tables 28 and 29 show area and volume estimates for three successive inventories of northwest Oregon. Volumes for the two earlier inventories have been adjusted for changes in d.b.h. and merchantable top diameter limits. Some of the differences between inventories are due to physical changes, such as cutting and growth of stands, restocking of deforested lands, and the shift of forest land into other uses such as urban development. Some differences are due to changes in the standards of utilization recognized, some to changes in procedures, and some to changes in standards and definitions. These variations make direct comparison of some statistics meaningless, and comparison of other statistics is meaningful only after they have been adjusted to a common base.

Nevertheless, certain general conclusions can be drawn concerning the trend of northwest Oregon's forest resource. Total forest area has remained relatively stable over the past 30 years. Commercial forest area has increased slightly, while noncommercial forest land has decreased. Two significant changes have occurred since the initial inventory to influence these differences. Reserved "watersheds" on the National Forests have been reclassified as available for cutting and, secondly, improvements in logging methods and accessibility have resulted in reclassification as commercial some areas previously classified as noncommercial because of topography.

Table 28.--Comparison of forest area statistics for northwest Oregon

(In acres)

Land use class	Initial inventory 1930-34	First reinventory 1937-54	Current inventory 1963
Commercial forest	3,736,000	3,897,000	3,954,000
Noncommercial forest:			
Productive-reserved	200,000	66,000	27,000
Unproductive	108,000	66,000	72,000
Total noncommercial forest	308,000	132,000	99,000
Total forest	4,044,000	4,029,000	4,053,000
Nonforest	1,612,000	1,620,000	1,554,000
All land	1/ 5,656,000	1/ 5,649,000	2/ 5,607,000

1/ Government Land Office, U.S. Department of Interior figures.

2/ U.S. Bureau of the Census, 1960.

Table 29.--Comparison of timber-volume statistics for northwest Oregon

(In million board feet, Scribner rule)

Species	Initial inventory 1930-34	First reinventory 1937-54	Current inventory 1963
Softwoods:			
Douglas-fir	47,406	37,382	33,383
Ponderosa pine	65	83	140
Western white pine	307	370	317
Lodgepole pine	5	32	67
Grand and white fir	417	429	630
Pacific silver fir	1,794	2,272	1,633
Noble fir	2,357	2,430	1,432
Subalpine fir	40	78	75
Engelmann spruce	122	152	165
Sitka spruce	2,924	2,503	2,744
Mountain hemlock	846	1,113	1,581
Western hemlock	14,805	13,341	16,953
Western redcedar	1,526	1,347	1,405
Other cedars	--	--	--
Western larch	99	118	204
Other softwoods	23	15	21
Total	72,736	61,665	60,750
Hardwoods:			
Red alder	283	209	3,366
Black cottonwood	81	60	78
Bigleaf maple	96	102	849
Other hardwoods	54	27	524
Total	514	398	4,817
All species	73,250	62,063	65,567

The most significant changes in sawtimber volume appear to be: (1) the reduction of softwood volume and (2) the marked increase in hardwood volume. Softwood volume has shown a decrease over both previous inventories, with Douglas-fir making the most significant change.

The increase in hardwood volume is attributed to two things: (1) the rapid establishment of hardwoods on conifer sites following cutting and (2) more liberal specifications for merchantable hardwoods in the latest inventory.

FOREST SURVEY PROCEDURES

This northwest Oregon report combines the data from four separate inventory projects: the Siuslaw National Forest, 1956; Mount Hood National Forest, 1961; Willamette National Forest, 1962; and the remaining area outside the National Forests, 1961.

Siuslaw National Forest

The data from the 1956 inventory were the latest available for inclusion in this report; therefore, these data were used after updating them to January 1, 1963, by adding estimated growth and subtracting cut. The inventory of the Siuslaw National Forest was a cooperative effort of Forest Survey and the Siuslaw National Forest. A complete type map was made using aerial photos, and area data were taken from this map. Field plots were located by random selection on aerial photos. Field plots consisted of three 1/5-acre circular subplots spaced at 6-chain intervals. Permanent plots were located and established in the field; supplemental plots were measured but not marked. The field plots provided data only for volume estimates. Area estimates were made from the type map summary and updated for exchanges in area since the date of inventory.

Mount Hood and Willamette National Forests

These two forests were inventoried in 1961 and 1962, respectively, by National Forest inventory crews. The basic data were adjusted to Forest Survey standards, and the volume data updated to January 1, 1963, by the addition of growth and subtraction of cut. The statistics on forest land area, timber volume, and growth were obtained from permanent sample plot data. These plots consisted of clusters of three 1/5-acre plots similar to the Siuslaw National Forest. The plots are located on a systematic grid with intervals of 1.7 miles.

Outside National Forests

The area outside National Forests was inventoried by Forest Survey during the summer of 1961. The volume data were updated to January 1, 1963, in a manner similar to that for the National Forests.

A systematic sample of field plots was distributed across all owners other than National Forest. The field plots, spaced 3.4 miles apart, were supplemented by a more intensive sample of photo plots. The ratio of photo to field plots was approximately 16 to 1. A field plot consisted of 10 sample points distributed systematically over an acre. The variable-radius-plot principle was used at each sample point to select the trees to be tallied. The summation of the 10-point tally expressed the resources and conditions for that acre and provided area, volume, growth, and mortality statistics.

DEFINITION OF TERMS

Land Area

Total Land Area

Includes dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains; streams, sloughs, and canals less than one-eighth mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest Land Area

Land at least 10 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area of nonforest land recognized is 1 acre.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved. Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding crops of industrial wood products (usually sawtimber) because of adverse site conditions.

Subalpine. Forest stands at the upper elevational limits of tree growth.

Noncommercial rocky. Areas within the commercial forest zone but so steep and rocky that they are incapable of producing usable wood products.

Types

Forest land types are based upon the predominant species in the present tree cover. Types are determined on the basis of majority of stocking by all live trees of various species, considering both size and spacing.

Tree Classes

Growing Stock

Live trees of commercial species that are now or may be expected to become suitable for use as industrial wood. They must meet the following specifications:

Sawtimber trees (11.0 inches d.b.h. and larger). Contain at least one 16-foot coniferous saw log or one 12-foot hardwood saw log to a variable top diameter of not less than 8.0 inches inside bark and with not less than 25 percent of the board-foot volume of the tree free of defect.

Poletimber trees (5.0 to 10.9 inches d.b.h.). Not less than 50 percent sound on a cubic-foot basis and with no defects or deformities which are likely to prevent them from becoming growing-stock sawtimber trees.

Sapling and seedling trees (less than 5.0 inches d.b.h.). No defects or deformities which are likely to prevent them from becoming growing-stock poletimber trees.

Nongrowing Stock

Trees which do not meet the requirements for growing stock.

Cull trees. Trees of noncommercial species and trees of commercial species which are too defective or which are unlikely to become growing-stock trees due to deformity, disease, low vigor, etc.

Sound cull trees. Trees of noncommercial species, or with excessive defect due to form, roughness, etc.

Rotten cull trees. Trees with excessive defect due primarily to rot.

Mortality trees. Trees which died from natural causes and which were not cull trees at the time of death.

Salvable dead trees. Standing or down dead trees 11.0 inches or more in diameter that contain 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 12-foot hardwood saw log.

Stand-Size Classes

Sawtimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with sawtimber stocking at least equal to poletimber stocking.

Large sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees 21.0 inches d.b.h. and larger.

Small sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees from 11.0 to 20.9 inches d.b.h.

Poletimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with poletimber stocking exceeding sawtimber stocking.

Sapling and Seedling Stand

Stand at least 10 percent stocked with growing-stock trees and with more than half of this stocking in saplings and/or seedlings.

Nonstocked Area

An area of commercial forest land less than 10 percent stocked with growing-stock trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands.

"Stocking percentages" express current area occupancy or stocking in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to make effective use of forest land. Stocking by all live trees is used in classifying forest land and forest cover type. Stocking by growing-stock trees is used in classifying stand-size class.

Standards used for full stocking are:

trees 2 years old to 4.9 inches d.b.h.	750 trees per acre
trees 5.0 to 6.9 inches d.b.h.	670 trees per acre
trees 7.0 inches d.b.h. and larger:	
conifer sites	160 square feet basal area per acre
hardwood sites	100 square feet basal area per acre

Well-Stocked Stand

A stand that is 70 percent or more stocked with present or potential growing-stock trees.

Medium-Stocked Stand

A stand that is 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly Stocked Stand

A stand that is 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked Area

An area less than 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species:

Scribner rule. The common board-foot log rule used in determining volume of sawtimber in the Pacific Northwest.

International 1/4-inch rule. The standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top outside bark.

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other Public Lands

Federal lands other than National Forests, including lands administered by the U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

Privately owned lands other than forest industry or farmer-owned lands.

TREE SPECIES

Tree species found in northwest Oregon include:

Softwoods:

- Alaska-cedar (*Chamaecyparis nootkatensis*)
- Douglas-fir (*Pseudotsuga menziesii*)
- Engelmann spruce (*Picea engelmannii*)
- Grand fir (*Abies grandis*)
- Incense-cedar (*Libocedrus decurrens*)
- Lodgepole pine (*Pinus contorta*)
- Mountain hemlock (*Tsuga mertensiana*)
- Noble fir (*Abies procera*)
- Pacific silver fir (*Abies amabilis*)
- Ponderosa pine (*Pinus ponderosa*)
- Sitka spruce (*Picea sitchensis*)
- Subalpine fir (*Abies lasiocarpa*)
- Sugar pine (*Pinus lambertiana*)
- Western hemlock (*Tsuga heterophylla*)
- Western larch (*Larix occidentalis*)
- Western redcedar (*Thuja plicata*)
- Western white pine (*Pinus monticola*)
- Whitebark pine (*Pinus albicaulis*)
- White fir (*Abies concolor*)

Hardwoods:

- Bigleaf maple (*Acer macrophyllum*)
- Black cottonwood (*Populus trichocarpa*)
- Golden chinkapin (*Castanopsis chrysophylla*)
- Oregon ash (*Fraxinus latifolia*)
- Oregon white oak (*Quercus garryana*)
- Red alder (*Alnus rubra*)

RECENT FOREST SURVEY PUBLICATIONS

Number	Title	Date
Miscellaneous:	1963 Oregon Log Production	June 1964
Research Paper:		
PNW-5	Timber Trends in Western Oregon and Western Washington	Oct. 1963
Resource Bulletins:		
PNW-6	1962 Washington Log Production	Dec. 1963
PNW-5	Forest Statistics for Chelan and Douglas Counties, Washington	May 1963
PNW-4	Forest Statistics for Northeast Washington	May 1963
PNW-3	Toward Complete Use of Eastern Oregon's Forest Resources	May 1963
PNW-2	1962 Oregon Log Production	Apr. 1963
PNW-1	1961 Washington Log Production	Jan. 1963
Resource Reports:		
146	1961 Oregon Log Production	Dec. 1962 (rev.)
145	Forest Statistics for Clallam County, Washington	July 1962
144	Forest Statistics for Jefferson County, Washington	June 1962
143	Forest Statistics for King County, Washington	June 1962
142	Forest Statistics for Island and Kitsap Counties, Washington, 1959; San Juan County, Washington, 1960	May 1962
141	Forest Statistics for Pierce County, Washington	May 1962

Available from:

Pacific Northwest Forest & Range Experiment Station
P. O. Box 3141
Portland, Oregon 97208

Forest Statistics for

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN PNW-8

1964

PREPARED BY

THE DIVISION OF FOREST ECONOMICS RESEARCH

Carl A. Newport, Chief

FOREST SURVEY

Melvin E. Metcalf, In Charge

Field and Office Work in Southwest Oregon, by

John M. Berger and Richard L. Nielsen, Field Supervisors

Dennis D. Adams
Lee A. Black
Don M. Bolinger
Charles L. Bolsinger
Eric L. Burbano
Carl M. Burgeson
John B. Casteel
David D. Chapman
Donald H. Doyle
Joseph M. Dunford
William L. Ericksen
Barry K. Ford
Herbert D. Hahn
Charles C. Hawks, Jr.
Raymond E. Jackman
Donald W. Jarvis
Addison B. Johnson, Jr.
Robert J. Kerzel
Alan D. Lane
Don C. Lindsay
Hector Lisboa
Douglas W. MacCleery
Robert L. McCormack
Donald L. Meyer
Dennis D. Murphy
Robert C. Musselman
Richard J. Neilitz
David N. Odahl
Gary I. Payne
Kai T. Petersen
Ronald C. Prichard
Kendall L. Rich
Thomas J. Riding
Ralph G. Rosenberg
Wendell W. St. Pierre
Charles B. Schmokel
Dwight A. Smith
Noah Q. Speer
William F. Spinner
Glenn P. Standley
Albert G. Stoll
Albert H. Tsuda
Ronald W. Van Domele
David C. Walz
Thomas E. Wooten
Ronald Yasenchak
James A. Zumbo, Jr.
John W. Hazard
Mable A. Northrup
Margaret C. O'Mara
Marian E. Simons
Carmen V. Wilson

Acknowledgment is made of the cooperation of the Division of Timber Management, Region 6, U.S. Forest Service, in supplying resource data for National Forest lands; of the assistance of the Oregon State Board of Forestry in furnishing ownership information; and of other public and private agencies in making aerial photography available to Forest Survey for interpretation.

U.S. Forest Service
Resource Bulletin PNW-8
August 1964

FOREST STATISTICS FOR SOUTHWEST OREGON

by

John W. Hazard

and

Melvin E. Metcalf

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director
Portland, Oregon

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

ERRATA SHEET

Hazard, John W., and Metcalf, Melvin E. Forest statistics for southwest Oregon. U.S. Forest Serv. Resource Bul. PNW-8. 1964.

Page 1, under "NET ANNUAL GROWTH," second statement should read:

Is 0.60 percent of growing-stock volume; and

Pacific Northwest Forest &
Range Experiment Station
P. O. Box 3141
Portland, Oregon 97208

PREFACE

This publication summarizes the results of the latest reinventory of five counties in southwest Oregon: Coos, Curry, Douglas, Jackson, and Josephine. This block of five counties is one of 10 such blocks set up in the States of Oregon and Washington by the Forest Survey to facilitate orderly reinventories of the timber resources. Each block will be reinventoried at 10-year intervals and the results published in a single report for the block. The five blocks in Oregon are northwest Oregon, west-central Oregon, southwest Oregon, central Oregon, and northeast Oregon.

Field data for southwest Oregon were collected during 1955-62 for the five National Forests involved and during 1962 for all lands outside the National Forests. Volume data have been adjusted for growth and cutting to January 1, 1963, but not for effects of the windstorm of October 12, 1962. The results of this latest reinventory are presented with a minimum of interpretation to permit more rapid publication of the timber resource statistics.

The five counties covered by this report were initially inventoried in 1932-33 and the results published in 1934 as a series of pamphlets containing forest statistics for each individual county. Coos County was reinventoried in 1938, and all five counties were reinventoried as a block in 1947-49 with the results appearing in two publications, "Forest Statistics for Coos County, Oregon, 1940" and "Forest Statistics for Southwest Oregon Unit, 1951."

These inventories are a part of the Forest Survey--a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other forest products on them, to determine rates of forest growth and depletion, to estimate present consumption of timber products and probable future trends in timber requirements, to analyze and make available survey information needed in the formulation of forest policies and programs, and to make resurveys as necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the regional Experiment Stations of the U.S. Forest Service. In the States of Oregon and Washington, it is the responsibility of the Pacific Northwest Forest and Range Experiment Station at Portland, Oreg.

CONTENTS

SUMMARY TABLES (continued)

CONTENTS (continued)

SOUTHWEST OREGON'S FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

Covers 6,899,000 acres or 85 percent of the land area;
Has sawtimber stands on 66 percent of its area; and
Is composed of 65 percent Douglas-fir type, 17 percent other softwood types, and 18 percent hardwood types.

GROWING-STOCK VOLUME--

Totals 31,026 million cubic feet;
Is 91 percent softwoods; and
Is 90 percent in trees of sawtimber size.

SAWTIMBER VOLUME--

Totals 186,198 million board feet, International 1/4-inch rule (152,346 million board feet, Scribner rule);
Is 70 percent publicly owned;
Is 61 percent in trees over 29 inches in diameter; and
Is almost the same as in 1951.

NATIONAL FOREST OWNERSHIP--

Has 33 percent of the commercial forest area;
Controls 39 percent of the sawtimber area; and
Holds 40 percent of the sawtimber volume.

OTHER PUBLIC OWNERSHIP--

Has 25 percent of the commercial forest area;
Controls 29 percent of the sawtimber area; and
Holds 31 percent of the sawtimber volume.

FOREST INDUSTRY OWNERSHIP--

Has 22 percent of the commercial forest area;
Controls 19 percent of the sawtimber area; and
Holds 23 percent of the sawtimber volume.

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

Has 20 percent of the commercial forest area;
Controls 13 percent of the sawtimber area; and
Holds 6 percent of the sawtimber volume.

NET ANNUAL GROWTH--

Totals 185.3 million cubic feet (845.6 million board feet, International 1/4-inch rule, 701.5 million board feet, Scribner);
Is 60 percent of growing-stock volume; and
Is 88 percent softwood.

AVERAGE ANNUAL CUT OVER THE PAST 5 YEARS--

Has been 3,055 million board feet, Scribner rule, of which 62 percent has been from private timber; and
Has been 335 percent greater than net annual growth.

Table 1.--Area by land classes, by county, southwest Oregon, 1963

(In acres)

Land class	Total	County				
		Coos	Curry	Douglas	Jackson	Josephine
Commercial forest	6,899,000	900,000	855,000	2,864,000	1,365,000	915,000
Unproductive forest	348,000	2,000	76,000	55,000	170,000	45,000
Productive-reserved forest	56,000	3,000	47,000	2,000	3,000	1,000
Total	7,303,000	905,000	978,000	2,921,000	1,538,000	961,000
Nonforest	1/ 847,000	126,000	60,000	318,000	264,000	79,000
All land	2/ 8,150,000	1,031,000	1,038,000	3,239,000	1,802,000	1,040,000

1/ Includes 34,000 acres of water according to Forest Survey standards of area classification but defined as land by the Bureau of the Census.

2/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2.--Area of commercial forest land, by ownership classes, southwest Oregon, 1963

(In acres)

Ownership class	Area
National Forest	2,267,000
Other Federal:	
Bureau of Land Management	1,544,000
Indian	--
Miscellaneous Federal	--
Total other Federal	1,544,000
State	115,000
County and municipal	52,000
Forest industry:	
Pulp and paper	174,000
Lumber	1,125,000
Other	215,000
Total forest industry	1,514,000
Farmer owned	567,000
Miscellaneous private	840,000
All ownerships	6,899,000

Table 3.--Area of commercial forest land, by county and ownership classes, southwest Oregon, 1963

(In acres)

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
Coos	900,000	66,000	237,000	288,000	309,000
Curry	855,000	483,000	62,000	161,000	149,000
Douglas	2,864,000	960,000	684,000	695,000	525,000
Jackson	1,365,000	399,000	400,000	309,000	257,000
Josephine	915,000	359,000	328,000	61,000	167,000
All counties	6,899,000	2,267,000	1,711,000	1,514,000	1,407,000

Table 4.--Area of commercial forest land, by stand-size and ownership classes, southwest Oregon, 1963

(In acres)

Stand-size class	All owner-ships	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
Sawtimber stands:					
Large	3,483,000	1,387,000	1,089,000	745,000	262,000
Small	1,100,000	414,000	246,000	102,000	338,000
Total	4,583,000	1,801,000	1,335,000	847,000	600,000
Poletimber stands	595,000	298,000	65,000	80,000	152,000
Sapling and seedling stands	1,298,000	64,000	252,000	490,000	492,000
Nonstocked areas	423,000	104,000	59,000	97,000	163,000
All classes	6,899,000	2,267,000	1,711,000	1,514,000	1,407,000

Table 5.--Area of commercial forest land, by stand-volume classes for sawtimber and other stand-size classes, southwest Oregon, 1963

(In acres)

Stand-volume class[1/]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	1,488,000	58,000	1,430,000
1,500 to 5,000 board feet	956,000	287,000	669,000
More than 5,000 board feet	4,455,000	4,238,000	217,000
All classes	6,899,000	4,583,000	2,316,000

1/ Net volume per acre, International 1/4-inch rule.

Table 6.--Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, southwest Oregon, 1963

(In acres)

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Non-stocked stands
70 percent or more	3,948,000	3,238,000	346,000	364,000	(1/)
40 to 70 percent	1,493,000	941,000	110,000	442,000	(1/)
10 to 40 percent	1,035,000	404,000	139,000	492,000	(1/)
Less than 10 percent	423,000	(1/)	(1/)	(1/)	423,000
All classes	6,899,000	4,583,000	595,000	1,298,000	423,000

1/ Not applicable.

Table 7.--Area of commercial forest land, by yield and ownership classes, southwest Oregon, 1963

(In acres)

Yield class[1/]	All ownerships	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
120 cubic feet or more	3,547,000	1,017,000	875,000	980,000	675,000
85 to 120 cubic feet	1,751,000	713,000	376,000	332,000	330,000
50 to 85 cubic feet	1,295,000	450,000	354,000	180,000	311,000
Less than 50 cubic feet	306,000	87,000	106,000	22,000	91,000
All classes	6,899,000	2,267,000	1,711,000	1,514,000	1,407,000

[1/] A classification in terms of capacity for cubic-foot annual growth per acre.

Table 8.--Area of commercial forest land, by forest types and ownership classes, southwest Oregon, 1963

(In acres)

Type	All ownerships	Public ownership	Private ownership
Douglas-fir	4,211,000	2,656,000	1,555,000
Redwood	10,000	3,000	7,000
Ponderosa pine	142,000	120,000	22,000
Hemlock—Sitka spruce	203,000	104,000	99,000
Spruce—fir	538,000	386,000	152,000
Lodgepole pine	96,000	76,000	20,000
White pine	181,000	173,000	8,000
Hardwoods	1,095,000	297,000	798,000
Nonstocked	423,000	163,000	260,000
All types	6,899,000	3,978,000	2,921,000

Table 9.--Area of noncommercial forest land, by forest types, southwest Oregon, 1963

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	34,000	34,000	--
Ponderosa pine	1,000	1,000	--
Hemlock—Sitka spruce	4,000	4,000	--
Lodgepole pine	3,000	3,000	--
Spruce—fir	1,000	1,000	--
Other softwoods	1,000	1,000	--
Hardwoods	11,000	11,000	--
Nonstocked	1,000	1,000	--
Subalpine	2,000	--	2,000
Noncommercial rocky	126,000	(1/)	126,000
Noncommercial other	220,000	(1/)	220,000
All types	404,000	56,000	348,000

1/ Not applicable.

Table 10.--Volume of all growing stock and sawtimber on commercial forest land by counties, southwest Oregon, 1963[1/]

County	All growing stock	Sawtimber (International 1/4-inch rule)	Sawtimber (Scribner rule)
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Coos	4,406	28,049	23,562
Curry	3,687	20,956	17,549
Douglas	14,945	94,234	76,986
Jackson	4,986	27,114	21,383
Josephine	3,002	15,845	12,866
All counties	31,026	186,198	152,346

[1/] In this and all subsequent tables, conifer volumes are in terms of 32-foot logs for Scribner rule and 16-foot logs for International 1/4-inch rule. All hardwood volumes are in terms of 8-foot logs.

Table 11.--Volume of all growing stock and sawtimber on commercial forest land by county and ownership class, southwest Oregon, 1963

County	Total	National Forest	Other public	Forest industry	Farmer and miscellaneous private
	Million cubic feet				
All growing stock:					
Coos	4,406	392	1,983	1,246	785
Curry	3,687	2,244	340	733	370
Douglas	14,945	6,237	4,281	3,626	801
Jackson	4,986	2,128	1,421	1,045	392
Josephine	3,002	1,234	1,398	77	293
Total	31,026	12,235	9,423	6,727	2,641
	Million board feet[1/]				
Sawtimber:					
Coos	28,049	2,619	12,979	8,032	4,419
Curry	20,956	12,669	1,862	4,996	1,429
Douglas	94,234	40,191	26,596	23,575	3,872
Jackson	27,114	11,640	7,915	6,136	1,423
Josephine	15,845	7,198	7,485	397	765
Total	186,198	74,317	56,837	43,136	11,908

[1/] International 1/4-inch rule.

Table 12.--Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, southwest Oregon, 1963

(Thousands of trees)

Diameter class (inches d.b.h.)	All species	Softwoods	Hardwoods
5.0 - 6.9	239,380	140,475	98,905
7.0 - 8.9	160,909	92,723	68,186
9.0 - 10.9	90,990	64,079	26,911
11.0 - 12.9	60,119	43,916	16,203
13.0 - 14.9	47,771	36,463	11,308
15.0 - 16.9	38,021	29,684	8,337
17.0 - 18.9	28,389	22,894	5,495
19.0 - 28.9	68,542	61,579	6,963
29.0 - 38.9	27,861	27,165	696
39.0 and larger	19,612	19,561	51
All classes	781,594	538,539	243,055

Table 13.--Number of cull and salvable dead trees on commercial forest land, by diameter groups and by softwoods and hardwoods, southwest Oregon, 1963

(Thousands of trees)

Diameter class (inches d.b.h.)	Cull trees	Salvable dead trees
Softwoods:		
5.0 - 10.9	17,018	--
11.0 - 18.9	2,563	4,436
19.0 and larger	4,195	3,988
Total	23,776	8,424
Hardwoods:		
5.0 - 10.9	42,143	--
11.0 - 18.9	6,364	1,296
19.0 and larger	1,254	292
Total	49,761	1,588
All species	73,537	10,012

Table 14.--Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, southwest Oregon, 1963

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	26,031	24,442	1,589
Upper-stem portion	1,960	1,840	120
Total	27,991	26,282	1,709
Poletimber trees	3,035	1,818	1,217
All growing-stock trees	31,026	28,100	2,926
Sound cull trees:			
Sawtimber-size	218	56	162
Poletimber-size	369	70	299
Total	587	126	461
Rotten cull trees:			
Sawtimber-size	98	88	10
Poletimber-size	10	1	9
Total	108	89	19
Salvable dead trees:			
Sawtimber-size	963	940	23
Total, all timber	32,684	29,255	3,429

Table 15.--Volume of all growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, southwest Oregon, 1963

Timber and ownership classes	All species	Softwoods	Hardwoods
	Million cubic feet		
All growing stock:			
National Forest	12,235	11,751	484
Other public	9,423	8,565	858
Forest industry	6,727	6,042	685
Farmer and miscellaneous private	2,641	1,742	899
All ownerships	31,026	28,100	2,926
	Million board feet		
Sawtimber (International 1/4-inch rule):			
National Forest	74,317	73,470	847
Other public	56,837	54,225	2,612
Forest industry	43,136	39,875	3,261
Farmer and miscellaneous private	11,908	9,111	2,797
All ownerships	186,198	176,681	9,517
Sawtimber (Scribner rule):			
National Forest	59,903	59,078	825
Other public	46,672	44,124	2,548
Forest industry	35,629	32,447	3,182
Farmer and miscellaneous private	10,142	7,413	2,729
All ownerships	152,346	143,062	9,284

Table 16.--Volume of all growing stock and sawtimber on commercial forest land, by stand-size classes and by softwoods and hardwoods, southwest Oregon, 1963

Stand-size class	All species	Softwoods	Hardwoods
	Million cubic feet		
All growing stock:			
Sawtimber stands	29,010	27,075	1,935
Poletimber stands	721	430	291
Sapling and seedling stands	995	565	430
Nonstocked areas	300	30	270
Total	31,026	28,100	2,926
	Million board feet		
Sawtimber (International 1/4-inch rule):			
Sawtimber stands	180,720	172,906	7,814
Poletimber stands	1,292	1,060	232
Sapling and seedling stands	3,723	2,540	1,183
Nonstocked areas	463	175	288
Total	186,198	176,681	9,517
Sawtimber (Scribner rule):			
Sawtimber stands	147,616	139,995	7,621
Poletimber stands	1,086	860	226
Sapling and seedling stands	3,221	2,066	1,155
Nonstocked areas	423	141	282
Total	152,346	143,062	9,284

Table 17.--Volume of all growing stock on commercial forest land, by species and diameter classes, southwest Oregon, 1963

(In million cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:											
Douglas-fir	20,094	203	301	414	452	635	677	731	3,969	4,460	8,252
Redwood	41	--	(1/)	3	3	2	2	3	11	7	10
Ponderosa pine and Jeffrey pine	692	7	10	21	31	27	43	46	192	160	155
Sugar pine	776	3	5	12	7	16	17	18	172	204	322
Western white pine	287	5	7	10	13	22	14	27	99	61	29
Lodgepole pine	247	31	69	66	36	18	11	9	6	--	1
Knobcone pine	39	2	8	6	6	4	4	2	7	--	--
White fir	1,421	22	49	78	66	95	123	111	468	308	101
Grand fir	260	7	17	16	17	24	32	31	79	18	19
Shasta red fir	538	3	6	9	8	10	15	17	151	170	149
Pacific silver fir	159	8	11	15	14	14	15	12	51	12	7
Noble fir	240	3	5	8	6	8	8	10	63	83	46
Subalpine fir	49	1	1	3	3	3	3	3	11	7	14
Engelmann spruce	19	1	2	1	1	1	2	2	5	4	--
Sitka spruce	143	1	5	9	4	4	9	8	47	17	39
Mountain hemlock	519	18	31	41	40	40	47	47	190	53	12
Western hemlock	1,296	29	52	92	71	89	117	107	416	194	129
Incense-cedar	661	8	13	20	16	23	37	39	154	148	203
Port-Orford-cedar	212	7	8	5	9	7	13	8	62	35	58
Western redcedar	404	6	14	10	7	13	20	16	65	94	159
Other softwoods	3	(1/)	(1/)	(1/)	(1/)	1	(1/)	(1/)	2	--	--
Total	28,100	365	614	839	810	1,056	1,209	1,247	6,220	6,035	9,705
Hardwoods:											
Red alder	751	80	85	81	73	99	124	114	83	12	--
Black cottonwood	17	--	--	--	1	--	4	3	9	--	--
Bigleaf maple	297	25	25	27	35	39	22	26	77	18	3
Oaks 2/	438	72	54	50	24	26	47	41	108	16	--
Tanoak	477	67	65	46	57	44	28	29	107	32	2
Pacific madrone	677	150	150	97	69	56	39	25	70	14	7
Other hardwoods	269	77	36	30	30	14	15	13	41	13	--
Total	2,926	471	415	331	289	278	279	251	495	105	12
All species	31,026	836	1,029	1,170	1,099	1,334	1,488	1,498	6,715	6,140	9,717

1/ Less than 500,000 cubic feet.

2/ Oaks consist of California black and Oregon white oak.

Table 18.--Volume of sawtimber on commercial forest land, by species and diameter classes, southwest Oregon, 1963 (International 1/4-inch rule)

(In million board feet)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Douglas-fir	132,385	2,053	3,176	3,734	4,261	25,651	31,405	62,105
Redwood	280	11	9	10	15	78	53	104
Ponderosa and Jeffrey pine	3,702	147	130	206	231	1,041	963	984
Sugar pine	4,622	41	82	94	97	995	1,220	2,093
Western white pine	1,670	72	126	90	161	656	406	159
Lodgepole pine	436	163	104	71	56	36	--	6
Knobcone pine	126	28	22	21	9	46	--	--
White fir	7,444	353	568	748	672	2,770	1,748	585
Grand fir	1,391	108	148	201	193	503	118	120
Shasta red fir	2,802	49	66	91	97	838	894	767
Pacific silver fir	818	76	85	100	82	344	86	45
Noble fir	1,343	38	49	46	59	358	500	293
Subalpine fir	302	15	24	21	17	80	54	91
Engelmann spruce	91	5	6	13	15	33	19	--
Sitka spruce	923	20	22	53	58	333	123	314
Mountain hemlock	2,908	211	265	334	335	1,313	364	86
Western hemlock	7,671	398	547	760	713	2,888	1,406	959
Incense-cedar	4,007	67	100	185	205	924	1,008	1,518
Port-Orford-cedar	1,177	36	30	67	40	368	227	409
Western redcedar	2,574	30	68	117	101	422	663	1,173
Other softwoods	9	(1/)	1	1	2	5	--	--
Total	176,681	3,921	5,628	6,963	7,419	39,682	41,257	71,811
Hardwoods:								
Red alder	2,662	308	450	637	634	550	83	--
Black cottonwood	117	5	--	23	20	69	--	--
Bigleaf maple	1,378	152	187	114	151	581	162	31
Oaks 2/	1,652	106	145	253	243	760	145	--
Tanoak	1,550	192	161	108	142	673	257	17
Pacific madrone	1,490	283	251	187	131	458	119	61
Other hardwoods	668	128	60	72	71	226	111	--
Total	9,517	1,174	1,254	1,394	1,392	3,317	877	109
All species	186,198	5,095	6,882	8,357	8,811	42,999	42,134	71,920

1/ Less than 500,000 board feet.

2/ Oaks consist of California black and Oregon white oak.

Table 19.--Volume of sawtimber on commercial forest land, by species and diameter classes, southwest Oregon, 1963 (Scribner rule)

(In million board feet)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Douglas-fir	109,119	1,275	2,048	2,528	3,018	19,863	26,095	54,292
Redwood	224	7	6	7	10	60	44	90
Ponderosa and Jeffrey pine	2,868	89	79	130	157	777	790	846
Sugar pine	3,777	24	52	63	68	759	1,000	1,811
Western white pine	1,274	43	80	60	112	504	337	138
Lodgepole pine	283	100	66	46	39	27	--	5
Knobcone pine	86	17	14	14	6	35	--	--
White fir	5,461	199	330	461	450	2,085	1,433	503
Grand fir	907	46	76	115	120	358	92	100
Shasta red fir	2,255	30	42	61	67	645	741	669
Pacific silver fir	599	46	54	66	57	265	72	39
Noble fir	1,071	23	31	31	41	275	414	256
Subalpine fir	236	10	15	15	12	61	44	79
Engelmann spruce	67	3	4	9	10	26	15	--
Sitka spruce	741	13	14	37	41	256	102	278
Mountain hemlock	2,141	129	168	222	235	1,010	302	75
Western hemlock	5,850	245	355	518	508	2,231	1,165	828
Incense-cedar	3,122	41	60	113	132	677	812	1,287
Port-Orford-cedar	925	20	19	43	28	275	187	353
Western redcedar	2,050	18	41	75	69	315	533	999
Other softwoods	6	(1/)	1	(1/)	1	4	--	--
Total	143,062	2,378	3,555	4,614	5,181	30,508	34,178	62,648
Hardwoods:								
Red alder	2,586	293	433	617	619	542	82	--
Black cottonwood	115	4	--	23	20	68	--	--
Bigleaf maple	1,348	145	180	111	147	573	161	31
Oaks 2/	1,615	100	140	245	237	749	144	--
Tanoak	1,517	183	155	105	139	663	255	17
Pacific madrone	1,451	270	241	182	127	452	118	61
Other hardwoods	652	121	57	70	70	223	111	--
Total	9,284	1,116	1,206	1,353	1,359	3,270	871	109
All species	152,346	3,494	4,761	5,967	6,540	33,778	35,049	62,757

1/ Less than 500,000 board feet.

2/ Oaks consist of California black and Oregon white oak.

Table 20.--Volume of all growing stock on commercial forest land by species and county, southwest Oregon, 1963

(In million cubic feet)

Species	Total	County				
		Coos	Curry	Douglas	Jackson	Josephine
Softwoods:						
Douglas-fir	20,094	3,215	2,462	10,256	2,482	1,679
Ponderosa pine and Jeffrey pine	692	--	18	199	328	147
Sugar pine	776	8	78	296	149	245
Western white pine	287	2	28	187	52	18
Lodgepole and other pines	287	6	39	190	37	15
White and grand fir	1,681	55	45	484	897	200
California and Shasta red fir	538	--	9	88	355	86
Other true firs	448	(1/)	--	445	3	--
Spruces	163	52	4	94	13	(1/)
Western hemlock	1,296	320	52	878	41	5
Incense-cedar	661	3	34	393	170	61
Port-Orford-cedar	212	120	64	2	1	25
Western redcedar	404	149	5	246	(1/)	4
Other softwoods	561	(1/)	41	386	118	16
Total	28,100	3,930	2,879	14,144	4,646	2,501
Hardwoods:						
Red alder	751	342	149	225	6	29
Black cottonwood	17	--	--	17	--	--
Bigleaf maple	297	68	30	171	22	6
Oaks 2/	438	5	28	132	138	134
Tanoak	477	25	429	--	--	23
Pacific madrone	677	2	105	193	163	215
Other hardwoods	269	34	67	63	11	94
Total	2,926	476	808	801	340	501
All species	31,026	4,406	3,687	14,945	4,986	3,002

1/ Less than 500,000 cubic feet.

2/ Oaks consist of California black and Oregon white oak.

Table 21.--Volume of sawtimber on commercial forest land by species and county, southwest Oregon, 1963 (International 1/4-inch rule)

(In million board feet)

Species	Total	County				
		Coos	Curry	Douglas	Jackson	Josephine
Softwoods:						
Douglas-fir	132,385	21,859	16,290	69,248	14,662	10,326
Ponderosa and Jeffrey pine	3,702	--	107	1,058	1,747	790
Sugar pine	4,622	52	440	1,777	849	1,504
Western white pine	1,670	9	119	1,177	288	77
Lodgepole and other pines	566	36	81	334	57	58
White and grand fir	8,835	314	243	2,590	4,711	977
California and Shasta red fir	2,802	--	107	481	1,751	463
Other true firs	2,463	1	--	2,452	10	--
Spruces	1,017	272	23	656	64	2
Western hemlock	7,671	1,817	232	5,382	219	21
Incense-cedar	4,007	19	162	2,433	1,076	317
Port-Orford-cedar	1,177	707	311	16	3	140
Western redcedar	2,574	990	12	1,552	2	18
Other softwoods	3,190	--	314	2,232	577	67
Total	176,681	26,076	18,441	91,388	26,016	14,760
Hardwoods:						
Red alder	2,662	1,266	418	884	30	64
Black cottonwood	117	--	--	117	--	--
Bigleaf maple	1,378	456	106	734	66	16
Oaks[1/]	1,652	13	35	468	595	541
Tanoak	1,550	75	1,445	--	1	29
Pacific madrone	1,490	2	288	501	386	313
Other hardwoods	668	161	223	142	20	122
Total	9,517	1,973	2,515	2,846	1,098	1,085
All species	186,198	28,049	20,956	94,234	27,114	15,845

[1/] Oaks consist of California black and Oregon white oak.

Table 22.--Volume of sawtimber on commercial forest land by species and county, southwest Oregon, 1963 (Scribner rule)

(In million board feet)

Species	Total	County				
		Coos	Curry	Douglas	Jackson	Josephine
Softwoods:						
Douglas-fir	109,119	18,362	13,450	57,204	11,757	8,346
Ponderosa and Jeffrey pine	2,868	--	80	826	1,359	603
Sugar pine	3,777	42	361	1,467	681	1,226
Western white pine	1,274	7	88	894	225	60
Lodgepole and other pines	372	25	53	217	36	41
White and grand fir	6,368	220	165	1,914	3,338	731
California and Shasta red fir	2,255	--	78	389	1,420	368
Other true firs	1,906	1	--	1,897	8	--
Spruces	810	213	19	530	47	1
Western hemlock	5,850	1,401	167	4,103	164	15
Incense-cedar	3,122	15	127	1,891	844	245
Port-Orford-cedar	925	545	252	11	3	114
Western redcedar	2,050	806	9	1,219	2	14
Other softwoods	2,366	--	242	1,648	428	48
Total	143,062	21,637	15,091	74,210	20,312	11,812
Hardwoods:						
Red alder	2,586	1,231	405	860	28	62
Black cottonwood	115	--	--	115	--	--
Bigleaf maple	1,348	448	103	717	65	15
Oaks[1/]	1,615	13	33	457	583	529
Tanoak	1,517	72	1,416	--	1	28
Pacific madrone	1,451	2	283	489	375	302
Other hardwoods	652	159	218	138	19	118
Total	9,284	1,925	2,458	2,776	1,071	1,054
All species	152,346	23,562	17,549	76,986	21,383	12,866

1/ Oaks consist of California black and Oregon white oak.

Table 23.--Net annual growth of all growing stock and sawtimber on commercial forest land by species, southwest Oregon, 1962

Species	All growing stock	Sawtimber (International 1/4-inch rule)	Sawtimber (Scribner rule)
	Thousand cu. ft.	Thousand bd. ft.	Thousand bd. ft.
Softwoods:			
Douglas-fir	99,337	476,907	387,049
Ponderosa and Jeffrey pine	5,614	22,030	17,934
Sugar pine	4,382	17,810	14,459
Western hemlock	14,582	69,131	56,099
White and grand fir	16,088	63,546	51,632
Other true firs	3,765	20,293	16,445
Spruce	5,203	19,796	16,073
Western redcedar	3,012	17,252	14,025
Other softwoods	10,613	46,419	37,793
Total	162,596	753,184	611,509
Hardwoods	22,729	92,403	89,982
All species	185,325	845,587	701,491

Table 24.--Annual mortality of all growing stock and sawtimber on commercial forest land by species, southwest Oregon, 1962[1/]

Species	All growing stock	Sawtimber (International 1/4-inch rule)	Sawtimber (Scribner rule)
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Softwoods:			
Douglas-fir	133	870	706
Pines	17	82	66
True firs	21	106	73
Western hemlock	8	49	36
Other softwoods	9	41	32
Total	188	1,148	913
Hardwoods	11	39	39
All species	199	1,187	952

[1/] Estimate of long-term average annual mortality including both enphytotic and catastrophic losses.

Table 25.--Volume of salvable dead sawtimber-size trees on commercial forest land, by softwoods and hardwoods, southwest Oregon, 1963

(In million board feet)

Species group	Volume	
	International 1/4-inch rule	Scribner rule
Softwoods	6,813	5,571
Hardwoods	131	127
All species	6,944	5,698

Table 26.--Timber harvest by ownership class, southwest Oregon, 1950-62 (Scribner rule)

(In thousand board feet)

Year[1/]	Total	Private	State	National Forest	Other public
1950	2,653,927	2,392,627		252,300	9,000
1951	3,181,033	2,903,833		277,200	--
1952	3,887,385	3,616,585		270,800	--
1953	3,222,276	2,928,776		293,500	--
1954	3,550,143	3,151,343		398,800	--
1955	4,087,349	3,702,323		385,026	--
1956	3,533,168	2,821,526		398,000	313,642
1957	2,861,379	2,200,086		326,200	335,093
1958	2,921,450	1,990,426	11,549	480,037	439,438
1959	3,562,357	2,272,729	20,541	688,335	580,752
1960	3,299,203	2,256,604	29,061	511,721	501,817
1961	2,496,454	1,378,802	54,381	550,522	512,749
1962	2,995,482	1,570,415	52,796	705,300	666,971

Source: Reports of the State Forester, U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and Division of Timber Management, Region 6, U.S. Forest Service.

[1/] For the years 1950-57, data for private and State ownerships were not separated, and for the years 1950-55 data for Bureau of Land Management lands were included with private and State ownerships.

ACCURACY OF THE CURRENT INVENTORY DATA

Forest Area and Timber Volume

Estimates of forest land area for the Siuslaw National Forest and the Cottage Grove unit of the Umpqua National Forest were based on complete enumeration by means of a forest type map and thus have no sampling errors. Area estimates for all the remaining area, both National Forest and other lands, were derived by sampling. Sampling errors were computed separately for each of these subunits, then combined into a single estimate for the entire inventory unit. Thus, the sampling errors for total commercial and noncommercial forest land express the combined errors from the sampled units as a percent of the total estimate from all units.

Total volume estimates for southwest Oregon were derived by sampling and thus have sampling errors associated with them. Sampling errors were calculated for total board-foot and cubic-foot volume only.

In all cases, an effort was made to hold errors due to techniques or judgment to a minimum by close supervision and frequent checks of all phases of the work.

Table 27 presents the estimated sampling errors as a percent of the total estimates at the 68-percent and 95-percent probability levels.

The sampling error of any breakdown of these totals will be substantially greater than for the total, and the smaller the breakdown the larger the sampling error.

Table 27.--Sampling errors of estimates of forest area and timber volume

Item	Estimated total	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land	6,899,000 acres	±0.6	±1.2
Noncommercial forest land	404,000 acres	±8.3	±16.3
Volume:			
Growing stock	31,026 million cubic feet	±2.0	±3.9
Sawtimber	152,346 million board feet (Scribner rule)	±2.4	±4.7

DIFFERENCES IN RESULTS OF INVENTORIES

Tables 28 and 29 show area and volume statistics for three successive inventories of southwest Oregon. Sawtimber volumes for the two earlier inventories have been adjusted for changes due to lowering the diameter limit of sawtimber trees and changes in merchantable top diameter limits. Some of the differences between inventories are due to physical changes, such as cutting and growth of stands, restocking of deforested lands, and the shift of forest land to other uses such as urban development. Some differences are due to changes in the standards of utilization recognized, some to changes in procedures, and some to changes in standards and definitions. These variations make direct comparison of some statistics meaningless, and comparison of other statistics is meaningful only after they have been adjusted to a common base.

Nevertheless, certain general conclusions can be drawn concerning the trend of southwest Oregon's forest resource. Total forest land area has remained relatively stable. Commercial forest area has increased about 5 percent while noncommercial forest land has decreased about 38 percent since the previous inventory. A large part of the shift of noncommercial forest to commercial forest status is due to the reclassification as commercial forest of some productive forest areas formerly in a reserved status as potential wild or wilderness areas. Some of the shift is also due to the reclassification as commercial because of improvements in logging methods and accessibility of some areas formerly considered noncommercial.

Softwood sawtimber volume appears to have decreased slightly while the volume of hardwoods has risen. The principal decrease in softwood volume appears to have taken place in ponderosa pine, sugar pine, true firs, and Port-Orford-cedar.

FOREST SURVEY PROCEDURES

This southwest Oregon report combines data from five National Forest inventory projects and one Forest Survey project. These are: Siuslaw National Forest, 1956; Umpqua National Forest, 1956-58;[1/] Rogue River and Siskiyou National Forests, 1960; Willamette National Forest, 1962; and the remaining area outside National Forest ownership, 1962.

Siuslaw National Forest and Cottage Grove Unit of the Umpqua National Forest

The area data from the 1956 inventory were the latest available for inclusion in this report; the volume data were updated to January 1, 1963, by adding estimated growth and subtracting cut. The inventory of the Siuslaw

---

[1/] Each unit of the Umpqua National Forest was inventoried in successive years: Cottage Grove, 1956; North Umpqua, 1957; and South Umpqua, 1958.

Table 28.--Comparison of forest area statistics for southwest Oregon

(In acres)

Land class	Initial inventory 1932-33	First reinventory 1948	Current inventory 1963
Commercial forest	6,586,000	6,581,000	6,899,000
Noncommercial forest:			
Productive-reserved	1,000	221,000	56,000
Unproductive	591,000	432,000	348,000
Total noncommercial forest	592,000	653,000	404,000
Total forest	7,178,000	7,234,000	7,303,000
Nonforest	954,000	911,000	847,000
All land	8,132,000	8,145,000	8,150,000

Source: Government Land Office, U.S. Department of Interior figures and U.S. Bureau of the Census, 1960.

National Forest was a cooperative effort of Forest Survey and the Siuslaw National Forest. A complete type map was made using aerial photos, and area data were taken from this map. Field plots were located by random selection on aerial photos. Field plots consisted of three 1/5-acre circular subplots spaced at 6-chain intervals. Permanent plots were located and established in the field; supplemental plots were measured but not marked. The field plots provided data only for volume estimates. Area estimates were made from the type map summary and updated for exchanges in area since the date of inventory.

The inventory of the Cottage Grove unit of the Umpqua National Forest was similar to the Siuslaw inventory.

All Other National Forest Units

These units were inventoried by National Forest inventory crews during the period 1957-62. The basic data were adjusted to Forest Survey standards, then updated to January 1, 1963, by the addition of growth and the subtraction of cut. The statistics on forest land area, timber volume, and growth were obtained from permanent sample plot data. These plots consisted of clusters of three 1/5-acre plots located on a systematic grid with intervals of 1.7 miles.

Table 29.--Comparison of timber-volume statistics for southwest Oregon

(In million board feet, Scribner rule)

Species	Initial inventory 1932-33	First reinventory 1948	Current inventory 1963
Softwoods:			
Douglas-fir	122,420	109,560	109,119
Redwood	68	84	224
Ponderosa and Jeffrey pine	5,611	5,446	2,868
Sugar pine	4,028	6,968	3,777
Western white pine	727	457	1,274
Lodgepole and other pines	7	155	372
True firs	8,299	14,060	10,529
Engelmann and other spruces	17	15	69
Sitka spruce	1,591	274	741
Mountain hemlock	977	1,052	2,141
Western hemlock	2,339	4,119	5,850
Incense-cedar	1,880	2,802	3,122
Port-Orford-cedar	1,397	1,688	925
Western redcedar	1,064	2,754	1/ 2,051
Total	150,425	149,434	143,062
Hardwoods:			
Red alder	433	997	2,586
Black cottonwood	6	--	115
Bigleaf maple	237	379	1,348
Other hardwoods	1,126	1,752	5,235
Total	1,802	3,128	9,284
All species	152,227	152,562	152,346

1/ Includes Alaska-cedar.

Outside National Forest

The area outside the National Forests was inventoried by Forest Survey during the summer of 1962.

A systematic sample of field plots was distributed across all owners other than National Forest. The field plots, spaced 3.4 miles apart, were supplemented by a more intensive sample of photo plots. The ratio of photo to field plots was

approximately 16 to 1. A field plot consisted of 10 sample points distributed systematically over an acre. The variable-radius-plot principle was used at each sample point to select the trees to be tallied. The summation of the 10-point tally expressed the resources and conditions for that acre and provided area, volume, growth, and mortality statistics.

DEFINITION OF TERMS

Land Area

Total Land Area

Includes dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains; streams, sloughs, and canals less than one-eighth mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest Land Area

Land at least 10 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area of forest land recognized is 1 acre.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved. Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding crops of industrial wood products (usually sawtimber) because of adverse site conditions.

Subalpine. Forest stands at the upper elevational limits of tree growth.

Noncommercial rocky. Areas within the commercial forest zone but so steep and rocky that they are incapable of producing usable wood products.

Types

Forest land types are based upon the predominant species in the present tree cover. Types are determined on the basis of majority of stocking by all live trees of various species, considering both size and spacing.

Tree Classes

Growing Stock

Live trees of commercial species that are now or may be expected to become suitable for use as industrial wood. They must meet the following specifications:

Sawtimber trees (11.0 inches d.b.h. and larger). Contain at least one 16-foot coniferous saw log or one 12-foot hardwood saw log to a variable top diameter of not less than 8.0 inches inside bark and with not less than 25 percent of the board-foot volume of the tree free of defect.

Poletimber trees (5.0-10.9 inches d.b.h.). Not less than 50 percent sound on a cubic-foot basis and with no defects or deformities which are likely to prevent them from becoming growing-stock sawtimber trees.

Sapling and seedling trees (less than 5.0 inches d.b.h.). No defects or deformities which are likely to prevent them from becoming growing-stock poletimber trees.

Nongrowing Stock

Trees which do not meet the requirements for growing stock.

Cull trees. Trees of noncommercial species and trees of commercial species which are too defective or which are unlikely to become growing-stock trees due to deformity, disease, low vigor, etc.

Sound cull trees. Trees of noncommercial species, or with excessive defect due to form, roughness, etc.

Rotten cull trees. Trees with excessive defect due primarily to rot.

Mortality trees. Trees which died from natural causes during a specified period and which were not cull trees at the time of death.

Salvable dead trees. Standing or down dead trees 11.0 inches or more in diameter that contain 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 12-foot hardwood saw log.

Stand-Size Classes

Sawtimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with sawtimber stocking at least equal to poletimber stocking.

Large sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees 21.0 inches d.b.h. and larger.

Small sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees from 11.0 to 20.9 inches d.b.h.

Poletimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with poletimber stocking exceeding sawtimber stocking.

Sapling and Seedling Stand

Stand at least 10 percent stocked with growing-stock trees and with more than half of this stocking in saplings and/or seedlings.

Nonstocked Area

An area of commercial forest land less than 10 percent stocked with growing-stock trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands.

"Stocking percentages" express current area occupancy or stocking in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to make effective use of forest land. Stocking by all live trees is used in classifying forest land and forest cover type. Stocking by growing-stock trees is used in classifying stand size.

Standards used for full stocking are:

trees 2 years old to 4.9 inches d.b.h.	750 trees per acre
trees 5.0 to 6.9 inches d.b.h.	670 trees per acre
trees 7.0 inches d.b.h. and larger:	
conifer sites	160 square feet basal area per acre
hardwood sites	100 square feet basal area per acre

Well-Stocked Stand

A stand that is 70 percent or more stocked with present or potential growing-stock trees.

Medium-Stocked Stand

A stand that is 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly Stocked Stand

A stand that is 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked Area

An area less than 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species:

Scribner rule. The common board-foot log rule used in determining volume of sawtimber in the Pacific Northwest.

International 1/4-inch rule. The standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top outside bark.

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other Public Lands

Federal lands other than National Forests, including lands administered by the U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

Privately owned lands other than forest industry or farmer-owned lands.

TREE SPECIES

Tree species found in southwest Oregon include:

Softwoods:

Alaska-cedar *(Chamaecyparis nootkatensis)*
Brewer spruce *(Picea breweriana)*
Douglas-fir *(Pseudotsuga menziesii)*
Engelmann spruce *(Picea engelmannii)*
Grand fir *(Abies grandis)*
Incense-cedar *(Libocedrus decurrens)*
Jeffrey pine *(Pinus jeffreyi)*
Knobcone pine *(Pinus attenuata)*
Lodgepole pine *(Pinus contorta)*
Mountain hemlock *(Tsuga mertensiana)*
Noble fir *(Abies procera)*
Pacific silver fir *(Abies amabilis)*
Ponderosa pine *(Pinus ponderosa)*
Port-Orford-cedar *(Chamaecyparis lawsoniana)*
Redwood *(Sequoia sempervirens)*
Shasta red fir *(Abies magnifica* var. *shastensis)*
Sitka spruce *(Picea sitchensis)*
Subalpine fir *(Abies lasiocarpa)*
Sugar pine *(Pinus lambertiana)*
Western hemlock *(Tsuga heterophylla)*
Western redcedar *(Thuja plicata)*
Western white pine *(Pinus monticola)*
White fir *(Abies concolor)*
Whitebark pine *(Pinus albicaulis)*

Hardwoods:

Bigleaf maple *(Acer macrophyllum)*
Black cottonwood *(Populus trichocarpa)*
California black oak *(Quercus kelloggii)*
California-laurel *(Umbellularia californica)*
Canyon live oak *(Quercus chrysolepis)*
Golden chinkapin *(Castanopsis chrysophylla)*
Oregon ash *(Fraxinus latifolia)*
Oregon white oak *(Quercus garryana)*
Pacific madrone *(Arbutus menziesii)*
Red alder *(Alnus rubra)*
Tanoak *(Lithocarpus densiflorus)*

RECENT FOREST SURVEY PUBLICATIONS

Number	Title	Date
Miscellaneous:		
	1963 Oregon Log Production	June 1964
Research Paper:		
PNW-5	Timber Trends in Western Oregon and Western Washington	October 1963
Resource Bulletins:		
PNW-7	Forest Statistics for Northwest Oregon	July 1964
PNW-6	1962 Washington Log Production	December 1963
PNW-5	Forest Statistics for Chelan and Douglas Counties, Washington	May 1963
PNW-4	Forest Statistics for Northeast Washington	May 1963
PNW-3	Toward Complete Use of Eastern Oregon's Forest Resources	May 1963
PNW-2	1962 Oregon Log Production	April 1963
PNW-1	1961 Washington Log Production	January 1963
Reports:		
146	1961 Oregon Log Production	December 1962
145	Forest Statistics for Clallam County, Washington	July 1962
144	Forest Statistics for Jefferson County, Washington	June 1962
143	Forest Statistics for King County, Washington	June 1962
142	Forest Statistics for Island and Kitsap Counties, Washington, 1959; San Juan County, Washington, 1960	May 1962

Available from:

Pacific Northwest Forest & Range Experiment Station
P.O. Box 3141
Portland, Oregon 97208

Timber Resource Statistics for the PACIFIC NORTHWEST

as of January 1, 1963

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN
PNW – 9
1965

PREPARED BY

THE DIVISION OF FOREST ECONOMICS RESEARCH

Carl A. Newport, Chief

FOREST SURVEY

Melvin E. Metcalf, Project Leader

Donald R. Gedney
John H. Beuter
John M. Berger
John W. Hazard
Richard L. Nielsen
Charles L. Bolsinger
Margaret C. O'Mara
Mable A. Northrup
Marion E. Simons
Carmen V. Wilson

FOREWORD

The report by the Forest Service on the national timber situation, "Timber Trends in the United States," presents timber resource data by States and broad regional groups. The timber resources of the Pacific Northwest (the States of Oregon and Washington) are a vital part of this national picture. Although only 9 percent of the total commercial forest land area of the 50 States is located in this area, it contains 42 percent of all the softwood sawtimber and 35 percent of all sawtimber in the Nation. In 1963, the Pacific Northwest produced 41 percent of all the softwood lumber and 84 percent of all the softwood plywood manufactured in the United States. In 1962, it produced 16 percent of the total woodpulp in the Nation.

Because of the tremendous importance of the timber resources of the Pacific Northwest to the Nation, it seems desirable to present data for this area in greater detail than is available in the national report. Statistics are presented here by half States and subregions as well as by States. These statistics are the basis for those presented in the national report.

The data presented here are as of January 1, 1963. More specific data for counties or county groups are also available. Such data are the result of the continuing reinventory by Forest Survey of about one-tenth of the Pacific Northwest area annually and are presented as of the date of the reinventory.

The subregions referred to in this report are: Douglas-fir subregion--all counties west of the crest of the Cascade Range in both Oregon and Washington plus Hood River County, Oreg.; ponderosa pine subregion--all counties east of the crest of the Cascade Range in both Oregon and Washington excluding Hood River County, Oreg.

CONTENTS

Table 1.--Land area by major classes of land and by region and State, January 1, 1963

(Thousand acres)

Region and State	Total land area[1/]	Forest land				Cropland[2/]	Pasture and range[2/]	Other land
		Total	Commercial	Productive-reserved	Unproductive			
Western Oregon	19,202	15,858	15,082	261	515	1,770	730	844
Eastern Oregon	42,403	14,881	11,531	420	2,930	3,607	23,385	530
Total Oregon	61,605	30,739	26,613	681	3,445	5,377	24,115	1,374
Western Washington	15,874	13,061	10,950	981	1,130	799	528	1,486
Eastern Washington	26,812	9,989	8,560	331	1,098	7,112	8,551	1,160
Total Washington	42,686	23,050	19,510	1,312	2,228	7,911	9,079	2,646
Douglas-fir subregion	35,076	28,919	26,032	1,242	1,645	2,569	1,258	2,330
Ponderosa pine subregion	69,215	24,870	20,091	751	4,028	10,719	31,936	1,690
All regions	104,291	53,789	46,123	1,993	5,673	13,288	33,194	4,020

[1/] Source: U.S. Bureau of the Census.
[2/] Source: Census of Agriculture.

Table 2.--Area of commercial forest land by ownership, and by region and State, January 1, 1963

(Thousand acres)

Region and State	All ownerships	Federal					State[1/]	County and municipal[1/]	Forest industry				Farmer	Miscellaneous private
		Total	National Forest	Bureau of Land Management[1/]	Indian[1/]	Miscellaneous[1/]			Total	Pulp and paper	Lumber	Other		
Western Oregon	15,082	7,320	5,085	2,227	8	--	731	137	3,532	1,042	2,199	291	1,677	1,685
Eastern Oregon	11,531	8,059	7,460	250	346	3	38	17	1,477	74	1,403	--	1,652	288
Total Oregon	26,613	15,379	12,545	2,477	354	3	769	154	5,009	1,116	3,602	291	3,329	1,973
Western Washington	10,950	3,075	2,752	23	234	66	1,339	187	3,789	1,313	2,361	115	867	1,693
Eastern Washington	8,560	5,084	3,408	164	1,452	60	662	12	612	38	574	--	1,700	490
Total Washington	19,510	8,159	6,160	187	1,686	126	2,001	199	4,401	1,351	2,935	115	2,567	2,183
Douglas-fir subregion	26,032	10,395	7,837	2,250	242	66	2,070	324	7,321	2,355	4,560	406	2,544	3,378
Ponderosa pine subregion	20,091	13,143	10,868	414	1,798	63	700	29	2,089	112	1,977	--	3,352	778
All regions	46,123	23,538	18,705	2,664	2,040	129	2,770	353	9,410	2,467	6,537	406	5,896	4,156

[1/] Estimates derived by sampling methods; consequently, they may not agree exactly with official totals.

Table 3.--Area of commercial forest land by stand-size class and by region and State, January 1, 1963

(Thousand acres)

Region and State	All areas	Sawtimber stands			Pole-timber stands	Sapling and seedling stands	Non-stocked areas
		Total	Old growth	Young growth			
Western Oregon	15,082	9,483	3,934	5,549	1,469	3,400	730
Eastern Oregon	11,531	8,923	5,783	3,140	2,044	365	199
Total Oregon	26,613	18,406	9,717	8,689	3,513	3,765	929
Western Washington	10,950	5,730	2,156	3,574	2,971	1,790	459
Eastern Washington	8,560	6,081	3,273	2,808	1,670	634	175
Total Washington	19,510	11,811	5,429	6,382	4,641	2,424	634
Douglas-fir subregion	26,032	15,213	6,090	9,123	4,440	5,190	1,189
Ponderosa pine subregion	20,091	15,004	9,056	5,948	3,714	999	374
All regions	46,123	30,217	15,146	15,071	8,154	6,189	1,563

Table 4.--Area of commercial forest land by stand-volume class and by region and State, January 1, 1963

(Thousand acres)

Region and State	Stand volume per acre[1/]			
	Total	Less than 1,500 bd. ft.	1,500 to 5,000 bd. ft.	More than 5,000 bd. ft.
Western Oregon	15,082	3,488	2,050	9,544
Eastern Oregon	11,531	2,608	2,592	6,331
Total Oregon	26,613	6,096	4,642	15,875
Western Washington	10,950	3,467	1,777	5,706
Eastern Washington	8,560	2,458	1,795	4,307
Total Washington	19,510	5,925	3,572	10,013
Douglas-fir subregion	26,032	6,955	3,827	15,250
Ponderosa pine subregion	20,091	5,066	4,387	10,638
All regions	46,123	12,021	8,214	25,888

[1/] Net volume, International ¼-inch rule.

Table 5.--Commercial forest land area by stand-size class and stocking class of growing stock and by region and State, January 1, 1963

(Thousand acres)

Region and State	Stand-size and stocking classes															
	All stands					Sawtimber stands				Poletimber stands				Sapling and seedling stands			
	Total	70 percent or more	40-70 percent	10-40 percent	Non-stocked	Total	70 percent or more	40-70 percent	10-40 percent	Total	70 percent or more	40-70 percent	10-40 percent	Total	70 percent or more	40-70 percent	10-40 percent
Western Oregon	15,082	8,639	3,383	2,330	730	9,483	6,826	1,819	838	1,469	851	325	293	3,400	962	1,239	1,199
Eastern Oregon	11,531	6,679	3,324	1,329	199	8,923	5,259	2,617	1,047	2,044	1,205	600	239	365	215	107	43
Total Oregon	26,613	15,318	6,707	3,659	929	18,406	12,085	4,436	1,885	3,513	2,056	925	532	3,765	1,177	1,346	1,242
Western Washington	10,950	6,205	3,119	1,167	459	5,730	3,389	1,704	637	2,971	1,757	883	331	1,790	1,059	532	199
Eastern Washington	8,560	4,306	2,767	1,312	175	6,081	3,273	1,929	879	1,670	775	594	301	634	258	244	132
Total Washington	19,510	10,511	5,886	2,479	634	11,811	6,662	3,633	1,516	4,641	2,532	1,477	632	2,424	1,317	776	331
Douglas-fir subregion	26,032	14,844	6,502	3,497	1,189	15,213	10,215	3,523	1,475	4,440	2,608	1,208	624	5,190	2,021	1,771	1,398
Ponderosa pine subregion	20,091	10,985	6,091	2,641	374	15,004	8,532	4,546	1,926	3,714	1,980	1,194	540	999	473	351	175
All regions	46,123	25,829	12,593	6,138	1,563	30,217	18,747	8,069	3,401	8,154	4,588	2,402	1,164	6,189	2,494	2,122	1,573

Table 6.--Area of commercial forest land by fore

(Th

Region and State	Total all types			Total			Douglas-fir			Hemlock-Sitka spruce			Redwood		
	All owner-ships	Public	Private	All owner-ships	Public	Private	All owner-ships	Public	Private	All owner-ships	Public	Private	All owner-ships	Public	Pr
Western Oregon	15,082	8,188	6,894	12,625	7,581	5,044	9,709	5,695	4,014	1,366	636	730	10	3	
Eastern Oregon	11,531	8,114	3,417	11,513	8,109	3,404	1,111	800	311	--	--	--	--	--	
Total Oregon	26,613	16,302	10,311	24,138	15,690	8,448	10,820	6,495	4,325	1,366	636	730	10	3	
Western Washington	10,950	4,601	6,349	9,675	4,383	5,292	5,711	2,167	3,544	2,899	1,334	1,565	--	--	
Eastern Washington	8,560	5,758	2,802	8,497	5,731	2,766	2,972	2,048	924	--	--	--	--	--	
Total Washington	19,510	10,359	9,151	18,172	10,114	8,058	8,683	4,215	4,468	2,899	1,334	1,565	--	--	
Douglas-fir subregion	26,032	12,789	13,243	22,300	11,964	10,336	15,420	7,862	7,558	4,265	1,970	2,295	10	3	
Ponderosa pine subregion	20,091	13,872	6,219	20,010	13,840	6,170	4,083	2,848	1,235	--	--	--	--	--	
All regions	46,123	26,661	19,462	42,310	25,804	16,506	19,503	10,710	8,793	4,265	1,970	2,295	10	3	

Table 7.--Proportion of commercial forest land area by o

Region and State	All ownerships					National Forest				
	All classes	120 cu. ft. or more	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu.ft.	All classes	120 cu. ft. or more	85 to 120 cu. ft.	50 to 85 cu. ft.	Les 50
Western Oregon	100	60	19	16	5	100	52	23	20	
Eastern Oregon	100	2	9	64	25	100	1	7	65	
Total Oregon	100	35	15	37	13	100	22	14	46	
Western Washington	100	61	19	15	5	100	33	27	28	
Eastern Washington	100	6	21	50	23	100	4	15	63	
Total Washington	100	37	20	31	12	100	17	20	47	
Douglas-fir aubregion	100	61	19	15	5	100	45	24	23	
Ponderosa pine subregion	100	3	15	58	24	100	2	10	64	
All regions	100	36	17	34	13	100	20	16	46	

1/ Capacity for annual cubic-foot growth per acre.

nership and by region and State, January 1, 1963

onderosa pine		White pine			Lodgepole pine			Larch			Fir-spruce			Total hardwood types		
Public	Private	All owner-ships	Public	Private	All owner-ships	Public	Private	All owner-ships	Public	Private	All owner-ships	Public	Privste	All owner-ships	Public	Privste
134	25	198	190	8	146	116	30	4	4	--	1,033	803	230	2,457	607	1,850
4,889	2,529	54	43	11	1,408	1,094	314	388	327	61	1,134	956	178	18	5	13
5,023	2,554	252	233	19	1,554	1,210	344	392	331	61	2,167	1,759	408	2,475	612	1,863
3	--	26	23	3	46	32	14	--	--	--	990	824	166	1,275	218	1,057
2,156	1,311	111	93	18	732	516	216	471	342	129	744	576	168	63	27	36
2,159	1,311	137	116	21	778	548	230	471	342	129	1,734	1,400	334	1,338	245	1,093
137	25	224	213	11	192	148	44	4	4	--	2,023	1,627	396	3,732	825	2,907
7,045	3,840	165	136	29	2,140	1,610	530	859	669	190	1,878	1,532	346	81	32	49
7,182	3,865	389	349	40	2,332	1,758	574	863	673	190	3,901	3,159	742	3,813	857	2,956

s and productivity classes and by region and State, January 1, 1963

it)

tivity classes[1/]

l ies	Other public				Forest industry					Farmer and miscellaneous private				
	120 cu. ft. or more	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu.ft.	All classes	120 cu. ft. or more	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu.ft.	All classes	120 cu. ft. or more	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu.ft.
)	67	15	13	5	100	69	17	11	3	100	57	19	18	6
)	4	8	63	25	100	2	12	67	19	100	3	15	61	21
)	56	14	22	8	100	49	15	28	8	100	37	18	34	11
)	64	17	16	3	100	75	15	8	2	100	70	15	12	3
)	10	20	49	21	100	10	33	33	24	100	3	28	38	31
)	34	19	34	13	100	66	18	11	5	100	39	21	24	16
)	66	16	14	4	100	72	16	9	3	100	63	17	16	4
)	8	18	52	22	100	5	18	57	20	100	3	22	49	26
)	45	16	28	11	100	57	17	20	6	100	38	19	29	14

Table 8.--Net volume of timber on commercial forest land by class of timber, softwoods and hardwoods, and by region and State, January 1, 1963

(Million cubic feet)

Region and State	Total all timber			Growing-stock trees									Rough (sound cull) trees			Rotten cull trees			Salvable dead trees		
				Total			Sawtimber trees			Poletimber trees											
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Western Oregon	73,473	66,796	6,677	69,522	63,635	5,887	62,254	58,723	3,531	7,268	4,912	2,356	951	244	707	196	171	25	2,804	2,746	58
Eastern Oregon	26,040	25,995	45	25,601	25,568	33	21,079	21,069	10	4,522	4,499	23	74	62	12	87	87	--	278	278	--
Total Oregon	99,513	92,791	6,722	95,123	89,203	5,920	83,333	79,792	3,541	11,790	9,411	2,379	1,025	306	719	283	258	25	3,082	3,024	58
Western Washington	56,182	51,267	4,915	53,497	48,755	4,742	45,488	42,747	2,741	8,009	6,008	2,001	188	60	128	389	372	17	2,108	2,080	28
Eastern Washington	20,291	20,047	244	19,401	19,191	210	14,283	14,202	81	5,118	4,989	129	271	244	27	190	184	6	429	428	1
Total Washington	76,473	71,314	5,159	72,898	67,946	4,952	59,771	56,949	2,822	13,127	10,997	2,130	459	304	155	579	556	23	2,537	2,508	29
Douglas-fir subregion	129,655	118,063	11,592	123,019	112,390	10,629	107,742	101,470	6,272	15,277	10,920	4,357	1,139	304	835	585	543	42	4,912	4,826	86
Ponderosa pine subregion	46,331	46,042	289	45,002	44,759	243	35,362	35,271	91	9,640	9,488	152	345	306	39	277	271	6	707	706	1
All regions	175,986	164,105	11,881	168,021	157,149	10,872	143,104	136,741	6,363	24,917	20,408	4,509	1,484	610	874	862	814	48	5,619	5,532	87

Table 9.--Net volume of growing stock on commercial forest land by ownership, softwoods and hardwoods, and by region and State, January 1, 1963

(Million cubic feet)

Region and State	All ownerships			National Forest			Other public			Forest industry			Farmer and miscellaneous private		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Western Oregon	69,522	63,635	5,887	33,277	32,146	1,131	15,141	13,794	1,347	13,828	12,628	1,200	7,276	5,067	2,209
Eastern Oregon	25,601	25,568	33	18,474	18,467	7	1,476	1,474	2	2,898	2,898	--	2,753	2,729	24
Total Oregon	95,123	89,203	5,920	51,751	50,613	1,138	16,617	15,268	1,349	16,726	15,526	1,200	10,029	7,796	2,233
Western Washington	53,497	48,755	4,742	19,838	19,810	28	8,631	7,591	1,040	17,770	16,194	1,576	7,258	5,160	2,098
Eastern Washington	19,401	19,191	210	9,808	9,684	124	4,865	4,830	35	1,322	1,306	16	3,406	3,371	35
Total Wasbington	72,898	67,946	4,952	29,646	29,494	152	13,496	12,421	1,075	19,092	17,500	1,592	10,664	8,531	2,133
Douglas-fir subregion	123,019	112,390	10,629	53,115	51,956	1,159	23,772	21,385	2,387	31,598	28,822	2,776	14,534	10,227	4,307
Ponderosa pine subregion	45,002	44,759	243	28,282	28,151	131	6,341	6,304	37	4,220	4,204	16	6,159	6,100	59
All regions	168,021	157,149	10,872	81,397	80,107	1,290	30,113	27,689	2,424	35,818	33,026	2,792	20,693	16,327	4,366

Table 10.--Net volume of sawtimber by ownership, softwoods and hardwoods, and by region and State, January 1, 1963

(Million board feet, International ¼-inch rule)

Region and State	All ownerships			National Forest			Other public			Forest industry			Farmer and miscellaneous private		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
Western Oregon	410,837	390,502	20,335	205,196	201,270	3,926	89,229	85,169	4,060	83,014	78,045	4,969	33,398	26,018	7,380
Eastern Oregon	125,472	125,377	95	93,663	93,645	18	7,472	7,457	15	13,860	13,860	--	10,477	10,415	62
Total Oregon	536,309	515,879	20,430	298,859	294,915	3,944	96,701	92,626	4,075	96,874	91,905	4,969	43,875	36,433	7,442
Western Washington	291,362	277,355	14,007	122,651	122,512	139	44,306	41,424	2,882	96,080	91,226	4,854	28,325	22,193	6,132
Eastern Washington	81,703	81,306	397	43,389	43,155	234	21,447	21,382	65	5,843	5,806	37	11,024	10,963	61
Total Washington	373,065	358,661	14,404	166,040	165,667	373	65,753	62,806	2,947	101,923	97,032	4,891	39,349	33,156	6,193
Douglas-fir subregion	702,199	667,857	34,342	327,847	323,782	4,065	133,535	126,593	6,942	179,094	169,271	9,823	61,723	48,211	13,512
Ponderosa pine subregion	207,175	206,683	492	137,052	136,800	252	28,919	28,839	80	19,703	19,666	37	21,501	21,378	123
All regions	909,374	874,540	34,834	464,899	460,582	4,317	162,454	155,432	7,022	198,797	188,937	9,860	83,224	69,589	13,635

Table 11.--Net volume of growing stock on commercial for

(Mill

Region and State	Softwo								
	All softwoods	Douglas-fir	Ponderosa and Jeffrey pines	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sit spr
Western Oregon	63,635	42,818	772	5,158	7,859	819	599	40	1,
Eastern Oregon	25,568	3,821	11,653	5,161	94	143	142	--	
Total Oregon	89,203	46,639	12,425	10,319	7,953	962	741	40	1,
Western Washington	48,755	16,389	16	7,890	18,595	--	319	--	
Eastern Washington	19,191	6,374	4,450	3,324	660	--	245	--	
Total Washington	67,946	22,763	4,466	11,214	19,255	--	564	--	
Douglas-fir subregion	112,390	59,207	788	13,048	26,454	819	918	40	1,
Ponderosa pine subregion	44,759	10,195	16,103	8,485	754	143	387	--	
All regions	157,149	69,402	16,891	21,533	27,208	962	1,305	40	1,

Table 12.--Net volume of sawtimber on commercial for

(Million board fe

Region and State	Softwo								
	All softwoods	Douglas-fir	Ponderosa and Jeffrey pines	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sit spr
Western Oregon	390,502	276,499	4,156	25,406	46,440	4,849	3,471	276	6
Eastern Oregon	125,377	17,049	69,509	20,676	330	567	824	--	
Total Oregon	515,879	293,548	73,665	46,082	46,770	5,416	4,295	276	6
Western Washington	277,355	90,426	91	44,443	107,849	--	1,618	--	3
Eastern Washington	81,306	28,020	24,348	12,084	3,072	--	1,357	--	
Total Washington	358,661	118,446	24,439	56,527	110,921	--	2,975	--	3
Douglas-fir subregion	667,857	366,925	4,247	69,849	154,289	4,849	5,089	276	9
Ponderosa pine subregion	206,683	45,069	93,857	32,760	3,402	567	2,181	--	
All regions	874,540	411,994	98,104	102,609	157,691	5,416	7,270	276	9

d by species, and by region and State, January 1, 1963

ic feet)

						Hardwoods				
elmann and er spruces	Western larch	Western redcedar	Incense-cedar	Lodgepole pine	Other softwoods	All hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
100	35	1,440	758	395	1,640	5,887	57	2,638	813	2,379
639	1,146	8	72	2,000	689	33	25	2	1	5
739	1,181	1,448	830	2,395	2,329	5,920	82	2,640	814	2,384
72	8	4,518	--	137	285	4,742	189	3,396	--	1,157
695	1,436	233	--	1,613	161	210	143	5	58	4
767	1,444	4,751	--	1,750	446	4,952	332	3,401	58	1,161
172	43	5,958	758	532	1,925	10,629	246	6,034	813	3,536
1,334	2,582	241	72	3,613	850	243	168	7	59	9
1,506	2,625	6,199	830	4,145	2,775	10,872	414	6,041	872	3,545

d by species, and by region and State, January 1, 1963

ernational ¼-inch rule)

						Hardwoods				
elmann and er spruces	Western larch	Western redcedar	Incense-cedar	Lodgepole pine	Other softwoods	All hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
532	263	7,983	4,484	1,636	8,433	20,335	387	10,064	2,474	7,410
2,942	5,789	24	301	4,023	3,343	95	88	--	--	7
3,474	6,052	8,007	4,785	5,659	11,776	20,430	475	10,064	2,474	7,417
390	54	27,183	--	409	1,667	14,007	981	9,199	--	3,827
2,688	5,785	877	--	2,545	530	397	352	3	37	5
3,078	5,839	28,060	--	2,954	2,197	14,404	1,333	9,202	37	3,832
922	317	35,166	4,484	2,045	10,100	34,342	1,368	19,263	2,474	11,237
5,630	11,574	901	301	6,568	3,873	492	440	3	37	12
6,552	11,891	36,067	4,785	8,613	13,973	34,834	1,808	19,266	2,511	11,249

Table 13.--Net volume of growing stock on commercial forest land

(Milli

Region and diameter class (inches)	Total all species	Softwo				
		Total	Douglas-fir	Ponderosa and Jeffrey pines	Western white and sugar pines	Western hemlock
Western Oregon:						
5.0 - 7.0	1,853	1,044	511	7	14	13
7.0 - 9.0	2,459	1,673	811	13	23	26
9.0 - 11.0	2,956	2,195	1,087	22	39	37
11.0 - 13.0	3,135	2,407	1,344	30	39	37
13.0 - 15.0	3,556	2,964	1,711	29	63	48
15.0 - 17.0	3,907	3,317	1,839	42	60	57
17.0 - 19.0	3,717	3,241	1,818	45	74	55
19.0 - 29.0	16,968	16,050	9,764	213	399	2,70
29.0 - 39.0	13,239	13,038	9,194	190	327	1,52
39.0 and larger	17,732	17,706	14,739	181	380	87
Total	69,522	63,635	42,818	772	1,418	7,85
Eastern Oregon:						
5.0 - 7.0	1,212	1,195	166	261	2	
7.0 - 9.0	1,624	1,621	275	343	4	
9.0 - 11.0	1,686	1,683	276	413	6	
11.0 - 13.0	1,661	1,656	285	442	34	
13.0 - 15.0	1,700	1,700	266	539	22	1
15.0 - 17.0	1,702	1,702	269	615	27	1
17.0 - 19.0	1,660	1,660	238	711	21	1
19.0 - 29.0	8,114	8,110	1,149	4,331	101	4
29.0 - 39.0	4,724	4,724	560	3,092	27	
39.0 and larger	1,518	1,517	337	906	41	
Total	25,601	25,568	3,821	11,653	285	9
Oregon:						
5.0 - 7.0	3,065	2,239	677	268	16	13
7.0 - 9.0	4,083	3,294	1,086	356	27	26
9.0 - 11.0	4,642	3,878	1,363	435	45	37
11.0 - 13.0	4,796	4,063	1,629	472	73	37
13.0 - 15.0	5,256	4,664	1,977	568	85	49
15.0 - 17.0	5,609	5,019	2,108	657	87	58
17.0 - 19.0	5,377	4,901	2,056	756	95	56
19.0 - 29.0	25,082	24,160	10,913	4,544	500	2,74
29.0 - 39.0	17,963	17,762	9,754	3,282	354	1,53
39.0 and larger	19,250	19,223	15,076	1,087	421	87
Total	95,123	89,203	46,639	12,425	1,703	7,95
Western Washington:						
5.0 - 7.0	1,814	1,371	477	--	6	49
7.0 - 9.0	2,847	2,097	766	1	15	72
9.0 - 11.0	3,348	2,540	955	1	22	87
11.0 - 13.0	3,441	2,730	1,146	1	33	92
13.0 - 15.0	3,351	2,789	1,158	1	30	93
15.0 - 17.0	3,177	2,752	1,053	1	30	99
17.0 - 19.0	3,021	2,723	1,017	1	28	95
19.0 - 29.0	13,086	12,493	3,947	4	87	4,96
29.0 - 39.0	9,214	9,076	2,441	--	47	3,95
39.0 and larger	10,198	10,184	3,429	6	21	3,76
Total	53,497	48,755	16,389	16	319	18,59

ecies and diameter class and by region and State, January 1, 1963

bic feet)

				Hardwoods				
rue firs	Redwood	Spruce	Other softwoods	Total	Cottonwood and aspen	Red alder	Oaks	Other western hardwoods
184	--	45	146	809	--	259	137	413
245	--	60	261	786	3	271	144	368
334	3	39	297	761	--	325	124	312
273	3	84	262	728	3	381	77	267
338	2	68	268	592	2	335	42	213
384	2	111	303	590	11	358	66	155
371	3	90	284	476	6	286	58	126
1,527	11	349	1,086	918	21	361	140	396
981	7	150	667	201	8	60	23	110
521	9	306	694	26	3	2	2	19
5,158	40	1,302	4,268	5,887	57	2,638	813	2,379
250	--	71	444	17	12	2	1	2
341	--	50	607	3	2	--	--	1
356	--	57	572	3	2	--	--	1
377	--	57	456	5	4	--	--	1
436	--	62	365	--	--	--	--	--
432	--	61	287	--	--	--	--	--
413	--	58	207	--	--	--	--	--
1,639	--	175	674	4	4	--	--	--
767	--	37	233	--	--	--	--	--
150	--	11	70	1	1	--	--	--
5,161	--	639	3,915	33	25	2	1	5
434	--	116	590	826	12	261	138	415
586	--	110	868	789	5	271	144	369
690	3	96	869	764	2	325	124	313
650	3	141	718	733	7	381	77	268
774	2	130	633	592	2	335	42	213
816	2	172	590	590	11	358	66	155
784	3	148	491	476	6	286	58	126
3,166	11	524	1,760	922	25	361	140	396
1,748	7	187	900	201	8	60	23	110
671	9	317	764	27	4	2	2	19
10,319	40	1,941	8,183	5,920	82	2,640	814	2,384
213	--	8	171	443	3	328	--	112
341	--	16	231	750	7	575	--	168
421	--	21	241	808	14	619	--	175
383	--	36	205	711	10	569	--	132
419	--	33	216	562	13	440	--	109
445	--	31	196	425	19	313	--	93
480	--	32	213	298	24	195	--	79
2,344	--	156	990	593	65	325	--	203
1,671	--	128	830	138	30	32	--	76
1,173	--	137	1,655	14	4	--	--	10
7,890	--	598	4,948	4,742	189	3,396	--	1,157

Table 13.--Net volume of growing stock on commercial forest land by species d

(Mill

Region and diameter class (inches)	Total all species	Softwo				
		Total	Douglas-fir	Ponderosa and Jeffrey pines	Western white and sugar pines	Wester hemloc
Eastern Washington:						
5.0 - 7.0	1,383	1,335	360	147	6	1
7.0 - 9.0	1,814	1,767	501	213	10	2
9.0 - 11.0	1,921	1,887	619	281	12	4
11.0 - 13.0	1,785	1,763	597	312	14	4
13.0 - 15.0	1,687	1,674	569	345	11	4
15.0 - 17.0	1,551	1,545	525	343	33	5
17.0 - 19.0	1,399	1,396	472	344	14	4
19.0 - 29.0	5,096	5,079	1,705	1,467	123	28
29.0 - 39.0	2,134	2,125	745	804	22	7
39.0 and larger	631	620	281	194	--	2
Total	19,401	19,191	6,374	4,450	245	66
Washington:						
5.0 - 7.0	3,197	2,706	837	147	12	51
7.0 - 9.0	4,661	3,864	1,267	214	25	75
9.0 - 11.0	5,269	4,427	1,574	282	34	92
11.0 - 13.0	5,226	4,493	1,743	313	47	96
13.0 - 15.0	5,038	4,463	1,727	346	41	97
15.0 - 17.0	4,728	4,297	1,578	344	63	1,05
17.0 - 19.0	4,420	4,119	1,489	345	42	99
19.0 - 29.0	18,182	17,572	5,652	1,471	210	5,25
29.0 - 39.0	11,348	11,201	3,186	804	69	4,03
39.0 and larger	10,829	10,804	3,710	200	21	3,78
Total	72,898	67,946	22,763	4,466	564	19,25
Douglas-fir subregion:						
5.0 - 7.0	3,667	2,415	988	7	20	63
7.0 - 9.0	5,306	3,770	1,577	14	38	98
9.0 - 11.0	6,304	4,735	2,042	23	61	1,25
11.0 - 13.0	6,576	5,137	2,490	31	72	1,29
13.0 - 15.0	6,907	5,753	2,869	30	93	1,41
15.0 - 17.0	7,084	6,069	2,892	43	90	1,57
17.0 - 19.0	6,738	5,964	2,835	46	102	1,50
19.0 - 29.0	30,054	28,543	13,711	217	486	7,66
29.0 - 39.0	22,453	22,114	11,635	190	374	5,48
39.0 and larger	27,930	27,890	18,168	187	401	4,63
Total	123,019	112,390	59,207	788	1,737	26,45
Ponderosa pine subregion:						
5.0 - 7.0	2,595	2,530	526	408	8	1
7.0 - 9.0	3,438	3,388	776	556	14	2
9.0 - 11.0	3,607	3,570	895	694	18	4
11.0 - 13.0	3,446	3,419	882	754	48	4
13.0 - 15.0	3,387	3,374	835	884	33	5
15.0 - 17.0	3,253	3,247	794	958	60	6
17.0 - 19.0	3,059	3,056	710	1,055	35	5
19.0 - 29.0	13,210	13,189	2,854	5,798	224	32
29.0 - 39.0	6,858	6,849	1,305	3,896	49	8
39.0 and larger	2,149	2,137	618	1,100	41	2
Total	45,002	44,759	10 195	16,103	530	75
All regions	168,021	157,149	69,402	16,891	2,267	27,20

ameter class and by region and State, January 1, 1963--Continued

ubic feet)

				Hardwoods				
True firs	Redwood	Spruce	Other softwoods	Total	Cottonwood and aspen	Red alder	Oaks	Other western hardwoods
283	--	40	482	48	13	3	29	3
325	--	57	634	47	31	1	15	--
348	--	69	517	34	29	--	5	--
335	--	71	392	22	16	--	5	1
318	--	76	311	13	9	--	4	--
276	--	73	237	6	5	1	--	--
230	--	80	212	3	3	--	--	--
868	--	147	481	17	17	--	--	--
267	--	55	153	9	9	--	--	--
74	--	27	24	11	11	--	--	--
3,324	--	695	3,443	210	143	5	58	4
496	--	48	653	491	16	331	29	115
666	--	73	865	797	38	576	15	168
769	--	90	758	842	43	619	5	175
718	--	107	597	733	26	569	5	133
737	--	109	527	575	22	440	4	109
721	--	104	433	431	24	314	--	93
710	--	112	425	301	27	195	--	79
3,212	--	303	1,471	610	82	325	--	203
1,938	--	183	983	147	39	32	--	76
1,247	--	164	1,679	25	15	--	--	10
11,214	--	1,293	8,391	4,952	332	3,401	58	1,161
397	--	53	317	1,252	3	587	137	525
586	--	76	492	1,536	10	846	144	536
755	3	60	538	1,569	14	944	124	487
656	3	120	467	1,439	13	950	77	399
757	2	101	484	1,154	15	775	42	322
829	2	142	499	1,015	30	671	66	248
851	3	122	497	774	30	481	58	205
3,871	11	505	2,076	1,511	86	686	140	599
2,652	7	278	1,497	339	38	92	23	186
1,694	9	443	2,349	40	7	2	2	29
13,048	40	1,900	9,216	10,629	246	6,034	813	3,536
533	--	111	926	65	25	5	30	5
666	--	107	1,241	50	33	1	15	1
704	--	126	1,089	37	31	--	5	1
712	--	128	848	27	20	--	5	2
754	--	138	676	13	9	--	4	--
708	--	134	524	6	5	1	--	--
643	--	138	419	3	3	--	--	--
2,507	--	322	1,155	21	21	--	--	--
1,034	--	92	386	9	9	--	--	--
224	--	38	94	12	12	--	--	--
8,485	--	1,334	7,358	243	168	7	59	9
21,533	40	3,234	16,574	10,872	414	6,041	872	3,545

Table 14.--Net volume of sawtimber on commercial forest land

(Million board fe

Region and diameter class (inches)	Total all species	Softwo				
		Total	Douglas-fir	Ponderosa and Jeffrey pines	Western white and sugar pines	Western hemlock
Western Oregon:						
11.0 - 13.0	14,644	11,490	5,722	146	187	1,81
13.0 - 15.0	17,733	14,858	8,281	131	330	2,66
15.0 - 17.0	21,337	18,140	9,889	208	343	3,42
17.0 - 19.0	21,637	18,824	10,500	234	436	3,45
19.0 - 29.0	109,824	103,478	63,803	1,162	2,489	18,11
29.0 - 39.0	92,878	91,155	66,131	1,139	2,073	10,89
39.0 and larger	132,784	132,557	112,173	1,136	2,462	6,06
Total	410,837	390,502	276,499	4,156	8,320	46,44
Eastern Oregon:						
11.0 - 13.0	6,759	6,735	949	2,197	53	1
13.0 - 15.0	7,859	7,856	1,107	2,709	72	2
15.0 - 17.0	8,589	8,586	1,257	3,290	121	3
17.0 - 19.0	8,963	8,963	1,203	4,066	87	4
19.0 - 29.0	49,735	49,684	6,574	28,149	473	17
29.0 - 39.0	32,461	32,459	3,592	22,275	163	3
39.0 and larger	11,106	11,094	2,367	6,823	422	1
Total	125,472	125,377	17,049	69,509	1,391	33
Oregon:						
11.0 - 13.0	21,403	18,225	6,671	2,343	240	1,82
13.0 - 15.0	25,592	22,714	9,388	2,840	402	2,68
15.0 - 17.0	29,926	26,726	11,146	3,498	464	3,45
17.0 - 19.0	30,600	27,787	11,703	4,300	523	3,50
19.0 - 29.0	159,559	153,162	70,377	29,311	2,962	18,29
29.0 - 39.0	125,339	123,614	69,723	23,414	2,236	10,92
39.0 and larger	143,890	143,651	114,540	7,959	2,884	6,07
Total	536,309	515,879	293,548	73,665	9,711	46,77
Western Washington:						
11.0 - 13.0	13,393	10,623	4,458	3	131	3,60
13.0 - 15.0	15,491	12,896	5,354	3	136	4,30
15.0 - 17.0	15,832	13,715	5,248	5	148	4,96
17.0 - 19.0	16,817	15,154	5,664	7	156	5,29
19.0 - 29.0	83,067	79,304	25,053	24	549	31,51
29.0 - 39.0	65,718	64,732	17,402	--	336	28,24
39.0 and larger	81,044	80,931	27,247	49	162	29,91
Total	291,362	277,355	90,426	91	1,618	107,84
Eastern Washington:						
11.0 - 13.0	7,117	7,034	2,164	1,518	70	15
13.0 - 15.0	7,846	7,790	2,549	1,761	55	19
15.0 - 17.0	7,955	7,926	2,666	1,878	177	27
17.0 - 19.0	7,699	7,685	2,604	2,010	81	22
19.0 - 29.0	31,564	31,470	10,672	9,704	810	1,61
29.0 - 39.0	14,816	14,762	5,190	5,943	164	47
39.0 and larger	4,706	4,639	2,175	1,534	--	12
Total	81,703	81,306	28,020	24,348	1,357	3,07

ecies and diameter class and by region and State, January 1, 1963

ternational ¼-inch rule)

				Hardwoods				
rue firs	Redwood	Spruce	Other softwoods	Total	Cottonwood and aspen	Red alder	Oaks	Other western hardwoods
1,361	11	245	2,002	3,154	13	1,681	340	1,120
1,819	10	281	1,338	2,875	9	1,651	230	985
2,180	10	436	1,651	3,197	62	1,963	361	811
2,146	15	416	1,620	2,813	35	1,707	343	728
9,155	77	2,049	6,625	6,346	162	2,540	987	2,657
5,553	52	887	4,429	1,723	76	507	195	945
3,192	101	2,292	5,134	227	30	15	18	164
25,406	276	6,606	22,799	20,335	387	10,064	2,474	7,410
1,431	--	258	1,836	24	22	--	--	2
1,862	--	317	1,769	3	3	--	--	--
2,026	--	375	1,483	3	1	--	--	2
1,791	--	372	1,397	--	--	--	--	--
8,506	--	1,265	4,543	51	51	--	--	--
4,018	--	279	2,100	2	--	--	--	2
1,042	--	76	352	12	11	--	--	1
20,676	--	2,942	13,480	95	88	--	--	7
2,792	11	503	3,838	3,178	35	1,681	340	1,122
3,681	10	598	3,107	2,878	12	1,651	230	985
4,206	10	811	3,134	3,200	63	1,963	361	813
3,937	15	788	3,017	2,813	35	1,707	343	728
17,661	77	3,314	11,168	6,397	213	2,540	987	2,657
9,571	52	1,166	6,529	1,725	76	507	195	947
4,234	101	2,368	5,486	239	41	15	18	165
46,082	276	9,548	36,279	20,430	475	10,064	2,474	7,417
1,489	--	136	800	2,770	38	2,220	--	512
1,936	--	158	1,001	2,595	58	2,035	--	502
2,219	--	153	977	2,117	92	1,563	--	462
2,673	--	173	1,185	1,663	137	1,086	--	440
14,877	--	997	6,289	3,763	414	2,064	--	1,285
11,921	--	913	5,914	986	214	231	--	541
9,328	--	1,085	13,147	113	28	--	--	85
44,443	--	3,615	29,313	14,007	981	9,199	--	3,827
1,233	--	259	1,636	83	57	--	21	5
1,394	--	332	1,509	56	40	--	16	--
1,333	--	356	1,237	29	26	3	--	--
1,183	--	413	1,169	14	14	--	--	--
4,869	--	829	2,968	94	94	--	--	--
1,617	--	332	1,038	54	54	--	--	--
455	--	167	180	67	67	--	--	--
12,084	--	2,688	9,737	397	352	3	37	5

Table 14.--Net volume of sawtimber on commercial forest land by speci

(Million board fee

Region and diameter class (inches)	Total all species	Softwoo				
		Total	Douglas-fir	Ponderosa and Jeffrey pines	Western white and sugar pines	Western hemlock
Washington:						
11.0 - 13.0	20,510	17,657	6,622	1,521	201	3,760
13.0 - 15.0	23,337	20,686	7,903	1,764	191	4,498
15.0 - 17.0	23,787	21,641	7,914	1,883	325	5,244
17.0 - 19.0	24,516	22,839	8,268	2,017	237	5,521
19.0 - 29.0	114,631	110,774	35,725	9,728	1,359	33,133
29.0 - 39.0	80,534	79,494	22,592	5,943	500	28,724
39.0 and larger	85,750	85,570	29,422	1,583	162	30,041
Total	373,065	358,661	118,446	24,439	2,975	110,921
Douglas-fir subregion:						
11.0 - 13.0	28,037	22,113	10,180	149	318	5,422
13.0 - 15.0	33,224	27,754	13,635	134	466	6,976
15.0 - 17.0	37,169	31,855	15,137	213	491	8,388
17.0 - 19.0	38,454	33,978	16,164	241	592	8,753
19.0 - 29.0	192,891	182,782	88,856	1,186	3,038	49,633
29.0 - 39.0	158,596	155,887	83,533	1,139	2,409	39,137
39.0 and larger	213,828	213,488	139,420	1,185	2,624	35,980
Total	702,199	667,857	366,925	4,247	9,938	154,289
Ponderosa pine subregion:						
11.0 - 13.0	13,876	13,769	3,113	3,715	123	165
13.0 - 15.0	15,705	15,646	3,656	4,470	127	210
15.0 - 17.0	16,544	16,512	3,923	5,168	298	313
17.0 - 19.0	16,662	16,648	3,807	6,076	168	272
19.0 - 29.0	81,299	81,154	17,246	37,853	1,283	1,792
29.0 - 39.0	47,277	47,221	8,782	28,218	327	510
39.0 and larger	15,812	15,733	4,542	8,357	422	140
Total	207,175	206,683	45,069	93,857	2,748	3,402
All regions	909,374	874,540	411,994	98,104	12,686	157,691

l diameter class and by region and State, January 1, 1963--Continued

ternational ¼-inch rule)

				Hardwoods				
rue firs	Redwood	Spruce	Other softwoods	Total	Cottonwood and aspen	Red alder	Oaks	Other western hardwoods
2,722	--	395	2,436	2,853	95	2,220	21	517
3,330	--	490	2,510	2,651	98	2,035	16	502
3,552	--	509	2,214	2,146	118	1,566	--	462
3,856	--	586	2,354	1,677	151	1,086	--	440
19,746	--	1,826	9,257	3,857	508	2,064	--	1,285
13,538	--	1,245	6,952	1,040	268	231	--	541
9,783	--	1,252	13,327	180	95	--	--	85
56,527	--	6,303	39,050	14,404	1,333	9,202	37	3,832
2,850	11	381	2,802	5,924	51	3,901	340	1,632
3,755	10	439	2,339	5,470	67	3,686	230	1,487
4,399	10	589	2,628	5,314	154	3,526	361	1,273
4,819	15	589	2,805	4,476	172	2,793	343	1,168
24,032	77	3,046	12,914	10,109	576	4,604	987	3,942
17,474	52	1,800	10,343	2,709	290	738	195	1,486
12,520	101	3,377	18,281	340	58	15	18	249
69,849	276	10,221	52,112	34,342	1,368	19,263	2,474	11,237
2,664	--	517	3,472	107	79	--	21	7
3,256	--	649	3,278	59	43	--	16	--
3,359	--	731	2,720	32	27	3	11	2
2,974	--	785	2,566	14	14	--	--	--
13,375	--	2,094	7,511	145	145	--	--	--
5,635	--	611	3,138	56	54	--	--	2
1,497	--	243	532	79	78	--	--	1
32,760	--	5,630	23,217	492	440	3	37	12
102,609	276	15,851	75,329	34,834	1,808	19,266	2,511	11,249

Table 15.--Net volume of salvable dead sawtimber-size trees on commercial forest land, by softwoods and hardwoods and by region and State, January 1, 1963

(Million board feet, International ¼-inch rule)

Region and State	All species	Softwoods	Hardwoods
Western Oregon	19,589	19,277	312
Eastern Oregon	1,551	1,551	--
Total Oregon	21,140	20,828	312
Western Washington	14,191	13,964	227
Eastern Washington	2,360	2,354	6
Total Washington	16,551	16,318	233
Douglas-fir subregion	33,780	33,241	539
Ponderosa pine subregion	3,911	3,905	6
All regions	37,691	37,146	545

Table 16.--Net annual growth and cut of growing stock on commercial forest land, by softwoods and hardwoods and by region and State, 1962

(Thousand cubic feet)

Region and State	All species		Softwoods		Hardwoods	
	Growth	Cut	Growth	Cut	Growth	Cut
Western Oregon	595,000	1,337,879	502,180	1,319,284	92,820	18,595
Eastern Oregon	279,000	279,544	278,330	279,544	670	--
Total Oregon	874,000	1,617,423	780,510	1,598,828	93,490	18,595
Western Washington	1,137,000	720,727	965,846	682,145	171,154	38,582
Eastern Washington	304,000	181,840	300,693	181,840	3,307	--
Total Washington	1,441,000	902,567	1,266,539	863,985	174,461	38,582
Douglas-fir subregion	1,732,000	2,058,606	1,468,026	2,001,429	263,974	57,177
Ponderosa pine subregion	583,000	461,384	579,023	461,384	3,977	--
All regions	2,315,000	2,519,990	2,047,049	2,462,813	267,951	57,177

Table 17.--Net annual growth and cut of sawtimber on commercial forest land, by softwoods and hardwoods and by region and State, 1962

(Thousand board feet, International ¼-inch rule)

Region and State	All species		Softwoods		Hardwoods	
	Growth	Cut	Growth	Cut	Growth	Cut
Western Oregon	2,700,000	9,093,388	2,365,200	8,965,395	334,800	127,993
Eastern Oregon	955,000	1,702,004	953,338	1,702,004	1,662	--
Total Oregon	3,655,000	10,795,392	3,318,538	10,667,399	336,462	127,993
Western Washington	4,920,000	4,694,073	4,464,263	4,443,233	455,737	250,840
Eastern Washington	997,000	1,031,242	991,909	1,031,242	5,091	--
Total Washington	5,917,000	5,725,315	5,456,172	5,474,475	460,828	250,840
Douglas-fir subregion	7,620,000	13,787,461	6,829,463	13,408,628	790,537	378,833
Ponderosa pine subregion	1,952,000	2,733,246	1,945,247	2,733,246	6,753	--
All regions	9,572,000	16,520,707	8,774,710	16,141,874	797,290	378,833

Table 18.--Net annual growth and cut of growing stock

(Thous

Region and State	All species		Douglas-fir		Ponderosa and Jeffrey pines		Western white and sugar pines	
	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
Western Oregon	595,000	1,337,879	337,896	1,044,874	6,101	10,554	11,189	15,8
Eastern Oregon	279,000	279,544	46,129	57,865	93,317	176,112	2,282	1,3
Total Oregon	874,000	1,617,423	384,025	1,102,739	99,418	186,666	13,471	17,2
Western Washington	1,137,000	720,727	324,661	340,186	311	2,796	6,324	6,0
Eastern Washington	304,000	181,840	98,008	49,642	60,331	91,302	3,320	1,9
Total Washington	1,441,000	902,567	422,669	389,828	60,642	94,098	9,644	8,0
Douglas-fir subregion	1,732,000	2,058,606	662,557	1,385,060	6,412	13,350	17,513	21,9
Ponderosa pine subregion	583,000	461,384	144,137	107,507	153,648	267,414	5,602	3,3
All regions	2,315,000	2,519,990	806,694	1,492,567	160,060	280,764	23,115	25,2

Table 19.--Net annual growth and cut of sawtimber

(Thousand board fe

Region and State	All species		Douglas-fir		Ponderosa and Jeffrey pines		Western white and sugar pines	
	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
Western Oregon	2,700,000	9,093,388	1,674,719	7,100,592	25,172	71,723	50,389	107,5
Eastern Oregon	955,000	1,702,004	149,765	352,315	363,310	1,072,262	7,271	8,5
Total Oregon	3,655,000	10,795,392	1,824,484	7,452,907	388,482	1,143,985	57,660	116,0
Western Washington	4,920,000	4,694,073	1,455,504	2,215,840	1,468	18,217	26,032	39,5
Eastern Washington	997,000	1,031,242	347,764	281,529	271,170	517,787	15,115	11,2
Total Washington	5,917,000	5,725,315	1,803,268	2,497,369	272,638	536,004	41,147	50,7
Douglas-fir subregion	7,620,000	13,787,461	3,130,223	9,316,432	26,640	89,940	76,421	147,1
Ponderosa pine subregion	1,952,000	2,733,246	497,529	633,844	634,480	1,590,049	22,386	19,7
All regions	9,572,000	16,520,707	3,627,752	9,950,276	661,120	1,679,989	98,807	166,8

mercial forest land, by species and by region and State, 1962

ic feet)

Western hemlock		True firs		Redwood		Spruce		Other western softwoods		Hardwoods	
Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
62,015	150,398	40,703	71,241	318	--	10,273	6,596	33,685	19,790	92,820	18,595
1,309	--	71,873	30,191	--	--	8,899	839	54,521	13,139	670	--
63,324	150,398	112,576	101,432	318	--	19,172	7,435	88,206	32,929	93,490	18,595
368,381	201,642	156,299	71,897	--	--	11,848	9,823	98,022	49,730	171,154	38,582
11,295	1,872	56,903	20,512	--	--	11,866	1,746	58,970	14,785	3,307	--
379,676	203,514	213,202	92,409	--	--	23,714	11,569	156,992	64,515	174,461	38,582
430,396	352,040	197,002	143,138	318	--	22,121	16,419	131,707	69,520	263,974	57,177
12,604	1,872	128,776	50,703	--	--	20,765	2,585	113,491	27,924	3,977	--
443,000	353,912	325,778	193,841	318	--	42,886	19,004	245,198	97,444	267,951	57,177

mercial forest land, by species and by region and State, 1962

ernational ¼-inch rule)

Western hemlock		True firs		Redwood		Spruce		Other western softwoods		Hardwoods	
Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
281,274	1,022,055	153,876	484,131	1,670	--	40,011	44,828	138,089	134,481	334,800	127,993
3,822	--	239,188	183,816	--	--	34,032	5,106	155,950	79,995	1,662	--
285,096	1,022,055	393,064	667,947	1,670	--	74,043	49,934	294,039	214,476	336,462	127,993
735,920	1,313,420	715,349	468,316	--	--	58,181	63,982	471,809	323,913	455,737	250,840
39,861	10,622	156,791	116,324	--	--	34,883	9,900	126,325	83,840	5,091	--
775,781	1,324,042	872,140	584,640	--	--	93,064	73,882	598,134	407,753	460,828	250,840
017,194	2,335,475	869,225	952,447	1,670	--	98,192	108,810	609,898	458,394	790,537	378,833
43,683	10,622	395,979	300,140	--	--	68,915	15,006	282,275	163,835	6,753	--
060,877	2,346,097	1,265,204	1,252,587	1,670	--	167,107	123,816	892,173	622,229	797,290	378,833

Table 20.--Net annual growth and cut of growing stock on commercial for

(Thous

Region and State	All ownerships						National Forest							
	All species		Softwoods		Hardwoods		All species		Softwoods		Hardwoods		All species	
	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
Western Oregon	595,000	1,337,879	502,180	1,319,284	92,820	18,595	65,000	422,484	62,872	420,869	2,128	1,615	161,000	238,
Eastern Oregon	279,000	279,544	278,330	279,544	670	--	149,000	162,326	148,944	162,326	56	--	7,000	14,
Total Oregon	874,000	1,617,423	780,510	1,598,828	93,490	18,595	214,000	584,810	211,816	583,195	2,184	1,615	168,000	252,
Western Washington	1,137,000	720,727	965,846	682,145	171,154	38,582	54,000	177,157	53,924	176,922	76	235	254,000	81,
Eastern Washington	304,000	181,840	300,693	181,840	3,307	--	123,000	65,769	121,445	65,769	1,555	--	51,000	43,
Total Washington	1,441,000	902,567	1,266,539	863,985	174,461	38,582	177,000	242,926	175,369	242,691	1,631	235	305,000	125,
Douglas-fir subregion	1,732,000	2,058,606	1,468,026	2,001,429	263,974	57,177	119,000	599,641	116,796	597,791	2,204	1,850	415,000	319,
Ponderosa pine subregion	583,000	461,384	579,023	461,384	3,977	--	272,000	228,095	270,389	228,095	1,611	--	58,000	57,
All regions	2,315,000	2,519,990	2,047,049	2,462,813	267,951	57,177	391,000	827,736	387,185	825,886	3,815	1,850	473,000	377,

Table 21.--Net annual growth and cut of sawtimber on commercial forest l

(Thousand board fe

Region and State	All ownerships						National Forest							
	All species		Softwoods		Hardwoods		All species		Softwoods		Hardwoods		All species	
	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
Western Oregon	2,700,000	9,093,388	2,365,200	8,965,395	334,800	127,993	380,000	2,870,704	369,556	2,863,380	10,444	7,324	780,000	1,619,
Eastern Oregon	955,000	1,702,004	953,338	1,702,004	1,662	--	455,000	988,329	454,913	988,329	87	--	22,000	85,
Total Oregon	3,655,000	10,795,392	3,318,538	10,667,399	336,462	127,993	835,000	3,859,033	824,469	3,851,709	10,531	7,324	802,000	1,704,
Western Washington	4,920,000	4,694,073	4,464,263	4,443,233	455,737	250,840	260,000	1,152,249	259,705	1,151,077	295	1,172	1,110,000	530,
Eastern Washington	997,000	1,031,242	991,909	1,031,242	5,091	--	428,000	372,982	425,692	372,982	2,308	--	175,000	248,
Total Washington	5,917,000	5,725,315	5,456,172	5,474,475	460,828	250,840	688,000	1,525,231	685,397	1,524,059	2,603	1,172	1,285,000	778,
Douglas-fir subregion	7,620,000	13,787,461	6,829,463	13,408,628	790,537	378,833	640,000	4,022,953	629,261	4,014,457	10,739	8,496	1,890,000	2,149,
Ponderosa pine subregion	1,952,000	2,733,246	1,945,247	2,733,246	6,753	--	883,000	1,361,311	880,605	1,361,311	2,395	--	197,000	333,
All regions	9,572,000	16,520,707	8,774,710	16,141,874	797,290	378,833	1,523,000	5,384,264	1,509,866	5,375,768	13,134	8,496	2,087,000	2,483,

, by ownership, softwoods and hardwoods, and by region and State, 1962

c feet)

r public				Forest industry						Farmer and miscellaneous private					
Softwoods		Hardwoods		All species		Softwoods		Hardwoods		All species		Softwoods		Hardwoods	
owth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
48,426	234,513	12,574	3,745	188,835	598,441	173,389	594,830	15,446	3,611	180,165	78,696	117,493	69,072	62,672	9,624
6,991	14,078	9	--	53,640	70,668	53,640	70,668	--	--	69,360	32,472	68,755	32,472	605	--
55,417	248,591	12,583	3,745	242,475	669,109	227,029	665,498	15,446	3,611	249,525	111,168	186,248	101,544	63,277	9,624
23,394	72,842	30,606	8,456	494,849	309,202	450,967	296,376	43,882	12,826	334,151	153,070	237,561	136,005	96,590	17,065
50,633	43,738	367	--	27,214	22,206	26,885	22,206	329	--	102,786	50,127	101,730	50,127	1,056	--
74,027	116,580	30,973	8,456	522,063	331,408	477,852	318,582	44,211	12,826	436,937	203,197	339,291	186,132	97,646	17,065
71,820	307,355	43,180	12,201	683,684	907,643	624,356	891,206	59,328	16,437	514,316	231,766	355,054	205,077	159,262	26,689
57,624	57,816	376	--	80,854	92,874	80,525	92,874	329	--	172,146	82,599	170,485	82,599	1,661	--
29,444	365,171	43,556	12,201	764,538	1,000,517	704,881	984,080	59,657	16,437	686,462	314,365	525,539	287,676	160,923	26,689

wnership, softwoods and hardwoods, and by region and State, 1962

rnational ¼-inch rule)

r public				Forest industry						Farmer and miscellaneous private					
Softwoods		Hardwoods		All species		Softwoods		Hardwoods		All species		Softwoods		Hardwoods	
owth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut	Growth	Cut
39,107	1,595,923	40,893	23,336	798,875	4,066,923	750,678	4,042,189	48,197	24,734	741,125	536,502	505,859	463,903	235,266	72,599
21,956	85,713	44	--	219,350	430,259	219,350	430,259	--	--	258,650	197,703	257,119	197,703	1,531	--
61,063	1,681,636	40,937	23,336	1,018,225	4,497,182	970,028	4,472,448	48,197	24,734	999,775	734,205	762,978	661,606	236,797	72,599
37,797	478,665	72,203	51,633	2,321,501	2,013,068	2,204,219	1,926,162	117,282	86,906	1,228,499	998,458	962,542	887,329	265,957	111,129
74,470	248,046	530	--	91,584	125,935	91,004	125,935	580	--	302,416	284,279	300,743	284,279	1,673	--
12,267	726,711	72,733	51,633	2,413,085	2,139,003	2,295,223	2,052,097	117,862	86,906	1,530,915	1,282,737	1,263,285	1,171,608	267,630	111,129
76,904	2,074,588	113,096	74,969	3,120,376	6,079,991	2,954,897	5,968,351	165,479	111,640	1,969,624	1,534,960	1,468,401	1,351,232	501,223	183,728
96,426	333,759	574	--	310,934	556,194	310,354	556,194	580	--	561,066	481,982	557,862	481,982	3,204	--
73,330	2,408,347	113,670	74,969	3,431,310	6,636,185	3,265,251	6,524,545	166,059	111,640	2,530,690	2,016,942	2,026,263	1,833,214	504,427	183,728

Table 22.--Annual mortality of growing stock and sawtimber on commercial forest land, by softwoods and hardwoods and by region and State, 1962

Region and State	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1/]		
Western Oregon	511,000	487,761	23,239	2,850,000	2,766,365	83,635
Eastern Oregon	261,000	260,664	336	1,260,000	1,259,042	958
Total Oregon	772,000	748,425	23,575	4,110,000	4,025,407	84,593
Western Washington	439,000	418,806	20,194	2,120,000	2,060,640	59,360
Eastern Washington	158,000	156,290	1,710	643,000	639,874	3,126
Total Washington	597,000	575,096	21,904	2,763,000	2,700,514	62,486
Douglas-fir subregion	950,000	906,567	43,433	4,970,000	4,827,005	142,995
Ponderosa pine subregion	419,000	416,954	2,046	1,903,000	1,898,916	4,084
All regions	1,369,000	1,323,521	45,479	6,873,000	6,725,921	147,079

[1/] International ¼-inch rule.

Table 23.--Annual mortality of growing stock and sawtimber on commercial forest land by cause and by region and State, 1962

Region and State	Fire			Insects			Disease			Other[1]			Unknown		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet														
Growing stock:															
Western Oregon	23,222	23,222	--	223,320	223,320	--	59,303	54,598	4,705	88,152	83,445	4,707	117,003	103,176	13,827
Eastern Oregon	4,735	4,735	--	126,321	126,321	--	23,038	22,971	67	71,703	71,633	70	35,203	35,004	199
Total Oregon	27,957	27,957	--	349,641	349,641	--	82,341	77,569	4,772	159,855	155,078	4,777	152,206	138,180	14,026
Western Washington	14,986	14,986	--	185,506	185,506	--	53,002	48,914	4,088	128,088	123,998	4,090	57,418	45,402	12,016
Eastern Washington	3,356	3,356	--	62,170	62,170	--	10,622	10,276	346	54,827	54,481	346	27,025	26,007	1,018
Total Washington	18,342	18,342	--	247,676	247,676	--	63,624	59,190	4,434	182,915	178,479	4,436	84,443	71,409	13,034
Douglas-fir subregion	38,208	38,208	--	408,826	408,826	--	112,305	103,512	8,793	216,240	207,443	8,797	174,421	148,578	25,843
Ponderosa pine subregion	8,091	8,091	--	188,491	188,491	--	33,660	33,247	413	126,530	126,114	416	62,228	61,011	1,217
All regions	46,299	46,299	--	597,317	597,317	--	145,965	136,759	9,206	342,770	333,557	9,213	236,649	209,589	27,060
	Thousand board feet[2]														
Sawtimber:															
Western Oregon	111,696	111,696	--	1,308,465	1,308,465	--	349,319	329,789	19,530	417,406	397,878	19,528	663,114	618,537	44,577
Eastern Oregon	22,868	22,868	--	609,818	609,818	--	111,217	110,994	223	346,148	345,924	224	169,949	169,438	511
Total Oregon	134,564	134,564	--	1,918,283	1,918,283	--	460,536	440,783	19,753	763,554	743,802	19,752	833,063	787,975	45,088
Western Washington	81,376	81,376	--	885,894	885,894	--	266,836	252,976	13,860	640,405	626,544	13,861	245,489	213,850	31,639
Eastern Washington	13,659	13,659	--	246,651	246,651	--	40,685	39,955	730	228,851	228,121	730	113,154	111,488	1,666
Total Washington	95,035	95,035	--	1,132,545	1,132,545	--	307,521	292,931	14,590	869,256	854,665	14,591	358,643	325,338	33,305
Douglas-fir subregion	193,072	193,072	--	2,194,359	2,194,359	--	616,155	582,765	33,390	1,057,811	1,024,422	33,389	908,603	832,387	76,216
Ponderosa pine subregion	36,527	36,527	--	856,469	856,469	--	151,902	150,949	953	574,999	574,045	954	283,103	280,926	2,177
All regions	229,599	229,599	--	3,050,828	3,050,828	--	768,057	733,714	34,343	1,632,810	1,598,467	34,343	1,191,706	1,113,313	78,393

[1] Weather, animals, suppression, etc.

[2] International ¼-inch rule.

Table 24.--Total output of timber products by produ

(Stan

Region and State	Saw logs			Veneer logs			Pulpwood			Total miscellaneous		
	All species	Softwoods	Hard-woods	All species	Softwoods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Har wood
	M bd. ft.[2]			M bd. ft.[2]			M cords			M cu. ft.		
Western Oregon	5,983,000	5,927,000	56,000	3,436,000	3,436,000	--	2,031	1,916	115	20,172	20,110	6
Eastern Oregon	1,729,000	1,729,000	--	--	--	--	97	97	--	1,806	1,806	--
Total Oregon	7,712,000	7,656,000	56,000	3,436,000	3,436,000	--	2,128	2,013	115	21,978	21,916	6
Western Washington	2,518,000	2,460,000	58,000	689,000	689,000	--	5,034	4,730	304	28,565	28,565	--
Eastern Washington	955,000	955,000	--	--	--	--	83	83	--	3,522	3,522	--
Total Washington	3,473,000	3,415,000	58,000	689,000	689,000	--	5,117	4,813	304	32,087	32,087	--
Douglas-fir subregion	8,501,000	8,387,000	114,000	4,125,000	4,125,000	--	7,065	6,646	419	48,737	48,675	6
Ponderosa pine subregion	2,684,000	2,684,000	--	--	--	--	180	180	--	5,328	5,328	--
All regions	11,185,000	11,071,000	114,000	4,125,000	4,125,000	--	7,245	6,826	419	54,065	54,003	6

[1] These estimates of total output include both roundwood and plant byproducts.

[2] International 1/4-inch rule. In case of saw logs, assumed to equal lumber tally.

[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery and handle stock, shuttle blocks, chemical wood, farm timbers, and plant byproduc used for mulch, livestock bedding, etc.

Table 25.--Total roundwood production by source of materi

(Thous

Region and State	All sources			Growing-stock trees		
	All species	Softwoods	Hard-woods	All species	Softwoods	Har woo
Western Oregon	1,493,320	1,475,075	18,245	1,219,630	1,202,403	17,2
Eastern Oregon	280,222	280,222	--	268,753	268,753	-
Total Oregon	1,773,542	1,755,297	18,245	1,488,383	1,471,156	17,2
Western Washington	716,897	680,789	36,108	650,671	615,563	35,1
Eastern Washington	181,775	181,775	--	171,306	171,306	
Total Washington	898,672	862,564	36,108	821,977	786,869	35,1
Douglas-fir subregion	2,210,217	2,155,864	54,353	1,870,301	1,817,966	52,3
Ponderosa pine subregion	461,997	461,997	--	440,059	440,059	
All regions	2,672,214	2,617,861	54,353	2,310,360	2,258,025	52,3

[1] Trees less than 5.0 inches in diameter on commercial forest land and trees on noncom mercial and nonforest lands.

ods and hardwoods, and by region and State, 1962[1/]

Miscellaneous industrial wood																			Fuelwood		
ooperage			Piling			Poles			Posts			Mine timbers			Other industrial[3/]					
All s	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
bd. ft.[2/] --			--- M lin. ft. ---			--- M pieces ---			---- M pieces ----			--- M cu. ft. ---			----- M cu. ft. -----			------ M cords ------		
--	--		2,196	2,196	--	236	236	--	1,059	1,003	56	--	--	--	11,391	11,391	--	2,424	2,422	2
--	--		--	--	--	5	5	--	1,548	1,548	--	--	--	--	--	--	--	678	678	--
--	--		2,196	2,196	--	241	241	--	2,607	2,551	56	--	--	--	11,391	11,391	--	3,102	3,100	2
--	--		619	619	--	65	65	--	391	391	--	43	43	--	26,206	26,206	--	927	926	1
--	--		--	--	--	67	67	--	1,677	1,677	--	126	126	--	--	--	--	492	492	--
--	--		619	619	--	132	132	--	2,068	2,068	--	169	169	--	26,206	26,206	--	1,419	1,418	1
--	--		2,815	2,815	--	301	301	--	1,450	1,394	56	43	43	--	37,597	37,597	--	3,351	3,348	3
--	--		--	--	--	72	72	--	3,225	3,225	--	126	126	--	--	--	--	1,170	1,170	--
--	--		2,815	2,815	--	373	373	--	4,675	4,619	56	169	169	--	37,597	37,597	--	4,521	4,518	3

ods and hardwoods, and by region and State, 1962

t feet)

Cull trees			Dead trees			Other sources[1/]		
es	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
16	13,380	436	256,733	256,733	--	3,141	2,559	582
69	1,469	--	10,000	10,000	--	--	--	--
85	14,849	436	266,733	266,733	--	3,141	2,559	582
91	11,047	144	54,025	53,169	856	1,010	1,010	--
00	1,800	--	8,669	8,669	--	--	--	--
91	12,847	144	62,694	61,838	856	1,010	1,010	--
07	24,427	580	310,758	309,902	856	4,151	3,569	582
69	3,269	--	18,669	18,669	--	--	--	--
76	27,696	580	329,427	328,571	856	4,151	3,569	582

Table 26.--Timber cut from growing stock, by roundwood products

(Thous

Region and State	Total timber cut			Roundw					
				Total			Saw logs		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard wood
Western Oregon	1,337,879	1,319,284	18,595	1,219,630	1,202,403	17,227	746,000	739,000	7,0
Eastern Oregon	279,544	279,544	--	268,753	268,753	--	267,000	267,000	
Total Oregon	1,617,423	1,598,828	18,595	1,488,383	1,471,156	17,227	1,013,000	1,006,000	7,0
Western Washington	720,727	682,145	38,582	650,671	615,563	35,108	320,000	312,000	8,0
Eastern Washington	181,840	181,840	--	171,306	171,306	--	160,000	160,000	
Total Washington	902,567	863,985	38,582	821,977	786,869	35,108	480,000	472,000	8,0
Douglas-fir subregion	2,058,606	2,001,429	57,177	1,870,301	1,817,966	52,335	1,066,000	1,051,000	15,0
Ponderosa pine subregion	461,384	461,384	--	440,059	440,059	--	427,000	427,000	
All regions	2,519,990	2,462,813	57,177	2,310,360	2,258,025	52,335	1,493,000	1,478,000	15,0

1/ Includes hewn ties, box bolts, shingle logs, excelsior bolts, turnery bolts, chemical wood, and bolts for other miscellaneous products.

Table 27.--Timber cut from sawtimber, by roundwood products a

(Thousand board fe

Region and State	Total timber cut			Round					
				Total			Saw logs		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard wood
Western Oregon	9,093,388	8,965,395	127,993	8,312,000	8,192,629	119,371	5,074,000	5,025,000	49,0
Eastern Oregon	1,702,004	1,702,004	--	1,685,055	1,685,055	--	1,675,000	1,675,000	
Total Oregon	10,795,392	10,667,399	127,993	9,997,055	9,877,684	119,371	6,749,000	6,700,000	49,0
Western Washington	4,694,073	4,443,233	250,840	4,586,686	4,341,686	245,000	2,245,000	2,194,000	51,0
Eastern Washington	1,031,242	1,031,242	--	1,010,000	1,010,000	--	939,000	939,000	
Total Washington	5,725,315	5,474,475	250,840	5,596,686	5,351,686	245,000	3,184,000	3,133,000	51,0
Douglas-fir subregion	13,787,461	13,408,628	378,833	12,898,686	12,534,315	364,371	7,319,000	7,219,000	100,0
Ponderosa pine subregion	2,733,246	2,733,246	--	2,695,055	2,695,055	--	2,614,000	2,614,000	
All regions	16,520,707	16,141,874	378,833	15,593,741	15,229,370	364,371	9,933,000	9,833,000	100,0

gging residues, softwoods and hardwoods, and by region and State, 1962

bic feet)

oducts												Logging residues		
Veneer			Pulpwood			Other industrial[1/]			Fuelwood					
All pecies	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
382,000	382,000	--	72,000	62,000	10,000	14,133	14,089	44	5,497	5,314	183	118,249	116,881	1,368
--	--	--	--	--	--	1,124	1,124	--	629	629	--	10,791	10,791	--
382,000	382,000	--	72,000	62,000	10,000	15,257	15,213	44	6,126	5,943	183	129,040	127,672	1,368
90,000	90,000	--	222,660	195,660	27,000	15,311	15,311	--	2,700	2,592	108	70,056	66,582	3,474
--	--	--	6,030	6,030	--	2,816	2,816	--	2,460	2,460	--	10,534	10,534	--
90,000	90,000	--	228,690	201,690	27,000	18,127	18,127	--	5,160	5,052	108	80,590	77,116	3,474
472,000	472,000	--	294,660	257,660	37,000	29,444	29,400	44	8,197	7,906	291	188,305	183,463	4,842
--	--	--	6,030	6,030	--	3,940	3,940	--	3,089	3,089	--	21,325	21,325	--
472,000	472,000	--	300,690	263,690	37,000	33,384	33,340	44	11,286	10,995	291	209,630	204,788	4,842

gging residues, softwoods and hardwoods, and by region and State, 1962

ternational ¼-inch rule)

oducts												Logging residues		
Veneer			Pulpwood			Other industrial			Fuelwood					
All pecies	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
,611,000	2,611,000	--	496,000	426,000	70,000	93,000	92,629	371	38,000	38,000	--	781,388	772,766	8,622
--	--	--	--	--	--	6,055	6,055	--	4,000	4,000	--	16,949	16,949	--
,611,000	2,611,000	--	496,000	426,000	70,000	99,055	98,684	371	42,000	42,000	--	798,337	789,715	8,622
634,000	634,000	--	1,578,000	1,384,000	194,000	110,686	110,686	--	19,000	19,000	--	107,387	101,547	5,840
--	--	--	41,000	41,000	--	16,000	16,000	--	14,000	14,000	--	21,242	21,242	--
634,000	634,000	--	1,619,000	1,425,000	194,000	126,686	126,686	--	33,000	33,000	--	128,629	122,789	5,840
,245,000	3,245,000	--	2,074,000	1,810,000	264,000	203,686	203,315	371	57,000	57,000	--	888,775	874,313	14,462
--	--	--	41,000	41,000	--	22,055	22,055	--	18,000	18,000	--	38,191	38,191	--
,245,000	3,245,000	--	2,115,000	1,851,000	264,000	225,741	225,370	371	75,000	75,000	--	926,966	912,504	14,462

Table 28.--Total roundwood production from growing stock,

(Stand

Region and State	Saw logs			Veneer logs			Pulpwood			Cooperage		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard wood
	M bd. ft.[1]			M bd. ft.[1]			M cords			M bd. ft.[1]		
Western Oregon	5,074,000	5,025,000	49,000	2,611,000	2,611,000	--	809	694	115	--	--	--
Eastern Oregon	1,675,000	1,675,000	--	--	--	--	--	--	--	--	--	--
Total Oregon	6,749,000	6,700,000	49,000	2,611,000	2,611,000	--	809	694	115	--	--	--
Western Washington	2,245,000	2,194,000	51,000	634,000	634,000	--	2,478	2,174	304	--	--	--
Eastern Washington	939,000	939,000	--	--	--	--	67	67	--	--	--	--
Total Washington	3,184,000	3,133,000	51,000	634,000	634,000	--	2,545	2,241	304	--	--	--
Douglas-fir subregion	7,319,000	7,219,000	100,000	3,245,000	3,245,000	--	3,287	2,868	419	--	--	--
Ponderosa pine subregion	2,614,000	2,614,000	--	--	--	--	67	67	--	--	--	--
All regions	9,933,000	9,833,000	100,000	3,245,000	3,245,000	--	3,354	2,935	419	--	--	--

[1] International ¼-inch rule.

[2] Includes hewn ties, box bolts, shingle logs, excelsior bolts, turnery bolts, chemical wood, and bolts for other miscellaneous products.

Table 29.--Output of timber products from nongrowing-stock sources,

Region and State	Total roundwood			Roundw								
				Saw logs			Veneer logs			Pulpwood		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	M cu. ft.			M cu. ft.			M cu. ft.			M cu. ft.		
Western Oregon	273,690	272,672	1,018	133,000	132,000	1,000	121,000	121,000	--	--	--	--
Eastern Oregon	11,469	11,469	--	8,742	8,742	--	--	--	--	--	--	--
Total Oregon	285,159	284,141	1,018	141,742	140,742	1,000	121,000	121,000	--	--	--	--
Western Washington	66,226	65,226	1,000	39,000	38,000	1,000	8,000	8,000	--	--	--	--
Eastern Washington	10,469	10,469	--	2,769	2,769	--	--	--	--	--	--	--
Total Washington	76,695	75,695	1,000	41,769	40,769	1,000	8,000	8,000	--	--	--	--
Douglas-fir subregion	339,916	337,898	2,018	172,000	170,000	2,000	129,000	129,000	--	--	--	--
Ponderosa pine subregion	21,938	21,938	--	11,511	11,511	--	--	--	--	--	--	--
All regions	361,854	359,836	2,018	183,511	181,511	2,000	129,000	129,000	--	--	--	--

[1] From cull trees, dead trees, and other sources, including noncommercial forest land, nonforest land, and material less than 5.0 inches diameter.

[2] Includes pulp chips from slabs and edgings, mill waste used for fuel, etc.

Table 30.--Roundwood production from nongrowing-stock sources,

(Stand

Region and State	Saw logs			Veneer logs			Pulpwood			Cooperage		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Har woo
	M bd. ft.[1]			M bd. ft.[1]			M cords			M bd. ft.[1]		
Western Oregon	909,000	902,000	7,000	825,000	825,000	--	--	--	--	--	--	-
Eastern Oregon	54,000	54,000	--	--	--	--	--	--	--	--	--	-
Total Oregon	963,000	956,000	7,000	825,000	825,000	--	--	--	--	--	--	-
Western Washington	273,000	266,000	7,000	55,000	55,000	--	--	--	--	--	--	-
Eastern Washington	16,000	16,000	--	--	--	--	--	--	--	--	--	-
Total Washington	289,000	282,000	7,000	55,000	55,000	--	--	--	--	--	--	-
Douglas-fir subregion	1,182,000	1,168,000	7,000	880,000	880,000	--	--	--	--	--	--	-
Ponderosa pine subregion	70,000	70,000	7,000	--	--	--	--	--	--	--	--	-
All regions	1,252,000	1,238,000	14,000	880,000	880,000	--	--	--	--	--	--	-

[1] International ¼-inch rule.

[2] Includes hewn ties, box bolts, shingle logs, excelsior bolts, turnery bolts, chemical wood, and bolts for other miscellaneous products.

duct, softwoods and hardwoods, and by region and State, 1962

ts)

Piling			Poles			Posts			Mine timbers			Other industrial[2/]			Fuelwood		
ll cies	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
--- M lin. ft. -----			----- M pieces -------			----- M pieces -------			----- M cu. ft. ------			------ M cu. ft. ------			------ M cords -------		
196	2,196	--	236	236	--	748	708	40	--	--	--	5,696	5,696	--	61	59	2
--	--	--	5	5	--	929	929	--	--	--	--	--	--	--	7	7	--
196	2,196	--	241	241	--	1,677	1,637	40	--	--	--	5,696	5,696	--	68	66	2
619	619	--	65	65	--	254	254	--	43	43	--	13,103	13,103	--	30	29	1
--	--	--	67	67	--	1,037	1,037	--	126	126	--	--	--	--	27	27	--
619	619	--	132	132	--	1,291	1,291	--	169	169	--	13,103	13,103	--	57	56	1
815	2,815	--	301	301	--	1,002	962	40	43	43	--	18,799	18,799	--	91	88	3
--	--	--	72	72	--	1,966	1,966	--	126	126	--	--	--	--	34	34	--
815	2,815	--	373	373	--	2,968	2,928	40	169	169	--	18,799	18,799	--	125	122	3

e of material, softwoods and hardwoods, and by region and State, 1962

oducts[1/]						Plant byproducts[2/]								
Miscellaneous industrial			Fuelwood			Pulpwood			Miscellaneous industrial			Fuelwood		
All ecies	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
------- M cu. ft. -------			------- M cu. ft. --------			-------- M cords --------			------- M cu. ft. -------			-------- M cords --------		
6,039	6,021	18	13,651	13,651	--	1,222	1,222	--	--	--	--	2,211	2,211	--
682	682	--	2,045	2,045	--	97	97	--	--	--	--	648	648	--
6,721	6,703	18	15,696	15,696	--	1,319	1,319	--	--	--	--	2,859	2,859	--
13,254	13,254	--	5,972	5,972	--	2,556	2,556	--	--	--	--	831	831	--
706	706	--	6,994	6,994	--	16	16	--	--	--	--	387	387	--
13,960	13,960	--	12,966	12,966	--	2,572	2,572	--	--	--	--	1,218	1,218	--
19,293	19,275	18	19,623	19,623	--	3,778	3,778	--	--	--	--	3,042	3,042	--
1,388	1,388	--	9,039	9,039	--	113	113	--	--	--	--	1,035	1,035	--
20,681	20,663	18	28,662	28,662	--	3,891	3,891	--	--	--	--	4,077	4,077	--

oduct, softwoods and hardwoods, and by region and State, 1962

its)

Piling			Poles			Posts			Mine timbers			Other industrial[2/]			Fuelwood		
All ecies	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
--- M lin. ft. ------			------ M pieces -------			----- M pieces --------			----- M cu. ft. ------			----- M cu. ft. --------			------ M cords ------		
--	--	--	--	--	--	311	295	16	--	--	--	5,695	5,695	--	152	152	--
--	--	--	--	--	--	619	619	--	--	--	--	--	--	--	23	23	--
--	--	--	--	--	--	930	914	16	--	--	--	5,695	5,695	--	175	175	--
--	--	--	--	--	--	137	137	--	--	--	--	13,103	13,103	--	66	66	--
--	--	--	--	--	--	640	640	--	--	--	--	--	--	--	78	78	--
--	--	--	--	--	--	777	777	--	--	--	--	13,103	13,103	--	144	144	--
--	--	--	--	--	--	448	432	16	--	--	--	18,798	18,798	--	218	218	--
--	--	--	--	--	--	1,259	1,259	--	--	--	--	--	--	--	101	101	--
--	--	--	--	--	--	1,707	1,691	16	--	--	--	18,798	18,798	--	319	319	--

Table 31.--Volume of unused plant residues, by type of material, softwoods and hardwoods, and by region and State, 1962[1/]

(Thousand cubic feet)

Region and State	Total			Coarse[2/]			Fine[3/]		
	All species	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods
Western Oregon	168,810	161,418	7,392	83,519	80,979	2,540	85,291	80,439	4,852
Eastern Oregon	28,018	28,018	--	19,466	19,466	--	8,552	8,552	--
Total Oregon	196,828	189,436	7,392	102,985	100,445	2,540	93,843	88,991	4,852
Western Washington	27,308	26,399	909	13,410	13,055	355	13,898	13,344	554
Eastern Washington	6,748	6,748	--	5,596	5,596	--	1,152	1,152	--
Total Washington	34,056	33,147	909	19,006	18,651	355	15,050	14,496	554
Douglas-fir subregion	196,118	187,817	8,301	96,929	94,034	2,895	99,189	93,783	5,406
Ponderosa pine subregion	34,766	34,766	--	25,062	25,062	--	9,704	9,704	--
All regions	230,884	222,583	8,301	121,991	119,096	2,895	108,893	103,487	5,406

[1/] These estimates are for unused plant residues at primary manufacturing plants and are in addition to the byproducts used for pulpwood, etc., shown in other tables.

[2/] Unused material suitable for chipping, such as slabs, edgings and veneer cores, and trimmings.

[3/] Material such as sawdust and shavings.

Table 32.--Volume of unused plant residues, by industrial source and type of material and by region and State, 1962

(Thousand cubic feet)

Region and State	All industries			Lumber industry			Veneer and plywood industry			Other primary industries[1/]		
	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine
Western Oregon	168,810	83,519	85,291	129,696	44,566	85,130	37,865	37,865	--	1,249	1,088	161
Eastern Oregon	28,018	19,466	8,552	27,205	18,653	8,552	813	813	--	--	--	--
Total Oregon	196,828	102,985	93,843	156,901	63,219	93,682	38,678	38,678	--	1,249	1,088	161
Western Washington	27,308	13,410	13,898	18,913	7,344	11,569	4,901	4,901	--	3,494	1,165	2,329
Eastern Washington	6,748	5,596	1,152	6,748	5,596	1,152	--	--	--	--	--	--
Total Washington	34,056	19,006	15,050	25,661	12,940	12,721	4,901	4,901	--	3,494	1,165	2,329
Douglas-fir subregion	196,118	96,929	99,189	148,609	51,910	96,699	42,766	42,766	--	4,743	2,253	2,490
Ponderosa pine subregion	34,766	25,062	9,704	33,953	24,249	9,704	813	813	--	--	--	--
All regions	230,884	121,991	108,893	182,562	76,159	106,403	43,579	43,579	--	4,743	2,253	2,490

[1/] Including cooperage, small dimension, excelsior, and other primary manufacturing plants.

DEFINITIONS OF TERMS

Commercial forest land.--Forest land which is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. Includes areas suitable for management to grow crops of industrial wood and generally capable of producing in excess of 20 cubic feet per acre of annual growth. Includes both accessible and prospectively accessible areas and both operable and prospectively operable areas.

Commercial species.--Tree species presently or prospectively suitable for industrial wood products; excludes so-called weed species.

Cull trees.--Live trees that do not contain at least one merchantable saw log, now or prospectively, because of defect, rot, or species (also see sound cull trees and rotten cull trees).

Diameter classes.--A classification of trees based on diameter of the tree outside bark, measured at breast height (4-1/2 feet above the ground). D.b.h. is the common abbreviation for "diameter at breast height." Two-inch diameter classes in which the even inch is the approximate midpoint are used. For example, the 6-inch class includes trees 5.0 to 6.9 inches d.b.h. inclusive.

Farm.--A place operated as a unit of 10 or more acres from which the sale of agricultural products totaled $50 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products totaled $250 or more annually during the previous year.

Farmer-owned lands.--Lands owned by operators of farms.

Forest industry lands.--Lands owned by companies or individuals operating wood-using plants.

Forest land.--Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover and not currently developed for non-forest use. (Also see commercial forest land, noncommercial forest land, productive-reserved forest land, and unproductive forest land). Includes chaparral areas in the West and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classed as forest if less than 120 feet in width.

Forest management.--The protection and management of forest lands for the production of timber and related products.

Forest types.--A classification of forest land based upon the species presently forming a plurality of stocking.

Growing-stock trees.--Live sawtimber trees, poletimber trees, saplings, and seedlings of commercial species meeting specified standards of quality or vigor that are now or may be expected to become suitable for use as industrial wood; excludes cull trees.

Indian lands.--Tribal lands held in fee and administered by the Federal Government and Indian trust allotments.

Industrial wood.--Commercial roundwood products such as saw logs and pulpwood, but excluding fuelwood and posts.

Land area.--(a) Census definition: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. (b) Forest Survey definition: Same as above except maximum width of streams, etc., is 120 feet and maximum size of lakes, etc., is 1 acre.

Logging residues.--The unused portions of growing stock or sawtimber trees cut or killed by harvesting timber, land clearing, or cultural operations.

Lumber producer.--A forest owner who manufactures lumber and uses a greater cubic volume of timber from his land for this purpose than for any other primary wood product that he may produce.

Miscellaneous Federal lands.--Federal lands other than National Forest, lands administered by the Bureau of Land Management, and Indian lands.

Miscellaneous private lands.--Privately owned lands other than forest industry or farmer-owned.

Mortality.--The volume of sound wood in live sawtimber and poletimber trees dying from natural causes during a specified period.

National Forest land.--Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Net annual growth.--The annual change in volume of sound wood in live sawtimber and poletimber trees resulting from natural causes, i.e., increase in volume in absence of mortality and cutting, minus mortality, plus growth on mortality and growth on one-half the cut during a specified year.

Net volume.--Gross volume less deductions for defects:

> Growing stock. Gross cubic-foot volume less deductions for rot and missing sections.

Sawtimber. Gross board-foot volume less deductions for rot, sweep, crook, missing sections, and other defects that affect use for lumber.

Noncommercial forest land.--Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive forest land withdrawn from commercial timber use through statute or administrative regulation.

Nonforest land.--Land that has never supported forests and lands formerly forested where use of timber is precluded by development for nonforest uses such as crops, improved pasture, residential areas, and city parks. Also includes improved roads and adjoining rights-of-way, powerline clearings, and certain areas of water classified by the U.S. Bureau of the Census as land. In forest areas unimproved roads, streams, canals, and nonforest strips must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Nonstocked areas.--Commercial forest land less than 10 percent stocked with growing-stock trees.

Old-growth sawtimber stands.--Sawtimber stands in which 50 percent or more of the stand is in old-growth sawtimber trees.

Old-growth sawtimber trees.--Trees that have reached or passed the age of physiological maturity.

Other wood products producer.--A forest owner who manufactures one or more wood products other than lumber and/or pulp and who uses a greater cubic volume of timber from his land for such products than for lumber or pulp.

Ownership.--The property owned by one owner, regardless of the number of parcels that it may consist of, in a specified area such as a State or the United States as a whole.

Plant byproducts.--Wood residues from primary manufacturing that are used for products. Includes slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings at pulpmills.

Plant residues.--Wood materials from primary manufacturing plants that are not used for some product.

Poletimber stands.--Stands at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and/or poletimber trees, and with poletimber stocking exceeding that of sawtimber.

Poletimber trees.--Live trees 5.0 to 10.9 inches in diameter at breast height.

Productive-reserved forest land.--Productive public forest land withdrawn from timber utilization through statute or administrative regulation.

Productivity class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood under reasonably good forest management.

Pulp and paper producer.--A forest owner who manufactures woodpulp and uses a greater volume of timber from his land for this purpose than for any other primary wood product that he may produce.

Rotten cull trees.--Live trees of commercial species, 5.0 inches and larger in diameter at breast height, that do not contain at least one minimum saw log, now or prospectively, and have less than 25 percent of their volume in sound wood primarily because of rot (e.g., when more than 50 percent of cull volume in a tree is rotten).

Rough trees (sound cull trees).--Live trees, 5.0 inches or larger in diameter at breast height, that do not contain at least one minimum saw log, now or prospectively, and have less than 25 percent of their volume in usable form primarily because of roughness, poor form, or noncommercial species.

Roundwood products.--Logs, bolts, or other round sections cut from trees.

Salvable dead trees.--Standing or down dead trees, 11.0 inches or more in diameter at breast height, that contain at least one merchantable saw log and 25 percent or more of sound wood volume.

Saplings.--Live trees of commercial species, 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Sapling-seedling stands.--Stands at least 10 percent stocked with growing-stock trees and with saplings and/or seedlings comprising more than half of this stocking.

Saw log.--A log meeting minimum approved log-grade specifications; or, for species for which approved log grades are lacking, a log at least 12 feet long if conifer or 8 feet long if hardwood, with a minimum d.i.b. of 6 inches, and with deduction for defect no greater than two-thirds the gross volume.

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the saw log top.

Sawtimber stands.--Stands at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Sawtimber trees.--Live trees, 11.0 inches or larger in diameter at breast height, containing at least one minimum saw log.

Seedlings.--Established live trees of commercial species, less than 1.0 inch in diameter at breast height and of good form and vigor.

Stand-size class.--A classification of forest land based on the predominant size of timber present, that is, sawtimber, poletimber, saplings, and seedlings.

State, county, and municipal lands.--Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Stocking.--A measure of the degree to which area is occupied or utilized by trees of specified classes, including (1) all live trees, (2) growing-stock trees, and (3) desirable trees. Classification of forest land and forest types is based on stocking of all live trees. Stocking of growing-stock trees is used to determine stand size and age class.

Stocking standards.--The minimum number of well-spaced trees required to fully utilize the area by specified forest types and sites.

Timber cut from growing stock.--The volume of sound wood in live sawtimber and poletimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber cut from sawtimber.--The net board-foot volume of live sawtimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber products.--Roundwood products and byproducts of primary wood manufacturing plants. Includes saw logs, veneer logs and bolts, cooperage logs and bolts, pulpwood, fuelwood, piling, poles, posts, hewn ties, mine timbers, and other round, split, or hewn products.

Tree-size class.--A classification of growing-stock trees according to diameter at breast height outside bark, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.--Forest land incapable of yielding crops of industrial wood because of adverse site conditions. Includes sterile or poorly drained forest land, subalpine forests, and steep, rocky areas where topographic conditions are likely to prevent management for timber production.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4.0 inches outside bark, or to the point where the central stem breaks into limbs.

Volume of growing stock.--The cubic-foot volume of sound wood in the bole of noncull sawtimber and poletimber trees of commercial species from a 1-foot stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Volume of salvable dead sawtimber-size trees.--Net volume of dead sawtimber-size trees, standing or down, that are considered merchantable by regional standards.

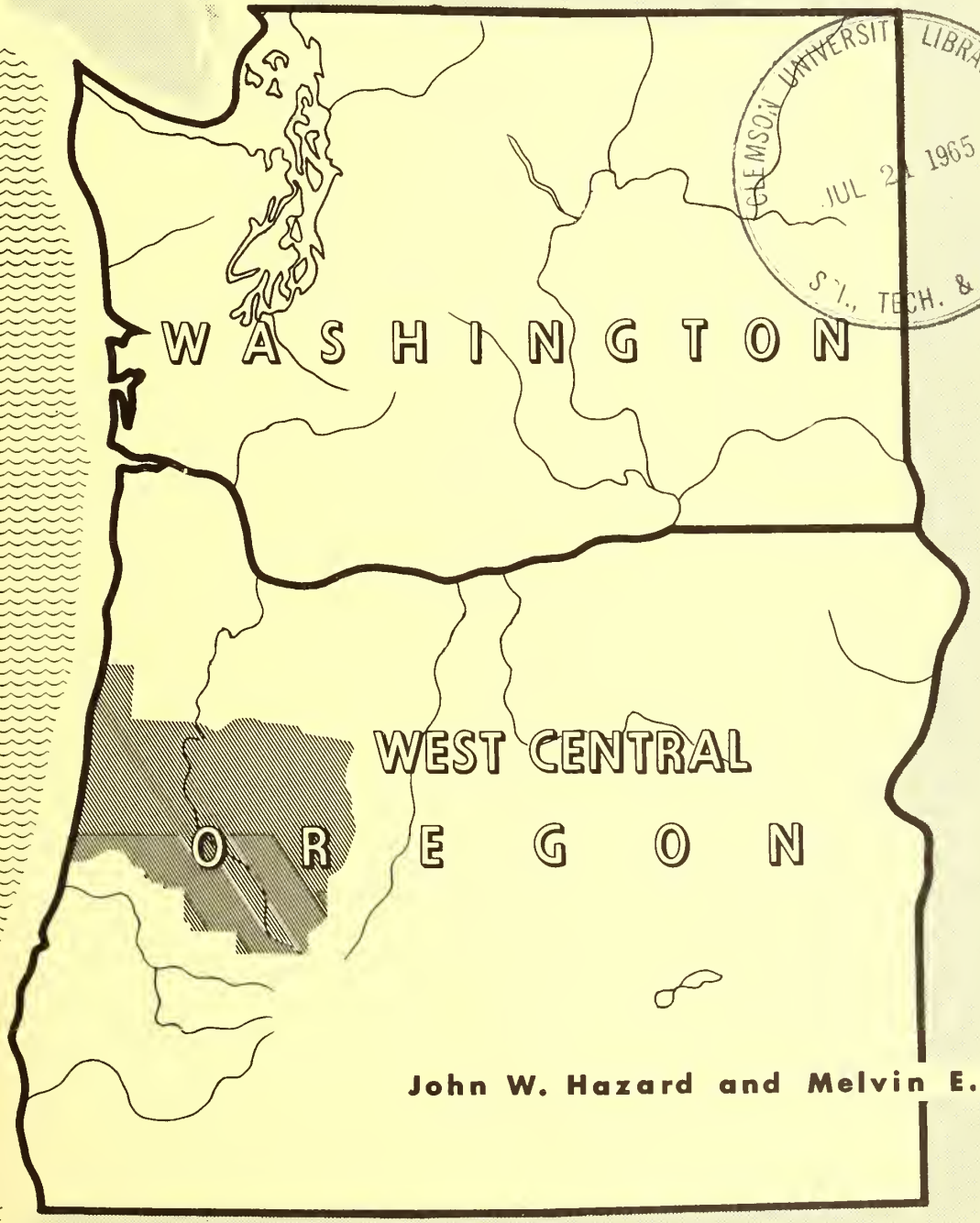
Volume of sawtimber.--Net volume of the saw-log portion of live sawtimber trees in board feet.

Young-growth sawtimber stands.--Sawtimber stands in which 50 percent or more of the stand is in young-growth sawtimber trees.

Young-growth sawtimber trees.--Trees that have not passed the age of physiological maturity.

The FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

Forest Statistics for



John W. Hazard and Melvin E. Metcalf

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN
PNW-10
1965

PREPARED BY

THE DIVISION OF FOREST ECONOMICS AND MARKETING RESEARCH

Carl A. Newport, Chief

FOREST SURVEY

Melvin E. Metcalf, In Charge

Field and Office Work in West-Central Oregon, by

John M. Berger and Richard L. Nielsen, Field Supervisors

John H. Beuter
Lee A. Black
Charles L. Bolsinger
Carl M. Burgeson
John B. Casteel
David D. Chapman
Thomas C. Christian
Donald D. Connally
Donald H. Doyle
William E. Ericksen
Barry K. Ford
Lewin R. Gordon
Herbert D. Hahn
Charles C. Hawks, Jr.
Raymond E. Jackman
Donald W. Jarvis
Addison B. Johnson, Jr.
Marvin P. Johnson
Ronald N. Johnson
Robert J. Kerzel
James F. Koons
Richard A. Koppe
Robert P. Lathan
Don C. Lindsay
Douglas W. MacCleery
Colin D. MacLean
Robert L. McCormack
James A. Moorhouse
Richard J. Neilitz
David N. Odahl
Gary I. Payne
Kai T. Petersen
Thomas J. Riding
Thomas E. Rogers
Ralph G. Rosenberg
Ronald V. Rydberg
Charles B. Schmokel
Dwight A. Smith
Noah Q. Speer
Glenn P. Standley
Albert G. Stoll
Albert H. Tsuda
Ronald W. Van Domelen
Charles K. Wakida
David C. Walz
Robert G. Weinberger
Ronald G. Yasenchak
James A. Zumbo, Jr.
John W. Hazard
Margaret C. O'Mara
Marian E. Simons
Mable A. Northrup
Carmen V. Wilson

Acknowledgment is made of the cooperation of the Division of Timber Management, Region 6, U.S. Forest Service, in supplying resource data for National Forest lands; of the assistance of the Oregon State Board of Forestry in furnishing ownership information; and of other public and private agencies in making aerial photography available to Forest Survey for interpretation.

PREFACE

This publication summarizes the results of the latest reinventory of four counties centrally located in western Oregon: Benton, Lane, Lincoln, and Linn. This block of four counties is one of 10 such blocks set up in the States of Oregon and Washington by the Forest Survey to facilitate orderly reinventories of the timber resources. Each block will be reinventoried at 10-year intervals and the results published in a single report for the block. The five blocks in Oregon are northwest Oregon, west-central Oregon, southwest Oregon, central Oregon, and eastern Oregon.

Field data for west-central Oregon were collected in 1961 and 1962 for all areas except the Siuslaw National Forest and the Cottage Grove unit of the Umpqua National Forest, for which the most recent data available were collected in 1956. Volume data have been adjusted for growth and cutting to January 1, 1963. The results of this latest reinventory are presented with a minimum of interpretation to permit more rapid publication of the timber resource statistics.

The initial inventory of these counties was made during the period 1930-32. The results of this inventory were published in 1934 as a series of pamphlets containing the forest statistics for each individual county. During the period 1940-43, a reinventory of each county was conducted. Summaries of the data were published as Forest Survey county reports. Lane and Lincoln Counties were reinventoried separately in 1955-56. The results of this inventory appear in two 1957 publications: "Forest Statistics for Lincoln County, Oregon," and "Forest Resources and Forest Industries of Lane County, Oregon."

Such inventories are a part of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the amount and kind of timber volume on them, to determine rates of forest growth and depletion, to estimate timber cut and future trends in timber requirements, to analyze and make available survey information needed in the formulation of forest policies and programs, and to make resurveys as necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the Experiment Stations of the U.S. Forest Service. In the States of Oregon and Washington, it is the responsibility of the Pacific Northwest Forest and Range Experiment Station at Portland, Oreg.

CONTENTS

SUMMARY TABLES (continued)

WEST-CENTRAL OREGON'S FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

Totals 4,229,000 acres or 78 percent of the land area; has sawtimber stands on 67 percent of its area; and is 72 percent Douglas-fir type, 17 percent other softwood types, and 11 percent hardwood types.

GROWING-STOCK VOLUME--

Totals 23,622 million cubic feet; is 67 percent Douglas-fir; and is 92 percent in trees of sawtimber size.

SAWTIMBER VOLUME--

Totals 146,585 million board feet, International 1/4-inch rule (119,018 million board feet, Scribner); is 72 percent publicly owned; and is 57 percent in trees over 29 inches in diameter.

NATIONAL FOREST OWNERSHIP--

Has 41 percent of the commercial forest area; controls 53 percent of the sawtimber area; and holds 60 percent of the sawtimber volume.

OTHER PUBLIC OWNERSHIP--

Has 12 percent of the commercial forest area; controls 12 percent of the sawtimber area; and holds 12 percent of the sawtimber volume.

FOREST INDUSTRY OWNERSHIP--

Has 26 percent of the commercial forest area; controls 19 percent of the sawtimber area; and holds 20 percent of the sawtimber volume.

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

Has 21 percent of the commercial forest area; controls 16 percent of the sawtimber area; and holds 8 percent of the sawtimber volume.

NET ANNUAL GROWTH--

Totals 186 million cubic feet (994 million board feet, International 1/4-inch rule, 819 million board feet, Scribner); is 0.79 percent of growing-stock volume; and is 86 percent softwoods.

AVERAGE ANNUAL CUT OVER THE PAST 5 YEARS--

Has been 2,321 million board feet, Scribner rule; has been 53 percent from private timber; and has been 183 percent greater than net annual growth.

CHANGE IN LANE COUNTY SAWTIMBER VOLUME--

The 1956 inventory of the sawtimber volume in Lane County gave an estimate of 97.0 billion board feet, Scribner rule. Thorough reexamination of that estimate indicates that it should have been about 72.8 billion board feet in terms of current measurement standards (see page 26). The 1963 inventory of Lane County reported here gave an estimate of 67.1 billion board feet. During the period 1956-62 the actual net decrease in sawtimber volume due to cutting amounted to 5.7 billion board feet. Almost half of this cut came from the public lands under the allowable cut levels and management policies in effect during this period with the proportion of total cut supplied from these lands slowly increasing.

Currently 80 percent of the sawtimber volume is on public lands. The apparent decrease in total sawtimber is not expected to cause a reduction in cut from these public lands. Present levels of allowable cut are actually somewhat higher than existed during the period 1956-62 and are expected to continue at these present levels. The level of cut from private lands is determined by the individual landowner's objectives, his own estimate of his timber holdings, and the demand for timber in his local area. Therefore, this new estimate of total volume will not affect the amount of cut expected from private or public lands.

Table 1.--Area by land classes, by county, west-central Oregon, 1963

(In acres)

Land class	Total	Benton	Lane	Lincoln	Linn
Commercial forest	4,229,000	280,000	2,363,000	583,000	1,003,000
Unproductive forest	95,000	--	64,000	1,000	30,000
Productive-reserved forest	178,000	--	120,000	1,000	57,000
Total forest	4,502,000	280,000	2,547,000	585,000	1,090,000
Nonforest	1/943,000	148,000	371,000	45,000	379,000
All land	2/5,445,000	428,000	2,918,000	630,000	1,469,000

1/ Includes 20,700 acres of water according to Forest Survey standards of area classification but defined by the Bureau of the Census as land.

2/ From U.S. Bureau of the Census Land and Water Area of the United States, 1960.

Table 2.--Area of commercial forest land, by ownership classes, west-central Oregon, 1963

(In acres)

Ownership class	Area
National Forest	1,744,000
Other Federal:	
Bureau of Land Management	431,000
Indian	--
Miscellaneous Federal	(1/)
Total other Federal	431,000
State	71,000
County and municipal	7,000
Forest industry:	
Pulp and paper	153,000
Lumber	844,000
Other	76,000
Total forest industry	1,073,000
Farmer owned	454,000
Miscellaneous private	449,000
All ownerships	4,229,000

1/ Less than 500 acres.

Table 3.--Area of commercial forest land, by county and ownership classes, west-central Oregon, 1963

(In acres)

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Benton	280,000	17,000	72,000	15,000	176,000
Lane	2,363,000	1,179,000	281,000	567,000	336,000
Lincoln	583,000	169,000	47,000	256,000	111,000
Linn	1,003,000	379,000	109,000	235,000	280,000
All counties	4,229,000	1,744,000	509,000	1,073,000	903,000

Table 4.--Area of commercial forest land, by stand-size and ownership classes, west-central Oregon, 1963

(In acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands:					
Large	2,089,000	1,179,000	256,000	432,000	222,000
Small	730,000	326,000	80,000	87,000	237,000
Total	2,819,000	1,505,000	336,000	519,000	459,000
Poletimber stands	334,000	115,000	60,000	109,000	50,000
Sapling and seedling stands	975,000	97,000	113,000	414,000	351,000
Nonstocked areas	101,000	27,000	--	31,000	43,000
All classes	4,229,000	1,744,000	509,000	1,073,000	903,000

Table 5.--Area of commercial forest land, by stand-volume classes for sawtimber and other stand-size classes, west-central Oregon, 1963

(In acres)

Stand volumes per acre[1/]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	845,000	30,000	815,000
1,500 to 5,000 board feet	492,000	155,000	337,000
More than 5,000 board feet	2,892,000	2,634,000	258,000
All classes	4,229,000	2,819,000	1,410,000

1/ Net volume, International 1/4-inch rule.

Table 6.--Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, west-central Oregon, 1963

(In acres)

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked stands
70 percent or more	2,481,000	2,088,000	178,000	215,000	(1/)
40 to 70 percent	975,000	467,000	90,000	418,000	(1/)
10 to 40 percent	672,000	264,000	66,000	342,000	(1/)
Less than 10 percent	101,000	(1/)	(1/)	(1/)	101,000
All classes	4,229,000	2,819,000	334,000	975,000	101,000

1/ Not applicable.

Table 7.--Area of commercial forest land, by yield and ownership classes, west-central Oregon, 1963

(In acres)

Yield class[1/] (cubic feet)	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
120 or more	2,975,000	1,271,000	453,000	743,000	508,000
85 to 120	546,000	182,000	40,000	166,000	158,000
50 to 85	488,000	182,000	7,000	107,000	192,000
Less than 50	220,000	109,000	9,000	57,000	45,000
All classes	4,229,000	1,744,000	509,000	1,073,000	903,000

[1/] A classification in terms of capacity for cubic-foot annual growth per acre.

Table 8.--Area of commercial forest land, by forest types and ownership classes, west-central Oregon, 1963

(In acres)

Type	All ownerships	Public ownership	Private ownership
Douglas-fir	2,977,000	1,767,000	1,210,000
Ponderosa pine	5,000	5,000	--
Hemlock—Sitka spruce	420,000	158,000	262,000
Spruce—fir	250,000	211,000	39,000
Lodgepole pine	20,000	11,000	9,000
Western white pine	12,000	12,000	--
Hardwoods	444,000	62,000	382,000
Nonstocked	101,000	27,000	74,000
All types	4,229,000	2,253,000	1,976,000

Table 9.--Area of noncommercial forest land, by forest types, west-central Oregon, 1963

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	44,000	44,000	--
Engelmann spruce—fir	9,000	9,000	--
Western hemlock—Sitka spruce	6,000	6,000	--
Western white pine	6,000	6,000	--
Other softwoods	113,000	113,000	--
Hardwoods	(1/)	(1/)	--
Subalpine	5,000	--	5,000
Noncommercial rocky	90,000	--	90,000
All types	273,000	178,000	95,000

1/ Less than 500 acres.

Table 10.--Volume of all growing stock and sawtimber on commercial forest land, by counties, west-central Oregon, 1963[1/]

County	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Benton	1,272	7,690	6,356
Lane	13,327	32,919	67,086
Lincoln	3,095	21,013	17,289
Linn	5,928	34,963	28,287
All counties	23,622	146,585	119,018

1/ In this and all subsequent tables, conifer volumes are in terms of 32-foot logs for Scribner rule and 16-foot logs for International 1/4-inch rule. All hardwood volumes are in terms of 8-foot logs.

Table 11.--Volume of all growing stock and sawtimber on commercial forest land, by county and ownership class, west-central Oregon, 1963

County	Total	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
	Million cubic feet				
All growing stock:					
Benton	1,272	108	592	61	511
Lane	13,327	9,165	1,393	2,097	672
Lincoln	3,095	1,491	328	1,086	190
Linn	5,928	3,061	718	1,269	880
Total	23,622	13,825	3,031	4,513	2,253
	Million board feet[1/]				
Sawtimber:					
Benton	7,690	885	3,597	386	2,822
Lane	82,919	58,301	8,417	12,896	3,305
Lincoln	21,013	11,788	1,924	6,490	811
Linn	34,963	16,978	4,141	8,663	5,181
Total	146,585	87,952	18,079	28,435	12,119

1/ International 1/4-inch rule.

Table 12.--Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, west-central Oregon, 1963

(Thousands of trees)

Diameter class (inches d.b.h.)	All species	Softwoods	Hardwoods
5.0 - 6.9	120,957	98,702	22,255
7.0 - 8.9	78,631	64,616	14,015
9.0 - 10.9	56,939	45,101	11,838
11.0 - 12.9	44,964	34,578	10,386
13.0 - 14.9	34,475	29,487	4,988
15.0 - 16.9	25,859	21,673	4,186
17.0 - 18.9	18,990	16,331	2,659
19.0 - 28.9	54,055	50,869	3,186
29.0 - 38.9	20,279	19,965	314
39.0 and larger	14,195	14,181	14
All classes	469,344	395,503	73,841

Table 13.--Number of cull and salvable dead trees on commercial forest land, by diameter groups and by softwoods and hardwoods, west-central Oregon, 1963

(Thousands of trees)

Diameter class (inches d.b.h.)	Cull trees	Salvable dead trees
Softwoods:		
5.0 - 10.9	9,598	--
11.0 - 18.9	2,155	2,857
19.0 and larger	2,931	3,457
Total	14,684	6,314
Hardwoods:		
5.0 - 10.9	17,522	--
11.0 - 18.9	3,094	468
19.0 and larger	368	40
Total	20,984	508
All species	35,668	6,822

Table 14.--All-timber volume on commercial forest land, by class of timber and by softwoods and hardwoods, west-central Oregon, 1963

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	20,249	19,351	898
Upper-stem portion	1,525	1,457	68
Total	21,774	20,808	966
Poletimber trees	1,848	1,396	452
All growing-stock trees	23,622	22,204	1,418
Sound cull trees:			
Sawtimber-size	105	34	71
Poletimber-size	129	53	76
Total	234	87	147
Rotten cull trees:			
Sawtimber-size	64	62	2
Poletimber-size	2	1	1
Total	66	63	3
Salvable dead trees:			
Sawtimber-size	671	658	13
Total, all timber	24,593	23,012	1,581

Table 15.--Volume of all growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, west-central Oregon, 1963

Ownership classes	All species	Softwoods	Hardwoods
	Million cubic feet		
All growing stock:			
National Forest	13,825	13,398	427
Other public	3,031	2,826	205
Forest industry	4,513	4,249	264
Farmer and miscellaneous private	2,253	1,731	522
All ownerships	23,622	22,204	1,418
	Million board feet		
Sawtimber (International 1/4-inch rule):			
National Forest	87,952	86,256	1,696
Other public	18,079	17,456	623
Forest industry	28,435	27,414	1,021
Farmer and miscellaneous private	12,119	9,990	2,129
All ownerships	146,585	141,116	5,469
Sawtimber (Scribner rule):			
National Forest	70,905	69,256	1,649
Other public	14,731	14,123	608
Forest industry	23,191	22,198	993
Farmer and miscellaneous private	10,191	8,116	2,075
All ownerships	119,018	113,693	5,325

Table 16.--Volume of all growing stock and sawtimber on commercial forest land, by stand-size classes and by softwoods and hardwoods, west-central Oregon, 1963

Stand-size classes	All species	Softwoods	Hardwoods
	Million cubic feet		
All growing stock:			
Sawtimber stands	22,418	21,198	1,220
Poletimber stands	726	625	101
Sapling and seedling stands	474	377	97
Nonstocked areas	4	4	--
Total	23,622	22,204	1,418
	Million board feet		
Sawtimber (International 1/4-inch rule):			
Sawtimber stands	142,882	137,910	4,972
Poletimber stands	1,540	1,393	147
Sapling and seedling stands	2,162	1,812	350
Nonstocked areas	1	1	--
Total	146,585	141,116	5,469
Sawtimber (Scribner rule):			
Sawtimber stands	115,950	111,110	4,840
Poletimber stands	1,265	1,122	143
Sapling and seedling stands	1,802	1,460	342
Nonstocked areas	1	1	--
Total	119,018	113,693	5,325

Table 17.--Volume of all growing stock on commercial forest land, by species and diameter classes, west-central Oregon, 1963

(In million cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:											
Douglas-fir	15,748	130	205	296	406	566	584	592	3,921	3,592	5,456
Ponderosa pine	59	--	--	1	--	--	(1/)	(1/)	9	26	23
Western white pine	238	3	5	11	13	18	21	21	88	46	12
Sugar pine	53	(1/)	1	1	(1/)	1	2	2	19	11	16
Lodgepole pine	86	5	14	19	13	14	13	6	2	--	--
Whitebark pine	1	(1/)	(1/)	1	--	(1/)	(1/)	--	--	--	--
White and grand fir	225	13	13	17	15	18	15	23	63	36	12
Pacific silver fir	599	33	34	45	44	48	47	54	188	65	41
Noble fir	522	10	12	16	19	22	26	23	156	169	69
Subalpine fir	119	25	30	32	7	7	6	4	8	--	(1/)
Engelmann spruce	39	1	1	1	2	2	5	5	19	3	--
Sitka spruce	263	4	5	3	16	17	12	8	62	--	136
Mountain hemlock	503	11	23	37	30	45	49	47	185	67	9
Western hemlock	2,957	52	100	113	127	202	207	186	950	642	378
Alaska-cedar	3	(1/)	(1/)	1	(1/)	1	(1/)	(1/)	1	--	--
Western redcedar	680	11	18	33	37	37	33	41	170	182	118
Port-Orford-cedar	3	1	--	--	--	--	--	2	--	--	--
Incense-cedar	106	1	3	5	3	3	6	4	29	16	36
Total softwoods	22,204	300	464	632	732	1,001	1,026	1,018	5,870	4,855	6,306
Hardwoods:											
Red alder	884	70	60	84	159	113	119	99	158	22	(1/)
Oregon ash	25	6	--	7	3	3	2	3	1	--	--
Black cottonwood	26	--	2	--	(1/)	(1/)	4	(1/)	9	9	2
Bigleaf maple	281	33	33	45	27	26	24	20	51	19	3
Oregon white oak	119	18	20	18	18	4	11	13	17	--	--
California black oak	22	2	2	6	7	4	1	--	--	--	--
Golden chinkapin	34	9	13	5	2	(1/)	--	--	5	--	--
Pacific madrone	16	4	5	1	6	--	--	--	--	--	--
Other hardwoods	11	2	1	6	(1/)	(1/)	(1/)	(1/)	2	(1/)	(1/)
Total hardwoods	1,418	144	136	172	222	150	161	135	243	50	5
All species	23,622	444	600	804	954	1,151	1,187	1,153	6,113	4,905	6,311

1/ Less than 500,000 cubic feet.

Table 18.--Volume of sawtimber on commercial forest land, by species and diameter classes, west-central Oregon, 1963 (International 1/4-inch rule)

(In million board feet)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Douglas-fir	105,424	1,789	2,753	3,154	3,425	25,992	26,437	41,874
Ponderosa pine	342	(1/)	--	1	1	51	152	137
Western white pine	1,423	54	94	122	130	594	337	92
Sugar pine	297	2	6	9	8	102	67	103
Lodgepole pine	252	63	71	69	37	12	--	--
Whitebark pine	1	--	1	(1/)	--	--	--	--
White and grand fir	1,100	76	101	86	135	413	212	77
Pacific silver fir	2,865	199	249	259	308	1,170	420	260
Noble fir	2,564	64	87	115	111	916	763	508
Subalpine fir	126	23	26	27	16	33	--	1
Engelmann spruce	229	5	11	26	33	133	21	--
Sitka spruce	1,802	90	108	83	55	436	--	1,030
Mountain hemlock	2,239	120	199	238	241	1,000	390	51
Western hemlock	18,153	632	1,129	1,258	1,187	6,506	4,660	2,781
Alaska-cedar	10	(1/)	1	(1/)	2	7	--	--
Western redcedar	3,742	142	165	167	224	1,029	1,230	785
Port-Orford-cedar	12	--	--	--	12	--	--	--
Incense-cedar	535	8	10	24	13	148	76	256
Total	141,116	3,267	5,011	5,638	5,938	38,542	34,765	47,955
Hardwoods:								
Red alder	3,694	683	523	628	581	1,087	192	(1/)
Oregon ash	72	15	14	10	20	13	--	--
Black cottonwood	196	(1/)	(1/)	20	1	80	77	18
Bigleaf maple	991	109	122	124	116	343	154	23
Oregon white oak	366	80	23	66	76	121	--	--
California black oak	55	29	19	7	--	--	--	--
Golden chinkapin	38	8	1	--	--	29	--	--
Pacific madrone	46	1	1	--	10	9	25	--
Other hardwoods	11	(1/)	(1/)	(1/)	(1/)	11	(1/)	(1/)
Total	5,469	925	703	855	804	1,693	448	41
All species	146,585	4,192	5,714	6,493	6,742	40,235	35,213	47,996

1/ Less than 500,000 board feet.

Table 19.--Volume of sawtimber on commercial forest land, by species and diameter classes, west-central Oregon, 1963 (Scribner rule)

(In million board feet)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Douglas-fir	86,054	1,112	1,781	2,143	2,432	20,095	21,939	36,552
Ponderosa pine	280	(1/)	--	(1/)	1	38	124	117
Western white pine	1,086	33	60	82	92	459	280	80
Sugar pine	241	1	4	6	6	78	56	90
Lodgepole pine	162	39	44	45	26	8	--	--
Whitebark pine	1	--	1	(1/)	--	--	--	--
White and grand fir	814	43	61	55	93	319	175	68
Pacific silver fir	2,150	122	160	174	218	901	348	227
Noble fir	2,039	39	56	78	78	710	634	444
Subalpine fir	87	14	17	19	11	25	--	1
Engelmann spruce	171	3	8	18	23	102	17	--
Sitka spruce	1,475	56	70	56	40	339	--	914
Mountain hemlock	1,671	74	127	161	171	771	323	44
Western hemlock	14,131	389	735	860	848	5,031	3,857	2,411
Alaska-cedar	7	(1/)	1	(1/)	1	5	--	--
Western redcedar	2,891	85	103	109	153	771	997	673
Port-Orford-cedar	8	--	--	--	8	--	--	--
Incense-cedar	425	5	6	16	9	110	62	217
Total	113,693	2,015	3,234	3,822	4,210	29,762	28,812	41,838
Hardwoods:								
Red alder	3,590	651	503	609	568	1,069	190	(1/)
Oregon ash	69	14	13	10	19	13	--	--
Black cottonwood	195	(1/)	(1/)	20	1	79	77	18
Bigleaf maple	969	104	117	121	113	338	153	23
Oregon white oak	356	76	23	64	74	119	--	--
California black oak	52	28	18	6	--	--	--	--
Golden chinkapin	38	8	1	--	--	29	--	--
Pacific madrone	45	1	1	--	9	9	25	--
Other hardwoods	11	(1/)	(1/)	(1/)	(1/)	11	(1/)	(1/)
Total	5,325	882	676	830	784	1,667	445	41
All species	119,018	2,897	3,910	4,652	4,994	31,429	29,257	41,879

1/ Less than 500,000 board feet.

Table 20.--Volume of all growing stock on commercial forest land, by species and county, west-central Oregon, 1963

(In million cubic feet)

Species	Total	Benton	Lane	Lincoln	Linn
Softwoods:					
Douglas-fir	15,748	1,023	9,285	1,833	3,607
Ponderosa pine	59	--	59	--	--
Western white pine	238	--	146	--	92
Sugar pine	53	--	50	--	3
Lodgepole pine	86	--	59	(1/)	27
Whitebark pine	1	--	1	--	(1/)
White and grand fir	225	10	159	--	56
Pacific silver fir	599	--	317	28	254
Noble fir	522	2	280	--	240
Subalpine fir	119	--	56	--	63
Engelmann spruce	39	--	18	--	21
Sitka spruce	263	---	55	208	--
Mountain hemlock	503	--	436	--	67
Western hemlock	2,957	22	1,186	533	1,216
Alaska-cedar	3	(1/)	(1/)	--	3
Western redcedar	680	34	460	30	156
Port-Orford-cedar	3	--	3	--	--
Incense-cedar	106	--	104	--	2
Total	22,204	1,091	12,674	2,632	5,807
Hardwoods:					
Red alder	884	29	358	458	39
Oregon ash	25	13	6	--	6
Black cottonwood	26	(1/)	20	--	6
Bigleaf maple	281	59	157	5	60
Oregon white oak	119	79	35	--	5
California black oak	22	--	22	--	--
Golden chinkapin	34	1	30	--	3
Pacific madrone	16	--	16	--	--
Other hardwoods	11	(1/)	9	--	2
Total	1,418	181	653	463	121
All species	23,622	1,272	13,327	3,095	5,928

1/ Less than 500,000 cubic feet.

Table 21.--Volume of sawtimber on commercial forest land, by species and county, west-central Oregon, 1963 (International 1/4-inch rule)

(In million board feet)

Species	Total	Benton	Lane	Lincoln	Linn
Softwoods:					
Douglas-fir	105,424	6,626	62,315	13,834	22,649
Ponderosa pine	342	--	342	--	--
Western white pine	1,423	--	879	--	544
Sugar pine	297	--	288	--	9
Lodgepole pine	252	--	217	1	34
Whitebark pine	1	--	1	--	--
White and grand fir	1,100	52	850	--	198
Pacific silver fir	2,865	--	1,544	169	1,152
Noble fir	2,564	8	1,160	--	1,396
Subalpine fir	126	--	71	--	55
Engelmann spruce	229	--	104	--	125
Sitka spruce	1,802	--	318	1,484	--
Mountain hemlock	2,239	--	2,020	--	219
Western hemlock	18,153	111	7,309	3,319	7,414
Alaska-cedar	10	--	1	--	9
Western redcedar	3,742	237	2,615	184	706
Port-Orford-cedar	12	--	12	--	--
Incense-cedar	535	--	527	--	8
Total	141,116	7,034	80,573	18,991	34,518
Hardwoods:					
Red alder	3,694	151	1,445	1,997	101
Oregon ash	72	31	23	--	18
Black cottonwood	196	(1/)	156	--	40
Bigleaf maple	991	199	511	25	256
Oregon white oak	366	265	101	--	--
California black oak	55	--	55	--	--
Golden chinkapin	38	9	9	--	20
Pacific madrone	46	--	46	--	--
Other hardwoods	11	1	--	--	10
Total	5,469	656	2,346	2,022	445
All species	146,585	7,690	82,919	21,013	34,963

1/ Less than 500,000 board feet.

Table 22.--Volume of sawtimber on commercial forest land, by species and county, west-central Oregon, 1963 (Scribner rule)

(In million board feet)

Species	Total	Benton	Lane	Lincoln	Linn
Softwoods:					
Douglas-fir	86,054	5,383	50,902	11,152	18,617
Ponderosa pine	280	--	280	--	--
Western white pine	1,086	--	666	--	420
Sugar pine	241	--	234	--	7
Lodgepole pine	162	--	139	1	22
Whitebark pine	1	--	1	--	--
White and grand fir	814	40	628	--	146
Pacific silver fir	2,150	--	1,145	131	874
Noble fir	2,039	7	912	--	1,120
Subalpine fir	87	--	49	--	38
Engelmann spruce	171	--	77	--	94
Sitka spruce	1,475	--	218	1,257	--
Mountain hemlock	1,671	--	1,511	--	160
Western hemlock	14,131	90	5,588	2,634	5,819
Alaska-cedar	7	--	1	--	6
Western redcedar	2,891	196	2,026	148	521
Port-Orford-cedar	8	--	8	--	--
Incense-cedar	425	--	419	--	6
Total	113,693	5,716	64,804	15,323	27,850
Hardwoods:					
Red alder	3,590	148	1,402	1,942	98
Oregon ash	69	30	22	--	17
Black cottonwood	195	(1/)	155	--	40
Bigleaf maple	969	194	499	24	252
Oregon white oak	356	258	98	--	--
California black oak	52	--	52	--	--
Golden chinkapin	38	9	9	--	20
Pacific madrone	45	--	45	--	--
Other hardwoods	11	1	--	--	10
Total	5,325	640	2,282	1,966	437
All species	119,018	6,356	67,086	17,289	28,287

1/ Less than 500,000 board feet.

Table 23.--Net annual growth of all growing stock and sawtimber on commercial forest land, by species, west-central Oregon, 1963

Species	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	M cu. ft.	M bd. ft.	M bd. ft.
Softwoods:			
Douglas-fir	108,404	623,355	501,525
Ponderosa pine	-116	-862	-694
Sugar pine	468	2,860	2,300
Western hemlock	26,870	125,779	101,197
White and grand fir	3,317	14,115	11,356
Other true firs	6,303	30,964	24,912
Spruce	5,043	29,046	23,369
Western redcedar	7,066	37,899	30,492
Other softwoods	2,161	18,285	14,712
Total	159,516	881,441	709,169
Hardwoods	26,479	112,501	109,531
All species	185,995	993,942	818,700

Table 24.--Annual mortality of all growing stock and sawtimber on commercial forest land, by species, west-central Oregon, 1963[1/]

Species	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Softwoods:			
Douglas-fir	110	725	588
True firs	44	128	104
Western hemlock	28	174	140
Other softwoods	29	137	111
Total	211	1,164	943
Hardwoods	9	35	32
All species	220	1,199	975

[1/] Estimate of long-term average annual mortality including both enphytotic and catastrophic losses.

Table 25.--Volume of salvable dead sawtimber-size trees on commercial forest land, by softwoods and hardwoods, west-central Oregon, 1963

(In million board feet)

Species group	Volume	
	International 1/4-inch rule	Scribner rule
Softwoods	4,620	3,739
Hardwoods	69	67
All species	4,689	3,806

Table 26.--Timber harvest by ownership class, west-central Oregon, 1950-62 (Scribner rule)

(In thousand board feet)

Year[1/]	Total	Private	State	National Forest	Other[2/] public
1950	2,331,357	1,954,955		348,400	28,002
1951	2,371,536	2,000,236		352,300	19,000
1952	2,869,267	2,415,179		439,600	14,488
1953	2,468,737	2,002,460		465,600	677
1954	2,383,393	1,833,821		549,000	572
1955	2,487,500	1,916,696		570,804	--
1956	2,432,187	1,726,225		554,100	151,862
1957	2,056,359	1,366,861		538,900	150,598
1958	1,940,467	1,044,480	15,390	683,837	196,760
1959	2,126,380	945,419	15,505	932,568	232,888
1960	2,288,987	1,296,745	20,355	763,302	208,585
1961	2,448,498	1,428,615	16,100	762,089	241,694
1962	2,802,982	1,393,768	16,631	1,126,000	266,583

Source: Reports of the State Forester, U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and Division of Timber Management, Region 6, U.S. Forest Service.

1/ For the years 1950-57, data for private and State ownerships were not separated.

2/ Prior to 1956 timber harvest data for the Bureau of Land Management were included with State and Private.

ACCURACY OF THE CURRENT INVENTORY DATA

Forest Area and Timber Volume

Estimates of forest land area for the Siuslaw National Forest and the Cottage Grove unit of the Umpqua National Forest were based on complete enumeration by means of a forest type map. Area estimates for all the remaining areas, both National Forests and other lands, were derived by sampling. Sampling errors were computed separately for each subunit, then combined into a single estimate for the entire inventory unit. Thus, the sampling errors for total commercial and noncommercial forest land express the combined errors from the sampled subunits as a percent of the total area estimate for each class.

Total volume estimates for west-central Oregon were derived by sampling and thus have sampling errors associated with them. Sampling errors were calculated for total board-foot and cubic-foot volume only.

In all cases, an effort was made to hold errors due to techniques or judgment to a minimum by close supervision and frequent checks of all phases of the work.

Table 27 presents the estimated sampling errors as a percent of the total estimates at the 68-percent and 95-percent probability levels.

The sampling error of any breakdown of these totals will be substantially greater than for the total, and the smaller the breakdown the larger the sampling error.

Table 27.--Sampling errors of estimates of forest area and timber volume

Item	Estimated totals	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land.....acres..	4,229,000	±0.8	±1.6
Noncommercial forest land....acres..	273,000	±6.2	±12.2
Volume:			
Growing stock.....MM cu. ft..	23,569	±2.8	±5.5
Sawtimber (Scribner rule).....MM bd. ft..	119,018	±3.2	±6.3

DIFFERENCES IN RESULTS OF INVENTORIES

Tables 28 and 29 show area and volume statistics for three successive inventories of west-central Oregon. Sawtimber volumes for the two earlier inventories have been adjusted for changes due to lowering the diameter limit of sawtimber trees and changes in merchantable top diameter limits. Some of the differences between inventories are due to physical changes, such as cutting and growth of stands, restocking of deforested lands, and the shift of forest land to other uses such as urban development. Some differences are due to changes in the standards of utilization recognized, some to changes in procedures, and some to changes in standards and definitions. These variations complicate direct comparison of the statistics, and interpretation of the figures in these two tables as real changes in the forest resource must be made with caution.

Nevertheless, certain general conclusions can be drawn concerning the trend of the forest resources of west-central Oregon since the initial inventories of the 1930's. The area of commercial forest land has remained about the same. The 1963 estimate is about 2 percent higher than the initial estimate of the 1930's, about 1 percent lower than the estimate of the 1940's. Over the same period,

Table 28.--Comparison of area statistics for west-central Oregon

(In acres)

Land class	Initial inventory 1931-32	First reinventory 1940-43	Current inventory 1963
Commercial forest	4,144,000	4,278,000	4,229,000
Noncommercial forest:			
Productive-reserved	22,000	150,000	178,000
Unproductive	188,000	16,000	95,000
Total noncommercial forest	210,000	166,000	273,000
Total forest	4,354,000	4,444,000	4,502,000
Nonforest	1,135,000	1,048,000	943,000
All land	1/ 5,489,000	1/ 5,492,000	2/ 5,445,000

1/ From Government Land Office, U.S. Department of the Interior.

2/ From U.S. Bureau of the Census, 1960.

Table 29.--Comparison of timber-volume statistics for west-central Oregon

(In million board feet, Scribner rule)

Species	Initial inventory 1931-32	First reinventory 1940-43	Current inventory 1963
Softwoods:			
Douglas-fir	103,136	95,434	86,054
Ponderosa pine	82	101	280
Western white pine	492	379	1,086
Sugar pine	195	153	241
Lodgepole pine	76	20	162
Whitebark pine	--	--	1
True firs	3,380	2,781	5,090
Engelmann spruce	42	24	171
Sitka spruce	1,375	671	1,475
Mountain hemlock	2,616	1,870	1,671
Western hemlock	10,819	8,743	14,131
Alaska-cedar	(1/)	1	7
Western redcedar	2,543	1,955	2,891
Port-Orford-cedar	--	--	8
Incense-cedar	247	303	425
Total	125,003	112,435	113,693
Hardwoods:			
Red alder	1,061	292	3,590
Oregon ash	--	--	69
Black cottonwood	37	50	95
Bigleaf maple	251	267	969
Oregon white oak	--	--	356
California black oak	--	--	52
Golden chinkapin	--	--	38
Other hardwoods	11	9	56
Total	1,360	618	5,325
All species	126,363	113,053	119,018

1/ Less than 500,000 board feet.

the estimate of total forest land area has increased about 3 percent. The estimated area of productive-reserved land has increased about eightfold, due primarily to the creation of such reserved areas as the Mount Jefferson Primitive Area, the Mount Washington Wild Area, and the Three Sisters Wilderness Area. However, the shift of commercial forest land into productive-reserved

status has apparently been largely offset by areas shifted from unproductive commercial forest to commercial forest area due to changed logging methods and improved accessibility.

The estimated volume of Douglas-fir is about 17 percent less than 30 years ago, but the estimated volume of all other softwoods is higher so that the total volume of all softwoods is only 10 percent less. The volume of hardwoods, on the other hand, is estimated to be nearly four times that of the 1930's. A large share of this apparent increase is due to greater recognition of hardwoods in the last inventory, but it is also due, to a considerable degree, to the rapid establishment of hardwood stands, particularly red alder, on cutover conifer sites.

Two counties in west-central Oregon were inventoried between 1940-43 and 1963. They were Lincoln in 1955 and Lane in 1956. Comparisons of the results of these inventories and the 1963 inventory are shown in tables 30 and 31. The differences in the estimates of forest land area, both commercial and noncommercial, are insignificant. The difference in volume estimates for Lincoln County, after adjustment for estimated growth and cut during the intervening period, is well within the range of the sampling errors for the two inventories.

A direct comparison of the 1956 and 1962 estimates of Scribner sawtimber volume in Lane County suggests that the volume has dropped by 29.9 billion board feet in the intervening period. However, reported cut and estimated growth for this period indicate that the actual physical change in live sawtimber volume was only 5.7 billion board feet. Since the two estimates are the results of two independent inventories, sampling variation can be expected to prevent exact agreement of the estimates. However, the remaining difference of 24.2 billion is too large to be attributed to sampling variation alone.

Table 30.--Comparison of land area statistics for Lane and Lincoln Counties

(In acres)

Land class	Lane County		Lincoln County	
	1956	1963	1956	1963
Commercial forest	2,420,480	2,363,000	577,670	583,000
Noncommercial forest:				
Productive-reserved	125,370	120,000	470	1,000
Unproductive	29,850	64,000	--	1,000
Total noncommercial	155,220	184,000	470	2,000
Total forest	2,575,700	2,547,000	578,140	585,000
Nonforest	382,570	371,000	48,750	45,000
All lands	2,958,270	2,918,000	626,890	630,000

Table 31.--Comparison of timber-volume statistics for Lane and Lincoln Counties

(In million board feet, Scribner rule)

Stand-size classes	Lane		Lincoln	
	1956	1963	1956	1963
Sawtimber stands	96,731	65,557	20,355	16,887
Poletimber stands	247	765	160	207
Sapling and seedling stands	30	763	6	195
Nonstocked areas	2	1	1	--
Total	97,010	67,086	20,522	17,289

The 1956 inventory of Lane County was unique in several ways. It was the first county inventory to use average Girard form classes by species and diameter group in the computation of tree volume. It was the last such inventory in which log heights were estimated. Individual tree volume computations and all subsequent compilations were made by hand. In addition, the procedures used in the 1956 inventory for selecting field sample plots were subject to a risk of bias which could lead to an overestimate of volume.

Inventories made since 1956, including the 1962 inventory, have used a systematic sample of trees carefully measured for total height, average Girard form classes based on measurements taken from trees in the inventory unit, and the data applied in tree volume equations based on total tree height, diameter, and Girard form class to compute tree volumes. Automatic data processing has been used to obtain greater accuracy and more systematic checking of the results than is possible by hand methods. The procedures used in the 1962 inventory also eliminated the possibility of bias in the selection of field sample plots.

Therefore, much greater reliance is placed on the 1963 estimate of 67.1 billion and on the net inventory reduction of 5.7 billion due to cut and growth since 1956. Thus the best current estimate of the volume in 1956 is 72.8 billion board feet.

The difference of 24.2 billion between the two estimates of 1956 volume (97.0 and 72.8) is explained as follows:

A downward adjustment of 2.1 billion board feet is necessary due to the fact that in 1962 the sawtimber volume of all softwood trees over 11 inches in diameter was stated in terms of 32-foot logs whereas in the 1956 estimate the volume in these trees was stated in terms of 16-foot logs. Of the remaining difference of 22.1 billion board feet, approximately 13.4 billion is due to corrections found necessary in the Girard form classes used for the 1956 estimate. An examination of the form class estimates used at that time indicates that they average approximately four points too high compared with the measured data available in 1962.

The remaining difference of 8.7 billion board feet, 9 percent of the original 1956 estimate, is due to a combination of sampling and technique errors.

FOREST SURVEY PROCEDURES

This west-central Oregon report combines data from three National Forest inventory projects and two Forest Survey projects. These are: Siuslaw National Forest, 1956; Cottage Grove unit of the Umpqua National Forest, 1956; Willamette National Forest, 1961-62; Forest Survey projects in Linn and Benton Counties, 1961; and Lane and Lincoln Counties, 1962.

Siuslaw National Forest and Cottage Grove Unit of the Umpqua National Forest

The data from the 1956 inventory were the latest available for inclusion in this report; therefore, these data were used after updating them to January 1, 1963, by adding estimated growth and subtracting cut. The inventory of the Siuslaw National Forest was a cooperative effort of Forest Survey and the Siuslaw National Forest. A complete type map was made using aerial photos, and area data were taken from this map. Field plots were located by random selection on aerial photos. Field plots consisted of three 1/5-acre circular subplots spaced at 6-chain intervals. Permanent plots were located and established in the field; supplemental plots were measured but not marked. The field plots provided data only for volume estimates. Area estimates were made from the type map summary and updated for exchanges in area since the date of inventory.

The inventory of the Cottage Grove unit, Umpqua National Forest, was similar to the Siuslaw inventory. Both were type map inventories with random location of plot clusters. The Umpqua sample, however, was in sawtimber stands only.

Willamette National Forest

This forest was inventoried in 1961 and 1962 by National Forest inventory crews. The data were adjusted to Forest Survey standards and updated to January 1, 1963, by the addition of growth and subtraction of cut.

The statistics on land area, timber volume, and growth were obtained from permanent sample plot data. These plots consisted of clusters of three 1/5-acre plots located on a systematic grid with intervals of 1.7 miles.

Outside National Forests

The area outside National Forests was inventoried by Forest Survey during the summers of 1961 and 1962. The volume data were updated to January 1, 1963, in a manner similar to that for the National Forests.

A systematic sample of field plots was distributed across all ownerships other than National Forest. The field plots, spaced 3.4 miles apart, were supplemented by a more intensive sample of photo plots. The ratio of photo to field plots was approximately 16 to 1. A field plot consisted of 10 sample points distributed systematically over an acre. The variable-radius-plot principle was used at each sample point to select the trees to be tallied. The summation of the 10-point tally expressed the resources and conditions for that acre and provided area, volume, growth, and mortality statistics.

DEFINITION OF TERMS

Land Area

Total Land Area

Includes dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains; streams, sloughs, and canals less than one-eighth mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest Land Area

Land at least 10 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest Land Area

Land that does not qualify as forest land.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved. Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding crops of industrial wood products (usually sawtimber) because of adverse site conditions.

Subalpine. Forest stands at the upper elevational limits of tree growth.

Noncommercial rocky. Areas within the commercial forest zone but so steep and rocky that they are incapable of producing usable wood products.

Types

Forest land types are based upon the predominant species in the present tree cover. Types are determined on the basis of majority of stocking by all live trees of various species, considering both size and spacing.

Class of Timber

Growing Stock

Live trees of commercial species that are now or may be expected to become suitable for use as industrial wood. They must meet the following specifications:

Sawtimber trees (11.0 inches d.b.h. and larger). Contain at least one 16-foot coniferous saw log or one 12-foot hardwood saw log to a variable top diameter of not less than 8.0 inches inside bark and with not less than 25 percent of the board-foot volume of the tree free of defect.

Poletimber trees (5.0-10.9 inches d.b.h.). Not less than 50 percent sound on a cubic-foot basis and with no defects or deformities which are likely to prevent them from becoming growing-stock sawtimber trees.

Sapling and seedling trees (less than 5.0 inches d.b.h.). No defects or deformities which are likely to prevent them from becoming growing-stock poletimber trees.

Nongrowing Stock

Trees which do not meet the requirements for growing stock.

Cull trees. Trees of noncommercial species and trees of commercial species which are too defective or which are unlikely to become growing-stock trees due to deformity, disease, low vigor, etc.

Sound cull trees. Trees of noncommercial species, or with excessive defect due to form, roughness, etc.

Rotten cull trees. Trees with excessive defect due primarily to rot.

Mortality trees. Trees which died from natural causes during a specified period and which were not cull trees at the time of death.

Salvable dead trees. Standing or down dead trees 11.0 inches or more in diameter that contain 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 12-foot hardwood saw log.

Stand-Size Classes

Sawtimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with sawtimber stocking at least equal to poletimber stocking.

Large sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees 21.0 inches d.b.h. and larger.

Small sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees from 11.0 to 20.9 inches d.b.h.

Poletimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with poletimber stocking exceeding sawtimber stocking.

Sapling and Seedling Stand

Stand at least 10 percent stocked with growing-stock trees with more than half of this stocking in saplings and/or seedlings.

Nonstocked Area

An area of commercial forest land less than 10 percent stocked with growing-stock trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands.

"Stocking percentages" express current area occupancy or stocking in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to make effective use of forest land. Three categories of stocking are provided: (1) all live trees, (2) growing-stock trees (sawtimber and poletimber trees, saplings and established seedlings of commercial species), and (3) desirable trees (superior growing-stock trees). Stocking in terms of item 1 is used in classifying forest land and forest cover type. Stocking in terms of item 2 is used in classifying stand size and age. Stocking in terms of item 3 is used in classification of area condition.

Standards used for full stocking are:

trees 2 years old to 4.9 inches d.b.h.	750 trees per acre
trees 5.0 to 6.9 inches d.b.h.	670 trees per acre
trees 7.0 inches d.b.h. and larger:	
conifer sites	160 square feet basal area per acre
hardwood sites	100 square feet basal area per acre

Well-Stocked Stand

A stand that is 70 percent or more stocked with present or potential growing-stock trees.

Medium-Stocked Stand

A stand that is 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly Stocked Stand

A stand that is 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked Area

An area less than 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule. The common board-foot log rule used in determining volume of sawtimber in the Pacific Northwest.

International 1/4-inch rule. The standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top outside bark.

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other Public Lands

Federal lands other than National Forests, including lands administered by the U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

Privately owned lands other than forest industry or farmer-owned lands.

TREE SPECIES

Tree species found in west-central Oregon include:

Softwoods:

- Alaska-cedar *(Chamaecyparis nootkatensis)*
- Douglas-fir *(Pseudotsuga menziesii)*
- Engelmann spruce *(Picea engelmannii)*
- Grand fir *(Abies grandis)*
- Incense-cedar *(Libocedrus decurrens)*
- Lodgepole pine *(Pinus contorta)*
- Mountain hemlock *(Tsuga mertensiana)*
- Noble fir *(Abies procera)*
- Pacific silver fir *(Abies amabilis)*
- Ponderosa pine *(Pinus ponderosa)*
- Port-Orford-cedar *(Chamaecyparis lawsoniana)*
- Sitka spruce *(Picea sitchensis)*
- Subalpine fir *(Abies lasiocarpa)*
- Sugar pine *(Pinus lambertiana)*
- Western hemlock *(Tsuga heterophylla)*
- Western redcedar *(Thuja plicata)*
- Western white pine *(Pinus monticola)*
- Whitebark pine *(Pinus albicaulis)*
- White fir *(Abies concolor)*

Hardwoods:

- Bigleaf maple *(Acer macrophyllum)*
- Black cottonwood *(Populus trichocarpa)*
- California black oak *(Quercus kelloggii)*
- Golden chinkapin *(Castanopsis chrysophylla)*
- Oregon ash *(Fraxinus latifolia)*
- Oregon white oak *(Quercus garryana)*
- Pacific madrone *(Arbutus menziesii)*
- Red alder *(Alnus rubra)*

RECENT FOREST SURVEY PUBLICATIONS

Number	Title	Date
Miscellaneous:		
	1963 Washington Log Production	October 1964
	1963 Oregon Log Production	June 1964
Research Paper:		
PNW-5	Timber Trends in Western Oregon and Western Washington	October 1963
Resource Bulletins:		
PNW-9	Timber Resource Statistics for the Pacific Northwest	1965
PNW-8	Forest Statistics for Southwest Oregon	August 1964
PNW-7	Forest Statistics for Northwest Oregon	July 1964
PNW-6	1962 Washington Log Production	December 1963
PNW-5	Forest Statistics for Chelan and Douglas Counties, Washington	May 1963
PNW-4	Forest Statistics for Northeast Washington	May 1963
PNW-3	Toward Complete Use of Eastern Oregon's Forest Resources	May 1963
PNW-2	1962 Oregon Log Production	April 1963
PNW-1	1961 Washington Log Production	January 1963
Resource Reports:		
146	1961 Oregon Log Production	December 1962 (rev.)
145	Forest Statistics for Clallam County, Washington	July 1962
144	Forest Statistics for Jefferson County, Washington	June 1962
143	Forest Statistics for King County, Washington	June 1962

Available from:

Pacific Northwest Forest & Range Experiment Station
P. O. Box 3141
Portland, Oregon 97208

The FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

HARDWOOD

Timber Resources

OF THE DOUGLAS-FIR SUBREGION

BY MELVIN E. METCALF

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVIC
RESOURCE BULLETIN PNW-

1965

CONTENTS

INTRODUCTION

The statistics on hardwood timber volume and type area presented here are being made available in response to the increasing interest in this resource in western Oregon and western Washington. These estimates are based on data obtained by the U.S. Forest Service in the course of timber inventories carried out by National Forest Administration on National Forest lands and by the nationwide Forest Survey on the remaining public and private lands.

These inventories were designed to provide information on total commercial forest land and timber volume for planning purposes and were not designed to inventory hardwoods specifically. Since hardwoods comprise only a small fraction of the total timber volume of this subregion, these estimates may have considerably higher sampling errors and, consequently, considerably less reliability than estimates of the total volume of all species. Thus, these data should be used with caution.

The data presented are based on the most recent inventories available. The estimates of volume shown by half States in tables 1-5 and 9, although based on inventories of different dates, have all been adjusted to a common base year--1963. The estimates of area and volume by western Washington counties shown in tables 6-7 and 10-11, however, are as of the actual year of inventory and have not been adjusted to the base year. Consequently, the total volume estimates in these tables will not agree with the totals by half States in tables 1-5. Nevertheless, they provide information on the geographical dispersion of hardwood types and volumes.

More detailed statistics are shown for western Oregon than for western Washington because of the more recent and more detailed inventories completed there. Similar detailed information will become available for western Washington within the next 2 to 3 years as scheduled reinventories are completed in that area.

Persons desiring more detailed information on hardwood volumes on public lands in specific areas should consult the local offices of the National Forests, the district offices of the U.S. Bureau of Land Management, and the offices of the appropriate State Foresters.

All board-foot volumes shown are net and are for trees 11.0 inches d.b.h. and larger to an 8-inch top.

All cubic-foot volumes shown are net and are for trees 5.0 inches d.b.h. and larger to a 4-inch top.

DISCUSSION

Red alder *(Alnus rubra)* is the most important commercial hardwood in the Douglas-fir subregion. It makes up nearly 70 percent of the total board-foot volume (Scribner) of the three principal commercial species (red alder, bigleaf maple, and black cottonwood) and 58 percent of the total board-foot volume of all commercial hardwoods. The total board-foot volume of red alder is about equally distributed between western Oregon and western Washington. About 30 percent of the volume in western Oregon and one-fourth of that in western Washington is in trees over 19.0 inches d.b.h. (tables 1, 2, and 3).

Slightly more than 65 percent of the total board-foot volume of alder in the Douglas-fir subregion occurs on privately owned forest land: 76 percent in western Washington, 55 percent in western Oregon. In western Oregon, the remainder is divided between National Forest and other public owners. In western Washington, however, little volume occurs on National Forest lands (tables 4 and 5).

On lands other than National Forest in western Oregon, 56 percent of the board-foot volume of the three principal commercial species occurs in stands classed as hardwood type and 44 percent in stands classed as conifer type (table 8). For red alder the corresponding percentages are 54 and 42. Thus, slightly more than two-fifths of the red alder volume is scattered through the coniferous stands. This volume occurs in densities ranging from scattered trees up to concentrations of nearly one-half of the stand. Although similar statistics are unavailable for National Forest lands, most of the red alder volume on these lands occurs in stands which are predominantly conifer.

After red alder, the remaining two principal commercial hardwoods are bigleaf maple *(Acer macrophyllum)* and black cottonwood *(Populus trichocarpa)*. These two species together make up 30 percent of the board-foot volume of the three principal commercial hardwoods, with bigleaf maple making up 25 percent and cottonwood 5 percent. Bigleaf maple is about equally distributed between western Oregon and western Washington. However, 71 percent of the cottonwood occurs in western Washington, compared with only 29 percent in western Oregon. In western Oregon, 70 percent of the board-foot volume of bigleaf maple and practically all of the cottonwood are found on private land. In western Washington, the comparable percentages are 85 and 80.

Tables 6 and 7 contain estimates of the volume of total growing stock and sawtimber for the three principal species by county. The data presented are as of the date of the latest field inventory for each county.

As shown in table 8, two-thirds of the black cottonwood in western Oregon occurs in the cottonwood type, about 10 percent in conifer type, and the rest in other hardwood types. On the other hand, over half of the volume of bigleaf maple is found in conifer types, 30 percent in the bigleaf maple type, and the rest in other hardwood types.

Table 9 contains estimates of the volume of other commercial hardwood species of lesser importance in the Douglas-fir subregion. Pacific madrone *(Arbutus menziesii)* is the principal species, making up 24 percent of the total sawtimber volume, with tanoak *(Lithocarpus densiflorus)* second and Oregon white oak *(Quercus garryana)* third with 21 and 16 percent, respectively.

Tables 10 and 11 contain area estimates of the three principal commercial hardwood types by broad owner classes as of the date of the most recent county inventory.

Table 1.--Volume of growing stock of principal commercial hardwood species, by diameter class--western Oregon and western Washington

(In million cubic feet)

State and species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Western Oregon:											
Red alder	2,675	263	275	330	387	340	363	289	365	61	2
Black cottonwood	58	--	4	--	3	2	11	5	20	9	4
Bigleaf maple	842	92	93	115	103	94	63	57	166	49	10
Total	3,575	355	372	445	493	436	437	351	551	119	16
Western Washington:											
Red alder	3,449	333	584	628	578	447	318	198	330	33	--
Black cottonwood	191	3	7	14	10	13	19	25	66	30	4
Bigleaf maple	938	60	109	134	114	95	81	69	189	77	10
Total	4,578	396	700	776	702	555	418	292	585	140	14
Douglas-fir subregion:											
Red alder	6,124	596	859	958	965	787	681	487	695	94	2
Black cottonwood	249	3	11	14	13	15	30	30	86	39	8
Bigleaf maple	1,780	152	202	249	217	189	144	126	355	126	20
Total	8,153	751	1,072	1,221	1,195	991	855	643	1,136	259	30

Table 2.--Volume of sawtimber of principal commercial hardwood species, by diameter class--western Oregon and western Washington

(In million board feet, Scribner rule)

State and species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Western Oregon:								
Red alder	9,542	1,575	1,564	1,873	1,628	2,422	465	15
Black cottonwood	388	12	9	62	36	161	77	31
Bigleaf maple	3,166	414	438	326	325	1,171	406	86
Total	13,096	2,001	2,011	2,261	1,989	3,754	948	132
Western Washington:								
Red alder	9,061	2,154	1,992	1,539	1,076	2,066	234	--
Black cottonwood	980	37	57	91	136	414	216	29
Bigleaf maple	3,433	423	424	393	378	1,183	547	85
Total	13,474	2,614	2,473	2,023	1,590	3,663	997	114
Douglas-fir subregion:								
Red alder	18,603	3,729	3,556	3,412	2,704	4,488	699	15
Black cottonwood	1,368	49	66	153	172	575	293	60
Bigleaf maple	6,599	837	862	719	703	2,354	953	171
Total	26,570	4,615	4,484	4,284	3,579	7,417	1,945	246

Table 3.--Volume of sawtimber of principal commercial hardwood species, by diameter class--western Oregon and western Washington

(In million board feet, International 1/4-inch rule)

State and species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Western Oregon:								
Red alder	9,823	1,651	1,625	1,933	1,668	2,461	470	15
Black cottonwood	393	14	9	62	36	164	77	31
Bigleaf maple	3,240	434	456	335	334	1,187	408	86
Total	13,456	2,099	2,090	2,330	2,038	3,812	955	132
Western Washington:								
Red alder	9,355	2,258	2,070	1,589	1,104	2,099	235	--
Black cottonwood	998	39	59	94	139	421	217	29
Bigleaf maple	3,516	443	441	406	388	1,202	550	86
Total	13,869	2,740	2,570	2,089	1,631	3,722	1,002	115
Douglas-fir subregion:								
Red alder	19,178	3,909	3,695	3,522	2,772	4,560	705	15
Black cottonwood	1,391	53	68	156	175	585	294	60
Bigleaf maple	6,756	877	897	741	722	2,389	958	172
Total	27,325	4,839	4,660	4,419	3,669	7,534	1,957	247

Table 4.--Volume of growing stock of principal commercial hardwood species, by owner class--western Oregon and western Washington

(In million cubic feet)

State and species	All owners	National Forest	Other public	Forest industry	Miscellaneous private
Western Oregon:					
Red alder	2,675	619	591	593	872
Black cottonwood	58	1	1	4	52
Bigleaf maple	842	126	211	190	315
Total	3,575	746	803	787	1,239
Western Washington:					
Red alder	3,449	18	803	1,236	1,392
Black cottonwood	191	3	38	75	75
Bigleaf maple	938	8	166	278	486
Total	4,578	29	1,007	1,589	1,953
Douglas-fir subregion:					
Red alder	6,124	637	1,394	1,829	2,264
Black cottonwood	249	4	39	79	127
Bigleaf maple	1,780	134	377	468	801
Total	8,153	775	1,810	2,376	3,192

Table 5.--Volume of sawtimber of principal commercial hardwood species, by owner class--western Oregon and western Washington

(In million board feet, Scribner rule)

State and species	All owners	National Forest	Other public	Forest industry	Miscellaneous private
Western Oregon:					
Red alder	9,542	2,401	1,943	1,903	3,295
Black cottonwood	388	4	--	30	354
Bigleaf maple	3,166	253	696	916	1,301
Total	13,096	2,658	2,639	2,849	4,950
Western Washington:					
Red alder	9,061	67	2,124	3,351	3,519
Black cottonwood	980	28	165	392	395
Bigleaf maple	3,433	42	476	1,022	1,893
Total	13,474	137	2,765	4,765	5,807
Douglas-fir subregion:					
Red alder	18,603	2,468	4,067	5,254	6,814
Black cottonwood	1,368	32	165	422	749
Bigleaf maple	6,599	295	1,172	1,938	3,194
Total	26,570	2,795	5,404	7,614	10,757

Table 6.--Volume of growing stock of principal commercial hardwood species, by county--
western Oregon and western Washington

(In million cubic feet)

Western Oregon						Western Washington					
County	Date of inventory	Red alder	Bigleaf maple	Black cotton-wood	Total	County	Date of inventory	Red alder	Bigleaf maple	Black cotton-wood	Total
Benton	1961	29	59	(1/)	88	Clallam	1960	168	16	6	190
Clackamas	1961	85	74	(1/)	159	Clark	1963	75	14	--	89
Clatsop	1961	197	23	--	220	Cowlitz	1963	164	37	4	205
Columbia	1961	201	20	--	221	Grays Harbor	1951	391	38	11	440
Coos	1962	342	68	--	410	Island 2/	1959	148	30	--	178
Curry	1962	149	30	--	179	Jefferson	1960	145	22	--	167
Douglas	1962	225	171	17	413	King	1959	203	70	13	286
Hood River	1961	8	6	1	15	Lewis	1963	282	153	7	442
Jackson	1962	6	22	--	28	Mason	1951	114	11	10	135
Josephine	1962	29	6	--	35	Pacific	1963	252	4	--	256
Lane	1962	358	157	20	535	Pierce	1959	129	24	8	161
Lincoln	1962	458	5	--	463	Skagit	1957	207	47	13	267
Linn	1961	39	60	6	105	Skamania	1963	56	27	12	95
Marion	1961	12	51	9	72	Snohomish	1955	288	53	29	370
Multnomah	1961	64	25	--	89	Thurston	1954	62	--	--	62
Polk	1961	33	7	--	40	Wahkiakum	1963	65	--	--	65
Tillamook	1961	305	4	--	309	Whatcom	1957	169	194	30	393
Washington	1961	49	26	--	75						
Yamhill	1961	86	28	5	119						
Total		2,675	842	58	3,575	Total		2,918	740	143	3,801

1/ Less than 500,000 cubic feet.

2/ Includes Kitsap and San Juan Counties.

Table 7.--Volume of sawtimber of principal commercial hardwood species, by county--western Oregon and western Washington

(In million board feet, Scribner rule)

Western Oregon					
County	Date of inventory	Red alder	Bigleaf maple	Black cotton-wood	Total
Benton	1961	148	194	(1/)	342
Clackamas	1961	222	156	(1/)	378
Clatsop	1961	701	144	--	845
Columbia	1961	514	115	--	629
Coos	1962	1,231	448	--	1,679
Curry	1962	405	103	--	508
Douglas	1962	860	717	115	1,692
Hood River	1961	10	8	(1/)	18
Jackson	1962	28	65	--	93
Josephine	1962	62	15	--	77
Lane	1962	1,402	499	155	2,056
Lincoln	1962	1,942	24	--	1,966
Linn	1961	98	252	40	390
Marion	1961	19	199	63	281
Multnomah	1961	209	88	--	297
Polk	1961	86	--	--	86
Tillamook	1961	1,141	12	--	1,153
Washington	1961	102	35	--	137
Yamhill	1961	362	92	15	469
Total		9,542	3,166	388	13,096

Western Washington					
County	Date of inventory	Red alder	Bigleaf maple	Black cotton-wood	Total
Clallam	1960	553	58	34	645
Clark	1963	147	51	--	198
Cowlitz	1963	458	149	25	632
Grays Harbor	1951	663	15	(1/)	678
Island[2/]	1959	408	143	--	551
Jefferson	1960	330	74	--	404
King	1959	327	238	56	621
Lewis	1963	611	653	23	1,287
Mason	1951	178	19	60	257
Pacific	1963	878	26	--	904
Pierce	1959	277	58	47	382
Skagit	1957	434	154	54	642
Skamania	1963	118	80	61	259
Snohomish	1957	671	139	183	993
Thurston	1954	97	--	--	97
Wahkiakum	1963	245	--	--	245
Whatcom	1957	297	194	30	521
Total		6,692	2,051	573	9,316

1/ Less than 500,000 board feet.

2/ Includes Kitsap and San Juan Counties.

Table 8.--Volume of growing stock and sawtimber of principal commercial hardwood species, by forest cover type--western Oregon (lands other than National Forest only)

Forest cover type	Species			Total
	Red alder	Bigleaf maple	Black cottonwood	
	Million cubic feet			
Growing stock:				
Red alder	1,166	87	10	1,263
Black cottonwood	11	2	34	47
Bigleaf maple	58	172	4	234
Other hardwood	7	23	2	32
Conifer	814	432	7	1,253
Total	2,056	716	57	2,829
	Million board feet			
Sawtimber (Scribner rule):				
Red alder	3,860	382	51	4,293
Black cottonwood	74	15	254	343
Bigleaf maple	207	874	30	1,111
Other hardwood	20	35	14	69
Conifer	2,980	1,607	35	4,622
Total	7,141	2,913	384	10,438

Table 9.--Volume of growing stock and sawtimber of additional commercial hardwood species--western Oregon and western Washington

Region	Oregon ash	California black oak	Oregon white oak	Other oaks	Tanoak	California laurel	Pacific madrone	Golden chinkapin	Other hardwoods	Total
	Million cubic feet									
Growing stock:										
Western Oregon:										
Northwest Oregon[1]	41	--	239	--	--	--	--	1	--	281
West-central Oregon[2]	25	22	119	7	--	2	16	34	2	227
Southwest Oregon[3]	5	282	156	96	477	77	677	80	11	1,861
Total	71	304	514	103	477	79	693	115	13	2,369
Western Washington	21	--	6	--	--	--	40	--	168	235
Total	92	304	520	103	477	79	733	115	181	2,604
	Million board feet									
Sawtimber (Scribner rule):										
Western Oregon:										
Northwest Oregon[1]	122	--	402	--	--	--	--	--	--	524
West-central Oregon[2]	69	52	356	--	--	--	--	38	56	571
Southwest Oregon[3]	7	1,195	420	117	1,517	353	1,451	172	3	5,235
Total	198	1,247	1,178	117	1,517	353	1,451	210	59	6,330
Western Washington	32	--	9	--	--	--	62	--	259	362
Total	230	1,247	1,187	117	1,517	353	1,513	210	318	6,692

[1] Ten counties: Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, Polk, Tillamook, Washington, and Yamhill.

[2] Four counties: Benton, Lane, Lincoln, Linn.

[3] Five counties: Coos, Curry, Douglas, Jackson, Josephine.

Table 10.--Area of principal commercial hardwood forest cover types, by county and owner group--western Oregon

(In thousand acres)

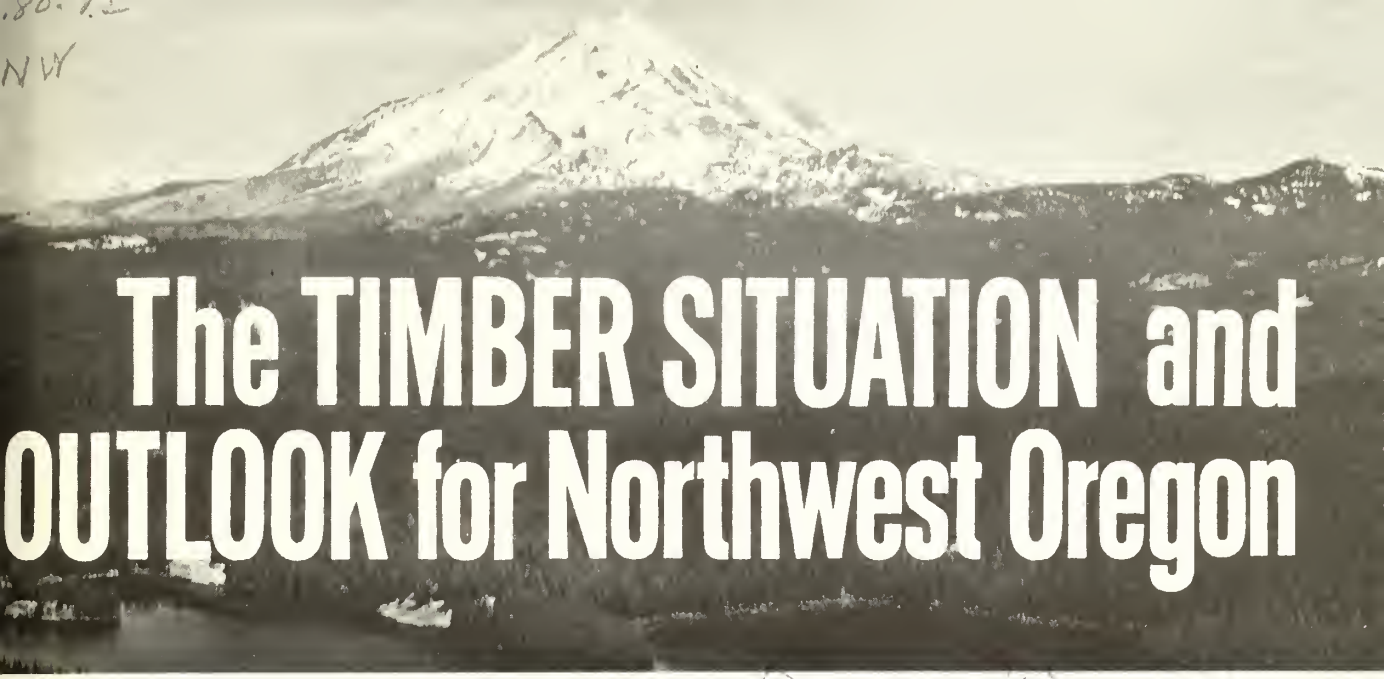
County	Date of inventory	Red alder			Bigleaf maple			Black cottonwood			Total		
		Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total
Benton	1961	5	15	20	--	15	15	--	--	--	5	30	35
Clackamas	1961	9	47	56	20	7	27	--	--	--	29	54	83
Clatsop	1961	36	36	72	--	7	7	--	--	--	36	43	79
Columbia	1961	7	87	94	--	7	7	--	--	--	7	94	101
Coos	1962	29	157	186	--	7	7	--	--	--	29	164	193
Curry	1962	--	--	--	--	6	6	--	--	--	--	6	6
Douglas	1962	21	7	28	7	29	36	--	7	7	28	43	71
Hood River	1961	1	8	9	--	8	8	--	--	--	1	16	17
Jackson	1962	--	--	--	--	14	14	--	--	--	--	14	14
Josephine	1962	--	--	--	--	--	--	--	--	--	--	--	--
Lane	1962	20	56	76	--	39	39	--	17	17	20	112	132
Lincoln	1962	5	116	121	--	--	--	--	--	--	5	116	121
Linn	1961	--	15	15	--	23	23	--	--	--	--	38	38
Marion	1961	--	--	--	7	15	22	--	8	8	7	23	30
Multnomah	1961	2	28	30	1	9	10	--	--	--	3	37	40
Polk	1961	--	37	37	--	--	--	--	--	--	--	37	37
Tillamook	1961	84	42	126	--	--	--	--	--	--	84	42	126
Washington	1961	8	7	15	--	15	15	--	--	--	8	22	30
Yamhill	1961	--	33	33	--	8	8	--	--	--	--	41	41
Total		227	691	918	35	209	244	--	32	32	262	932	1,194

Table 11.--Area of principal commercial hardwood forest cover types, by county and owner group--western Washington

(In thousand acres)

County	Date of inventory	Red alder			Bigleaf maple			Black cottonwood			Total		
		Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total
Clallam	1960	12	70	82	--	3	3	--	--	--	12	73	85
Clark	1963	14	43	57	--	--	--	--	--	--	14	43	57
Cowlitz	1963	17	105	122	--	25	25	--	--	--	17	130	147
Grays Harbor	1951	8	49	57	--	--	--	1	1	2	9	50	59
Island[1/]	1959	--	59	59	--	5	5	--	3	3	--	67	67
Jefferson	1960	10	36	46	1	3	4	--	--	--	11	39	50
King	1959	26	118	144	3	18	21	--	5	5	29	141	170
Lewis	1963	47	142	189	--	69	69	--	15	15	47	226	273
Mason	1951	3	28	31	--	--	--	--	--	--	3	28	31
Pacific	1963	10	81	91	--	--	--	--	--	--	10	81	91
Pierce	1959	9	81	90	--	5	5	--	5	5	9	91	100
Skagit	1957	38	115	153	1	1	2	2	6	8	41	122	163
Skamania	1963	7	--	7	5	16	21	2	7	9	14	23	37
Snohomish	1955	53	184	237	--	--	--	1	4	5	54	188	242
Thurston	1954	5	19	24	--	--	--	--	--	--	5	19	24
Wahkiakum	1963	7	11	18	--	--	--	--	--	--	7	11	18
Whatcom	1957	27	98	125	--	--	--	2	6	8	29	104	133
Total		293	1,239	1,532	10	145	155	8	52	60	311	1,436	1,747

[1/] Includes Kitsap and San Juan Counties.



The TIMBER SITUATION and OUTLOOK for Northwest Oregon

BY ROBERT W. COWLIN AND ROBERT M. FORSTER

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE • FOREST SERVICE
U.S. FOREST SERVICE RESOURCE BULLETIN PNW-12
1965

This report was originally prepared for the Area Redevelopment Administration under the title "Forest Resources and Forest Industries of Northwest Oregon," with funds provided by that agency. Its purpose was to provide a basis for consideration of the possibilities of increased development of the forest industries as a part of a general study of ways and means to increase overall employment in the area and, particularly, in Columbia, Clatsop, Hood River, and Yamhill Counties. The resource data used are those contained in "Forest Statistics for Northwest Oregon," U.S. Forest Service Resource Bulletin PNW-7, 1964. This report, however, contains additional information on the forest products industry and additional interpretations and analysis of the industry, the resource, and their interrelationship.

Because the forest products industry is important to the economy of northwestern Oregon, this report will be of interest to many people throughout the Pacific Northwest. Therefore, it is being made available, with the approval of the Area Redevelopment Administration, through the Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

CONTENTS

LIST OF TABLES

Page

INTRODUCTION

The 10 counties in northwest Oregon have a combined land area of 5.6 million acres, or about 8,760 square miles. These include Clatsop, Columbia, Tillamook, Washington, Multnomah, Hood River, Yamhill, Clackamas, Polk, and Marion Counties. Of this total, 4.0 million acres are commercial forest land and 1.6 million acres are nonforest land. In 1959, 1.7 million acres in northwest Oregon were in farms (U. S. Bureau of the Census 1961).[1] This total included 960,000 acres of cropland, of which 691,000 acres were harvested; the remainder was either in pasture or fallow. Woodland on farms totaled 507,000 acres, more than half of which was pastured.

Northwest Oregon includes the largest metropolitan area in Oregon, with Portland as the hub. This area is the banking, trade, and manufacturing center of the State. Northwest Oregon had a population of 1,768,687 in 1960. Well over a third lived in Portland and suburbs, not including Vancouver, Wash., a city of nearly 100,000 people, immediately across the Columbia River and considered part of the Portland metropolitan area.

[1]Names and dates in parentheses refer to Literature Cited, p. 55.

The rich forest resources and inland waterways giving access to ocean traffic were major factors in the economic growth of this area. For a century or more, lumber manufacture has been an important activity in northwest Oregon. More recently, pulp and paper, plywood, and other timber manufacturing industries have developed sizably. This has resulted in the formation and growth of an integrated manufacturing complex in this area centering on Portland. The Columbia River and its tributary, the Willamette, open the area's ports to world traffic and provide access to the interior of Oregon and Washington and their forest resources.

Northwest Oregon is divided geographically into three parts: the Coast Ranges, the Willamette Valley, and the foothills and mountains of the Cascade Range.

The Coast Ranges are a series of low, gently folded mountains forming long narrow ridges and valleys, the axes of which parallel the coast. The greatest relief is found near the coast, for as this range extends inland, it gradually drops into foothills which border the Willamette Valley basin. The elevation of these mountains usually ranges from 1,000 to 3,000 feet above sea level. The highest point is Saddle Mountain in Clatsop County with an elevation of 3,283 feet.

Within the Coast Ranges of northwest Oregon lie all of Clatsop, Columbia, and Tillamook Counties, and parts of Multnomah, Polk, Washington, and Yamhill Counties.

This portion of northwest Oregon has a mild mediterranean climate with cool, rainy winters and dry summers. Because of the rough topography, the rainfall varies widely with local terrain. The average annual rainfall in the Coast Ranges is 78.09 inches, but the extremes range from 130 inches annually at Glenora in Tillamook County to less than 40 inches annually in the rain shadow on the east slopes of the ranges.

The little agriculture that is practiced in this section is limited to the mountain valley floors, the river flood plains, and narrow coastal plains. Less than 6 percent of the total land area is classified as cropland, and more than 50 percent of that cropland is being used for pasture.

Approximately 88 percent of the land in this part of northwest Oregon is commercial forest land. Hemlock, spruce, and cedar grow along the coast and, further inland, Douglas-fir forms pure stands. These forests are the chief natural resource, and timber harvesting and manufacture of wood products are major factors in the economy of the area.

The Willamette Valley is a broad lowland trough lying between the Coast and Cascade Ranges. It is essentially an alluvial plain produced from sedimentary deposits eroded from the surrounding mountains. This valley, which is drained by the Willamette River and its tributaries, is approximately 30 miles wide and 130 miles long. Six northwest Oregon counties lie partially within the Willamette Valley. These counties are Clackamas, Marion, Multnomah, Polk, Washington, and Yamhill.

The Willamette Valley has a temperate maritime climate with dry, moderately warm summers and wet, mild winters. The average annual precipitation is about 40 inches, most of which falls during the late fall and winter months. Less than 2 inches of precipitation occurs during the 3 summer months. The mean annual temperature is 52° F.; snow and below-zero weather are very seldom experienced, giving the valley 200 frost-free days a year.

Approximately 70 percent of that portion of northwest Oregon which is in the Willamette Valley is mainly devoted to agriculture. The income derived directly from agriculture in the Willamette Valley in 1959 was estimated to be $98.5 million (U.S. Department of Agriculture 1962).

Sixty-three percent of this came from the sale of agricultural crops and the rest from the sale of livestock.

Although the Willamette Valley is primarily agricultural, it is dotted with farm woodlots and surrounded by the extensive forests of the Coast and Cascade Ranges. Consequently, the economy of the area is greatly influenced by logging and the manufacture of wood products. Many sawmills and other forest products industries are located within the valley, drawing their raw products from the surrounding forested ranges.

The Cascade Range divides the humid marine-type climate of western Oregon from the semiarid climate found to the east. Elevations in the Cascade Range ascend from 100 feet along the Columbia River to 11,245 feet at the summit of Mount Hood. This range in elevation produces almost every gradation of climate, from warm and moist on the lower reaches of the western slopes of the Cascades, through perpetually glacial on the high summits, to hot and semiarid in the rain shadow of the eastern slopes. Mean annual precipitation is equally as variable, ranging from less than 20 inches on the eastern slopes to more than 100 inches in some places on the western slopes. Temperatures range from an average of 50° F. near the Willamette Valley to below freezing in the snowfields of Mount Hood.

Except for some cultivated fertile valleys, the economy of this portion of northwest Oregon is based upon the harvest of timber and manufacture of wood products. Vast tracts of Douglas-fir cover the western slopes of the Cascade Range between the elevations of 1,000 and 4,000 feet. These forests supply much of the timber needs of northwest Oregon.

In northwest Oregon, all of Hood River County and portions of Clackamas, Marion, and Multnomah Counties lie within the Cascade Range and its foothills.

TRANSPORTATION

In spite of exceedingly rough terrain in some parts of northwest Oregon, transportation facilities are excellent throughout the entire area. Portland, the second largest city in the Pacific Northwest, lies at the junction of two navigable rivers: the Willamette and the Columbia. All main railroad lines in northwest Oregon pass through or originate in Portland, and several major east-west and north-south highways pass through it (fig. 1). As a population center, Portland creates markets; as an industrial center, it manufactures goods and services for local consumption and export; and through its strategic location, it is the transportation hub of northwest Oregon.

Four major north-south highways transect northwest Oregon. Recently completed Interstate 5 passes through Portland and continues south through Salem and Albany to the California border. U.S. 99E and U.S. 99W flank the new Interstate Highway as it progresses south from Portland through the Willamette Valley. U.S. 101, Oregon's picturesque coastal highway, follows the ocean shore from the mouth of the Columbia River to the California border and beyond. Three major east-west highways link the principal points in northwest Oregon. From Hood River, Interstate 80 proceeds west as a limited access highway to Portland, where it becomes U.S. 30 and follows the Columbia River to its mouth at Astoria. U.S. 26 proceeds north from Madras, swinging northwest where it joins State Highway 35, and continues through Portland to U.S. 101 just south of the coast city of Seaside. The last major east-west highway, State Highway 22, proceeds north from U.S. 20 to the Santiam River Valley, follows the valley west to Salem, and from there proceeds to the coast where it meets U.S. 101 at Hebo.

An extensive network of railroad lines unites all major points in northwest Ore-

gon. Portland is the termination of the Union Pacific line, which follows the south bank of the Columbia River from the east. The Spokane, Portland & Seattle Railway, following the north bank of the Columbia from Pasco, Wash., crosses the river at Vancouver to Portland and follows the south bank of the river west to Astoria. Two lines of the Southern Pacific originate in Portland. The first proceeds west from Portland to Nehalem and from there south to Tillamook. The second follows the Willamette River Valley south from Salem and continues into California. Branches and spurs of these lines give rail service to McMinnville, Dallas, Silverton, and other smaller communities throughout northwest Oregon.

The Columbia and Willamette Rivers give northwest Oregon and neighboring southwest Washington the only freshwater ocean ports of the Pacific Northwest. Portland has excellent port facilities for ocean-going vessels, and navigation of shallow draft vessels is possible beyond Pasco on the Columbia River and up as far as Harrisburg on the Willamette; as new dam construction proceeds, new navigable water will result. The Columbia River freight traffic over the past years has been increasing. Forest and agricultural products are shipped downstream, and the vessels return with petroleum products and nonwood building materials, such as cement. Rafted logs comprise the greatest portion of the cargo being transported in the upper reaches of the Willamette River.

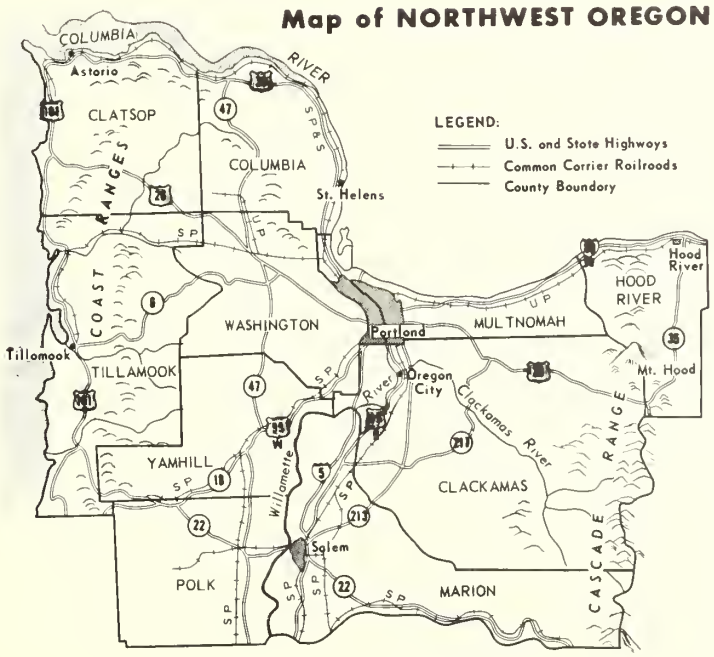


FIGURE 1. — Major political subdivisions and transportation routes in northwestern Oregon.

LABOR FORCE

Northwest Oregon has a labor force of 388,000, more than half of the State's 680,000 potential employees (U.S. Bureau of the Census 1962). The majority of this labor force is concentrated in or near the metropolitan area of Portland. Multnomah County has 214,000 potential workers, 55 percent of the labor force in northwest Oregon. Clackamas County, immediately south of Portland, has an additional labor force of 43,000, and Washington County, the boundary of which lies just 2 miles west of the City of Portland, has 34,000 able, willing workers.

Northwest Oregon plays a disproportionately large role in the State's agricultural and industrial endeavors because of its fertile land and strategic location. Forty-eight percent of the State's manufacturing establishments are within northwest Oregon. These add 47 percent of the total value to manufactured products and pay 47 percent of the manufacturing wages earned in the State. Portland has an even larger share of the State's wholesale and retail trade. Fifty-four percent of the State's retail establishments are in northwest Oregon, making 58 percent of the State's retail sales and paying 61 percent of the State's total salaries to retail sales employees. Sixty-two percent of Oregon's wholesale establishments are in northwest Oregon. These establishments represent 79 percent of the State's wholesale trade and pay 79 percent of the salaries paid in the State to wholesale trade employees (U.S. Bureau of the Census 1962).

Despite the general prosperity of northwest Oregon, four of its counties have a high rate of chronic unemployment. These counties, Clatsop, Columbia, Hood River, and Yamhill, are of primary interest in this study.[2] It is significant that the economy of these counties is largely based on the harvest and processing of forest products.

CLATSOP COUNTY

Clatsop County is in the extreme northwest corner of Oregon and has a land area of 525,000 acres. It is bounded by the Pacific Ocean, the Columbia River, and Tillamook and Columbia Counties and lies entirely within the Coast Ranges. Astoria, the county seat, is the largest city. Due to rough terrain, agriculture is not a significant industry within the county. Although 55,000 acres of the county are classified as farmland, 29,500 acres are subclassified as woodland, of which 6,000 are pastured. Only 7,280 acres of this farmland yielded crops in 1959. Nearly 90 percent of the county's area, 465,000 acres, is classified as commercial forest land.

The population of Clatsop County in 1960 was 27,380, which is an 11-percent decrease from 1950 when the population was 30,776. The average annual labor force in 1962 was 9,150. The average annual employment was 8,450, which left 7.6 percent of the total labor force unemployed. This was an improvement over 1961 when 8.7 percent of the total labor force was unemployed. This improvement was the result of the out-migration of Clatsop County's workers. In 1962, there were 350 fewer jobs and 590 fewer persons in the labor force competing for the available employment, resulting in a net improvement in the unemployment percentage.

In 1962, of the 8,450 persons employed, 640 were engaged in agriculture; 2,500, in manufacturing. Of those engaged in manufacturing, 1,320, or 53 percent, were employed in lumber or wood products firms. Thus, a large percentage of the employment and the county's economy is dependent upon forest products. Expansion of present firms or the development of new firms utilizing forest products would improve the economy of the county.

COLUMBIA COUNTY

Columbia County is bounded by the Columbia River and Clatsop, Multnomah, and Washington Counties. Except for narrow, alluvial plains along the Columbia River, this county is characteristic of the Coast Ranges. Columbia County has a land area of 413,000 acres, of which 25 percent is classified as farmland. One-fifth of the farmland is harvested cropland, half of which is grazed. Of the 413,000 acres in the county, 81 percent is commercial forest.

In 1960, Columbia County had a population of 22,379, an increase of 3 percent over the census of 1950. The average annual labor force of 1962 was 6,590. The average employment of that year was 6,180, leaving 6.2 percent of the labor force unemployed in 1962. This was an improvement over 1961 when 8.5 percent of the county's labor force was unemployed.

Of the 6,180 laborers employed in 1962, 5,020 were engaged in nonagricultural pursuits. Manufacturing employed 2,130; of these, 2,010 were employed by firms engaged in the manufacture of lumber, paper, and allied wood products. This is almost one-third the total employed working force of Columbia County. Thus, the prosperity of Columbia County is greatly influenced by the growth or decline of firms using forest products as a raw material.

YAMHILL COUNTY

About half of Yamhill County lies within the Coast Ranges and the remainder in the Willamette Valley. Its boundaries

[2]All labor figures for these counties were taken from tables published by Department of Employment, Research and Statistics, State of Oregon.

are Marion, Polk, Tillamook, and Washington Counties. The western half of the county, that in the Coast Ranges, has rolling foothills, becoming more mountainous toward the Tillamook border. The eastern half, lying within the Willamette Valley, is a relatively flat, fertile, alluvial plain, used primarily for production of agricultural crops. Of the 454,000 acres in Yamhill County, 57 percent is classified as farmland, a greater percentage of farmland than any other county in northwest Oregon. Of the 260,000 acres classified as farmland, 117,000 acres are cropland which produced a harvest in 1959. Only 83,000 acres of the land in farms is woodland, and more than two-thirds of this is pastured. Commercial forest land totals 258,000 acres in Yamhill County.

Yamhill County had a population in 1960 of 32,478, a decrease of 4 percent from the census figure of 1950. In 1962, the average labor force was 10,910. The average employment was 9,930. Thus, an average of 9 percent of the labor force was unemployed during the year of 1962. This was an improvement over 1961 when an average of 9.6 percent of the labor force was unemployed. The improvement was the result of a reduction in the labor force of 510 available workers, which more than compensated for the elimination of 420 jobs that existed the previous year.

Of the 9,930 employed in 1962, 2,500 were engaged in agriculture; 2,140, in manufacturing; and the remainder were in wholesale-retail, government, and miscellaneous occupations. More than one-third, or 850, of those in manufacturing pursuits were employed in firms producing lumber and wood products. Although it is not the largest single employer, the forest products industry plays a significant role in the economy of the county.

HOOD RIVER COUNTY

Hood River County, located in the northeast corner of the study area, lies entirely within the Cascade Range. Situated directly east of Clackamas and Multnomah Counties, it is separated from the State of Washington by the Columbia River on the north and is bounded on the east and south by Wasco County in central Oregon. The terrain is extremely mountainous, giving the county a scenic splendor but leaving most of its land unsuited for agriculture. Of the 338,000 acres in the county, 37,000 are classified as farmland, only 16,000 of which yielded crops in 1959. There are 258,000 acres of commercial forest in Hood River County, of which 177,000 acres are in the Mount Hood National Forest and 26,000 acres are county-owned lands but managed by the Mount Hood National Forest. The Hood River Valley contains most of the county's farmland. This valley, about 8 miles wide, extends 20 miles south from the Columbia River almost to the foot of Mount Hood. Fruit is the chief agricultural crop and represents about 90 percent of the revenue from agriculture.

In 1960, Hood River had a population of 13,395. This was a 5-percent increase in population since 1950 and a 10-percent increase since 1940. The average annual labor force in 1962 was 5,140. The average employment throughout that year was 4,700. Thus, 8.6 percent of the total labor force was unable to find jobs in 1962. This was a net improvement over 1961, when an average of 9 percent of the total labor force was unemployed.

Of the 4,700 laborers employed in 1962, 1,000 were engaged in agriculture, 980 were employed by manufacturing firms, and 720 found their livelihood in the wholesale-retail trade. Lumber and wood products industries employed almost half of 980 employees engaged in manufacturing. Thus, forest-product-based industries play a significant part in the manufacturing sector of the county's economy, and their contribution to the total county income is considerable.

FOREST RESOURCE[3]

The early explorers, who came to the lower Columbia River by sea and over land, described northwest Oregon as a land of dense and magnificent forests and equable climate. First settlement was by fur traders of the British-owned Hudson's Bay Co. and the American-owned Pacific Fur Co., founded by John Jacob Astor. Missionaries and emigrants soon followed by wagon train, using trails blazed by Lewis and Clark and fur traders, and around Cape Horn by ship. Sawmills were first established in northwest Oregon to fill the needs of the swelling tide of settlers and for limited ocean commerce with the Hawaiian Islands and China.

Not long after the turn of the century, the timber industries along the lower Columbia River developed on a large scale. However, at the time of the famous Tillamook conflagration in 1933, there were still great expanses of virgin forest a scant 40 miles from Portland.

[3]Detailed information, including definitions of terms used, has been published by the U.S. Forest Service (Metcalf and Hazard 1964).

After more than a century of settlement, northwest Oregon is still largely forested (table 1).

TABLE 1

Area by land classes, northwest Oregon, 1963
(In thousand acres)

Land class	Acres
Commercial forest	3,954
Unproductive forest	72
Productive-reserved forest	27
Total forest	4,053
Nonforest	1,554
All land	5,607

FOREST LAND

Practically all of the forest land in northwest Oregon is commercial in character. A small acreage of noncommercial forest land is on the slopes of Mount Hood above the commercial timberline, and some productive forest land is reserved from cutting in parks or other dedicated areas.

The present condition and potential productivity of the commercial forest land are basic factors in evaluating the capacity of the forest resource to maintain and expand the economy of northwest Oregon. This is particularly true in Clatsop and Columbia Counties, where forests overshadow other natural resources.

OWNERSHIP OF FOREST LAND

Nearly half of the commercial forest land is in public ownership (table 2). Slightly less than a quarter is in forest industry ownership, and the remainder is in farmer and miscellaneous private ownership.

Nearly all of the commercial forest land in public ownership is National Forest, Bureau of Land Management (chiefly O&C grant lands), and State of Oregon. Small acreages are owned by counties and municipalities. Practically all the public forest land is managed under sustained yield. Forest industry lands, totaling nearly a million acres, are an important factor in this area, particularly in Clatsop and Columbia Counties. These lands are generally managed by their owners for production of timber crops and are usually above the average in timber-growing capacity. In fact, 56, or nearly all, of the industrial owners have certified their holdings as tree farms. The acreage of industrial forest land in tree farms totals 911,000 acres, or 96 percent of the total in this category. There was considerable blocking and acquisition of small ownerships by industrial owners after World War II, a process which is continuing.

The "farmer and miscellaneous private" forest-land ownership is important because of the amount and nature of land in this class. It totals over a million acres

TABLE 2

Area of commercial forest land, by county group and ownership class, northwest Oregon, 1963
(In thousand acres)

County	All ownerships	National Forest	Other public	Forest industries	Farmer and misc. private
Clatsop	465	—	144	221	100
Columbia	336	—	19	195	122
Hood River	258	177	43	23	15
Yamhill	258	23	43	90	102
Other counties	2,637	875	634	416	712
All counties	3,954	1,075	883	945	1,051

and is accessible and potentially highly productive. A significant part of the land in this category is managed for continuing timber crops, including Christmas trees. About 37,000 acres are in 77 certified tree farms sponsored by the Industrial Forestry Association, and additional holdings are pending certification. Another large part is in the urban fringe, held by the owners for appreciation of land values in their lifetime or for estate purposes. In other cases, the owners hold and manage the forests on their lands for esthetic reasons. All in all, this group can probably be characterized as above the average in sophistication and understanding of forestry and forest-land values. Many members of this group have plans for continued tenure and utilization of their forest lands.

Number and total acreage of tree farms certified by the Industrial Forestry Association substantiate the conclusion that a large part of the private forest lands in this area is headed for intensive management.

CONDITION OF FOREST LANDS

Information on distribution of commercial forest land by stand-size class, by stocking class, and by forest types, as well as ownership, is needed to analyze the forest resource and its potential as a supplier of industrial raw material.

Over 2 million acres, or better than half the commercial forest land in the area, is in sawtimber stands (table 3). As might be expected, the largest acreage of sawtimber is on the National Forests, where it comprises more than four-fifths of the total commercial forest land. A surprising amount of the privately owned forest land is in sawtimber; however, this sawtimber is largely young growth as contrasted to the mainly virgin timber of the National Forests.

There is an apparent deficiency of poletimber stands which total a little more than half a million acres. On the other hand, well over a fourth of the 4.0 million acres of commercial forest land is in sapling and seedling stands. Very little of this stand-size class is on the National Forests where cutting has been more recent. About 200,000 acres are nonstocked; more than half of this land is in "other public" ownership, mostly State owned in the Tillamook Burn.

Generally speaking, commercial forest lands in northwest Oregon are satisfactorily stocked with trees, with only about 5 percent of the 4.0 million acres nonstocked. More than 2.2 million acres are classified as well stocked. Sawtimber and poletimber stands are in reasonably good condition, but the younger stands are in poorer condition. Roughly a third of the area in saplings and seedlings is well stocked; one-third, medium stocked; and

TABLE 3

Area of commercial forest land in northwest Oregon, by ownership class and stand-size class, 1963
(In thousand acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industries	Farmer and misc. private
Sawtimber	2,081	810	363	382	526
Poletimber	539	172	89	138	140
Saplings and seedlings	1,127	75	319	382	351
Nonstocked	207	18	112	43	34
Total	3,954	1,075	883	945	1,051

one-third, poorly stocked. It is anticipated that as these stands advance in age, stocking will improve. However, there are many hardwood trees, primarily red alder, intermixed with the conifers, contributing to the stocking but not generally considered as marketable as the conifers. This is especially true of the poletimber and younger stands in the coastal mountains.

Douglas-fir is the principal species and forms the forest type on 2.2 million acres (table 4). Second in rank is the hardwood type with 749,000 acres, a significant situation since this type presents difficult and often costly problems in management and utilization. Hemlock–Sitka spruce type follows closely in total acreage with 738,000 acres. This type occupies some of the better sites and is fast growing. The Douglas-fir and hemlock–Sitka spruce types are divided almost evenly between public and private ownership but nearly three-fourths of the hardwood type occurs on private lands.

TABLE 4

Area of commercial forest land by forest type and ownership classes, northwest Oregon, 1963
(In thousand acres)

Type	All ownerships	Public ownerships	Private ownerships
Douglas-fir	2,181	1,140	1,041
Hemlock–Sitka spruce	738	372	366
Spruce–fir	243	205	38
Lodgepole pine	28	28	—
Other conifers	15	15	—
Alder	470	146	324
Other hardwoods	279	52	227
Total	3,954	1,958	1,996

Forest site, or the capacity of the forest land to produce wood, is a criterion used in forecasting future timber crops. Northwest Oregon is unusually well endowed in forest land productivity. Forest sites are divided into four classes, determined by growing capacity in cubic feet per acre per year. Class A, 120 cubic feet or more per acre per year, is the highest of the four. Nearly two-thirds, 2.6 million acres, of this area's commercial forest land is in class A, compared with 200,000 acres, or about one-twentieth of the total, in class D, the lowest class — less than 50 cubic feet per acre per year.

TIMBER VOLUME

Northwest Oregon has a total sawtimber volume of 65.6 billion board feet (Scribner)[4] and a total growing-stock volume of 15.8 billion cubic feet (tables 5 and 6).

This relatively small area has a sawtimber volume exceeding that of all the New England States or all the southern Rocky Mountain States (Arizona, Colorado, Nevada, New Mexico, and Utah). It contains about one-tenth of the sawtimber volume in the Pacific Northwest (Oregon and Washington).

[4]Sawtimber volume data are presented in board feet, Scribner rule, throughout the report. This method of measuring timber volume is the one currently in common use in this region for commercial purposes. Other volume data are presented in cubic feet.

TABLE 5

Volume of sawtimber on commercial forest land, by species and species group and by county and county group, northwest Oregon, 1963

County and county group	All species	Douglas-fir	Spruce–hemlock	True fir	Other conifers	Hardwoods
	— — — — — — *Million board feet (Scribner)* — — — — — —					
Clatsop	7,789	969	5,697	15	263	845
Columbia	2,120	1,303	84	—	104	629
Hood River	4,817	2,367	803	1,146	466	35
Yamhill	3,146	2,395	39	16	—	696
Other counties	47,695	26,349	14,820	2,593	1,321	2,612
Total	65,567	33,383	21,443	3,770	2,154	4,817

TABLE 6
Volume of growing stock and sawtimber on commercial forest land, by diameter classes and species, northwest Oregon, 1963

Species and class of material	Diameter class (inches at breast height)						
	All classes	5.0-10.9	11.0-14.9	15.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million cubic feet						
Growing stock:							
Douglas-fir	7,548	892	1,036	1,123	2,005	1,262	1,230
Pine	181	60	30	21	42	16	12
True fir	1,093	231	168	188	309	126	71
Hemlock	4,015	393	443	613	1,486	722	358
Spruce	917	112	108	150	220	129	198
Larch	36	2	4	5	15	6	4
Cedar	382	72	53	45	94	58	60
Alder	1,040	408	283	196	124	27	2
Other hardwoods	560	299	120	53	61	19	8
Total	15,772	2,469	2,245	2,394	4,356	2,365	1,943
	Million board feet (Scribner)						
Sawtimber:							
Douglas-fir	33,383	—	2,840	4,279	10,074	7,629	8,561
Pine	528	—	73	77	214	93	71
True fir	3,770	—	523	699	1,432	691	425
Hemlock	18,534	—	1,375	2,530	7,704	4,258	2,667
Spruce	2,909	—	168	374	890	611	866
Larch	204	—	15	31	104	47	7
Cedar	1,422	—	152	151	415	311	393
Alder	3,366	—	1,259	1,088	811	193	15
Other hardwoods	1,451	—	526	306	413	143	63
Total	65,567	—	6,931	9,535	22,057	13,976	13,068

In analyzing the volume data and timber's availability as an industrial raw material, ownership, size of timber, species, and location must be considered in addition to quantity.

About 71 percent of the sawtimber volume and 66 percent of the growing-stock volume are publicly owned, compared with 29 percent and 34 percent, respectively, in private ownership (tables 7 and 8; fig. 2).

About two-fifths of the total sawtimber volume is in trees 29 inches in diameter and larger (table 6). About half the Douglas-fir volume is in trees 29 inches and larger.

Douglas-fir is the leading species, amounting to 33.4 billion board feet, or more than half the total, followed by hemlock with 18.5 billion board feet (fig. 3).

FIGURE 2. — Distribution of commercial forest land and sawtimber volume by owner group.

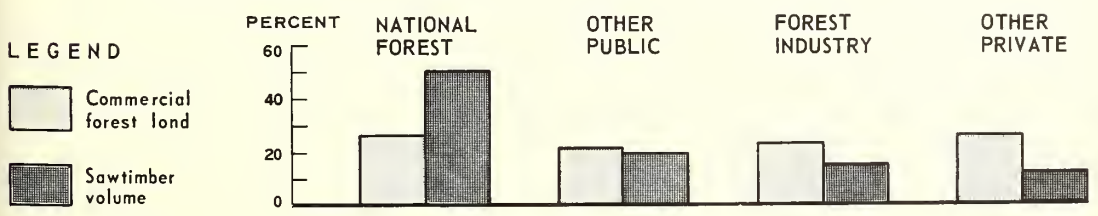


TABLE 7

Volume of sawtimber on commercial forest land, by ownership class and county group, northwest Oregon, 1963

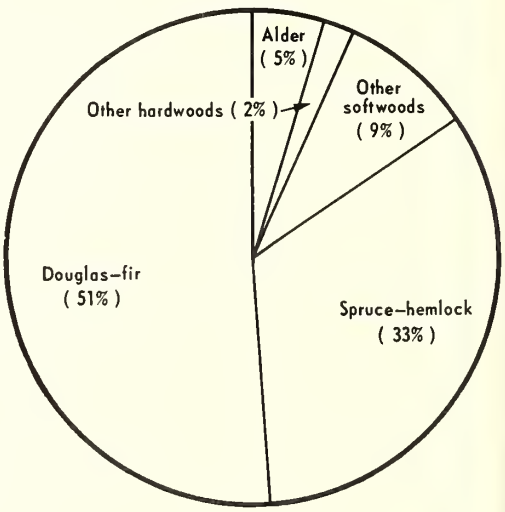
County	All ownerships	National Forest	Other public	Forest industries	Former and misc. private
	— — — — *Million board feet (Scribner)* — — — —				
Clatsop	7,789	—	1,778	4,639	1,372
Columbia	2,120	—	61	1,118	941
Hood River	4,817	3,988	345	373	111
Yamhill	3,146	752	1,134	697	563
Other counties	47,695	29,123	9,607	3,661	5,304
Total	65,567	33,863	12,925	10,488	8,291

TABLE 8

Volume of growing stock and sawtimber on commercial forest land, by ownership class and by softwoods and hardwoods, northwest Oregon, 1963

Timber and ownership class	All species	Softwoods	Hardwoods
	— *Million board feet (Scribner)* —		
Sawtimber:			
National Forest	33,863	33,065	798
Other public	12,925	12,082	843
Forest industry	10,488	9,777	711
Farmer and misc. private	8,291	5,826	2,465
All ownerships	65,567	60,750	4,817
	— — *Million cubic feet* — —		
Growing stock:			
National Forest	7,287	7,070	217
Other public	3,047	2,753	294
Forest industry	2,901	2,637	264
Farmer and misc. private	2,537	1,712	825
All ownerships	15,772	14,172	1,600

FIGURE 3. — Distribution of sawtimber volume by species and species group, 1963.



TIMBER HARVEST

Although logging and lumbering have been conducted on a large scale in northwest Oregon for half a century, log harvest did not reach its peak until 1941. During that year, nearly 2 billion board feet of saw logs were cut in this area. Since that time, the trend has been generally downward with occasional rises. By 1961, timber harvest had declined to barely more than a billion feet, increasing to 1.2 billion feet in 1962 (table 9). The average yearly harvest for 1958 through 1962 was 1.3 billion feet.

During the past several decades, heavy cutting has shifted eastward from Clatsop and Columbia Counties on the lower Columbia River to Clackamas County, essentially a Cascade Range county. Log harvest on private lands in northwest Oregon has been declining steadily in re-

TABLE 9

Timber harvest, by county group and ownership class, northwest Oregon, 1960-62 (Scribner)[1]

Ownership class and county	1960		1961		1962		Average 1958-62	
	Million bd. ft.	*Per-cent*	*Million bd. ft.*	*Per-cent*	*Million bd. ft.*	*Per-cent*	*Millian bd. ft.*	*Per-cent*
Forest industry:								
Clatsop	—	—	—	—	206.1	40	—	—
Columbia	—	—	—	—	15.5	3	—	—
Hood River	—	—	—	—	15.1	3	—	—
Yamhill	—	—	—	—	6.0	1	—	—
Other counties	—	—	—	—	268.3	53	—	—
Total	—	—	—	—	511.0	100	—	—
Farmers, miscellaneous:								
Clatsop	—	—	—	—	6.0	7	—	—
Columbia	—	—	—	—	21.2	26	—	—
Hood River	—	—	—	—	4.2	5	—	—
Yamhill	—	—	—	—	1.1	1	—	—
Other counties	—	—	—	—	49.7	61	—	—
Total	—	—	—	—	82.2	100	—	—
All private:								
Clatsop	212.5	33	167.5	32	212.1	36	198.0	27
Columbia	93.6	15	34.6	7	36.7	6	63.5	9
Hood River	37.6	6	38.9	8	19.3	3	32.9	5
Yamhill	24.4	4	16.6	3	7.1	1	29.1	4
Other counties	412.8	42	260.7	50	318.1	54	398.7	55
Total	780.9	100	518.3	100	593.2	100	722.2	100
Natianal Forest:								
Clatsop	—	—	—	—	—	—	—	—
Columbia	—	—	—	—	—	—	—	—
Hood River	35.2	11	32.1	9	54.0	14	46.6	13
Yamhill	5.2	2	—	—	—	—	1.0	—
Other counties	294.3	87	306.9	91	336.9	86	319.7	87
Total	334.7	100	339.0	100	390.9	100	367.3	100
Other public:								
Clatsop	40.6	18	44.9	21	24.3	10	29.3	13
Columbia	1.6	1	2.6	1	—	—	2.9	1
Hood River	—	—	—	—	—	—	—	—
Yamhill	11.0	5	21.1	10	26.1	10	16.0	8
Other counties	172.3	76	149.8	68	198.7	80	169.2	78
Total	225.5	100	218.4	100	249.1	100	217.4	100
All ownerships:								
Clatsop	253.1	19	212.4	20	236.4	19	227.3	17
Columbia	95.2	7	37.2	3	36.7	3	66.4	5
Hood River	72.8	5	71.0	7	73.3	6	79.5	6
Yamhill	40.6	3	37.7	4	33.2	3	46.1	4
Other counties	879.2	66	717.4	66	853.7	69	887.6	68
Total	1,341.1	100	1,075.7	100	1,233.2	100	1,306.9	100

[1]Does not include poles and piling.

cent years, but these lands still furnish nearly half the saw logs harvested in the area. The bulk of these logs are cut from forest industry lands. The shifts in source of logs and decline in total log harvest have been accompanied by the virtual passing of the Columbia River open log market and the closing of several large sawmills on or near the Columbia River. These include the Eastern & Western Lumber Co., Inman-Poulsen Lumber Co., West Oregon Lumber Co., Jones Lumber Corp., and B. F. Johnson mills in Portland; the Clark & Wilson Lumber Co. mills at Linnton, the Oregon Lumber Co. at Prescott, the Oregon American Lumber Corp. mill at Vernonia, and the Crosset-Western mill at Wauna. In contrast, across the Columbia River at Longview, Wash., a giant integrated timber industry complex has developed in the past four decades with the major growth occurring during the past two decades. The prominent enterprises in this complex are Weyerhaeuser, International Paper (formerly Long-Bell), and Longview Fibre Companies. These companies draw raw material, logs, bolts, and wood chips from both Oregon and Washington sources for their Longview plants and have extensive forest-land ownership in western Oregon and Washington.

Currently, the log harvest from National Forest lands in northwest Oregon averages about 367 million board feet annually, or about one-third of the total. Other public forest lands furnish about a quarter of a billion board feet annually.

Estimates of growth disclose an interesting situation, particularly when contrasted to log harvest. The average annual net growth in northwest Oregon for the period 1952-61 totals 327 million cubic feet, or 1,122 million board feet. This closely approaches current annual timber harvest. However, this comparison of totals is superficial, hiding internal imbalances among species which might lead to future problems. Growth by species (table 10) is not distributed the same as the estimated log harvest by species. In addition, this growth estimate recognizes only the mortality occurring during the 10-year period.

TABLE 10

Periodic average annual growth, by growing stock and sawtimber on commercial forest land and by species group, northwest Oregon, 1952-61[1]

Species group	Growing stock	Sawtimber (Scribner)
	Million cubic feet	*Million board feet*
Douglas-fir	165	568
Spruce–hemlock	72	277
Other softwoods	26	72
Total softwoods	263	917
Hardwoods	64	205
Total, all species	327	1,122

[1]This should not be confused with estimates of current annual net growth which are based upon estimates of long-term mortality, including normal and catastrophic mortality. In northwest Oregon, impact of catastrophes over the past few decades — such as the 1962 blowdown, conflagrations, and hemlock looper epidemics — results in lower long-term growth figures.

Quantitative data on log harvest by species are not available. However, it is possible to make estimates for the principal species based upon log consumption data of northwest Oregon industrial plants. It is estimated that considerably more than half the volume of logs harvested in northwest Oregon is Douglas-fir, with western hemlock in second rank; it is also estimated that only about 20 to 25 million board feet of hardwood logs annually are being harvested in this area. Consumption of hardwood logs by northwest Oregon plants is less than 20 million board feet, nearly all by sawmills. Demand for red alder logs by pulpmills is leading to some exports to neighboring areas. With 127 million board feet or 18 percent of the estimated sawtimber growth in hardwoods, it is evident that there is an imbalance between total cut and growth. On the other hand, it must be remembered that over half of the total sawtimber inventory volume is Douglas-fir, much of it in old-growth forests which are producing only small amounts of net

growth. As cutting proceeds in these forests and the lands are converted to faster growing young forests, net growth of Douglas-fir should increase. Nevertheless, it is clear that critical and complex problems in forest management exist in this area. These must be reckoned with in considering future forest yields.

A critical and understandable measure of the magnitude of future forest crops of the area is the estimated annual allowable cut from its commercial forest land. Federal and State forest lands, which account for nearly all public forests, are being managed under sustained yield, and allowable cuts are determined and the findings published. Timber from these lands is sold by public bid under stipulated conditions.

Generally speaking, the forest industry lands in this area are also firmly held and are being managed with the objective of producing continued crops of timber. In determining annual harvest from these lands, owners may consider holdings in other areas or prospective timber supply from public lands as well as the growth and yield of their northwest Oregon holdings. Annual allowable cuts from industry lands, if calculated, are not released. However, a reasonable estimate of the prospective cut in the near future may be made for industry lands, based upon known forest inventory and growth information and past cutting experience. Although many of the private owners in the farmer and miscellaneous category hold their lands for production of forest crops, future yields for industrial utilization are uncertain. Estimating future cuts for these lands is more speculative.

A projection was made, based upon the current forest inventory, growth, and mortality data for the decade 1952-61, of the consequences of continuing the present level of cut on private forest lands for 20 years. Separate projections were made for industrial and nonindustrial ownership and for softwoods and hardwoods.

The projected 1983 sawtimber inventory on industrial forest lands is 6.6 billion board feet, a decrease of 3.2 billion board feet from the 1963 inventory. The hardwood sawtimber inventory, conversely, may increase from 711 million board feet in 1963 to 2.1 billion board feet in 1983. Based upon these projections, average annual net growth of softwoods would increase during the 20-year period from 329 million board feet to 369 million board feet. Hardwood growth would increase from 53 million feet to 97 million feet.

The situation on the nonindustrial forest lands would be considerably different. The sawtimber inventory of softwoods would increase from 5.8 billion board feet in 1963 to 11.1 billion board feet in 1983; hardwoods would increase from 2.5 billion board feet to 5.9 billion board feet. Average annual net growth on these forest lands would increase during the 20 years from 250 million board feet to 420 million board feet for softwoods, and from 136 million board feet to 255 million board feet for hardwoods.

For all private forest lands, an annual cut of 575 million board feet of softwoods would result in an increase in the softwood sawtimber inventory from 15.6 billion board feet in 1963 to 17.7 billion board feet in 1983. Average annual net growth of softwoods in 1983 would be 789 million board feet. The hardwood sawtimber inventory on all private forest lands would increase from 3.2 billion board feet in 1963 to 8.0 billion board feet in 1983. Average annual net growth of hardwoods in 1983 would be 352 million board feet.

An average annual cut of softwood timber from all commercial forest land in northwest Oregon of from 1.2 to 1.3 billion board feet is not unlikely. About 620 million board feet, or nearly half of this total, could be cut from public lands, divided as follows: National Forest, 368 million feet; Bureau of Land Management, 162 million feet; and State, 90 million feet. The other half would be taken from the private lands.

FOREST MANAGEMENT

Consequences of past forest management and use and natural forest catastrophes have had a dramatic effect on present and future timber harvests in northwest Oregon. Timber harvest commenced with bull team logging to the nearby waterways and high-grading of the seemingly endless virgin forests. Later, during the steam-donkey-railroad logging period, large, unbroken clearcut areas were left. Also during this period, the coastal forests were again high-graded for Sitka spruce needed to build World War I planes.

Interspersed with this sequence of events were several hemlock looper epidemics and large fires which deforested extensive areas in the Coast Ranges. Despite these inroads into the virgin forests, there were still extensive stands in the early thirties of high-quality old growth in Tillamook, Yamhill, and interior of Clatsop and Columbia Counties. These forests were nearly all privately owned. The climax came in 1933 when the greatest of modern forest fire catastrophes in the Pacific Northwest, the famous Tillamook fire, burned over a quarter of a million acres, destroying an estimated 10 billion board feet of valuable timber. Burning about the same time was the Wolf Creek fire, north of the Tillamook fire and joining it at times. Under ordinary circumstances, this fire would have been a "headliner" in its own right, but it was overshadowed by its neighbor.

In addition to these natural disasters, the country was in the great economic depression; salvage of any appreciable quantity of the burned timber seemed almost hopeless in view of anticipated deterioration from insects and disease and the weakened market. However, major owners commenced salvage operations promptly in 1934, some of them combining their efforts to make the salvage program more effective. Tax concessions were given by local governments faced with prospect of total loss of revenue from these lands. Salvage proceeded slowly at first, aimed largely at cutting remnants of green timber. Advent of truck logging made salvage of the burned timber more feasible, since usable truck roads could be built quickly and relatively cheaply. This system of logging proved very flexible, allowing the cutting of scattered small tracts of timber.

During this period, little logging was taking place in the Cascade Range, where forest lands were nearly all publicly owned and road systems were underdeveloped.

Large expanses of snags in the Tillamook Burn created a severe fire hazard. At the time of the 1933 fires, most of this area was under protection of forest fire associations formed by the principal private owners. Only a small part of the Tillamook area was under Federal forest fire protection. By standards of fire control then in practice, protection was comparatively good. As new hazards were realized, protection efforts were intensified; however, these did not suffice, and this area was struck again and again by serious fires in 1939, 1945, and 1951. This increased the total area burned over by one or more of the fires to about 350,000 acres and timber killed to 13 billion board feet. Also, many areas of young forests were destroyed.

In spite of these recurring fires, salvaging proceeded apace, accelerating as economic conditions improved. The final tally of timber salvaged from the Burn approximates 7 billion board feet.

As the lands were cut over, or if salvage seemed unlikely, lands were allowed to revert to the counties through tax delinquency. The same phenomenon was also taking place in other areas of northwest Oregon, particularly in cutover lands and young forests. Later, this process was reversed and the young forests were reclaimed by forward-looking private owners. However, the Tillamook Burn was a

special situation. Costs of protecting and rehabilitating this area made it unattractive to private owners. The county, likewise, was not in a position to finance such a program, particularly since their tax base had been greatly reduced by the fires. Arrangements were made and these lands passed into State ownership. The succession of fires aroused public concern. Finally, a State bond issue was approved by the voters providing funds for rehabilitation, including snag falling, building of protection roads, and planting. Many obstacles, such as encroachment of brush and severe animal damage, have slowed progress in rehabilitating these lands; however, new reforestation techniques, planned game management, and new developments in forest rodent control are aiding restoration. All things considered, progress is notable, but much remains to be done before the area reaches full productivity.

Restocking of the older cutover areas, particularly those escaping repeated fires after slash burning, has been good. However, as discussed earlier, much of this land has been captured by red alder, which is faster growing than the conifers in the early years of their growth cycles. This is especially true on the very productive sites at the lower elevations in the Coast Ranges. A large part of these sites will grow either conifers or hardwoods at unusually high rates.

If the hardwoods can be utilized economically, reestablishment of conifers is possible on best suited sites. Otherwise, the process of clearing the lands of hardwoods, planting conifers, and protecting them from further encroachment may be too costly for exclusive production of conifers. Limited amounts of alder have been used for lumber. Recent technological developments in woodpulp processes are opening up opportunities for greater use of alder in pulp manufacture. Columbia River kraft pulpmills are using alder logs in small quantities. Logs are bundled in even lengths. Also recently, one mill has commenced taking random lengths from 10 to 40 feet, which should stimulate harvest of alder.

Projection of effect of continuing present level of cut on future inventories, discussed earlier, illustrates the importance of hardwoods in management of private forest land and the great potential in these species for increasing the industrial raw material base.

FOREST INDUSTRIES IN NORTHWEST OREGON

Expansion of the forest-based industries could help relieve chronic unemployment in northwest Oregon. In order to evaluate specific proposals for new plants or industries, more information is needed on the current status of these industries and their raw material supply. The preceding chapter analyzed the forest resource. This chapter presents the results of a survey of the nature and size of the existing industry, the kind and volume of raw material used, the products manufactured, and the amount and kind of plant wood residues developed, used, and unused.

SAWMILLS

In 1962, there were approximately 109 sawmills operating in northwest Oregon (table 11). These mills ranged in size from an owner-operated, one-man, portable mill, capable of producing only 3,000 board feet per day, to a corporate, integrated operation with a capacity of 300,000 board feet in an 8-hour shift. Detailed information about the 1962 consumption of stumpage and production of finished products was obtained from each of these mills.

TABLE 11

Lumber production in northwest Oregon, by mill-size class and degree of manufacture, 1962

Sawmill capacity per 8-hour shift (M bd. ft.)	Number of mills	Volume of production				
		Surfaced and seasoned	Surfaced green	Rough green	Rough seasoned	Total
		Million board feet, lumber tally				
Up to 39	57	10.2	87.3	43.4	—	140.9
40-79	23	67.6	126.1	47.9	—	241.6
80-119	12	81.7	153.4	21.1	—	256.2
120+	17	269.7	366.3	34.6	3.9	674.5
All mills	109	429.2	733.1	147.0	3.9	1,313.2

Sawmills are divided into four classes according to their 8-hour-shift production capacity: the first class, up to 39,000 board feet; the second class, 40,000 to 79,000 board feet; the third class, 80,000 to 119,000 board feet; and the fourth class, 120,000 board feet or more. The most mills, 57, fall into the first class. The second class is represented by less than half that number, 23 mills, and the third and fourth classes contain 12 and 17 mills, respectively (fig. 4).

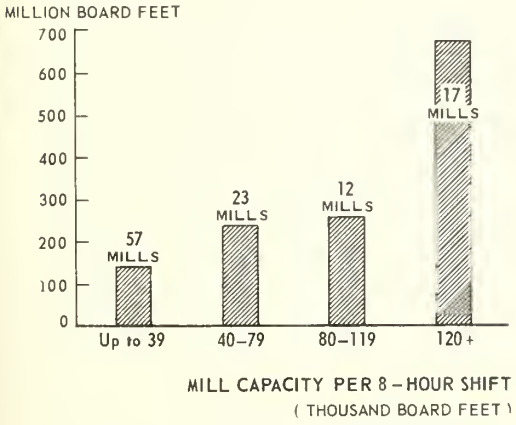


FIGURE 4. - Lumber production by mill-size class, 1962.

In 1962, the sawmills of northwest Oregon produced a total of 1.3 billion board feet of lumber. A little more than half of this volume, 733 million board feet, was shipped to the market surfaced but not seasoned. An additional third was both surfaced and seasoned before shipment, and the remainder was shipped rough green.

The 17 mills in the largest class produced more than 50 percent of northwest Oregon's lumber. Almost 95 percent of this production was surfaced, 42 percent of which was both surfaced and seasoned. The second and third largest mill classes each supplied about 20 percent of the total lumber production of northwest Oregon, the smallest class producing the remainder. The smaller the mill, generally, the less refinement of the end product. Thus, although the mills in the smallest size class contributed only 11 percent to the total lumber production in northwest Oregon, they produced 30 percent of the total rough green lumber.

The tendency to have processing equipment other than a head saw increases with mill size (table 12). All mills in the two largest size classes have planers and most of them have dry kilns, barkers, and chippers. Three of the seven mills in these two classes not having dry kilns are stud mills with exceptionally high 8-hour capacities. Two of these stud mills cut only veneer cores and have no need for a barker, although each has a chipper to process its residues for marketing. Less than half of the mills in the smallest size class have planers, two have dry kilns, and only one has a chipper.

TABLE 12

Equipment in northwest Oregon sawmills, by capacity class, 1962

Sawmill capacity per 8-hour shift (M bd. ft.)	Number of mills	Equipment other than head saw				
		Planer	Dry kiln	Barker	Chipper	Hog
Up to 39	57	27	2	0	1	1
40-79	23	19	8	10[1]	12	1
80-119	12	12	9	9[1]	11	—
120+	17	17	13	16[1]	17	—
Total	109	75	32	35	41	2

[1]One mill cuts veneer cores only, thus does not need a barker.

PLANING MILLS

There are 13 planing mills in northwest Oregon. Eight of these are located in Multnomah County and the remainder in Washington County. They range in size from 18,000- to 200,000-board-foot capacity in an 8-hour shift, the average being about 60,000 board feet. In 1962, these mills surfaced 70 million board feet, much of which was dried. All except two have dry kilns.

PLYWOOD AND VENEER PLANTS

In 1962, there were 26 firms manufacturing plywood or veneer within the study area. Six of these firms cut and sold veneer; 4 purchased veneer and manufactured plywood; and the remaining 16 cut veneer and manufactured plywood in single integrated units. These plants ranged in size from a small, single, cold press unit, capable of manufacturing 10,000 square feet of ⅜-inch plywood in an 8-hour shift, to firms with an 8-hour capacity of 270,000 square feet. In 1962, these firms manufactured the equivalent of 1,187 million square feet of ⅜-inch plywood. Those plants buying veneer used about 440 million square feet on a ⅛-inch basis. The plants manufacturing only veneer produced 380 million square feet on a ⅛-inch basis; thus, there was an apparent net import of 60 million square feet of veneer into the area.

PULP AND PAPER MILLS

There are five pulp and paper mills located in northwest Oregon. They range in capacity from 150 to 600 tons of pulp per 24-hour shift. The total capacity of all five mills is 685 tons of groundwood, 620 tons of sulfite pulp, and 375 tons of sulfate pulp in a 24-hour period (Lockwood Trade Journal Co., Inc. 1963). In 1963, about half a million tons of paper were produced by the pulp and paper mills in northwest Oregon.

WOOD COMPOSITION BOARD PLANTS

There are three wood composition board plants in northwest Oregon: two hardboard plants and one insulation board plant. Both hardboard plants are parts of integrated operations and obtain their entire raw material supply from their companion sawmills. These two plants, one located in Hood River County and one in Washington County, have a combined capacity of about 140 million square feet of ⅛-inch board annually and consume an estimated 40,000 tons of wood chips annually. In 1962, they produced at about 90 percent of rated capacity. The insulation board plant, located in Columbia County, has a rated annual capacity of 120 million square feet of ½-inch board. It purchases its entire supply of chips, although it has a wood mill and owns forest land. The wood mill has not operated for the past 5 or 6 years.

SHAKE AND SHINGLE MILLS

There are 14 shingle mills, 3 shake mills, and 6 firms producing both shakes and shingles in northwest Oregon, ranging in capacity from 20 squares to 120 squares per 6-hour shift. Most of these firms are located on the west side of the Coast Ranges, close to the supply of old-growth cedar growing there. In 1962, 294,000 squares of shingles and 31,000 squares of shakes were produced in northwest Oregon.

POSTS, POLES, AND PILING

Five pole and piling yards were included in the survey. Each has a barker, and four have pressure treatment plants. Besides poles, posts, and piling, these plants treat a limited amount of lumber. In 1962, 3.2 million lineal feet of poles and piling and almost 2 million feet of lumber were processed.

FOREST INDUSTRY AND RAW PRODUCT UTILIZATION

Of the 1,233 million board feet of sawtimber harvested in northwest Oregon in 1962, 380 million board feet, or about 31 percent, were harvested in the counties of primary consideration: Clatsop, Columbia, Hood River, and Yamhill. Within the 10-county area, the total log consumption of forest products industries was 1,733 million board feet (tables 13 and 14). About 20 percent, or 365 million board feet, was consumed within the four designated counties. Comparing consumption with production in these four counties shows a net export of about 25 million board feet of logs.

Of the 109 sawmills found in northwest Oregon, 29 are located in these four counties (table 15). In size-class distribution, these mills represent about one-fourth of the mills in each class. Also found within the boundaries of these four counties are two pulp and paper mills, two wood composition board plants, six plywood plants, two pole and piling yards, five shingle mills, and a shake mill.

FOREST PRODUCTS RESIDUES DEVELOPED IN NORTHWEST OREGON

In the survey of timber industries, sawmill residues were divided into two categories, coarse and fine. Coarse residues include slabs, edgings, and trimmings. Sawdust and shavings are classified as fine residues.

The residue developed by sawmills was estimated by multiplying the production of lumber in each county by the factors developed by Corder and Gedney (1956).

The residue produced by veneer plants was determined by multiplying the production of plywood in each county by factors developed by Corder (1956) in his study on residue production in Oregon in 1953.

Shingle mill residue data were derived with the use of factors developed in an unpublished study by the Pacific Northwest Forest and Range Experiment Station.

In 1962, it was estimated that the forest products industries of northwest Oregon produced 886,000 tons of dry, coarse residue, 373,000 tons of dry sawdust, and 250,000 tons of dry shavings (table 16). In addition to the above residues, an estimated 159,000 tons of plywood dry-end trim were produced. This residue is considered separately from the rest because it is coated with glue which limits the possibilities of its utilization.

The majority of the residue developed in northwest Oregon was Douglas-fir. Sixty-seven percent of the coarse residue and 62 percent of the shavings consisted of this species (tables 17 and 18). Spruce and hemlock were second, accounting for 30 percent of the coarse residue and 35 percent of the shavings. All other species, including both softwoods and hardwoods, accounted for only 3 percent of both the coarse residue and shavings produced in the study area.

TABLE 13

Capacity and consumption of sawmills in northwest Oregon, 1962

Size class (M bd. ft. per 8-hour shift)	Estimated capacity		1962 consumption	
	Per 8-hour shift	Annual[1]	Total	From northwest Oregon
	— *M bd.ft., lumber tally* —		— *M bd.ft., Scribner* —	
Up to 39	867	138,720	101,908	100,235
40-79	1,225	269,500	183,591	160,804
80-119	1,125	281,250	213,747	135,695
120+	2,745	768,600	514,494	387,706
All classes	5,962	1,458,070	1,013,740	784,440

[1]Based on 160 days of operation for up to 39,000-board-foot-capacity classes, 220 days for 40,000- to 79,000-board-foot classes, 250 days for 80,000- to 119,000-board-foot classes, and 280 days for 120,000+-board-foot classes.

TABLE 14

Consumption of forest products industries, other than sawmills, in northwest Oregon, 1962

Industry	1962 consumption	
	Total	From northwest Oregon
	— *M bd. ft., Scribner* —	
Shake and shingle[1]	34,187	24,987
Veneer and plywood (annual capacity, 1,367 MM sq. ft., 3/8-inch)	458,209	360,778
Wood composition board (annual capacity, 260 MM sq. ft.)	42,500	30,000
Pulp and paper (capacity, 1,680 tons per 24 hours)	165,777	104,935
Posts, poles, piling[1]	18,212	17,746
Total	718,885	538,446

[1]Capacity figures not available.

TABLE 15

Sawmill location by capacity class in northwest Oregon, 1962

Sawmill location	Sawmill capacity per 8-hour shift				
	Up to 39,000 board feet	40,000 to 79,000 board feet	80,000 to 119,000 board feet	120,000+ board feet	Total
	— — — — — — *Number of mills* — — — — — —				
Clackamas	14	6	—	4	24
Clatsop	3	—	1	1	5
Columbia	4	2	1	3	10
Hood River	—	—	2	2	4
Marion	7	4	3	1	15
Multnomah	1	4	1	1	7
Polk	5	2	1	2	10
Tillamook	4	1	—	3	8
Washington	14	1	1	—	16
Yamhill	5	3	2	—	10
Total	57	23	12	17	109

TABLE 16

Total residue developed in northwest Oregon, 1962

Type of plant	Coarse residue	Sawdust	Shavings
	— — — — *Tons (dry)* — — — —		
Sawmill capacity (per 8-hour shift):			
Up to 39,000 bd. ft.	55,811	35,785	17,194
40,000 to 79,000 bd. ft.	100,439	63,951	34,978
80,000 to 119,000 bd. ft.	132,319	78,231	52,996
120,000+ bd. ft.	279,159	177,924	131,482
Planing mills	—	—	13,833
Veneer mills	464,731[1]	—	—
Shingle mills	12,493	17,333	—
Total	1,044,952	373,224	250,483

[1]Includes 158,887 tons of veneer dry ends, utilization of which is limited by presence of glue.

TABLE 17

Coarse residue developed in selected counties and all northwest Oregon, by species and type of plant, 1962

Species and type of plant	Clatsop	Columbia	Hood River	Yamhill	All northwest Oregon
			Tons (dry)		
Douglas-fir:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	112	1,217	—	4,444	41,777
40,000 to 79,000 bd.ft.	—	3,029	—	11,405	59,521
80,000 to 119,000 bd.ft.	462	4,546	13,964	7,255	64,784
120,000 + bd. ft.	202	84,765	20,479	—	174,984
Veneer plants	13,567	23,397	—	11,740	253,875
Total	14,343	116,954	34,443	34,844	594,941
Hemlock—Sitka spruce:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	646	45	—	830	7,805
40,000 to 79,000 bd.ft.	—	1,739	—	9,474	34,236
80,000 to 119,000 bd.ft.	18,587	997	5,152	7,542	66,884
120,000 + bd.ft.	8,136	18,174	10,759	—	99,638
Veneer plants	1,507	13,161	—	2,935	51,969
Total	28,876	34,116	15,911	20,781	260,532
Other softwoods:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	184	30	—	10	1,116
40,000 to 79,000 bd.ft.	—	4,417	—	—	5,998
80,000 to 119,000 bd.ft.	—	248	—	—	248
120,000 + bd.ft.	—	—	600	—	4,537
Veneer plants	—	—	—	—	—
Shingle mills	3,059	388	—	—	12,493
Total	3,243	5,083	600	10	24,392
Hardwoods:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	775	—	—	—	5,113
40,000 to 79,000 bd.ft.	—	—	—	684	684
80,000 to 119,000 bd.ft.	—	—	—	—	403
120,000 + bd.ft.	—	—	—	—	—
Veneer plants	—	—	—	—	—
Total	775	—	—	684	6,200

TABLE 18

Shavings developed in selected counties and all northwest Oregon, by species and type of plant, 1962

Species and type of plant	Clatsap	Columbia	Hood River	Yamhill	All northwest Oregon
			Tons (dry)		
Douglas-fir:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	—	86	—	1,633	12,610
40,000 to 79,000 bd.ft.	—	50	—	4,862	20,612
80,000 to 119,000 bd.ft.	215	2,126	5,836	3,394	26,863
120,000+ bd.ft.	94	45,032	8,890	—	85,300
Planing mills	—	—	—	—	9,550
Total	309	47,294	14,726	9,889	154,935
Hemlock—Sitka spruce:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	—	18	—	387	2,792
40,000 to 79,000 bd. ft.	—	—	—	4,124	11,803
80,000 to 119,000 bd.ft.	8,664	465	2,305	3,515	25,857
120,000+ bd.ft.	3,793	8,472	4,721	—	44,403
Planing mills	—	—	—	—	3,423
Total	12,457	8,955	7,026	8,026	88,278
Other softwoods:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	—	—	—	12	277
40,000 to 79,000 bd.ft.	—	2,023	—	285	2,563
80,000 to 119,000 bd.ft.	—	116	—	—	276
120,000+ bd.ft.	—	—	243	—	1,716
Planing mills	—	—	—	—	258
Total	—	2,139	243	297	5,090
Hardwoods:					
Sawmills (capacity per 8-hour shift):					
Up to 39,000 bd.ft.	258	—	—	—	1,515
40,000 to 79,000 bd.ft.	—	—	—	—	—
80,000 to 119,000 bd.ft.	—	—	—	—	—
120,000+ bd.ft.	—	—	—	—	—
Planing mills	—	—	—	—	602
Total	258	—	—	—	2,117

PRESENT RESIDUE USE IN NORTHWEST OREGON

About two-tenths of the coarse residue and three-tenths of the fine residue developed in northwest Oregon is unused (table 19). All of the residue which is used should not, however, be considered totally unavailable for future expansion of forest products industries. Present uses, providing little or no return to the producer, can easily be diverted to industries willing and able to pay more for the residue. For example, coarse residue, given away for fuel, and shavings, given away for domestic animal bedding on a "pick-up" basis, are certainly available to any industry willing to pay a price for them.

In 1962, 520,000 tons of coarse residue were processed into chips at sawmills and plywood plants. This was 59 percent of all the coarse residue developed in northwest Oregon. Since the average unit of chips weighs 1 ton, pulpmills within the area purchased or transferred 623,000 tons of chips. Therefore, all of the chips produced within the study area could supply only 83 percent of the chip consumption by pulpmills within this area. Board plants within the area consume an additional 90,000 tons of chips annually. To supply this combined demand from pulpmills and board plants, an estimated 193,000 tons of chips are imported into the study area annually.

Nearly 70 percent of the total volume of chips produced in northwest Oregon came from mills in the two largest size classes. Almost 90 percent of the coarse residues of the 17 mills in the largest size class and 83 percent of those of the mills in the second largest size class were con-

TABLE 19

Production and disposition of mill residue by sawmill capacity class and type of mill, northwest Oregon, 1962

Residue and disposition	Sawmills (capacity per 8-hour shift)					Planing mills	Veneer and plywood plants	Shingle mills	Grand total	Percent of total
	Up to 39,000 bd. ft.	40,000-79,000 bd. ft.	80,000-119,000 bd. ft.	120,000+ bd. ft.	Total					
	Tons (dry)									
Coarse residue:										
Pulp chips	6,095	43,649	110,049	248,928	408,721	—	111,787	—	520,508	59
Remanufacturing	3,412	—	—	—	3,412	—	—	—	3,412	(1)
Fuel	14,472	40,160	15,484	8,234	78,620	—	102,457	963	182,040	21
Unused	31,562	16,630	6,786	21,997	76,975	—	91,600	11,530	180,105	20
Total	55,811	100,439	132,319	279,150	567,728	—	305,844	12,493	886,065	100
Fine residue:										
Sawdust:										
Agriculture and miscelloneous	3,122	8,738	11,993	8,643	32,496	—	—	1,771	34,267	9
Fuel	13,208	27,984	36,419	136,872	214,483	—	—	—	214,483	58
Unused	19,455	27,229	29,819	32,409	108,912	—	—	15,562	124,474	33
Total	35,785	63,951	78,231	177,924	355,891	—	—	17,333	373,224	100
Shavings:										
Agriculture and miscelloneous	4,406	9,999	9,751	21,950	46,106	7,397	—	—	53,503	21
Fuel	1,379	13,515	16,212	85,442	116,548	2,478	—	—	119,026	48
Unused	11,409	11,464	27,033	24,090	73,996	3,958	—	—	77,954	31
Total	17,194	34,978	52,996	131,482	236,650	13,833	—	—	250,483	100

[1]Less than 1 percent.

verted to chips. The proportion of coarse residues converted to chips dropped in the smaller size classes to 43 percent in the third class and only 11 percent in the smallest class. It is in the smallest classes that the greatest percentage of unused residue occurs. Here, 56 percent of the coarse residue was burned or left to rot. As mill size increases, the percentage of unused residue is reduced. Only 17 percent of the coarse residue in the second smallest mill size class remained unused, and this figure was reduced to less than 10 percent in both of the largest mill size classes.

Veneer mills and plywood plants produced about one-third of the coarse residue developed in northwest Oregon. Their disposition of this residue was split almost evenly three ways: 37 percent reduced to chips, 33 percent burned as fuel, and 30 percent disposed of as waste.

Fifty-eight percent of the sawdust developed in northwest Oregon was consumed as fuel, 33 percent was burned or left unused, and most of the remainder was used for agricultural bedding. Residue usage is related to sawmill size. More than 75 percent of the sawdust produced by the largest size class was burned as fuel, but only 36 percent of the sawdust produced in the smallest size class was disposed of in this manner. Conversely, only 18 percent of the sawdust in the largest size class was left unused, compared with 54 percent in the smallest.

Forty-eight percent of the shavings produced was used as fuel, 21 percent was diverted to agriculture and miscellaneous uses, and the remainder was unused. Again, the percent of shavings used increased with the mill size. In the largest mills, 82 percent of the shavings was utilized in some way as compared with only 33 percent in the smallest size class.

Bark has long been used as a garden and orchard mulch, for cork, a source of tannin, and medicinal purposes. In recent years, many new uses have developed through research. These include use as an additive or extender in adhesives, composition flooring and other products, insulating materials, lubricating flux for oil well drilling, and various chemical products. In northwest Oregon, the greatest volume of bark is used for garden mulch. Use for other products is expected to expand.

The processing and subsequent sale of residues have become an integral part of operations of large sawmills. The resultant revenue is often sufficient to become a profit factor in the operation. The expected revenue is taken into consideration in bidding for stumpage, so the producer who can exploit his residue is in an advantageous position compared with one who cannot.

The smaller the sawmill, the less likely that the residue will be profitably utilized. A considerable investment is involved in the installation of a barker and chipper, and this investment is more than a small mill can justify. The smaller the mill, the less likely it is to be located on a main transportation route or near the large industrial centers, and the transportation cost of residues may be prohibitive. The smaller the mill, the smaller the total amount of residue produced, and the volume produced may not be enough to give an attractive return on the investment in the processing and transportation equipment needed to utilize this residue. Thus, the small mill is at a disadvantage.

FOREST INDUSTRY CAPACITY AND RAW MATERIAL CONSUMED

The total capacity of all the sawmills included in this study is 5,962,000 board feet of lumber in an 8-hour shift. The single-shift capacity of the plywood plants is 2,500,000 square feet of $^3/_8$-inch plywood. Shingle mills were rated on a 6-hour shift since that is normal for these plants, and for such a shift their capacity is 1,443 squares of shingles or shakes. The capacity of pole and piling yards is difficult to determine, for these firms treat

at the same time, in varying quantities, lineal feet of poles, cubic feet of posts, and board feet of lumber.

In 1962, the forest industries of northwest Oregon used 1,690 million board feet of sawtimber, pulp logs, bolts, and poles and piling (tables 13 and 14). Sixty percent of this volume was cut into lumber, 27 percent was manufactured into plywood, 10 percent was utilized by pulpmills, and the remainder was cut into shakes and shingles or treated and sold as posts, poles, or piling. The total timber volume consumed by sawmills in this area was 1,014 million board feet. More than half of this volume, 514 million board feet, was processed by the 17 mills in the largest size class. The mills in the second and third size classes consumed about 200 million board feet each, and the remainder was used by the 57 mills in the smallest size class. Plywood plants were the second largest consumer of logs in northwest Oregon. Their share, 27 percent of the total volume consumed, was 458 million board feet. Pulpmills used 166 million board feet of logs and bolts and supplemented their consumption with the purchase of 622,000 units of chips. Shake and shingle mills and pole and piling yards utilized the remainder, about 52 million board feet.

A little more than three-fourths of the timber consumed within northwest Oregon is cut within the boundaries of the study area. The remainder, 397 million, is imported from surrounding Oregon counties and the State of Washington.

OUTDOOR RECREATION IN NORTHWEST OREGON

Bordered on three sides by an ocean, a river, and snowcapped mountains, northwest Oregon has an abundance of diversified recreation sites centered around the forest resource. Through the efforts of cities, counties, the State, the Federal Government, and private landowners, many of these sites have been developed and opened to the public. The 10 counties within this area have established and maintained 46 parks with facilities for picnicking, camping, hiking, and sports. The State has established 38 parks, varying in size from 1 to 8,000 acres. Most of these parks are on lakes, streams, or the seashore, offering facilities for every type of outdoor recreation. The State augments this park system with nine waysides where the motoring tourist can find rest and picnic sites. Some timber industries and public utilities also maintain forest recreation facilities.

The Federal Government has also developed numerous recreation sites on the land it manages. The Forest Service has established and maintains over 90 improved campgrounds and picnic areas, 5 winter-sports areas, and, for wilderness enthusiasts, the Mount Hood Wild Area, as well as numerous other areas dedicated to or managed primarily for recreation. A portion of the proposed Mount Jefferson Wild Area is in northwest Oregon. The Bureau of Land Management maintains six picnic and camp units and the Corps of Engineers has developed two land and water recreation sites, the combined area of which is almost 20,000 acres. Within northwest Oregon are two wildlife refuges and one national monument preserving the fort built by the Lewis and Clark Expedition in 1805.

Recreation in northwest Oregon is not only a service industry, providing the residents of this area with facilities for their leisure hours, but a basic industry, attracting tourists from bordering counties and States. The Portland metropolitan population makes abundant use of the nearby superb natural resources for fishing, hunting, camping, hiking, picnicking, and water sports on the lakes, rivers, and seashore. In 1960, more than 6 million out-of-State tourists poured into Oregon. Most of them traveled one of three routes — the coast highway, through the Willamette Valley, or through the Columbia Gorge. Each of these routes passes through northwest Oregon. Fifty percent of these tourists spent nights in the motels and hotels of the area. More ate their meals in the local restaurants and all purchased gas, oil, and other travel necessities.

Due to a greater amount of leisure time, an increase in the amount of spendable income and the percentage allocated to recreation, and a vast improvement in transportation facilities, the predicted tourist flow in 1975 is 15 million people. It is also anticipated that the wealth of outdoor recreation facilities and equable climate will attract people to this area as residents. The impact this increase will have on the economy of northwest Oregon is considerable and should be taken into consideration in any economic proposals for the area.

INDUSTRIAL OPPORTUNITIES

Preceding sections of this report have described the forest resource as a raw material base for industry. Short-range projections of the stumpage supply, to determine if current level of industrial activity could be maintained or expanded, also have been presented.

Capacity and level of production of the timber industries was determined, including the quantities and disposition of mill residues. The present market situation of these industries was also studied.

Opportunities for expanding timber industries in northwest Oregon will depend not only upon the raw material supply but also upon future market prospects. Labor and capital are likewise needed to expand industry, but if raw material, industrial technology, and market prospects are favorable, labor can usually be found and capital obtained.

Several studies of future demand for timber products have been made during the past decade by public, quasi-public, and private agencies. The two most comprehensive and basic studies of this sort were made by the U.S. Forest Service (1958) and the Stanford Research Institute (1954). More recently, another was made by Guthrie and Armstrong (1961), which is more specific for the West. Generally, quantitative findings of such studies are carefully described as projections and based upon assumptions made of the elements which support demand and their future behavior, such as population, gross national product, price relationships, and other socioeconomic factors. Although such projections are disclaimed as forecasts, they are frequently used as such. For that reason, they may tend to be conservative; at least, the earlier ones are apparently proving to be underesti-

mates. One cause seems to be underestimation of rate of population increase.

The U.S. Forest Service has restudied the timber demand and supply situation, and preliminary results are available in a report entitled "Timber Trends in the United States" (1965). Based upon specified assumptions of economic and social conditions and use of wood in construction, projections were made of the outlook for timber demand in the year 2000. Prospective demand for lumber increases from 37.3 billion board feet in 1962 to 53.5 billion feet by 2000, of which 81 percent will be softwoods and 7 billion feet will be net imports. Prospective demand for plywood and veneer use rises from 12 billion square feet, $\frac{3}{8}$-inch basis, in 1962 to 31.5 billion feet in 2000. Potential demand for paper and board is expected to nearly triple by 2000.

Translating the findings regarding the national situation to northwest Oregon has some speculative aspects, but some general conclusions can be drawn. In view of all the factors previously presented, regarding timber supply and demand for timber products in northwest Oregon as well as nationwide, a moderate decline in lumber production can be anticipated over the next two decades. This will be accompanied by a comparable increase in plywood production based upon logs shifted from lumber production. A substantial increase in pulp, paper, and wood composition board production is anticipated.

Clatsop, Columbia, Hood River, and Yamhill Counties, of major interest in this study, have many common features but they also have many dissimilarities and contrasts.

Each of the four counties has access to water transportation, but two of the counties, Hood River and Yamhill, are limited to some extent in this respect. Hood River County fronts on the Columbia River, but it is located upstream from the deepwater dredged channel and Bonneville Dam, and water traffic is limited to small boats, barges, and log rafts. The eastern boundary of Yamhill County is the Willamette River but, like Hood River County, traffic is limited to log rafts, small boats, and barges since it is upstream from the Oregon City falls and locks which will not pass large ships. The Yamhill River, flowing east through the county to join the Willamette near McMinnville, is used to some extent for rafting logs.

In contrast, Clatsop and Columbia Counties, bordering the lower Columbia River, have good facilities for docking and loading ocean-going vessels and are well located to receive log rafts from the interior of southwestern Washington and the Willamette Valley counties of Oregon.

In Hood River and Yamhill Counties, agriculture is more important than other industry. On the other hand, Clatsop and Columbia Counties are more highly industrialized, and agriculture is of minor importance. Forest industries are the mainstay of the economy of these two counties. Canning of seafood is another important activity in Clatsop County. Tourism and commercial and sport fishing are also exceedingly important to Clatsop County.

Probably the most significant difference between these counties is the relation of log harvest to log consumption. During 1962, log harvest from Clatsop County lands was 236 million board feet compared with log consumption of 119 million feet by Clatsop County industries. Neighboring Columbia County harvested 37 million feet of logs, and its industries consumed 248 million feet. Hood River, in its more isolated location, had a log harvest of 73 million feet and consumption of 95 million feet. Yamhill County harvested 33 million feet of logs and consumed 132 million feet. Each of these counties, Clatsop excepted, was drawing a large part of their industrial raw material from other areas.

As might be expected, relationship between wood chips produced and wood chips consumed also varies considerably from county to county. For example, Columbia County industries consumed more than twice the amount of wood chips its timber industries produced. Clatsop County, on the other hand, produced 41,000 tons of chips annually and consumed none. Hood River County produced about two and a half times the amount of chips consumed. Yamhill County produced only about one-fifth of its requirements for wood chips during 1962.

LUMBER MANUFACTURE

During the decade 1953-62, production of softwood lumber in the United States declined nearly 10.5 percent. Consumption declined, but at a much lesser rate, after imports of softwood lumber from Canada increased from 2.5 billion feet to 4.6 billion feet. Thus, during the decade, U.S. consumption of softwood lumber was estimated at 32.0 billion feet in 1953 compared with 31.0 billion feet in 1962, a decline of about 3 percent. However, during the past 3 years, United States softwood lumber production has been fairly uniform, increasing slightly from 25.9 billion feet in 1961 to 26.8 billion feet in 1963. Imports of softwood lumber continued to increase during the past 3 years from about 4.0 billion feet in 1961 to 5.3 billion feet in 1963.

Lumber production in the Douglas-fir subregion during the past decade declined from a high of 10.4 billion feet in 1952 to 8.1 billion feet in 1962, or 22.1 percent compared with a decline in total U.S. softwood lumber production of 10.5 percent (fig. 5). This decline is probably due

FIGURE 5. — Lumber production, Douglas-fir subregion, 1926-62.

to a combination of causes, including impact of softwood lumber imports, shifts of lumber production to other areas where stumpage is cheaper, and shifts to plywood production. During 1961-63, inclusive, however, lumber production of the Douglas-fir subregion has been somewhat stable at about 8 billion feet annually. Western Oregon production has declined relatively more than that of western Washington.

Northwest Oregon's share of the lumber production of the Douglas-fir subregion declined from 19 percent in 1953 to 17 percent in 1962. The bulk of the decline took place during the first 4 years of the decade, dropping from 1.8 billion feet in 1953 to 1.5 billion feet in 1954 and 1955 and to 1.3 billion feet in 1956. From 1956 to 1962, lumber production in northwest Oregon has been comparatively uniform at about 1.3 billion feet annually.

Movement southward of the center of production in the Douglas-fir subregion is shown by analysis of data available for the period 1926-61 (fig. 6). The first third of the period, center of production was near the south end of Puget Sound. Commencing in 1938, center of production moved swiftly southward in western Washington as production of the Puget Sound and Grays Harbor mills dropped off with declining supplies of old-growth timber. At the same time, southwestern Washington and western Oregon were increasing production of lumber. World War II demands for lumber increased and western Washington did not have stumpage supplies to meet this need. About 1945, the center of lumber production in the region crossed the Columbia River into Oregon. From then on, it moved southward toward the large, remaining supplies of old-growth Douglas-fir in southern Oregon and northern California.

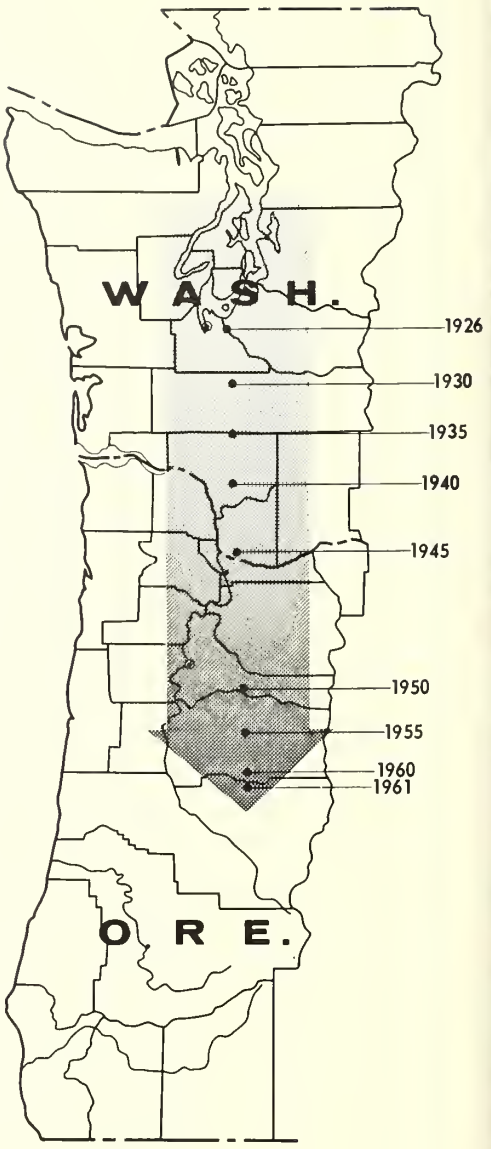


FIGURE 6. — Center of lumber production, Douglas-fir subregion, by periods, 1926-61.

During the postwar period, lumber production increased rapidly in California, largely fed by the previously unexploited "white woods"[5] of northern California — particularly, the coast counties where large quantities of privately owned stumpage were available for cutting. Production of lumber in California reached its high point in 1959, dropping off slightly in the following years. Students of the situation there conclude that the period of expansion is over and timber supply does not warrant any further increases in production (Zivnuska et al. 1963). When all that is known regarding the timber supply situation in the Pacific Coast States is related to the migratory history of the industry and the present status of timber supply and sawmill installation in northwest Oregon, the conclusion is that no increase can be expected in softwood lumber production there. This conclusion is reinforced by the various projections of lumber demand which see no significant increase in national needs during the next decade that would exert strong forces on latent stumpage supplies.

Fedkiw (1964) determined that annual sawmill capacity in northwest Oregon peaked in 1951, and has been declining since then. In 1962, annual capacity of sawmills in northwest Oregon was about 1.46 billion board feet. However, this does not include idle mills. With both active and idle mills considered, unused capacity probably amounted to about 10 percent in 1962 when 1.36 billion board feet of lumber were produced by northwest Oregon mills. Fedkiw found that, for the entire Douglas-fir subregion, unused sawmill capacity averaged 14.5 percent annually during 1951 to 1960.

[5]A term used commonly in the redwood region of northern California forests to describe Douglas-fir and the true firs.

In view of the set of circumstances and conditions described above, there is no apparent justification for increasing overall sawmill capacity in northwest Oregon for manufacture of softwood lumber. Strategic advantages of much of this area, for obtaining logs and shipping lumber products by water as well as rail, are negated by the generally unfavorable outlook for increasing lumber production here. Unless the competitive situation with British Columbia changes through legislative or other governmental action, no increase can be expected in intercoastal or coastwise lumber shipments from Columbia or Willamette River ports. Outlook for foreign markets is believed to be better, since high-profit Douglas-fir clears are the principal items in this commerce and cargoes are handled for less freight cost in foreign bottoms. Northwest Oregon, in recent years, has been holding its own in this market and, as economic conditions improve in Latin America, Asia, and Africa, the market should expand. Australia has been another favored market for Douglas-fir producers.

It can be expected that new mills, designed for small logs, will be established as character of the area's stumpage resource changes to smaller timber and more young growth. Industry owning or controlling timber will be in the best position to construct new mills or modernize existing plants. Integrated operations, seeking to balance end product with raw material, may increase their sawmill capacity. Of the four counties with current high unemployment, Clatsop and Columbia on the lower Columbia River, seem to offer the best opportunity for establishing new sawmills.

The large volume of hardwoods growing in this area and the low rate of utilizing

them were pointed out earlier in this report. Currently, the quantity of hardwood lumber produced is relatively small. Nearly all hardwood lumber produced here is used in local or California furniture plants. These furniture manufacturers are market oriented, as are all of the secondary wood-using industries, and they are destined to expand with the growing population of the Pacific Coast and Southwest States. Opportunities for expanding the hardwood lumber industry are particularly good in Clatsop, Columbia, and Yamhill Counties.

PLYWOOD MANUFACTURE

Unlike the softwood lumber industry, the softwood plywood industry anticipates expanding markets as population increases and the national economy expands. The industry's large research and development program and aggressive marketing policies are opening new markets. A rapid expansion is taking place in the softwood plywood industry in the South, encouraged by expanding markets and available raw material. Some 19 new plants are already completed, or scheduled for completion by the end of 1965, with prospects of 6 to 10 more in 1966. The resulting expansion in total softwood plywood capacity is expected to be 1.6 billion square feet by the end of 1965, possibly reaching 2.8 billion by the end of 1966 (Anonymous 1965). This expansion will inevitably offer increased competition to Oregon plants.

Regardless of the favorable market outlook, raw material is a limiting factor to expansion of the industry in northwest Oregon. Although plywood logs can bear higher transportation costs under normal circumstances than sawmill logs, the industry must locate close to raw material sources to obtain weight reduction economies. History of the industry's growth illustrates this principle. Greatest expansion in recent years has been in southern Oregon, northern California, Idaho, western Montana, and eastern Oregon. Records of plant closures, new plants, changes in ownership, and plants opening in 1964 (Sherman 1964) emphasize the above conclusions.

New plants added during 1963 were all located in southern Oregon, and plants scheduled to commence operation in 1964 are in Arkansas, Idaho, eastern Oregon, Texas, and Washington. Acquisitions during recent years by expanding integrated firms, such as Georgia-Pacific Corp. and U.S. Plywood Corp., generally have been of companies which either had substantial timber ownership or firm access to timber supplies. During 1963, four plants closed, three of them in northwest Oregon. Although the reasons for closure were not due entirely to timber supply problems, they probably were a contributing factor. Other reasons for closure were plant obsolescence, finances, and overall company policy regarding utilization of log supply and manufacturing facilities. One of the plants reopened in 1964 after extensive modernization. This plant has installed mechanized equipment which enables it to use smaller logs. However, it will employ about 40 percent fewer people than it did before modernization.

On the optimistic side, plants in northwest Oregon having access to water transportation, or within reasonable truck haul distance of National Forest timber, can anticipate continued supply of old-growth logs. In view of the competitive situation for plywood and sawmill logs, establishment of new plywood enterprises would face some raw material difficulties. At the least, before establishment, a thorough, detailed study should be made of raw material prospects and possible plant locations.

Again, existing firms having an assured timber supply may find it profitable to install or expand plywood capacity to obtain better product mix or other advantages of integration.

Products using plywood with facings of hardwood veneer, paper products, or light metals should offer advantages to plants in this area. Northwest Oregon is in a prime position to receive hardwood logs and veneer from abroad and hardwood veneer and other face material from United States sources by rail or water.

The expanding metropolitan area of northwest Oregon and southwest Washington offers local market outlets for such products. Population forecasters expect this area to grow at a higher rate than other parts of Oregon and at a rate more comparable to California and Washington growth, which is expected to be higher than the national average.

WOOD-FIBER INDUSTRIES — PULP, PAPER, AND WOOD COMPOSITION BOARD

The wood composition board industries (hardboard, particle board, and insulating board) have much in common with the pulp and paper industry in technology and raw material supply. Both employ continuous production processes, use wood residues for raw material, and require industrial water in considerable volume.

The combination of raw material availability and projected market demand is favorable to continued expansion of these industries in the Pacific Northwest. Like the sawmill and plywood industry, they are location-oriented toward raw material supply. Using wood residues for all or a major part of their raw material permits more flexibility in location as weight reduction advantages are partly obtained through use of chips rather than logs. In spite of this, history of the board industry in the Northwest has been generally one of integration with sawmills or plywood plants. Integration with sawmills and plywood plants is not as common in the pulp industry. Lower capital investment requirements for board plants are a probable factor influencing this type of integration. Many more lumber and plywood firms can command capital for board plants than for pulp and paper plants. Market organizations and outlets are also more closely related between lumber, plywood, and fiberboard than between board and paper products.

The pulp and paper industry also differs from the board industry in the continued use of roundwood for part of its raw material. However, as was pointed out earlier, the great majority of pulp capacity installed during the past decade or more has been based upon availability and use of wood chips, byproducts of the sawmill and plywood industries.

Another point of difference is in the degree of processing needed to produce a completely manufactured commodity. The initial manufacturing process in board plants results in an end product, although all types of board can be and are used in secondary industries to a considerable extent; for example, use of hardboard and particle board in furniture manufacture.

Nevertheless, the major market for wood composition boards is for construction. There it competes with lumber and plywood. Woodpulp, on the other hand, must be made into paper or paperboard to reach end-product use. Paper is also converted to many other products, extending the degrees of vertical integration in the industry. It competes with lumber, plywood, and wood composition boards in limited markets only.

The two industries differ sufficiently, regardless of similarities, that blanket conclusions cannot be drawn regarding opportunities for expansion in northwest Oregon.

Pulp and paper industry. — Pulp and paper mills are a natural complement to the other primary timber industries in the Pacific Northwest. This industry can use wood residues from other primary manufacture, roundwood unsuitable or of marginal value for lumber, and hardwood

species having limited use for lumber or plywood manufacture.

The species composition in northwest Oregon forests makes possible the choice of several technical pulping processes, chemical, semichemical, and mechanical. Recent advances in technology have improved types of each of these three basic processes. This is giving greater flexibility in type of raw material needed, plant location, and magnitude of investment.

Stream and air pollution are being given greater attention by regulatory bodies. However, research and development are solving these problems.

Markets are expanding in volume of demand and type of products made from paper.

The great surge in expanding this industry has been in kraft mills. Although smaller mills have proved feasible, the industry seems to favor a minimum size of 300 to 400 tons capacity per 24 hours for establishing new kraft plants. An integrated pulp and paper mill of this size requires a capital investment of $30 million to $40 million. Such a plant would use about 210,000 to 280,000 tons of dry wood a year, based upon 350 operating days. Semichemical and mechanical pulpmills are commonly constructed with smaller capacities and lesser investment.

Recent research and development has made use of shavings and sawdust more feasible for pulping. The large volumes of red alder in northwest Oregon and the tremendous roundwood potential in mortality salvage thinnings and intermediate harvest cut from conifer young-growth stands in this area also add to the raw material base here. The Columbia River offers several choice pulpmill sites. No doubt other suitable sites could be found on the Willamette River system, depending upon type of pulping process and method of effluent disposal.

Raw material availability, plant sites, and market prospects combine to make northwest Oregon a likely area for expansion of the pulp and paper industry.

Wood composition board industries. — The board industries offer good prospects for expanding the timber-based economy in northwest Oregon. The outlook for markets is favorable, raw material is available, labor supply should present no problem, and this area has a number of feasible plant locations. Since this industry can use planer shavings as well as wood chips, expansion is not totally dependent upon importing chips from eastern and southern Oregon. Further, wood chips used do not have to be entirely bark free, strengthening ability of the industry to compete for supplies of this raw material. Roundwood and logging residues can also be used.

Plants of relatively small size are economical; a capital investment of about $1 million to $2 million, depending upon the type of board produced, is required for plants with a daily capacity of 50 to 70 tons of board. Annual raw material requirements are from 15,000 to 25,000 tons of dry wood material, depending upon days operated per year, size of plant, and type of product. Man-hours of labor required per ton of daily capacity were estimated at 7 to 10 in a study made in 1955 (Pacific Power & Light Company). Recent theoretical calculations, based upon reported output and labor employed at several typical west coast plants, give a slightly smaller figure, 6.5 to 8.6 man-hours per ton of daily capacity. Proposals for specific plant establishment should be preceded by intensive study of raw material supply, plant location, technical processes, plant and operating costs, and a market survey.

POLES AND PILING

This industry, including preservative treatment of lumber, has been active in this area for years, although it is small

in comparison with the other primary timber industries. About 1 percent of the logs and other roundwood processed in northwest Oregon is treated and marketed as poles and piling. Western pole producers have lost ground to southern pine producers since World War II. New developments in chemical wood preservatives and fire retardants lend encouragement to expanding this industry moderately in the future.

SECONDARY WOOD-USING INDUSTRIES

This industry group includes manufacturers of a wide range of products. These industries have two things in common: (1) They use as a principal raw material the products of sawmills, plywood and veneer plants, wood composition board plants, and pulp and paper mills; (2) these industries are market oriented, to a large degree, as far as plant location is concerned.

Related to these two factors is the tendency for these industries to cluster in and around metropolitan areas having concentrations of primary timber products industries. In the Douglas-fir subregion, for example, concentrations are found in the Seattle-Puget Sound metropolitan area and the Portland metropolitan area. In this way, they remain near raw material supply and also are close to much or part of their market outlet.

In northwest Oregon, this group includes the following: planing mills; sash and door plants; furniture factories; plants making prefabricated products such as housing components, portable buildings, precut structures, laminated beams and trusses, and converted paper products plants. Other specialty products, such as ladders, garage doors, boats, panels, molded products, and wood flour, are produced in this area. In addition, plants sawing specialty products, custom sawing and drying, and slicing veneer might be included in this category.

Products of some of these industries — paper products, for example — may be marketed nationally, but mostly these industries depend upon western markets. The paper products are largely produced by the pulp and paper manufacturers at integrated plants or at subsidiaries. However, there are a number of relatively small independent producers of converted paper products in the area.

The other industries are largely made up of relatively small, independently owned plants, serving the local market. One or two exceptions — nationally known firms, such as Timber Structures — market products east to the Lake States or further.

Some items produced by these industries, cut stock for example, are also produced by sawmills in the area.

Nearly all of the plants in this category are located in Portland and its suburbs. However, there is no basic reason suitable locations cannot be found elsewhere in northwest Oregon, considering the network of transportation facilities available. As the economy and population of the Pacific coast and Southwest grow, these industries should expand. Usually, the key factors in success of the small firms characterizing these industries are creativity and technical competence in management. Unquestionably, there are opportunities in many places in northwest Oregon for these kinds of enterprises.

CHRISTMAS TREE CULTURE AND MARKETING

The combination of farm forests, industrial forests, and public forests within easy driving distance of a large metropolitan area encourages growing Christmas trees for the market. Although small compared with other forest industries, it is a profitable part-time business for many individuals. A few make it a full-time occupation. Some individuals buy the trees on the stump from public and

private forest-land owners and harvest and market them only.

Another occupation somewhat similar to the latter is the gathering and selling of forest greens and other minor forest products of this sort. There are a few firms in the Pacific Northwest that handle these miscellaneous products on a wholesale basis.

These minor forest industries will probably grow as population grows in the area.

RECREATION AND TOURISM

Northwest Oregon is well known for the quality and convenience of its outdoor recreation features and facilities. The combination of snowcapped mountains, rivers, lakes, forests, and seacoast in a comparatively small area presents many natural opportunities for all sorts of business enterprises. It is difficult to separate forest recreation from other outdoor recreation — presence of verdant forests enhances all outdoor recreation that uses the inland waters, the sea, the snow, or the beaches.

Improvement of the Federal highways, growth of air travel, greater leisure time, population explosion, and many other recent developments and phenomena are contributing to the great growth of this industry in northwest Oregon. The completion of the Columbia River bridge near Astoria will surely increase tourist travel along the northwest Oregon coast and probably along the Columbia River highway.

Opportunities in this industry are well known to local chambers of commerce and the communities of the area. No attempt was made in this study to single out certain forestry aspects of outdoor recreation and tourism and study them. That has been done by public agencies and commissions, and findings have been published.

OUTLOOK FOR FOREST INDUSTRIES OF NORTHWEST OREGON

Compared with most other timber manufacturing areas of the West, the timber industries of northwest Oregon are well diversified and highly developed. The Portland-lower Columbia timber industry concentration can be described as highly integrated, although it does not have a single corporate industrial plant complex to compare with the Weyerhaeuser Co. operation across the Columbia River at Longview.

In reaching this condition, the area has passed through several stages of industrial development. In northwest Oregon were located not only the pioneer sawmills but also the pioneer wood-using pulp and paper mills of the west coast. The softwood plywood industry commenced in Portland nearly 60 years ago. The area passed through the era of the large cargo mills which shipped most, if not all, of their lumber green by vessel coastwise

to California, intercoastal to the east coast, and across the seas to world markets. In contrast, this area was the scene of early intensive use of dry kilns in seasoning the common grades of Douglas-fir; for example, the Oregon-American Lumber Co. at Vernonia. The newer sawmills, replacing the cargo mills, are usually smaller in size, designed to maximize use of automated equipment and produce a more refined product through surfacing and seasoning.

Many secondary wood-using industries, established and expanded in this area, include cooperage manufacture, wood lamination and prefabrication, sawing and surfacing of specialty products, furniture manufacture, and manufacture of converted paper products.

In addition, a number of satellite industries, dependent upon the forest industries for all or a major part of their markets, have developed in or near Portland. These include manufacturers of dry kilns, logging equipment and machinery, lumber carriers, lift trucks, and industrial chemicals. Also located in this area are firms warehousing and distributing products used in the timber industries but manufactured elsewhere in the United States.

Portland is a financial and business center for a large part of the Northwest timber industry. It is the headquarters for many large timber industry firms. Wholesalers, brokers, commission men, and exporters handling lumber, plywood, and other timber products are located here. It is also the headquarters for the principal associations of western lumber manufacturers.

Northwest Oregon is serviced by private and public power utilities centering in Portland, and enjoys relatively low industrial and domestic electric power rates. The recent introduction of natural gas into the area provides another competitive source of industrial fuel. Supplies of water for industrial and domestic use are better than adequate for attracting and holding timber industries dependent upon large quantities of water.

Earlier, the strategic physical location of northwest Oregon was described in detail. In brief, practically all of the industrial locations in the area have adequate access to excellent rail, highway, and water facilities for receiving raw material and shipping manufactured wood products.

Naturally, an area with the advantages described above would be a gathering place for labor. Adding the educational, cultural, social, and other living advantages makes this an attractive location for skilled, professional, clerical, and executive personnel experienced in the timber industries. Some economists consider that the natural amenities of an area may be an important factor in its economic growth.

With this background, it is evident that the crux of the problem for industrial expansion and job opportunity is in raw material supply and prospective market demand.

RAW MATERIAL SUPPLY FOR TIMBER INDUSTRIES

The log harvest from northwest Oregon forest lands of all ownerships was 1.2 billion board feet in 1962. In addition, unestimated but relatively small quantities of material in the form of poles, piling, cordwood, and bolts were cut and marketed commercially. Although this material is generally considered as nonsawtimber, it includes some that meets size specifications of small saw logs but brings greater returns when marketed as piling and poles, etc.

During 1962, the primary timber manufacturing plants consumed 1.6 billion board feet of logs. Thus, there was an apparent deficit of 400 million board feet in log supply which was satisfied by bringing logs from other parts of Oregon and Washington.

The other important form of raw material used by the primary timber manufacturing plants is chips produced from wood residues. Pulpmills and board plants of northwest Oregon used about 713,000 tons of wood chips from coarse wood residues. Apparently, 200,000 tons of chips were brought in to meet the demand.

Undoubtedly, some logs and chips produced in northwest Oregon are shipped to manufacturing plants out of the area. No attempt was made to determine these quantities. The important factor is the size of the net deficit of raw material needed to maintain northwest Oregon plants at current levels of activity and the dependability of imported chips as a source of supply. Also important are the potential sources of raw material which might be exploited to expand local industry.

Earlier in this report, it was demonstrated that an annual average cut of from 1.2 to 1.3 billion board feet of saw logs could be anticipated during the next decade or two from northwest Oregon commercial forest lands. This assumes continuation of current management practices on public and private lands. Although this amount is slightly higher than the 1962 log harvest on northwest Oregon lands, it is only about equal to the average annual harvest for the past 5 years.

Can the timber yield from northwest Oregon lands be increased without endangering future yields? There are several sources of additional log supply in northwest Oregon. First, there are close to 5 billion board feet of hardwood stumpage and a high growth potential from hardwood sites which have not been fully exploited. Second, there is a total of 5.8 billion board feet of softwood stumpage on private forest lands in the "farmer and miscellaneous" category. On the basis of past experience, current forest practices, and present knowledge of the owners' intent, it is not prudent to count upon any substantial increase in log harvest from these lands. However, any significant change in management of these lands or transfer of ownership to industrial owners could result in safely increasing harvest from these lands without lowering future yields, as was demonstrated in the 20-year projections. A substantial increase in stumpage and log prices would doubtless result in increased cutting on these lands.

A third source of increased log harvest is the thinnings from the young-growth forests. There is a strong beginning, underway now, in closer utilization through prelogging and thinnings. Improved economic conditions in the lumber industry, exhaustion of the wood chip supply for pulpmills, and reduced cost of harvesting such material through technological changes would accelerate this trend.

Can northwest Oregon depend upon other areas in Oregon and Washington for logs to augment local raw material supplies? Physically, most northwest Oregon timber industries are well located to obtain logs from southwestern Washington and west-central Oregon. Additional transportation and log handling costs are minimized by the Columbia River and Willamette River systems of waterways.

The principal sources of logs in southwest Washington available to northwest Oregon are the Gifford Pinchot National Forest and the Crown Zellerbach lands in Wahkiakum and Pacific Counties. Logs from the Crown Zellerbach lands are obviously committed first to their plants in northwest Oregon and their Camas mill in southwest Washington. Logs will be sold when not needed or when procurement of other logs is advanced.

The annual allowable cut from the Gifford Pinchot was recently announced as 381 million board feet in the regulated cut and 29 million board feet in the unregulated cut.

The unregulated cut is merely an estimate of a potential annual cut and is not

now regulated nor scheduled for cutting. It is composed of material from thinnings, hard-to-log areas, and landscape management areas, economically marginal or submarginal owing to adverse costs, inadequate markets, or physical conditions.

It is obvious that western Washington timber industries will obtain a large portion of the stumpage from northern portions of the Gifford Pinchot National Forest. However, a large part of this Forest fronts on the Columbia River east of Portland, is drained by relatively short south-flowing streams like Wind River, or is in the Lewis River drainage which joins the Columbia opposite St. Helens, Oregon, and natural transportation routes are southward.

Currently, northwest Oregon plants are procuring significant quantities of logs from the Gifford Pinchot Forest and are in a competitive position to continue obtaining logs from this source since this stumpage is sold by public bid.

Logs procured from west-central Oregon by northwest Oregon timber industries may originate from both public and private lands. This area, consisting of Benton, Lane, Lincoln, and Linn Counties, produced a total of 2.8 billion board feet of logs during 1962. This log harvest was about equally divided between private and public lands. However, about 90 percent of the log harvest from private lands came from forest industry holdings. Except where these lands were owned by firms having plants in northwest Oregon, it is logical to assume that the logs would be allocated to west-central Oregon manufacturers. This would be as likely in the case of logs harvested from other private lands. While northwest Oregon can probably count upon procuring some logs from private forest lands in west-central Oregon, the most dependable source would seem to be the public forest lands. However, competition for public-owned stumpage has been severe in this area and will probably continue so. Therefore, it is unlikely that northwest Oregon industries can expect any great increase in volume of logs procured from this area during the next decade, the ownership of private forest lands remaining as it is now.

Possibility of increasing the supply of wood chips, available for manufacture into pulp or wood composition boards, appears to be encouraging on the surface. Only about three-fifths of the coarse residue developing at northwest Oregon plants was converted to chips, despite the fact that local pulpmills and board plants imported nearly three-tenths of their chip requirements. The largest part of the coarse residues unused or used for fuel is developed at the smaller size sawmills and at the plywood and veneer mills. Cost of installing barkers and chippers is a limiting factor to the production of wood chips by the smaller sawmills. Approximately one-third of the coarse residue developing at the veneer and plywood plants was in the form of roundup, log trim, and spur ends. This material has disadvantages for chip production because of several factors, including physical shape and size, point in the plant where it develops, and cost. Pond "lilies" are not used and were not included as coarse residue in the survey.

Even at sawmills having barkers and chippers, a portion of the coarse residue is unsuited for processing into pulp chips because of adhering bark and other factors which make the operation uneconomical or infeasible. Some coarse residue is used for fuel which, under favorable economic conditions, could be converted to chips and marketed.

Analysis of available information and discussion with well-informed people show no market surplus of chips in this area currently. If more could be produced here at a price competitive with those shipped in from eastern and southern Oregon, there would be a ready market here and in western Washington.

Since northwest Oregon is both an exporter and importer of chips, appraisal of the overall situation and trends in use of chips and potential sources of supply is enlightening.

Volume of pulpwood in all forms, consumed by Oregon and Washington pulpmills, increased more than twofold from 3.4 million cords in 1947 to 7.2 million cords in 1962 (Northwest Pulp & Paper Association 1962). During that same period, use of chips and residue increased nearly fourteenfold from 290,000 cords to 4.0 million cords. Farmer wood increased from 283,000 cords to 729,000 cords, and consumption of logs decreased from 2.8 million cords to 2.5 million cords. Thus, the expansion of the pulp industry during this 15-year period was based almost entirely upon chips. In view of the pulp manufacturing capacity added in these two States during 1963 and that definitely planned for construction during 1964, a large part of which is in west-central and southwest Oregon, chips could become a critical raw material item.

The most recent overall analysis of pulpwood sources in the Pacific Northwest was made for 1957 by this Station (Grantham 1960). It showed that during 1957 chippable material developing at Oregon sawmill and plywood plants was 3.7 million cords and at Washington plants was 1.5 million cords, or a total of 5.2 million cords. During 1957, a total of 2.7 million cords of this material was used by pulpmills in the two States. Consumption has since increased to 4.0 million cords, or nearly 80 percent of the visible supply. This situation changes with volume of lumber and plywood production, but the diminishing margin between potential supply and consumption is a cautionary guidepost.

Other sources of raw material are available if chip prices become too high or the supply is actually exhausted. In the two States, these sources total 2.9 million cords of sawdust, 1.9 million cords of shavings, 1.6 million cords of logging residue, and 7.5 million cords of annual mortality. In Oregon alone, in 1957, there were 3.7 million cords of chippable manufacturing residue, 2.0 million cords of sawdust, 1.3 million cords of shavings, 1.2 million cords of logging residue, and 4.3 million cords of annual mortality.

Despite the mobility of log and chip supplies, there are local variations which require close analysis in evaluating the outlook for the timber industries in northwest Oregon. This is particularly true in the four subject counties: Clatsop, Columbia, Hood River, and Yamhill. The situation also varies by industry. Accordingly, each major industry will be discussed separately and raw material problems identified and described, following a general discusson of markets and transportation.

TRANSPORTATION AND MARKETS

The timber industries are commonly raw material oriented. On the other hand, the primary products of these industries are comparatively bulky and cost of shipping them to markets is a critical factor. Axiomatically, the greater the value added by manufacture to these products, the wider the markets open to them.

Sampson (1961), from a study of railroad shipments and rates from the Pacific Northwest, found that relatively few commodities, 14 out of 260, accounted for nearly half of the rail tonnage originating in the region. He also found that 13 of these 14 commodities were derived directly from forest or agricultural industries. Oregon was much more dependent upon these basic industries for extra-regional shipments than Washington. Sampson discovered that the principal markets for forest products are distant and concentrated geographically. He pointed out that the Pacific Northwest is greatly dependent upon adequate rail transportation and low freight rates because of the importance of distant markets for the region's comparatively high-

bulk, low-value commodities. He concluded that any adverse change in quality and cost of rail transportation would swiftly and directly affect the region's economy. A measure of importance of this rail traffic in Oregon is shown by the annual outgoing-freight bill,[6] which amounted to $248 million in 1958. Two commodity classes — lumber, including lath and shingles, and veneer and plywood — accounted for $189 million. Other products manufactured from wood or wood fiber raise the total accounted for by the forest resource industries to $200 million.

Northwest Oregon is physically well located with respect to transportation, having good world port facilities, direct rail connections with five transcontinental lines, and excellent highway access to principal routes east, north, and south. Only a comparatively small part of the total production of northwest Oregon's primary timber industries finds end use locally, and these industries are largely dependent upon national markets. Volume of lumber, plywood, and pulp and paper products shipped to foreign markets is sufficient to make this outlet important to some producers in this area. Generally, though, export markets are greatly overshadowed by domestic markets.

Although products of the northwest Oregon timber industries are marketed to some extent in every State of the Union, transportation costs and degree of competition from other United States timber-producing regions and from British Columbia and eastern Canada are restrictive factors in many States. Markets for woodpulp are much more limited. No specific information was obtained regarding export markets for wood composition boards. However, it is believed that this industry is largely dependent upon nearby domestic markets because of the competition from producers in the Southern and Lake States, eastern Canada, and the Scandinavian countries for eastern and world markets.

[6]Shipments out of the Pacific Northwest do not include intrastate shipments of logs, chips, and manufactured forest products.

LUMBER

The authoritative source for recent lumber distribution statistics was a West Coast Lumbermen's Association compilation, published monthly, which covered about half the production of the Douglas-fir subregion and is believed indicative of total distribution (West Coast Lumbermen's Association 1962). During 1962, out of a total of 3,629 million feet of lumber shipped from the region, 2,113 million feet were shipped by rail, 922 million by vessel, and 594 million by truck and barge. Western Oregon alone shipped a total of 2,042 million feet: 1,270 million feet by rail, 488 million feet by ship, and 284 million feet by truck and barge. Distribution of rail shipments within the conterminous United States is given in table 20.

Table 20 does not include Alaska and Hawaii. In addition to the amounts in table 20, 15.8 million feet were shipped by rail to Canada and 0.1 million feet to Mexico.

Domestic cargo shipments of lumber from the Douglas-fir subregion during 1962 amounted to 744 million feet, distributed as follows:

	Western Oregon	Western Washington	Douglas-fir subregion
	(million feet)		
DESTINATION:			
EAST COAST	332	178	510
WEST COAST	28	185	213
OFFSHORE	5	16	21
TOTAL	365	379	744

Export shipments of lumber during that year totaled 178 million feet, 70 million feet from western Washington and 108 million feet from western Oregon.

TABLE 20

Distribution of lumber rail shipments in United States from western Oregon and western Washington, 1962

Destination by region	Originating area					
	Western Oregon		Western Washington		Total	
	MM bd.ft.	Percent	MM bd.ft.	Percent	MM bd ft.	Percent
Northeast and north Atlantic States	106	8.4	128	15.2	234	11.2
Southern States	317	25.2	165	19.7	482	23.0
Lake States	238	18.9	243	29.0	481	22.9
Prairie States	190	15.1	142	16.9	332	15.9
Mountain States	94	7.5	41	4.9	135	6.4
California	231	18.4	39	4.6	270	12.9
Oregon	51	4.0	19	2.3	70	3.3
Washington	31	2.5	62	7.4	93	4.4
Total	1,258	100.0	839	100.0	2,097	100.0

Truck and barge shipments of lumber are combined in the West Coast Lumbermen's Association tabulation. During 1962, they totaled 594 million feet; 310 million feet were shipped from western Washington plants and 284 million feet from western Oregon plants. However, in both States, a large part of the "truck and barge" shipments are intrastate, either to wholesale and retail outlets or for factory and plant use. In western Washington, these categories accounted for 288 million feet and in western Oregon, 213 million feet. In addition, there was some exchange between the two States. The net result is that the volume shipped to other States was small, with one exception; California was the destination of 54 million feet of truck shipments, practically all shipped from western Oregon. Each of the remaining eight Western States received small amounts of lumber by truck. Although no further geographical breakdown is available, it is believed that the larger part of truck shipments to California was shipped by west-central and southwest Oregon mills. Information on total volume of lumber shipped by truck is unobtainable so perhaps the above figures are not truly representative. Nonmember mills and nonrespondent mills to the WCLA canvass in western Oregon are believed to be the smaller mills and ones more likely to ship by truck.

Although complete lumber distribution data are not available for northwest Oregon, information is available on waterborne shipments. Generalizations can also be made upon the basis of data presented above. Obviously, a greater volume of lumber is shipped by rail. Major markets are the Southern States — principally Texas and Oklahoma — North Atlantic States, the Midwest, and California. Producers in western Oregon, from Glendale south, have a lower rate to California and southwest points than those in the remainder of the Douglas-fir subregion. Truck and waterborne shipments place California in first rank.

Waterborne shipments of lumber from northwest Oregon ports amounted to more than 250 million feet in 1962. Of this, nearly 105 million feet were shipped coastwise, California markets absorbing most, if not all of it. About 60 million feet were shipped to the east coast. Eighty million feet were exported, and the remainder went to Hawaii or Alaska.

PLYWOOD

During 1962, northwest Oregon accounted for more than one-tenth of the total softwood plywood production in the Nation. Nearly all of the total U.S. production of 9.5 billion square feet (3/8-inch basis) was produced in the three Pacific Coast States. Producers in these three States have about the same competitive conditions in national and foreign markets. Therefore, it is reasonable to believe that industrywide distribution patterns will serve to describe the markets of northwest Oregon producers.

The Douglas Fir Plywood Association made a geographical analysis of 1962 shipments from member mills. This survey covered 6.5 billion square feet. Total production of all member mills was 7.3 billion square feet. Northeast and Middle Atlantic States received 18 percent of the total; Southern States, 27 percent; Lake States, 18 percent; Prairie States, 9 percent; Rocky Mountain States, 5 percent; California, 14 percent; Oregon, 3 percent; Washington, 5 percent; and Alaska, Hawaii, and foreign markets, 1 percent.

California producers have a preferential position in the California market. However, in spite of a rapid increase in plywood production in that State during recent years, it is not self-sufficient (Zivnuska et al. 1963). Since California producers ship much of their production out of the State, it remains an important market for Oregon producers.

Nearly all of the softwood plywood from northwest Oregon is shipped by rail and truck. Data on truck shipments are difficult to obtain, and such shipments are limited to the western continental States. Except for California, this market is relatively small — southern Oregon and northern California producers are in a better position than northwest Oregon producers to reach this market by truck. Logically, then, the great majority of northwest Oregon plywood moves to other markets by rail.

HARDBOARD

The principal domestic markets for hardboards were the North Central, New England, and Middle Atlantic States, according to a compilation made in 1954 by the U.S. Tariff Commission and covering the years 1950, 1953, and 1954 (Pacific Power & Light Co. 1955). During 1954, the 11 Western States probably consumed about one-sixth of the United States total.

The Northern and Eastern States are much more accessible to Eastern United States, Canadian, and foreign producers than to the western producers. The national market open to western producers is probably pretty well limited to the Midwest, Mountain, and Pacific Coast States.

Volume of all types of board shipped from northwest Oregon by water is minor.

PULP AND PAPER

The Pacific Northwest (Oregon and Washington) is an exporter of pulp, producing more than is used within the region for paper manufacture. During 1962, this region produced 4,576,000 tons[7] of woodpulp, about one-sixth of the total U.S. production. Of the regional total, Washington produced 3,345,000 tons and Oregon 1,231,000 tons. By type of pulp, sulfate pulp leads, followed by sulfite, alpha and dissolving, groundwood, semichemical, and soda. Exact figures on some types are unavailable to avoid disclosure of production of an individual manufacturer. It has only been in recent years that sulfate pulp has been the leader. During 1962, this region produced 3,121,000 tons of paper and paperboard; Washington produced 1,894,000 tons and Oregon, 1,227,000 tons.

A total of about 1.4 million tons of woodpulp was shipped out of the region

[7]Includes production of one plant in Alaska which is combined with the Washington total.

during 1962. Although part of this went to "captive" paper plants, by far the major part of it was market pulp.

Figures on 1962 distribution of pulp are not available, but Guthrie and Iulo's study (1963) showed that in 1960 Oregon and Washington shipped 1,072,000 tons of pulp to other States, 971,000 tons by rail and over 100,000 tons by water and truck. About 85 percent of this amount was shipped to the Midwest and East. The rest was shipped to the Southern States and California. Market sales of pulp during this year amounted to about 900,000 tons.

During 1960, Pacific Northwest pulp producers exported 410,000 tons of woodpulp. Again, this figure included the output of a dissolving pulpmill in Alaska, owned and operated by a Japanese firm. All of the output of this pulpmill is shipped to Japan.

The Western States as a whole do not produce all of their requirements for paper and paperboard. However, this is not true of Oregon, which produces in the aggregate more paper than it consumes.

All except one of the pulp and paper plants in northwest Oregon are integrated and use all the pulp they make for paper manufacture. The one exception is a pulp plant at Newberg, which markets its entire output. Its capacity is rated at 150 tons per 24 hours of unbleached sulfite pulp (Lockwood Trade Journal, Inc. 1963). Total daily capacity of all pulpmills in northwest Oregon is 1,680 tons.

LOGS

Logs are becoming an important and controversial export commodity in the Pacific Northwest. Regardless of the impact they may have on stumpage supply to regional timber industries, they are a source of income to some timber industry firms and to labor. During 1961, the Pacific Northwest exported 336 million feet of logs; volume of this traffic dropped slightly to 311 million feet during 1962. Traffic in logs picked up considerably during 1963. During the first three quarters of the year, log exports totaled 595 million feet. Japan takes nearly all of the logs exported, small quantities going to Canada and South Korea.

During 1962, northwest Oregon ports shipped 16 million feet of logs to Japan. Small amounts of piling were shipped to Hawaii.

SUMMARY

1. Northwest Oregon has many natural advantages favoring the growth of timber industries. These include abundant forest resources, water transportation to the sea and interior, excellent rail and highway facilities, relatively cheap power, plentiful supplies of industrial and domestic water, and equable climate.

2. Population growth on the Pacific coast, development of other industries in northwest Oregon, and overall economic growth of the area favor location of secondary wood-using industries here.

3. After more than a century of timber utilization and agricultural conversion of forest lands, 72 percent of the total land area of northwest Oregon is forest land. Forest land totals 4.1 million acres, of which 4.0 million acres are commercial forest land.

4. Northwest Oregon has a total sawtimber volume of 65.6 billion board feet. More than half of this volume is Douglas-fir. Hemlock–Sitka spruce type ranks second in softwood volume with 21.4 billion board feet. Hardwoods total 4.8 billion board feet, of which 3.4 billion is red alder.

5. Commercial forest land is about evenly divided between public and private ownership. More than half the sawtimber volume is on the Mount Hood National Forest. Combined public ownership accounts for seven-tenths of the timber volume.

6. A little less than half the private forest land is in industrial ownership, and the remainder is in farmer and miscellaneous private ownership, including a few large nonindustrial but forestry-oriented holding companies. Forest industry lands support 10.5 billion board feet of sawtimber compared with 8.3 billion feet on the nonindustrial private forest lands.

7. Net annual growth on all commercial forest lands during 1952-61 averaged 1.1 billion board feet, of which 917 million feet were in softwoods and 205 million feet in hardwoods.

8. During 1958-62, log harvest averaged 1.3 billion board feet. In 1962, it was 1.2 billion board feet.

9. The timber industry complex of northwest Oregon is highly developed, including sawmills, veneer and plywood plants, pulp and paper plants, wood composition board plants, and a variety of remanufacturing and secondary wood-using plants.

10. During 1962, the primary timber industries of northwest Oregon consumed 1.6 billion board feet of logs and 713,000 tons of wood chips processed from wood residues developed by sawmills and veneer and plywood plants. Northwest Oregon plants produced 513,000 tons of wood chips.

11. Northwest Oregon currently imports a net volume of 400 million board feet of logs and 200,000 tons of wood chips from neighboring areas in Oregon and southwest Washington to supply its industries.

12. Based upon analysis of timber supply and anticipated demand for timber products, an average annual log harvest of about 1.2 billion board feet is expected during the next decade or two. This is about the same as the average harvest for the 1958-62 period. The current allowable cut from public forest lands totals 620 million board feet. With continuation of current trends in management of private forest lands, a cut of 600 million board feet could be harvested from these lands without serious adverse effect on future yields.

13. The diverse and unpredictable intentions of nonindustrial private forestland owners make it exceedingly difficult to predict future timber harvest from their lands. Furthermore, the comparatively large volume of hardwood growing stock and current growth, not now being utilized, creates forest management problems for all owners, but particularly for the nonindustrial private owners.

14. Lumber production has declined during the past decade, absolutely and relative to the total of the Douglas-fir subregion. Production declined from 1.8 billion board feet in 1953 to 1.3 billion board feet in 1956. During the past 5 years, production has stabilized at about 1.3 billion board feet annually.

15. Trends in production of plywood, pulp and paper, and wood composition board have been generally upward in northwest Oregon.

CONCLUSIONS

1. Based upon findings of a national analysis of demand for wood products in the framework of the timber supply situation, a moderate decline in lumber production is expected in northwest Oregon over the next several decades. During this period, a moderate increase in production of veneer and plywood and a substantial increase in production of pulp and paper and wood composition board is anticipated in this area.

2. During the next few years, some increase in hardwood lumber production is expected, but this will be limited by economic availability of logs and competition from pulpmills and existing hardwood lumber manufacturers for available logs.

3. Veneer and plywood production is expected to increase during the next few years in this area at the expense of lumber manufacture or through withdrawal of logs from other areas.

4. Pulp and paper manufacture will increase, but it will have to be based upon thinnings and other low-cost roundwood or on fine mill residues.

5. Secondary wood-using industries, manufacturing such products as wood specialties, laminated beams, trusses, etc., wood chemicals, and converted paper products, offer good possibilities for industrial expansion in northwest Oregon owing to locational advantages in this area and nearness to growing consumer markets.

LITERATURE CITED

Anonymous.
1965. South moves fast into the softwood plywood industry. Forest Indus. 92(1):48, illus.

Corder, S. E.
1956. Oregon mill residues in 1953. Oreg. Forest Prod. Lab. Inform. Cir. 7, 32 pp, illus.

..... and Gedney, D. R.
1956. Mill residues in 3 Oregon counties. Oreg. Forest Prod. Lab. Inform. Cir. 8, 34 pp., illus.

Fedkiw, John.
1964. Forest industry capacity, production, and available log supplies in the Douglas-fir subregion.* U.S. Forest Serv. Res. Paper PNW-11, 63 pp., illus.

Grantham, John B.
1960. Availability and use of wood for pulp in Pacific Northwest.* Pulp & Paper 34(13): 107-108, 111-112.

Guthrie, John A., and Armstrong, George R.
1961. Western forestry industry, an economic outlook. 324 pp., illus. Baltimore: John Hopkins Press.

..... and Iulo, William.
1963. Some economic aspects of the pulp and paper industry with particular references to Washington and Oregon. 106 pp., illus. [Wash. State Univ., Pullman.]

Lockwood Trade Journal Co., Inc.
1963. Lockwood's directory of the paper, and allied trades. Ed. 88, 1,592 pp., illus. New York.

Metcalf, Melvin E., and Hazard, John W.
1964. Forest statistics for northwest Oregon.* U.S. Forest Serv. Resource Bul. PNW-7, 38 pp.

Northwest Pulp & Paper Association.
1962. Economic survey 1947-62. 10 pp. Seattle, Wash.

Pacific Power & Light Co.
1955. Wood composition boards; general characteristics, uses and manufacturing processes. 43 pp. plus appendixes, illus. Portland, Oreg.

Sampson, Roy J.
1961. Railroad shipments and rates from the Pacific Northwest. Univ. Oreg. Bur. Business Res., 64 pp., illus.

Sherman, Dean F.
1964. The plywood industry; where it is — where it is going. Forest Indus. 91(1): 35-38, illus.

Stanford Research Institute.
1954. America's demand for wood 1929-1975; summary of a report . . . to Weyerhaeuser Timber Co., Tacoma, Wash. 94 pp., illus.

U.S. Bureau of the Census.
1961. United States census of agriculture, 1959. Washington counties. 225 pp.

.....
1962. County and city data book; a statistical abstract supplement. 669 pp., illus.

U.S. Department of Agriculture
1962. USDA report on water and related land resources, middle Willamette River basin, Oregon. 180 pp., illus.

U.S. Forest Service.
1958. Timber resources for America's future. U.S. Dept. Agr. Forest Resource Rpt. 14, 713 pp., illus.

.....
1965. Timber trends in the United States. U.S. Dept. Agr. Forest Resource Rpt. 17, 235 pp., illus.

West Coast Lumbermen's Association.
1962. Distribution of lumber shipments. 4 pp. Portland, Oreg.: Western Wood Products Association. [Published monthly.]

Zivnuska, John A., Cox, Paul, Poli, A., and Pesonen, David.
1963. Economic development prospects for the commercial forest resources and forest products industries of California. Berkeley: University of California.

*Address requests for copies to the Pacific Northwest Forest & Range Experiment Station.

DPSU/65

The FOREST SERVICE of the
U. S. DEPARTMENT OF AGRICULTURE
is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.


NATIONAL FOREST SYSTEM
COOPERATIVE FORESTRY
FORESTRY RESEARCH
FOREST SERVICE
USDA
60
1905 - 1965
FOREST SERVICE YEARS

U.S. Forest Service
Resource Bulletin PNW-13

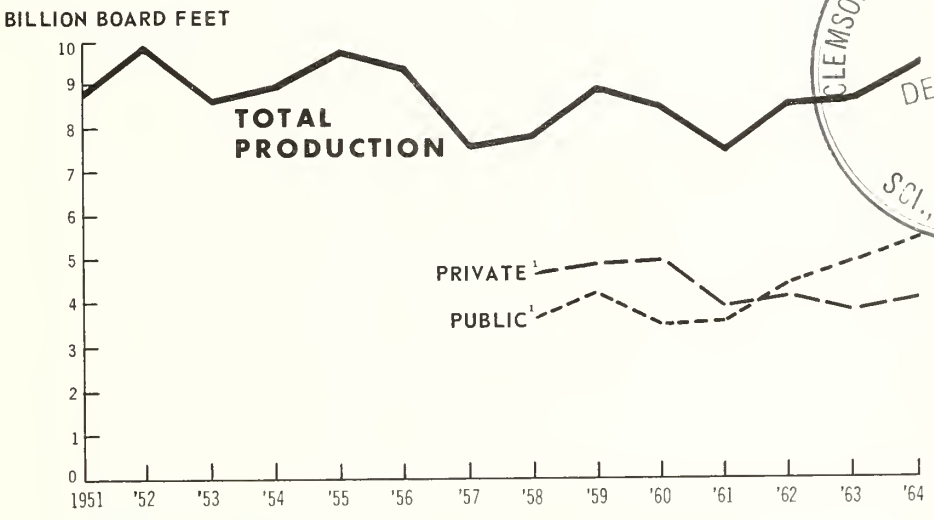
September 1965

1964 OREGON LOG PRODUCTION

by Brian R. Wall

The production of logs in Oregon in 1964 was 9.4 billion board feet, or nearly 9 percent above 1963. This year, 1964, had the third highest level of log production in history, exceeded only in 1955 and in 1952. The proportion of total cut from private lands fell to 43 percent, even though the total private cut increased 6 percent over that in 1963. Forest industry, accounting for 85 percent of the private production, had the greatest absolute increase, 291 million board feet.

Production rose on all public lands, with the Bureau of Land Management showing the greatest increase of 272 million board feet--up 20 percent over 1963. The National Forests reached a new production high of 3.4 billion feet, with an increase of 184 million board feet. An increase of 14 percent was recorded for State lands, and Indian lands increased their production by 27 percent in 1964.



[1] Separate data for public and private unavailable prior to 1958.

OREGON LOG PRODUCTION 1951-64

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director
Portland, Oregon

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

Log Production by Ownership in State of Oregon, 1964[1/]

(In thousands of board feet, Scribner log rule)

State and county	Private[2/]			Bureau of Land Mangt.[3/]	National Forest[4/]	Indian[5/]	State[2/]	Total
	Forest industry	Other	Total					
Western Oregon:								
Benton	22,532	15,179	37,711	70,904	21,500	--	4,392	134,507
Clackamas	88,231	16,381	104,612	22,143	206,000	--	3,659	336,414
Clatsop	247,072	8,757	255,829	--	--	--	35,443	291,272
Columbia	67,382	50,151	117,533	2,079	--	--	1,786	121,398
Coos	336,529	21,106	357,635	258,155	72,400	--	54,136	742,326
Curry	232,702	26,609	259,311	24,498	111,500	--	--	395,309
Douglas	576,183	66,629	642,812	439,017	475,300	--	38,028	1,595,157
Hood River	10,034	3,215	13,249	--	34,100	--	--	47,349
Jackson	177,267	9,644	186,911	113,561	164,500	--	550	465,522
Josephine	8,075	7,589	15,664	104,232	68,300	--	16	188,212
Lane	555,014	49,727	604,741	316,410	741,000	--	6,856	1,669,007
Lincoln	300,837	20,645	321,482	10,175	127,200	--	9,679	468,536
Linn	261,199	75,741	336,940	123,046	162,800	--	4,809	627,595
Marion	8,570	9,317	17,887	16,006	81,600	--	8,747	124,240
Multnomah	3,359	1,975	5,334	--	41,000	--	--	46,334
Polk	62,550	3,723	66,273	56,383	4,700	--	5,139	132,495
Tillamook	87,427	6,918	94,345	28,956	54,700	--	61,468	239,469
Washington	3,435	9,574	13,009	5,147	--	--	1,822	19,978
Yamhill	9,124	8,680	17,804	24,188	--	--	5,468	47,460
Total	3,057,522	411,560	3,469,082	1,614,900	2,366,600	--	241,998	7,692,580
Eastern Oregon:								
Baker	--	6,252	6,252	272	104,100	--	11	110,635
Crook	12,967	1,520	14,487	--	88,900	--	--	103,387
Deschutes	24,981	--	24,981	--	88,400	--	--	113,381
Gilliam	--	--	--	--	--	--	--	--
Grant	35,666	26,474	62,140	1,241	204,900	--	--	268,281
Harney	--	--	--	70	58,000	--	--	58,070
Jefferson	120	--	120	--	19,000	73,251	--	92,371
Klamath	95,755	29,596	125,351	19,929	143,700	--	906	289,886
Lake	95,399	5,408	100,807	--	158,000	--	--	258,807
Malheur	--	--	--	--	--	--	--	--
Morrow	10,822	14,194	25,016	--	4,500	--	--	29,516
Sherman	--	--	--	--	--	--	--	--
Umatilla	26,918	19,578	46,496	--	27,900	1,661	87	76,144
Union	12,828	38,020	50,848	--	47,300	--	--	98,148
Wallowa	25,800	15,097	40,897	74	55,600	--	--	96,571
Wasco	18,600	2,428	21,028	1,109	57,500	15,605	--	95,242
Wheeler	5,721	20,806	26,527	61	6,900	--	1,473	34,961
Total	365,577	179,373	544,950	22,756	1,064,700	90,517	2,477	1,725,400
Total Oregon	3,423,099	590,933	4,014,032	1,637,656	3,431,300	90,517	244,475	9,417,980

1/ Includes volume removed as logs but not volume removed for poles, piling, and woodcutting operations.

2/ Compiled by State Forester. State also includes small volume from county and municipal lands.

3/ Compiled by U.S. Bureau of Land Management.

4/ Compiled by U.S. Forest Service, Region 6.

5/ Compiled by U.S. Bureau of Indian Affairs.

Prepared by Forest Survey Project, Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, Portland, Oreg.

U.S. Forest Service
Resource Bulletin PNW-14

December 1965

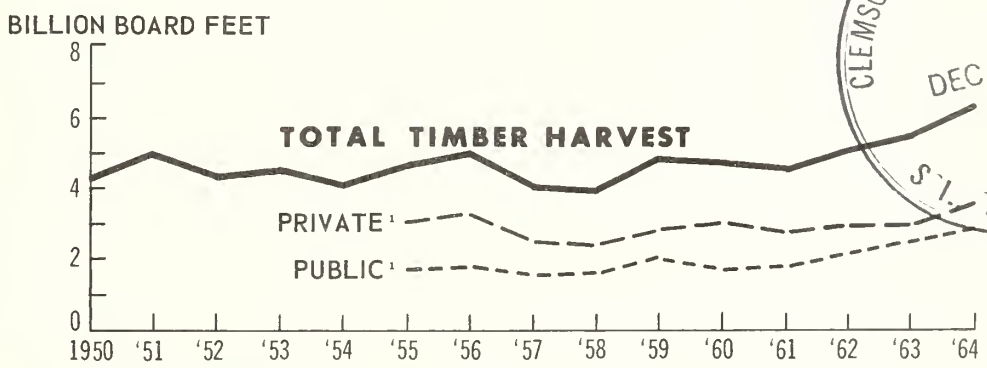
1964 WASHINGTON TIMBER HARVEST

by Brian R. Wall

The 1964 timber harvest was 6.2 billion board feet--an increase of 15 percent over 1963 (table 1). Total timber harvest for both western Washington and the State reached the highest level since 1929. A new alltime high in production was also recorded for eastern Washington--1 billion board feet.

Private timber harvest increased 569 million board feet, or 19 percent during 1964. The share of total production supplied by private lands rose from 54 percent of the total in 1963 to 56 percent in 1964, countering the long-term trend.

The total production from public lands increased 245 million board feet, or 10 percent, over 1963. Production increased from all public lands except State, which declined 2 percent. Among the public owners, National Forests had the greatest absolute increase--141 million board feet (9 percent). Indian lands were second, with a gain of 86 million board feet, or an increase of 25 percent over 1963.



¹Separate data for public and private not available prior to 1955.

WASHINGTON TIMBER HARVEST 1950-64

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
Philip A. Briegleb, Director Portland, Oregon

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

Table 1.--Timber harvest by ownership in State of Washington, 1964[1/]

(In thousands of board feet, Scribner log rule)

State and county	Private		State		Bur. Land Management		National Forests[3/]		Indian lands		Other public		Other Federal agencies		Total production		
	Live	Dead[2/]	Live	Dead[2/]	Live	Dead	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live	Dead[2/]	Live & Dead
Western Washington:																	
Clallam	166,002	3,810	27,136	40	--	--	70,720	24,380	8,704	24	7,938	--	3,237	912	283,737	29,166	312,903
Clark	14,014	339	771	--	--	--	--	--	--	--	--	--	--	--	14,785	339	15,124
Cowlitz	155,517	357,442	84,764	85,544	--	--	8,350	17,050	--	--	--	--	--	--	248,631	460,036	708,667
Grays Harbor	188,827	122,488	10,437	--	--	--	86,120	17,580	155,744	1,449	14,812	1,999	744	77	456,684	143,593	600,277
Island	12,496	8	--	--	--	--	--	--	--	--	554	--	--	--	13,050	8	13,058
Jefferson	114,149	3,067	89,104	3,855	--	--	31,940	65,960	8,472	--	162	--	384	--	244,211	72,882	317,093
King	274,024	15,300	35,855	70	--	--	44,510	15,590	--	--	7,655	1,592	--	--	362,044	32,552	394,596
Kitsap	16,980	--	3,239	6	--	--	--	--	--	--	719	--	850	--	21,788	6	21,794
Lewis	476,572	56,082	37,997	3,347	--	--	127,660	26,140	--	--	--	--	35	--	642,264	85,569	727,833
Maaon	64,727	838	5,144	81	--	--	98,120	8,980	--	--	82	--	361	--	168,434	9,899	178,333
Pacific	290,644	137,439	9,136	2,007	--	--	--	--	--	--	954	--	3,064	--	303,798	139,446	443,244
Pierce	230,051	37,093	12,143	179	--	--	54,480	14,620	--	--	591	--	20	--	297,285	51,892	349,177
San Juan	3,996	250	--	--	--	--	--	--	--	--	--	--	--	--	3,996	250	4,246
Skagit	78,012	7,061	11,474	2,795	--	--	95,250	2,450	--	--	--	21	--	--	184,736	12,327	197,063
Skamania	52,274	2,194	7,755	--	--	--	252,580	35,820	--	--	30	--	--	--	312,639	38,014	350,653
Snohomish	67,726	15,347	14,794	22,786	--	--	85,860	11,240	--	--	128	90	--	--	168,508	49,463	217,971
Thurston	101,177	26,584	6,810	50	--	--	--	--	--	--	--	806	--	--	107,987	27,440	135,427
Wahkiakum	43,519	2,893	5,474	--	--	--	--	--	--	--	32	--	--	--	49,025	2,893	51,918
Whatcom	47,148	19,374	14,806	4,949	--	--	65,680	13,120	--	--	85	--	--	--	127,719	37,443	165,162
Total	2,397,855	807,609	376,839	125,709	--	--	1,021,270	252,930	172,920	1,473	33,742	4,508	8,695	989	4,011,321	1,193,218	
Total live and dead	3,205,464		502,548		--		1,274,200		174,393		38,250		9,684				5,204,539
Eastern Washington:																	
Adams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Asotin	2,517	--	--	--	--	--	3,910	90	--	--	--	--	--	--	6,427	90	6,517
Benton	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chelan	18,364	--	441	--	--	--	70,310	1,190	--	--	--	--	--	--	89,115	1,190	90,305
Columbia	4,438	--	--	--	--	--	2,810	90	--	--	--	--	--	--	7,248	90	7,338
Douglas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ferry	12,383	--	2,247	--	--	--	47,746	50	83,706	--	4	--	--	--	146,086	50	146,136
Franklin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Garfield	5,443	--	648	--	--	--	14,760	340	--	--	--	--	--	--	20,851	340	21,191
Grant	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Kittitas	81,492	376	4,381	--	--	--	65,180	4,420	--	--	--	--	--	--	151,053	4,796	155,849
Klickitat	41,102	--	1,140	--	--	--	2,600	--	9,550	1	--	--	--	--	54,392	1	54,393
Lincoln	--	--	153	--	--	--	--	--	--	--	--	--	--	--	153	--	153
Okanogan	22,438	--	7,444	--	562	--	87,200	--	32,419	--	--	--	--	--	150,063	--	150,063
Pend Oreille	21,874	--	417	--	--	--	60,172	740	425	--	--	--	--	--	82,888	740	83,628
Spokane	10,229	--	428	--	--	--	--	--	--	--	121	--	--	--	10,778	--	10,778
Stevena	55,137	--	4,245	--	204	--	29,958	--	9,187	--	--	--	3,481	--	102,212	--	102,212
Walla Walla	7,261	--	--	--	--	--	--	--	--	--	--	--	--	--	7,261	--	7,261
Whitman	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yakima	15,042	--	12,316	--	--	--	57,640	1,360	114,115	383	--	--	--	--	199,113	1,743	200,856
Total	297,720	376	33,860	--	766	--	442,286	8,280	249,402	384	125	--	3,481	--	1,027,640	9,040	
Total live and dead	298,096		33,860		766		450,566		249,786		125		3,481				1,036,680
Total Washington	2,695,575	807,985	410,699	125,709	766	--	1,463,556	261,210	422,322	1,857	33,867	4,508	12,176	989	5,038,961	1,202,258	
Total Washington live and dead	3,503,560		536,408		766		1,724,766		424,179		38,375		13,165				6,241,219

1/ Includes volume in logs, poles, piling, cordwood, shingle bolts, etc., as compiled by Washington State Department of Natural Resources, except as noted.

2/ Includes snags and down material existing prior to initial logging. Salvage of this material does not constitute drain on the volume of the forest inventory of live trees

3/ Data for Region 6 National Forests compiled by Pacific Northwest Forest and Range Experiment Station.

Timber Resource Statistics for SOUTHWEST WASHINGTON

By John W. Hazard

PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPT. OF AGRICULTURE · FOREST SERVICE

U. S. FOREST SERVICE
RESOURCE BULLETIN
PNW – 15
1965

PREPARED BY

FOREST SURVEY PROJECT

Melvin E. Metcalf, In Charge

Field and Office Work in Southwest Washington, by

John M. Berger and Richard L. Nielsen, Field Supervisors

John W. Hazard, Office Compilations

William L. Ericksen
Charles L. Bolsinger
Dennis D. Adams
Gordon L. Beech
Joseph M. Dunford
John F. Dwyer, Jr.
Gary F. Finch
Douglas MacCleery
Neal J. Morrison
Kai T. Petersen
Gerald E. Ranger
Arthur W. Reese
Thomas J. Riding
Thomas E. Rogers
Noah Speer
Albert H. Tsuda
Ronald Yasenchak
Margaret C. O'Mara
Mable A. Northrup
Marian E. Simons
Carmen V. Wilson

Acknowledgment is made of the cooperation of the Division of Timber Management, Region 6, U.S. Forest Service, in supplying field plot data from National Forest lands; of the assistance of the county assessors of the inventoried counties in furnishing ownership information; and of the counties and other public and private agencies in making aerial photography available for interpretation.

PREFACE

This publication summarizes the results of the third reinventory of six counties in southwest Washington: Clark, Cowlitz, Lewis, Pacific, Skamania, and Wahkiakum. This block of 6 counties is one of 10 such blocks set up in the States of Oregon and Washington by the Forest Survey to facilitate orderly reinventories of the timber resources. Each block will be reinventoried at 10-year intervals and the results published in a single report for the block. The five blocks in Washington are southwest Washington, Olympic, Puget Sound, central Washington, and eastern Washington.

The field data for southwest Washington were collected for all lands except the National Forests during the summer of 1963; data were summarized as of January 1, 1964. Field data were collected in 1960 and 1961 for the Gifford Pinchot National Forest and in 1956 for the Mineral Working Circle of the Snoqualmie National Forest. Adjustments were made for land exchanges since then. No attempt was made to adjust the volume estimates on National Forest lands for timber cut, growth, or the October 1962 windstorm.

Previous inventories of these counties were made in the years shown below:

County	Initial inventory	First reinventory	Second reinventory
Clark	1931	1943	1949
Cowlitz	1930-31	1939	1949
Lewis	1931	1939	1952
Pacific	1932	1938	1950
Skamania	1930-31	1950	--
Wahkiakum	1931	1940	1949

The original inventory of southwest Washington was conducted during the period 1930-31, and the results were released in 1934 as a series of pamphlets containing forest statistics for each county. During the period 1938-43, this inventory was updated and the results issued in a series of pamphlets containing forest statistics for each county. Results of the subsequent reinventories in 1949 to 1952 were released in individual county reports 1 to 2 years following completion of the field inventory.

Such inventories are a part of the Forest Survey--a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928, amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the amount and kind of timber volume on them; to determine rates of forest growth and depletion; to estimate timber cut and probable future trends in timber requirements; and to analyze and make available survey information needed in the formulation of forest policies and programs. Resurveys are made as necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the regional Experiment Stations of the U.S. Forest Service. In the States of Oregon and Washington, it is the responsibility of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

CONTENTS

SUMMARY TABLES (continued) Page

SOUTHWEST WASHINGTON'S FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

Totals 3,721,000 acres and is 82 percent of the land area;
Is 40 percent publicly owned and 60 percent private;
Has sawtimber stands on 62 percent of its area; and
Is 47 percent Douglas-fir type, 33 percent other softwood types, 17 percent hardwood types, and 3 percent nonstocked.

GROWING STOCK VOLUME--

Totals 18,725 million cubic feet; 83 percent in three species, Douglas-fir, western hemlock, and Pacific silver fir;
Is 51 percent publicly owned;
Is 89 percent in trees of sawtimber size; and
Is 94 percent softwoods.

SAWTIMBER VOLUME--

Totals 110,691 million board feet, International 1/4-inch rule (88,698 million board feet, Scribner rule);
Is 52 percent publicly owned; and
Is 48 percent in trees over 29.0 inches in diameter.

NATIONAL FOREST OWNERSHIP--

Has 29 percent of the commercial forest area;
Controls 36 percent of the sawtimber area; and
Holds 42 percent of the sawtimber volume.

OTHER PUBLIC OWNERSHIP--

Has 11 percent of the commercial forest area;
Controls 11 percent of the sawtimber area; and
Holds 10 percent of the sawtimber volume.

FOREST INDUSTRY OWNERSHIP--

Has 42 percent of the commercial forest area;
Controls 39 percent of the sawtimber area; and
Holds 43 percent of the sawtimber volume.

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

Has 18 percent of the commercial forest area;
Controls 14 percent of the sawtimber area; and
Holds 5 percent of the sawtimber volume.

NET ANNUAL GROWTH--

Totals 274 million cubic feet (1,328 million board feet, International 1/4-inch rule, 989 million board feet, Scribner);
Is 1.5 percent of growing-stock volume; and
Is 78 percent softwood.

AVERAGE ANNUAL CUT OVER THE PAST 5 YEARS--

Has been 1,761 million board feet Scribner rule, of which 68 percent has been private timber.

Table 1.--Area by land classes, by county, southwest Washington, January 1, 1964

(In acres)

Land class	Total	County					
		Clark	Cowlitz	Lewis	Pacific	Skamania	Wahkiakum
Commercial forest	3,721,000	225,000	651,000	1,247,000	522,000	935,000	141,000
Unproductive forest	158,000	2,000	3,000	66,000	15,000	63,000	9,000
Productive-reserved forest	48,000	(1/)	(1/)	34,000	2,000	12,000	--
Total forest	3,927,000	227,000	654,000	1,347,000	539,000	1,010,000	150,000
Nonforest	2/611,000	176,000	78,000	219,000	53,000	63,000	22,000
All land	3/4,538,000	403,000	732,000	1,566,000	592,000	1,073,000	172,000

1/ Less than 500 acres.

2/ Includes 21,000 acres of water according to Forest Survey standards of area classification but defined as land by the U.S. Bureau of the Census.

3/ From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2.--Area of commercial forest land, by ownership classes, southwest Washington, January 1, 1964

(In acres)

Ownership class	Area
National Forest	1,065,000
Other Federal:	
Bureau of Land Management	2,000
Indian	1,000
Miscellaneous Federal	3,000
Total other Federal	6,000
State	398,000
County and municipal	10,000
Forest industry:	
Pulp and paper	381,000
Lumber	1,132,000
Other	50,000
Total forest industry	1,563,000
Farmer owned	115,000
Miscellaneous private	564,000
All ownerships	3,721,000

Table 3.--Area of commercial forest land, by county and ownership classes, southwest Washington, January 1, 1964

(In acres)

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
Clark	225,000	1,000	55,000	44,000	125,000
Cowlitz	651,000	18,000	76,000	411,000	146,000
Lewis	1,247,000	334,000	110,000	543,000	260,000
Pacific	522,000	--	67,000	385,000	70,000
Skamania	935,000	712,000	76,000	90,000	57,000
Wahkiakum	141,000	--	30,000	90,000	21,000
All counties	3,721,000	1,065,000	414,000	1,563,000	679,000

Table 4.--Area of commercial forest land, by stand-size and ownership classes, southwest Washington, January 1, 1964

(In acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
Sawtimber stands:					
Large	1,342,000	543,000	101,000	579,000	119,000
Small	947,000	282,000	139,000	316,000	210,000
Total	2,289,000	825,000	240,000	895,000	329,000
Poletimber stands	435,000	124,000	47,000	159,000	105,000
Sapling and seedling stands	895,000	92,000	113,000	472,000	218,000
Nonstocked areas	102,000	24,000	14,000	37,000	27,000
All classes	3,721,000	1,065,000	414,000	1,563,000	679,000

Table 5.--Area of commercial forest land, by stand-volume classes for sawtimber and other stand-size classes, southwest Washington, January 1, 1964

(In acres)

Stand volumes per acre[1/]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	976,000	22,000	954,000
1,500 to 5,000 board feet	365,000	102,000	263,000
More than 5,000 board feet	2,380,000	2,165,000	215,000
All classes	3,721,000	2,289,000	1,432,000

[1/] Net volume, International 1/4-inch rule.

Table 6.--Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, southwest Washington, January 1, 1964

(In acres)

Stocking class	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Non-stocked stands
70 percent or more	2,274,000	1,725,000	247,000	302,000	(1/)
40 to 69 percent	805,000	390,000	79,000	336,000	(1/)
10 to 39 percent	540,000	174,000	109,000	257,000	(1/)
Less than 10 percent	102,000	(1/)	(1/)	(1/)	102,000
All classes	3,721,000	2,289,000	435,000	895,000	102,000

[1/] Not applicable.

Table 7.--Area of commercial forest land, by yield and ownership classes, southwest Washington, January 1, 1964

(In acres)

Yield class[1/] (cubic feet)	All ownerships	National Forest	Other public	Forest industry	Farmer and miscel-laneous private
120 or more	2,388,000	364,000	328,000	1,236,000	460,000
85 to 120	535,000	243,000	44,000	172,000	76,000
50 to 85	689,000	371,000	29,000	146,000	143,000
Less than 50	109,000	87,000	13,000	9,000	--
All classes	3,721,000	1,065,000	414,000	1,563,000	679,000

[1/] A classification in terms of capacity for cubic-foot annual growth per acre.

Table 8.--Area of commercial forest land, by forest types and ownership classes, southwest Washington, January 1, 1964

(In acres)

Type	All ownerships	Public ownerships	Private ownerships
Douglas-fir	1,765,000	768,000	997,000
Ponderosa pine	3,000	3,000	--
Hemlock—Sitka spruce	920,000	294,000	626,000
Spruce—fir	279,000	237,000	42,000
Lodgepole pine	15,000	15,000	--
Western white pine	15,000	15,000	--
Red alder	480,000	98,000	382,000
Other hardwoods	142,000	11,000	131,000
Nonstocked	102,000	38,000	64,000
All types	3,721,000	1,479,000	2,242,000

Table 9.--Area of noncommercial forest land, by forest types, southwest Washington, January 1, 1964

(In acres)

Type	All areas	Productive-reserved areas	Unproductive areas
Douglas-fir	12,000	12,000	--
Hemlock—Sitka spruce	8,000	8,000	--
Lodgepole pine	(1/)	(1/)	--
Spruce—fir	26,000	26,000	--
Hardwoods	(1/)	(1/)	--
Nonstocked	2,000	2,000	--
Subalpine	49,000	--	49,000
Noncommercial rocky	66,000	--	66,000
Noncommercial other	43,000	--	43,000
All types	206,000	48,000	158,000

1/ Less than 500 acres.

Table 10.--Volume of all growing stock and sawtimber on commercial forest land, by counties, southwest Washington, January 1, 1964 1/

County	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	Million cu. ft.	Million bd. ft.	Million bd. ft.
Clark	329	1,280	1,001
Cowlitz	3,176	19,966	16,392
Lewis	5,983	34,533	27,620
Pacific	2,495	14,687	11,955
Skamania	6,048	36,610	28,894
Wahkiakum	694	3,615	2,836
All counties	18,725	110,691	88,698

1/ In this and all subsequent tables, conifer volumes are in terms of 32-foot logs for Scribner rule and 16-foot logs for International 1/4-inch rule. All hardwood volumes are in terms of 8-foot logs.

Table 11.--Volume of all growing stock and sawtimber on commercial forest land, by county and ownership class, southwest Washington, January 1, 1964

County	Total	National Forest	Other public	Forest industry	Farmer and miscellaneous private
	Million cubic feet				
All growing stock:					
Clark	329	2	88	116	123
Cowlitz	3,176	152	442	2,345	237
Lewis	5,983	2,608	418	2,309	648
Pacific	2,495	--	272	1,995	228
Skamania	6,048	4,892	501	553	102
Wahkiakum	694	--	146	498	50
Total	18,725	7,654	1,867	7,816	1,388
	Million board feet[1/]				
Sawtimber:					
Clark	1,280	6	406	407	461
Cowlitz	19,966	994	2,973	14,877	1,122
Lewis	34,533	15,927	2,344	13,410	2,852
Pacific	14,687	--	1,415	12,306	966
Skamania	36,610	29,813	2,911	3,534	352
Wahkiakum	3,615	--	602	2,891	122
Total	110,691	46,740	10,651	47,425	5,875

[1/] International 1/4-inch rule.

Table 12.--Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, southwest Washington, January 1, 1964

(Thousands of trees)

Diameter class (inches d.b.h.)	All species	Softwoods	Hardwoods
5.0 - 6.9	124,128	94,479	29,649
7.0 - 8.9	84,361	67,668	16,693
9.0 - 10.9	65,269	53,354	11,915
11.0 - 12.9	47,503	40,746	6,757
13.0 - 14.9	32,824	28,241	4,583
15.0 - 16.9	23,484	20,474	3,010
17.0 - 18.9	16,107	14,725	1,382
19.0 - 28.9	42,383	40,747	1,636
29.0 - 38.9	13,215	13,067	148
39.0 and larger	6,679	6,659	20
All classes	455,953	380,160	75,793

Table 13.--Number of cull and salvable dead trees on commercial forest land, by diameter groups and by softwoods and hardwoods, southwest Washington, January 1, 1964

(Thousands of trees)

Diameter class (inches d.b.h.)	Cull trees	Salvable dead trees
Softwoods:		
5.0 - 10.9	16,958	--
11.0 - 18.9	1,250	20,496
19.0 and larger	1,956	16,200
Total	20,164	36,696
Hardwoods:		
5.0 - 10.9	12,507	--
11.0 - 18.9	744	1,100
19.0 and larger	191	104
Total	13,442	1,204
All species	33,606	37,900

Table 14.--Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, southwest Washington, January 1, 1964

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	15,471	14,880	591
Upper-stem portion	1,165	1,120	45
Total	16,636	16,000	636
Poletimber trees	2,089	1,554	535
All growing-stock trees	18,725	17,554	1,171
Sound cull trees:			
Sawtimber-size	32	10	22
Poletimber-size	170	82	88
Total	202	92	110
Rotten cull trees:			
Sawtimber-size	23	23	--
Poletimber-size	3	1	2
Total	26	24	2
Salvable dead trees:			
Sawtimber-size	1,432	1,394	38
Total, all timber	20,385	19,064	1,321

Table 15.--Volume of all growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, southwest Washington, January 1, 1964

Timber and ownership classes	All species	Softwoods	Hardwoods
	Million cubic feet		
All growing stock:			
National Forest	7,654	7,605	49
Other public	1,867	1,679	188
Forest industry	7,816	7,275	541
Farmer and miscellaneous private	1,388	995	393
All ownerships	18,725	17,554	1,171
	Million board feet		
Sawtimber (International 1/4-inch rule):			
National Forest	46,740	46,610	130
Other public	10,651	10,098	553
Forest industry	47,425	45,680	1,745
Farmer and miscellaneous private	5,875	4,620	1,255
All ownerships	110,691	107,008	3,683
Sawtimber (Scribner rule):			
National Forest	36,766	36,640	126
Other public	8,637	8,101	536
Forest industry	38,388	36,693	1,695
Farmer and miscellaneous private	4,907	3,687	1,220
All ownerships	88,698	85,121	3,577

Table 16.--Volume of all growing stock and sawtimber on commercial forest land, by stand-size classes and by softwoods and hardwoods, southwest Washington, January 1, 1964

Stand-size classes	All species	Softwoods	Hardwoods
	Million cubic feet		
All growing stock:			
Sawtimber stands	17,527	16,671	856
Poletimber stands	755	556	199
Sapling and seedling stands	438	324	114
Nonstocked areas	5	3	2
Total	18,725	17,554	1,171
	Million board feet		
Sawtimber (International 1/4-inch rule):			
Sawtimber stands	107,940	104,602	3,338
Poletimber stands	1,168	1,028	140
Sapling and seedling stands	1,566	1,364	202
Nonstocked areas	17	14	3
Total	110,691	107,008	3,683
Sawtimber (Scribner rule):			
Sawtimber stands	86,447	83,205	3,242
Poletimber stands	947	811	136
Sapling and seedling stands	1,289	1,093	196
Nonstocked areas	15	12	3
Total	88,698	85,121	3,577

Table 17.--Volume of all growing stock on commercial forest land, by species and diameter classes, southwest Washington, January 1, 1964

(In million cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 & larger
Softwoods:											
Douglas-fir	8,554	112	195	340	439	500	537	485	2,286	1,403	2,257
Ponderosa pine	9	(1/)	(1/)	1	1	1	1	(1/)	1	--	4
Western white pine	119	3	5	8	11	12	9	10	33	10	18
Lodgepole and whitebark pine	27	4	7	6	4	2	2	1	1	--	--
White and grand fir	90	4	4	8	9	7	7	7	28	12	4
Pacific silver fir	2,047	65	87	104	114	113	135	137	700	399	193
Noble fir	273	3	4	3	6	7	6	13	78	75	78
Subalpine fir	80	4	7	10	12	12	10	7	17	1	--
Engelmann spruce	41	1	2	3	3	4	3	3	15	5	2
Sitka spruce	251	1	8	2	10	7	8	6	34	38	137
Mountain hemlock	163	2	6	8	9	11	13	16	55	29	14
Western hemlock	4,904	69	150	261	325	289	266	260	1,417	1,145	722
Alaska-cedar	24	--	1	(1/)	1	1	1	1	9	7	3
Western redcedar	962	11	23	22	33	36	28	39	211	165	394
Western larch	10	(1/)	(1/)	(1/)	(1/)	(1/)	1	1	6	2	--
Total	17,554	279	499	776	977	1,002	1,027	986	4,891	3,291	3,826
Hardwoods:											
Red alder	895	157	146	142	118	112	86	48	80	6	(1/)
Oregon ash	18	7	--	2	3	1	2	1	2	--	--
Black cottonwood and aspen	23	2	--	3	4	2	3	1	3	3	2
Bigleaf maple	235	19	18	39	24	25	32	23	38	12	5
Total	1,171	185	164	186	149	140	123	73	123	21	7
All species	18,725	464	663	962	1,126	1,142	1,150	1,059	5,014	3,312	3,833

1/ Less than 500,000 cubic feet.

Table 18.--Volume of sawtimber on commercial forest land, by species and diameter classes, southwest Washington, January 1, 1964 (International 1/4-inch rule)

(In million board feet)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Douglas-fir	54,433	1,860	2,495	2,983	2,908	15,482	10,485	18,220
Ponderosa pine	39	2	3	3	2	8	--	21
Western white pine	666	56	60	52	64	217	76	141
Lodgepole and whitebark pine	59	18	15	13	6	7	--	--
White and grand fir	447	43	39	41	39	175	80	30
Pacific silver fir	10,831	486	554	728	780	4,346	2,621	1,316
Noble fir	1,810	24	29	29	69	501	528	630
Subalpine fir	258	42	49	44	36	84	3	--
Engelmann spruce	193	10	17	16	18	89	30	13
Sitka spruce	1,661	49	43	52	36	231	266	984
Mountain hemlock	883	42	54	69	87	336	195	100
Western hemlock	29,377	1,571	1,625	1,618	1,657	9,622	8,086	5,198
Alaska-cedar	157	3	4	8	6	64	51	21
Western redcedar	6,137	148	189	159	233	1,387	1,161	2,860
Western larch	57	(1/)	1	3	5	37	11	--
Total	107,008	4,354	5,177	5,818	5,946	32,586	23,593	29,534
Hardwoods:								
Red alder	2,536	536	593	498	300	560	49	(1/)
Oregon ash	52	15	3	12	10	12	--	--
Black cottonwood and aspen	112	16	10	19	6	20	20	21
Bigleaf maple	983	109	132	187	148	272	95	40
Total	3,683	676	738	716	464	864	164	61
All species	110,691	5,030	5,915	6,534	6,410	33,450	23,757	29,595

1/ Less than 500,000 board feet.

Table 19.--Volume of sawtimber on commercial forest land, by species and diameter classes, southwest Washington, January 1, 1964 (Scribner rule)

(In million board feet)

Species	Diameter class (inches at breast height)							
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Softwoods:								
Douglas-fir	43,869	1,155	1,629	2,056	2,096	12,088	8,750	16,095
Ponderosa pine	34	1	2	2	2	7	--	20
Western white pine	505	35	38	35	45	166	63	123
Lodgepole and whitebark pine	37	10	9	9	4	5	--	--
White and grand fir	330	26	25	27	28	133	65	26
Pacific silver fir	8,310	298	352	491	548	3,327	2,158	1,136
Noble fir	1,474	14	18	19	49	390	437	547
Subalpine fir	163	24	29	27	23	57	3	--
Engelmann spruce	141	6	10	11	12	66	25	11
Sitka spruce	1,412	31	28	37	26	184	222	884
Mountain hemlock	651	25	32	43	58	248	158	87
Western hemlock	23,149	980	1,078	1,125	1,199	7,515	6,740	4,512
Alaska-cedar	120	2	3	5	4	48	41	17
Western redcedar	4,884	88	114	101	154	1,021	931	2,475
Western larch	42	(1/)	1	2	3	27	9	--
Total	85,121	2,695	3,368	3,990	4,251	25,282	19,602	25,933
Hardwoods:								
Red alder	2,457	511	570	483	293	552	48	(1/)
Oregon ash	50	14	3	11	10	12	--	--
Black cottonwood and aspen	110	15	10	19	5	20	20	21
Bigleaf maple	960	105	127	180	144	268	95	41
Total	3,577	645	710	693	452	852	163	62
All species	88,698	3,340	4,078	4,683	4,703	26,134	19,765	25,995

1/ Less than 500,000 board feet.

Table 20.--Volume of all growing stock on commercial forest land, by species and county, southwest Washington, January 1, 1964

(In million cubic feet)

Species	Total	Clark	Cowlitz	Lewis	Pacific	Skamania	Wahkiakum
Softwoods:							
Douglas-fir	8,554	226	1,791	3,234	301	2,771	231
Ponderosa pine	9	--	--	--	--	9	--
Western white pine	119	--	1	23	--	95	--
Lodgepole and whitebark pine	27	--	1	1	--	25	--
White and grand fir	90	--	2	8	--	76	4
Pacific silver fir	2,047	--	247	527	97	1,172	4
Noble fir	273	--	49	116	--	108	--
Subalpine fir	80	--	1	43	--	36	--
Engelmann spruce	41	--	--	1	--	40	--
Sitka spruce	251	--	--	(1/)	210	--	41
Mountain hemlock	163	--	2	34	--	127	--
Western hemlock	4,904	13	671	1,191	1,461	1,232	336
Alaska-cedar	24	--	--	9	--	15	--
Western redcedar	962	1	206	336	170	236	13
Western larch	10	--	--	--	--	10	--
Total	17,554	240	2,971	5,523	2,239	5,952	629
Hardwoods:							
Red alder	895	75	164	282	252	57	65
Oregon ash	18	--	--	18	--	--	--
Black cottonwood and aspen	23	--	4	7	--	12	--
Bigleaf maple	235	14	37	153	4	27	--
Total	1,171	89	205	460	256	96	65
All species	18,725	329	3,176	5,983	2,495	6,048	694

1/ Less than 500,000 cubic feet.

Table 21.--Volume of sawtimber on commercial forest land, by species and county, southwest Washington, January 1, 1964 (International 1/4-inch rule)

(In million board feet)

Species	Total	Clark	Cowlitz	Lewis	Pacific	Skamania	Wahkiakum
Softwoods:							
Douglas-fir	54,433	1,011	11,986	20,049	1,861	18,162	1,364
Ponderosa pine	39	--	--	--	--	39	--
Western white pine	666	--	10	140	--	516	--
Lodgepole and whitebark pine	59	--	2	3	--	54	--
White and grand fir	447	--	--	35	--	406	6
Pacific silver fir	10,831	--	1,418	2,827	566	6,010	10
Noble fir	1,810	--	318	819	--	673	--
Subalpine fir	258	--	1	138	--	119	--
Engelmann spruce	193	--	--	4	--	189	--
Sitka spruce	1,661	--	--	2	1,424	--	235
Mountain hemlock	883	--	(1/)	188	--	695	--
Western hemlock	29,377	60	4,294	6,842	8,723	7,783	1,675
Alaska-cedar	157	--	--	57	--	100	--
Western redcedar	6,137	4	1,288	2,053	1,180	1,539	73
Western larch	57	--	1	--	--	56	--
Total	107,008	1,075	19,318	33,157	13,754	36,341	3,363
Hardwoods:							
Red alder	2,536	152	470	634	906	122	252
Oregon ash	52	--	--	52	--	--	--
Black cottonwood and aspen	112	--	25	23	--	64	--
Bigleaf maple	983	53	153	667	27	83	--
Total	3,683	205	648	1,376	933	269	252
All species	110,691	1,280	19,966	34,533	14,687	36,610	3,615

1/ Less than 500,000 board feet, International 1/4-inch rule.

Table 22.--Volume of sawtimber on commercial forest land, by species and county, southwest Washington, January 1, 1964 (Scribner rule)

(In million board feet)

Species	Total	Clark	Cowlitz	Lewis	Pacific	Skamania	Wahkiakum
Softwoods:							
Douglas-fir	43,869	758	9,907	16,099	1,486	14,568	1,051
Ponderosa pine	34	--	--	--	--	34	--
Western white pine	505	--	9	108	--	388	--
Lodgepole and whitebark pine	37	--	1	2	--	34	--
White and grand fir	330	--	--	26	--	300	4
Pacific silver fir	8,310	--	1,130	2,165	456	4,553	6
Noble fir	1,474	--	260	677	--	537	--
Subalpine fir	163	--	1	86	--	76	--
Engelmann spruce	141	--	--	3	--	138	--
Sitka spruce	1,412	--	--	1	1,207	--	204
Mountain hemlock	651	--	(1/)	137	--	514	--
Western hemlock	23,149	43	3,437	5,335	6,891	6,177	1,266
Alaska-cedar	120	--	--	43	--	77	--
Western redcedar	4,884	3	1,014	1,601	1,010	1,196	60
Western larch	42	--	1	--	--	41	--
Total	85,121	804	15,760	26,283	11,050	28,633	2,591
Hardwoods:							
Red alder	2,457	147	458	611	879	118	245
Oregon ash	50	--	--	50	--	--	--
Black cottonwood and aspen	110	--	25	23	--	62	--
Bigleaf maple	960	50	149	653	26	81	--
Total	3,577	197	632	1,337	905	261	245
All species	88,698	1,001	16,392	27,620	11,955	28,894	2,836

1/ Less than 500,000 board feet.

Table 23.--Net annual growth of all growing stock and sawtimber on commercial forest land, by species, southwest Washington, 1963[1/]

Species	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	Million cu. ft.	Million bd. ft.	
Softwoods:			
Douglas-fir	130	722	524
True firs	18	89	68
Western hemlock	57	304	211
Other	9	22	11
Total	214	1,137	814
Hardwoods	60	191	175
All species	274	1,328	989

[1/] Based on measured growth and mortality for the period 1953-63.

Table 24.--Average annual mortality of growing stock and sawtimber on commercial forest land, by species, southwest Washington, 1953-63[1/]

Species	All growing stock	Sawtimber	
		International 1/4-inch rule	Scribner rule
	Million cu. ft.	Million bd. ft.	
Softwoods:			
Douglas-fir	84	536	448
True firs	43	246	192
Western hemlock	100	645	516
Other	28	176	139
Total	255	1,603	1,295
Hardwoods	15	52	50
All species	270	1,655	1,345

[1/] Includes estimated loss due to October 12, 1962, windstorm of 930 million cubic feet of growing stock and 5,917 million board feet, International 1/4-inch rule (4,811 million board feet, Scribner), of sawtimber.

Table 25.--Volume of salvable dead sawtimber-size trees on commercial forest land, by softwoods and hardwoods, southwest Washington, January 1, 1964[1/]

(In million board feet)

Species group	International 1/4-inch rule	Scribner rule
Softwoods	9,610	7,778
Hardwoods	214	207
All species	9,824	7,985

[1/] Includes 1962 blowdown on lands other than National Forests.

Table 26.--Timber harvest, by ownership class, southwest Washington, 1950-63 (Scribner rule)

(In thousand board feet)

Year[1/]	Total	Private	State	National Forest	Other public
1950	1,702,167	1,555,167		147,000	--
1951	1,928,729	1,758,129		170,600	--
1952	1,382,723	1,223,723		159,000	--
1953	1,812,261	1,638,791		172,500	970
1954	1,461,850	1,265,409		195,200	1,241
1955	1,697,306	1,315,483	144,087	237,367	369
1956	1,920,801	1,468,636	197,405	252,900	1,860
1957	1,463,248	1,051,803	218,339	184,621	8,485
1958	1,443,550	977,546	186,425	274,716	4,863
1959	1,669,142	1,115,801	99,461	447,581	6,299
1960	1,601,288	1,112,804	100,774	384,520	3,190
1961	1,607,218	1,081,660	129,513	393,870	2,175
1962	1,949,064	1,368,463	99,970	480,600	31
1963	1,976,342	1,325,216	179,779	464,200	7,147

Source: Reports of the State of Washington Dept. of Natural Resources, U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, and Division of Timber Management, Region 6, U.S. Forest Service.

[1/] For the years 1950-54, data for private and State ownerships were not separated.

ACCURACY OF THE CURRENT INVENTORY DATA

Forest Area and Timber Volume

Sampling errors are quoted for commercial forest land area, noncommercial forest land area, net growing-stock volume of timber in cubic feet, and sawtimber volume in board feet International 1/4-inch rule.

The estimates of forest land area in southwest Washington were all derived by sampling, except for a small portion of the Snoqualmie National Forest in Lewis County. For this portion, area data were based on a complete enumeration by means of a forest type map. These estimates are assumed to have no sampling error. Where sampling was used, sampling errors were computed separately for each subunit and then combined into a single estimate for the entire inventory unit. Thus, the sampling errors for total area of commercial and noncommercial forest land reflect the combined errors from the sampled subunits, expressed as a percent of the total area estimate for each class.

The total volume estimates were derived entirely by sampling methods. Sampling errors were calculated separately for each subunit, then combined into the total sampling error estimates of board-foot and cubic-foot volume.

The errors which exist due to technique and judgment cannot be measured; however, in all cases, an effort was made to keep this type of error to a minimum by close supervision and frequent checks of all phases of the work.

Table 27 presents the estimated sampling error as a percent of the total estimate at the 68-percent and 95-percent probability levels.

Table 27.--Sampling errors of estimates of forest area and timber volume

Item	Estimated total	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land	3,721,000 acres	±0.7	±1.3
Noncommercial forest land	206,000 acres	±7.2	±14.0
Volume:			
Growing-stock	18,725 million cubic feet	±2.4	±4.8
Sawtimber (International 1/4-inch rule)	110,691 million board feet	±2.8	±5.5

The sampling error of any breakdown of these totals will be substantially greater than for the total. The smaller the breakdown the larger the sampling error. An approximation of the sampling error for a fraction of the unit estimate can be obtained by referring to the following relationships:

Fraction of unit estimate	Multiplier
0.90	1.05
.80	1.1
.70	1.2
.60	1.3
.50	1.4
.40	1.6
.30	1.8
.20	2.2
.10	3.2

For example, an estimate which is 50 percent of the total unit estimate can be expected to have a sampling error about 1.4 times that for the unit total.

COMPARISON WITH PREVIOUS INVENTORIES

Tables 28 and 29 present area and volume statistics as reported for four successive Forest Survey inventories in southwest Washington. Some of the differences between inventories are due to actual physical changes such as cutting and growth of stands, restocking of forest lands, and the shift of forest land to other uses. Some differences are due to changes in definitions and standards of utilization and some to sampling and technique errors. The latter differences complicate direct comparison of the statistics.

Area.-- Total forest land area as shown in table 28 has decreased slowly but steadily over the past 25 years. This is attributed to such factors as urban development, expansion of powerline and road rights-of-way, and agricultural and industrial use. The area of commercial forest land has remained almost constant over the past 15 years, due in part to reclassification as commercial forest land of some areas previously under consideration for reservation as wild or wilderness areas.

Table 28.--Comparison of forest area statistics for southwest Washington

(In acres)

Land class	Initial inventory 1933	First reinventory 1938-43	Second reinventory 1949-52	Current inventory 1964
Commercial forest	3,858,000	3,904,000	3,725,000	3,721,000
Noncommercial forest:				
Productive-reserved	3,000	28,000	128,000	48,000
Unproductive	130,000	133,000	161,000	158,000
Total noncommercial forest	133,000	161,000	289,000	206,000
Total forest	3,991,000	4,065,000	4,014,000	3,927,000
Nonforest	558,000	523,000	533,000	611,000
All land	1/ 4,549,000	1/ 4,588,000	1/ 4,547,000	2/ 4,538,000

1/ From Government Land Office, U.S. Department of Interior.

2/ From U.S. Bureau of the Census, 1960.

Volume. -- No attempt has been made to adjust all the volume estimates in table 29 to a common set of utilization standards or inventory procedures. The first two inventories, made in the early 1930's and early 1940's, did not include softwood trees less than 15.0 inches in diameter in the board-foot volume estimate and were based on compilation of existing cruise data. Subsequent inventories in 1949-52 and in 1963 included all trees down to 11.0 inches in diameter in the board-foot volume estimates. These volume estimates were derived from measured sample plots distributed throughout the forested area. These differences make it impossible to accurately adjust the early volume estimates to a basis comparable with the later estimates. Thus, the only valid comparison of volume which can be made is between the 1949-52 and 1964 inventories. In 1964, the estimate of Scribner board-foot volume was made in terms of 32-foot logs for all softwoods, whereas in the 1949-52 estimate the volume of trees less than 21.0 inches in diameter was shown in terms of 16-foot logs. The estimate for 1964, as shown in table 29, has been adjusted for this difference to make it comparable to the 1949-52 estimate.

Table 29.--Comparison of sawtimber and growing-stock volume statistics for southwest Washington

Species	1933 inventory	1938-43 reinventory	1949-52 reinventory	Current inventory 1964
	Million board feet, Scribner rule			
SAWTIMBER				
Softwoods:				
Douglas-fir	51,629	45,431	49,124	1/45,289
True firs	8,980	8,204	12,511	1/10,686
Western hemlock	20,121	18,972	21,911	1/24,046
Other softwoods	7,469	6,431	9,351	1/ 8,028
Total	88,199	79,038	92,897	88,049
Hardwoods	380	321	2,510	3,577
All species	88,579	79,359	95,407	1/91,626
	Million cubic feet			
GROWING STOCK				
Softwoods:				
Douglas-fir	--	--	8,896	8,554
True firs	--	--	2,663	2,490
Western hemlock	--	--	4,446	4,904
Other softwoods	--	--	1,723	1,606
Total	--	--	17,728	17,554
Hardwoods	--	--	840	1,171
All species			18,568	18,725

1/ Adjusted to 16-foot logs for softwood trees less than 21.0 inches d.b.h. to be comparable to 1949-52 estimate.

Examination of the estimates from these two inventories indicates that over the past 12-15 years the total cubic-foot volume of softwood growing stock has decreased only about 1 percent, whereas the total board-foot volume of softwood sawtimber has decreased about 5 percent. The lesser decrease in growing-stock volume is due to the increase in poletimber-size trees. All conifer species except western hemlock show a decrease in volume. During this same period, the volume of hardwoods has increased about 40 percent.

FOREST SURVEY PROCEDURES

This inventory of southwest Washington combines the data from three separate inventory projects: the Mineral Working Circle, Snoqualmie National Forest, 1956; Gifford Pinchot National Forest, 1961; and the remaining area outside the National Forests, 1963. No attempt was made to update the inventories for growth or cut to a common date; however, changes in area were made to agree with the most current records available.

Snoqualmie National Forest

That part of the Mineral Working Circle in Lewis County makes up less than 2 percent of the commercial forest area in the unit. Thus, even though these are the oldest data, they have very little influence on the statistics for the entire unit.

This unit was field sampled for volume estimates in 1956. Plots were randomly distributed within sawtimber types. Each plot consisted of three 1/5-acre circular subplots. No samples were taken in the poletimber and smaller size-class stands. Statistics on forest area were taken from a 1953 forest type map and adjusted for minor changes. Volume statistics were compiled from the plot data, expanded to the county level by area statistics obtained from the forest type map.

Gifford Pinchot National Forest

This forest was inventoried in 1960-61 by National Forest inventory crews. Field plots were distributed on a systematic grid at 1.7-mile intervals. Plots consisted of clusters of three 1/5-acre circular subplots. Estimates of area, volume, and growth were obtained from the field sample plots.

Outside National Forest

The area outside National Forests in southwest Washington was inventoried by Forest Survey during the summer of 1963.

A systematic sample of field plots was distributed across all owners other than National Forest. Field plots, located on a 3.4-mile grid, were supplemented by a more intensive sample of photo plots. The ratio of photo to field plots was approximately 16 to 1. Field plots consisted of 10 sample points distributed systematically over an acre. The variable-radius-plot sampling principle was used at each point to select the trees to be tallied. The summation of the 10-point tally expressed the resources and conditions for that acre and provided area, volume, growth, and mortality statistics.

DEFINITION OF TERMS

Land Area

Total Land Area

Includes dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains; streams, sloughs and canals less than one-eighth mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest Land Area

Land at least 10 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest Land Area

Land that does not qualify as forest land.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved. Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding crops of industrial wood products (usually sawtimber) because of adverse site conditions.

Subalpine. Forest stands at the upper elevational limits of tree growth.

Noncommercial rocky. Areas within the commercial forest zone but so steep and rocky that they are incapable of producing usable wood products.

Noncommercial other. Other areas within the commercial forest zone unsuitable for producing usable wood products due to poor drainage, shallow infertile soils, etc.

Types

Forest land types are based upon the predominant species in the present tree cover. Types are determined on the basis of majority of stocking by all live trees of various species, considering both size and spacing.

Tree Classes

Growing Stock

Live trees of commercial species that are now or may be expected to become suitable for use as industrial wood. They must meet the following specifications:

Sawtimber trees (11.0 inches d.b.h. and larger). Contain at least one 16-foot coniferous saw log or one 12-foot hardwood saw log to a variable top diameter of not less than 8.0 inches inside bark and with not less than 25 percent of the board-foot volume in the tree free of defect.

Poletimber trees (5.0 to 10.9 inches d.b.h.). Be not less than 50 percent sound on a cubic-foot basis and with no defects or deformities which are likely to prevent them from becoming growing-stock sawtimber trees.

Sapling and seedling trees (less than 5.0 inches d.b.h.). Have no defects or deformities which are likely to prevent them from becoming growing-stock poletimber trees.

Nongrowing Stock

Trees which do not meet the requirements for growing stock.

Cull trees. Trees of noncommercial species and trees of commercial species which are too defective or which are unlikely to become growing-stock trees due to deformity, disease, low vigor, etc.

Sound cull trees. Trees of noncommercial species, or with excessive defect due to form, roughness, etc.

Rotten cull trees. Trees with excessive defect due primarily to rot.

Mortality trees. Trees which died from natural causes and which were not cull trees at the time of death.

Salvable dead trees. Standing or down dead trees 11.0 inches or more in diameter that contain 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 12-foot hardwood saw log.

Stand-Size Classes

Sawtimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Large sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees 21.0 inches d.b.h. and larger.

Small sawtimber stand. Stand in which the majority of the sawtimber stocking is in trees from 11.0 to 20.9 inches d.b.h.

Poletimber Stand

Stand at least 10 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding sawtimber stocking.

Sapling and Seedling Stand

Stand at least 10 percent stocked with growing-stock trees, with more than half of this stocking in saplings and/or seedlings.

Nonstocked Area

An area of commercial forest land less than 10 percent stocked with growing-stock trees.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Degree of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands.

"Stocking percentages" express current area occupancy or stocking in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to make effective use of forest land. Three categories of stocking are provided: (1) all live trees, (2) growing-stock trees (sawtimber and poletimber trees, saplings and established seedlings of commercial species), and (3) desirable trees (superior growing-stock trees).

Stocking in terms of item 1 is used in classifying forest land and forest cover type. Stocking in terms of item 2 is used in classification of stand size and age. Stocking in terms of item 3 is used in classification of area condition.

Standards used for full stocking were:

trees 2 years old to 4.9 inches d.b.h.	750 trees per acre
trees 5.0 to 6.9 inches d.b.h.	670 trees per acre
trees 7.0 inches d.b.h. and larger:	
conifer sites	160 square feet basal area per acre
hardwood sites	100 square feet basal area per acre

Well-Stocked Stand

A stand that is 70 percent or more stocked with present or potential growing-stock trees.

Medium-Stocked Stand

A stand that is 40 to 69 percent stocked with present or potential growing-stock trees.

Poorly Stocked Stand

A stand that is 10 to 39 percent stocked with present or potential growing-stock trees.

Nonstocked Area

An area less than 10 percent stocked with present or potential growing-stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule. The common board-foot log rule used in determining volume of sawtimber in the Pacific Northwest.

International 1/4-inch rule. The standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top outside bark.

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other Public Lands

Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

Privately owned lands other than forest industry or farmer-owned lands.

TREE SPECIES

Tree species found in southwest Washington include:

Softwoods:

- Alaska-cedar *(Chamaecyparis nootkatensis)*
- Douglas-fir *(Pseudotsuga menziesii)*
- Engelmann spruce *(Picea engelmannii)*
- Grand fir *(Abies grandis)*
- Lodgepole pine *(Pinus contorta)*
- Mountain hemlock *(Tsuga mertensiana)*
- Noble fir *(Abies procera)*
- Pacific silver fir *(Abies amabilis)*
- Ponderosa pine *(Pinus ponderosa)*
- Sitka spruce *(Picea sitchensis)*
- Subalpine fir *(Abies lasiocarpa)*
- Western hemlock *(Tsuga heterophylla)*
- Western larch *(Larix occidentalis)*
- Western redcedar *(Thuja plicata)*
- Western white pine *(Pinus monticola)*
- Whitebark pine *(Pinus albicaulis)*

Hardwoods:

- Aspen *(Populus tremuloides)*
- Bigleaf maple *(Acer macrophyllum)*
- Black cottonwood *(Populus trichocarpa)*
- Oregon ash *(Fraxinus latifolia)*
- Oregon white oak *(Quercus garryana)*
- Pacific madrone *(Arbutus menziesii)*
- Red alder *(Alnus rubra)*

RECENT FOREST SURVEY PUBLICATIONS

Number	Title	Date
Resource Bulletins:		
PNW-13	1964 Oregon Log Production	Sept. 1965
PNW-12	The Timber Situation and Outlook for Northwest Oregon	1965
PNW-11	Hardwood Timber Resources of the Douglas-fir Subregion	1965
PNW-10	Forest Statistics for West Central Oregon	1965
PNW-9	Timber Resource Statistics for the Pacific Northwest	1965
PNW-8	Forest Statistics for Southwest Oregon	Aug. 1964
PNW-7	Forest Statistics for Northwest Oregon	July 1964
PNW-6	1962 Washington Log Production	Dec. 1963
PNW-5	Forest Statistics for Chelan and Douglas Counties, Washington	May 1963
PNW-4	Forest Statistics for Northeast Washington	May 1963
PNW-3	Toward Complete Use of Eastern Oregon's Forest Resources	May 1963
PNW-2	1962 Oregon Log Production	Apr. 1963
PNW-1	1961 Washington Log Production	Jan. 1963
Research Paper:		
PNW-5	Timber Trends in Western Oregon and Western Washington	Oct. 1963
Miscellaneous:		
	1963 Washington Log Production	Oct. 1964
	1963 Oregon Log Production	June 1964

Available from:

Pacific Northwest Forest & Range Experiment Station
P. O. Box 3141
Portland, Oregon 97208

The FOREST SERVICE of the
U. S. DEPARTMENT OF AGRICULTURE
is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.


NATIONAL FOREST SYSTEM
COOPERATIVE FORESTRY
FORESTRY RESEARCH
FOREST SERVICE
USDA
60
1905 - 1965
FOREST SERVICE YEARS

GPO 989-664