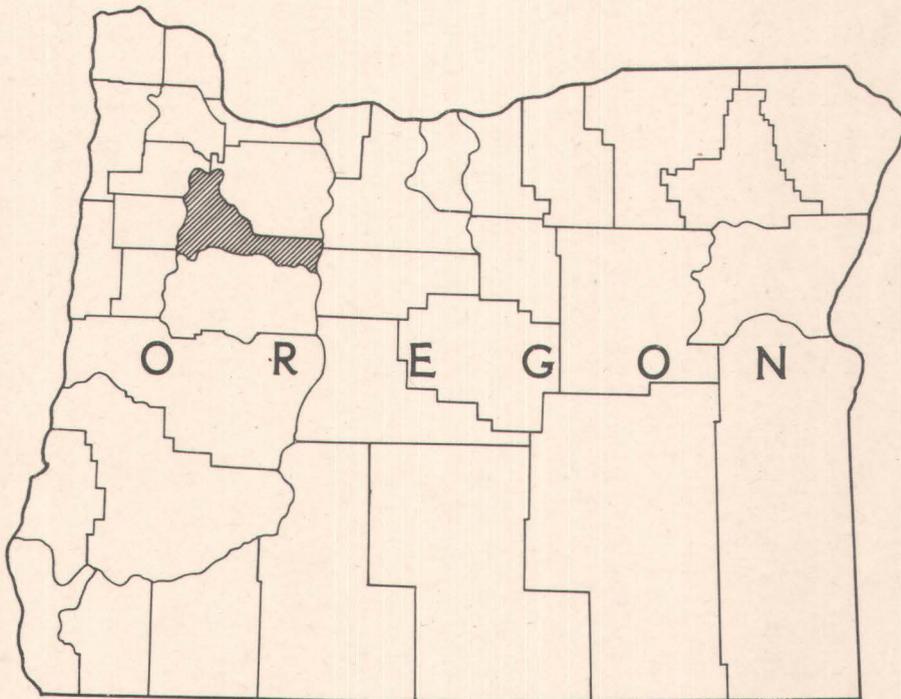


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FOREST STATISTICS FOR MARION COUNTY, OREGON

FROM THE FOREST SURVEY INVENTORY REVISED IN 1944
FOREST SURVEY REPORT NO. 96

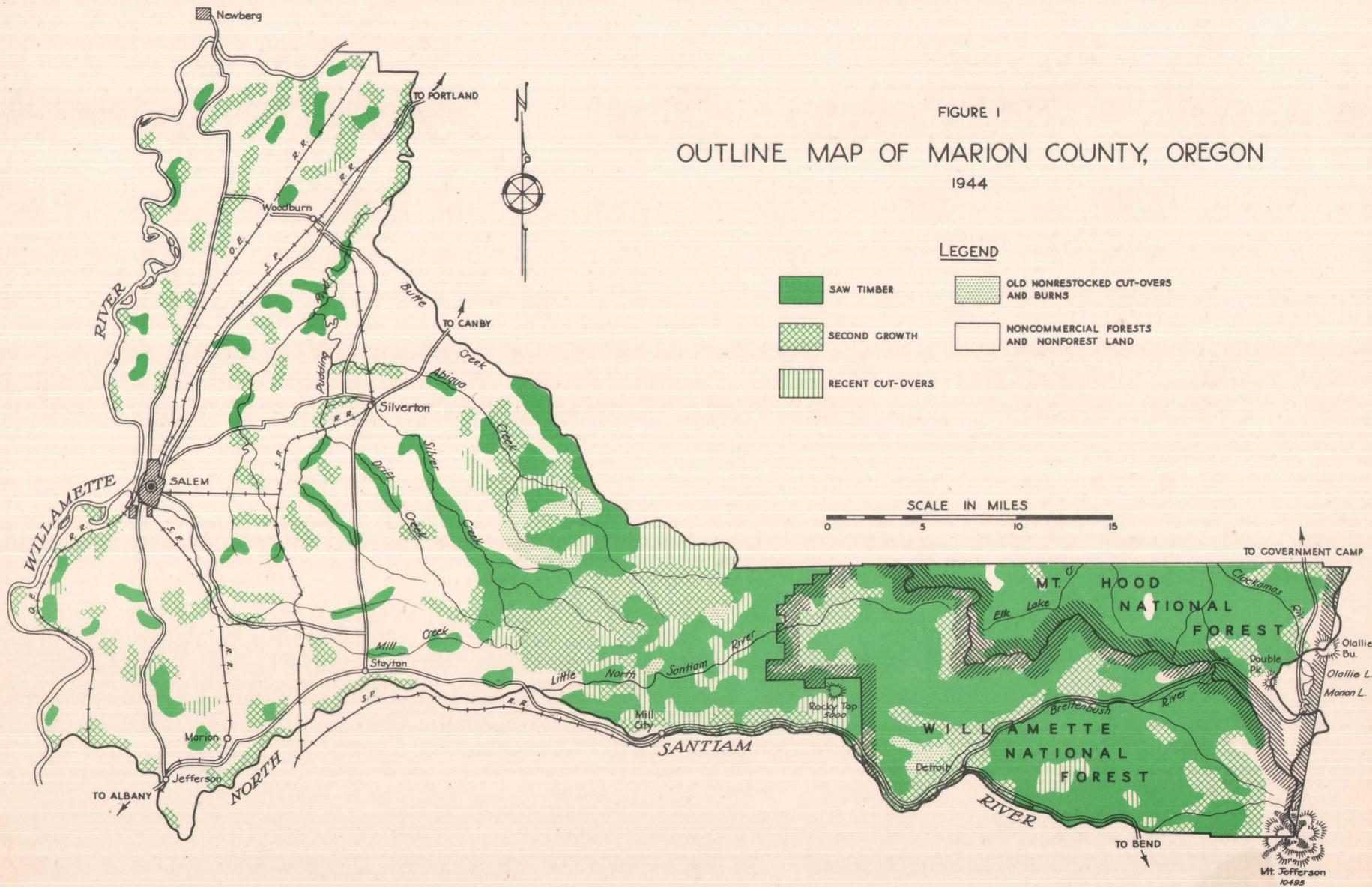


U. S. DEPARTMENT OF AGRICULTURE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
FOREST SERVICE
J. A. HALL, DIRECTOR

R. W. COWLIN, IN CHARGE OF FOREST SURVEY
PORTLAND, OREGON

F. L. MORAVETS, ASSISTANT
FEBRUARY 1946

FIGURE 1
 OUTLINE MAP OF MARION COUNTY, OREGON
 1944



Highlights

Fifty-five percent of the county area is forest land; 45 percent is in farms or is in other nonforest types.

Forty-two percent of the forest land and 19 percent of the saw-timber volume is in private ownership. The remainder is in the several classes of public ownership--Federal, State, and county.

Douglas-fir types comprise 65 percent of the forest land, western hemlock types only 5 percent, fir-mountain hemlock types 13 percent. Recent cutovers and burns total 9 percent.

A quarter of the forest land, nearly 100,000 acres, is intermixed with the farm lands of the valley and foothill sections of the county.

The timber volume amounts to 6.8 billion board feet, log scale, with Douglas-fir nearly 70 percent of the total. Western hemlock is next with 17 percent, followed by the balsam fir group with 7 percent. Minor species make up the remainder.

Sawlog production has averaged 104.9 million board feet, log scale, for the 20-year period from 1925 to 1944. The highest production, 182.6 million, was in 1942. Four-fifths of the volume of sawlogs has been Douglas-fir.

Lumber production has averaged 128.6 million board feet, lumber tally, for the same 20-year-period, with the largest production, 215 million, in 1925.

Current annual growth of the growing stands in unreserved ownership amounts to 44 million board feet. Potential annual growth, under good management practices, is 108 million board feet. Allowable annual cut, computed by the Hanzlik method, is 112 million board feet.

During the 11-year period between inventories, conifer saw-timber area has declined 3 percent. Seedling and sapling stands have increased 45 percent. Douglas-fir old-growth saw-timber volume has declined 17 percent, and the total saw-timber volume of the county 18 percent.

FOREWORD

The forest survey, a Nation-wide project, consists of a detailed investigation in five major parts of present and future forest resources: (1) An inventory of the country's existing forest resources in terms of areas occupied by forest-cover types and of timber volumes, by species, in board feet and cubic feet, and a study of conditions on cut-over and on burned forest lands; (2) a study of the depletion of the forests through cutting and through loss from fire, insects, disease, and other causes; (3) a determination of the current and potential growth on forest areas; (4) an investigation of present and prospective requirements of the United States for forest products; and (5) an analysis and correlation with other economic data of findings of these studies in order to make available basic facts and **guiding** principles necessary to plan for sound management and use of forest resources.

The forest survey of Oregon and Washington, an activity of the Pacific Northwest Forest and Range Experiment Station, was conducted in the Douglas-fir region during the period 1930-33.^{1/} In 1937, work of keeping the survey up to date was commenced in counties in which there had been a large amount of cutting depletion since the original survey.

In Marion County, Oregon, the first inventory was conducted in 1930, and tables summarizing the statistical data and a detailed forest type map were issued as of March 1, 1933. A reinventory of the county's forests was conducted late in 1944 to bring the forest statistics and type map up to date. Adjustments, based on field examinations, were made for changes due to logging, fire, restocking of cut- and burned-over areas, and transfer of land ownership since the original survey. Revised statistics, as of October 1, 1944, are given in this report, and prints of the revised county type map may be obtained.^{2/}

^{1/} Oregon and Washington were divided for survey purposes into two regions: (1) Douglas-fir region, consisting of that part of both States west of the Cascade Range summit, and (2) ponderosa pine region, that part of both States east of the Cascade Range summit. A regional report which includes an interpretation of the forest survey data and analysis of the forest situation has been published for each of the two regions.

^{2/} For information on the detailed 1-inch-to-the-mile forest type map of the county or the 1/4-inch-to-the-mile lithographed State type maps covering Oregon and Washington, address Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland 5, Oregon.

FOREST STATISTICS FOR MARION COUNTY, OREGON

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FOREST STATISTICS FOR MARION COUNTY, OREGON

By George E. Morrill^{1/}

From the earliest settlements to the present, the forests of Marion County have contributed to the welfare of the residents. Furnishing fuel for heating and lumber for construction, they have added much to the wealth of the county. Through the years, the lands in private ownership have been called upon to furnish a large share of the sawlogs so that these lands today are not covered with a forest of old-growth timber but are mostly in younger stands, some large enough for saw timber. At the present time, the largest part of the timber volume of the county is on lands in public ownership.

This report presents the statistics gathered by the forest survey showing the present condition of the forest lands, the volume of timber, the amount used annually, and the growth possibilities. From these data, conclusions may be reached as to the possible effect of the present and future forests on the economic welfare of the county.

Physical Character of the County

Marion County is situated in the north-central portion of the Willamette Valley, extending east from the Willamette River to the summit of the Cascade Range. The western part of the county measures 43 miles in a north and south direction but the eastern part is much narrower, being from 8 to 14 miles wide. The total length in an east and west direction is 70 miles. The area, as computed by the survey, is 757,725 acres.

The topography of the county is quite varied but divides readily into three classifications: Valley lands, foothills, and mountains. The valley of the Willamette River occupies the entire county north of Salem and Silverton (fig. 1). The land is generally gently rolling with elevations of from 80 to 200 feet. South of Salem, the valley narrows abruptly but widens out again west of Jefferson, along the Santiam River. The valley of the North Santiam River is quite wide in the region west of Stayton and north of Marion, but narrows above Stayton.

A spur of the foothills, known as the Waldo Hills, extends westward from a line between Stayton and Silverton. This area is rolling with rather steep slopes along the creeks and a maximum elevation of about 800 feet. The hilly area south of Salem and extending southeast to Marion is known as the Ankeny Hills and has much the same topography as the Waldo Hills.

^{1/} Assisting in the office compilation of the inventory were Inga E. Fulkerson and W. H. Schwindel.

The foothill section east of the Waldo Hills becomes progressively rougher and higher until elevations of slightly over 4,000 feet are reached in the area north of Mill City. The mountainous area farther to the east is very rough with narrow stream bottoms, steep slopes, and sharp ridges. The highest elevation occurs on the slopes of Mount Jefferson, about 8,500 feet, in the extreme southeast corner of the county, but the summit of the peak is south of the boundary.

Climate of the county is moderate. Temperatures seldom exceed 100° in summer and rarely go below zero in winter except at the higher elevations in the mountains. Precipitation varies according to the location in the county being least along the western edge and increasing eastward. Precipitation at Salem averages 37 inches per year. Near Silverton, it is 47 inches while Detroit averages 70 inches; much of this as snow. Most of the rain falls during the winter months, 70 percent occurring at Salem in the five months from November to March and only 10 percent in the four months from June to September. The frost-free period also varies from west to east, averaging 213 days at Salem, and 164 days at Detroit.

History and Development of the County

When the first white men passed through what is now Marion County about 1812, they found a timbered land but with many grassy prairies where stock could be grazed. As is the case now, Douglas-fir and oak were the principal trees in the valley, with maple, ash, and alder along the streams. Game was plentiful, deer and elk being the most numerous. One of the first settlements was on Mission Bottom in the northwest part of the county where Jason Lee established a Methodist mission in 1834. Other towns which were settled before 1850 were Champoeg, Jefferson, Salem, St. Paul, and Silverton.

By 1843 the Oregon Country had increased in population so that a meeting was held at Champoeg to organize a provisional government. The site of this meeting place is now preserved as a State Park. The territorial government followed in 1848 and admission of Oregon as a State in 1859. Salem has been the capital of the State since 1851, except for a short time in 1855 when the capital was moved to Corvallis.

Many of the early villages have not survived to the present time but others have grown through the years. Salem is now the largest city in the county with a population of slightly over 30,000. Other towns with populations of between one and three thousand are Mill City, Mount Angel, Silverton, Stayton, and Woodburn.

The first settlers in the county found rich soil which raised abundant crops of grain and other foods. Fruit trees were soon planted and extensive orchards developed. The Waldo Hills and Ankeny Hills sections of the county were found to be best adapted for fruits and are so used to the present. Other crops have been grown at times in the county but small grains and fruits still occupy the largest acreage of agricultural lands.

The need for lumber and flour soon led to the establishment of the first manufacturing plants in the region; sawmills and flour mills along the streams where water power was available. Manufacturing of various kinds has always been a minor factor in the development of Marion County, particularly until the last 30 years when a few medium-sized forest industries have been established in the county.

Indian trails and the rivers were the first means of travel but a transportation system has gradually developed through the years that reaches to all parts of the county. Railroad transportation came with the building of a narrow gauge road down the east side of the valley and later the Southern Pacific lines and the Oregon Electric. Hard-surfaced highways reach to many points and improved gravel roads extend into the mountainous section. The Willamette River is still used principally for the transportation of log rafts to the Portland area.

Forest Land

In the reinventory of the county, 419,820 acres was classified as forest land. This includes the scattered patches of timber in the valley zone, both Douglas-fir and the hardwoods, the forests of the foothills and mountains, and the subalpine type of the high mountains. The remainder of the county, about 45 percent of the total area, is in farms and pastures, in cities and towns, or in high mountain slopes above timberline.

As is usual in the valley counties west of the Cascade Range, Douglas-fir is the most important tree species in the county, occurring as the dominant species on nearly three-fourths of the forest land and making up 70 percent of the volume of saw timber. The second most important species is western hemlock. Although growing in pure stands on only 5 percent of the forest land, it makes up 17 percent of the volume of saw timber due to its occurrence in mixture with other species at the higher elevations.

Twenty timber types were recognized and mapped in the reinventory of the county. The area of each type by ownership class is shown in table 1. In this and the following tables, ownerships are grouped by two classes: Unreserved and reserved. In the first, cutting for commodity production is not prohibited, while it is prohibited by some form of legislation on lands classified as reserved. The types in commercial forest land were grouped together on the basis of the timber stand and the areas are shown in table 2. A more generalized grouping, giving the location of the types in the county, is shown in figure 1. Slightly over half of the forest land of the county is in stands of saw-timber size, one-third is in second growth, nearly one-tenth is in cutovers or burns, and the remainder is noncommercial.

Table 1.--Area of commercial and noncommercial forest land and nonforest land, by ownership and cover type, as of October 1, 1944

(Acres)

Type No.	Cover type	Total	Unreserved						Reserved					
			Total	Private	State	County	Indian	Federal			Total	State	Federal	
								Revested land grant	Public domain	National forest			Park	National forest
<u>All lands</u>														
	Total forest land	419,820	404,005	174,460	15,990	1,200	1,090	21,555	365	189,345	15,815	1,565	3,725	10,525
	Nonforest land	337,905	334,545	327,890	3,965			295	20	2,375	3,360	380	180	2,800
	Total	757,725	738,550	502,350	19,955	1,200	1,090	21,850	385	191,720	19,175	1,945	3,905	13,325
<u>Commercial forest land</u>														
6	Douglas-fir													
	Large old growth	39,745	39,745	7,385	1,945			3,115		27,300				
7	Small old growth	50,100	49,380	4,995	700			415		43,270	720		195	525
8	Large second growth	68,555	64,925	46,280	4,410	205		10,190	275	3,565	3,630	1,225	2,245	160
9	Small second growth	65,080	64,165	45,460	1,880	225		2,170	80	14,350	915	290	625	
10	Seedlings and saplings	46,465	45,770	24,555	2,475	130		2,590		16,020	695	50	580	65
14	Western hemlock													
	Large	21,455	21,420	965	15			20		20,420	35		35	
15	Small	490	490							490				
16	Seedlings and saplings	365	365		40			75		250				
17	Western redcedar													
	Large	150	150							150				
23	Fir-mountain hemlock													
	Large	41,580	39,340	1,085	115			35		36,105	2,240			2,240
24	Small	11,170	7,515	20	50					7,445	3,655			3,655
26	Lodgepole pine													
	Small	7,075	7,050				400			6,650	25			25
31,5	Hardwood													
	Large	3,020	3,020	3,010				10						
31	Small	8,065	8,065	7,835	105			100		25				
35A	Nonrestocked cutover													
	Cut from 1920-29, incl.	140	140	140										
36	Recent cutover, since 1930	29,270	29,265	22,895	3,250	205		2,385		530	5		5	
37	Deforested burn	8,255	8,215	4,270	965	435		450	10	2,085	40		40	
	Total	400,960	389,020	168,895	15,950	1,200	400	21,555	365	180,655	11,960	1,565	3,725	6,570
<u>Noncommercial forest land</u>														
4	Woodland (oak-madrone)	5,605	5,605	5,565	40									
33	Subalpine	10,920	7,065				690			6,375	3,855			3,855
38	Noncommercial rocky area	2,315	2,315							2,315				
	Total	18,840	14,985	5,565	40		690			8,690	3,855			3,855
<u>Nonforest land</u>														
3*	In agricultural use	322,240	321,680	317,970	3,440			250	20		560	380	180	
2	Other	15,665	12,865	9,920	525			45		2,375	2,800			2,800
	Total	337,905	334,545	327,890	3,965			295	20	2,375	3,360	380	180	2,800

Table 2.--Area of commercial forest land, by ownership and generalized forest type, as of October 1, 1944

(Acres)

Generalized forest type	Total	Unreserved							Reserved				
		Total	Private	State	County	Indian	Federal			Total	State	Federal	
							Revested land grant	Public domain	National forest			Park	National forest
Conifer saw timber Types 6, 7, 8, 14, 17, and 23	221,585	214,960	60,710	7,185	205		13,775	275	132,810	6,625	1,225	2,475	2,925
Conifer second growth Types 9, 15, 21, and 26													
On cut-over areas	15,655	15,555	14,790	330			130		305	100	60	40	
On burns	60,475	57,785	30,690	1,600	225	400	2,040	80	22,750	2,690	230	585	1,875
Total	76,130	73,340	45,480	1,930	225	400	2,170	80	23,055	2,790	290	625	1,875
Conifer seedlings and saplings Types 10, 16, and 24													
On cut-over areas	32,865	32,275	22,370	1,390	110		2,185		6,220	590	50	540	
On burns	21,650	19,740	2,185	1,125	20		480		15,930	1,910		40	1,870
Total	54,515	52,015	24,555	2,515	130		2,665		22,150	2,500	50	580	1,870
Recent cut-over areas Type 36	29,270	29,265	22,895	3,250	205		2,385		530	5		5	
Nonrestocked cut-over and burned-over areas Types 35A and 37	8,395	8,355	4,410	965	435		450	10	2,085	40		40	
Hardwoods Types 31, 5 and 31	11,085	11,085	10,845	105			110		25				
Total	400,980	389,020	168,895	15,950	1,200	400	21,555	365	180,655	11,960	1,565	3,725	6,670

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Conifer Saw-Timber Stands

Under utilization practices of the present time, Douglas-fir and western hemlock trees are not ordinarily cut for sawlogs until they have reached a diameter of 22 inches or more at breast height. Stands in which a majority of the volume is in this size of tree were classed as saw timber. Stands in the fir-mountain hemlock type were classed as saw timber when the majority of the trees had reached 16 inches or larger in diameter.

There is only about 40,000 acres of large old-growth Douglas-fir (type 6) left in the county. The majority of the volume of this type is in trees over 40 inches in diameter. Large old-growth Douglas-fir generally has the largest volume per acre, the best quality timber, and occurs at the lower, more accessible elevations, hence is the saw-timber stand that is most often logged first. Small remnants of this type are found in the foothills and lower mountains but the largest areas are located in the valley of the Breitenbush River.

The small old-growth Douglas-fir type (type 7) is composed of trees from 22 to 40 inches in diameter. It generally occurs at the higher elevations, from 2,500 to 5,000 feet. Practically all of the 50,100 acres in this type is found in the mountains, where very little cutting has taken place. The timber is smaller and not as high in quality as that found in the large old-growth stands.

Large second-growth stands of Douglas-fir (type 8) are under 160 years of age and the majority of the volume is in trees 22 to 40 inches in diameter. The 68,500 acres in this type is the largest single type found in the county, comprising 31 percent of the conifer saw-timber acreage and 16 percent of the forest land. The most extensive stands are found along Butte Creek, Abiqua Creek, and Silver Creek, southeast of Silverton. The age of the stands indicates that they originated after the great Silverton Fire of 1865. The second largest body of this type is found in the Little North Santiam River Valley, extending east 15 miles from its mouth. Nearly one-half of the type area occurs intermingled with farm lands in strips up to a mile wide along streams and on the steeper slopes. Trees in the more open type 8 stands are very limby and coarse grained while those in older, well-stocked stands are of much better quality. Many of the young, well-stocked stands have been partially cut over for piling during the last few years and older stands have been cut for sawlogs.

Western hemlock is the principal species on some 21,000 acres of saw-timber stands found in the mountains. This type is usually situated at a higher altitude than the Douglas-fir types. Although the species may occur in fairly pure stands, mixtures are more common with varying amounts of Douglas-fir, noble fir, and Pacific silver fir. A small acreage of this type was logged during the war years in addition to that cut previously.

The saw-timber type which grows at the highest elevation is the fir-mountain hemlock type with practically all of the 41,600 acres within the national forest boundaries. Key species are Pacific silver fir, noble fir, and mountain hemlock, but smaller amounts of western hemlock and Douglas-fir are also found in mixture. Generally, all these species with the exception of mountain hemlock are of fair to good quality grading down to low quality material because of small size and liminess at the higher elevations. Because of a lack of demand for these species in the past, and also because of their inaccessibility, only a few acres of this type has been logged to date.

Immature Conifer Types

Conifer second growth of less than saw-timber size is found on 130,600 acres in Marion County. Nearly three-fifths of these stands are in pole timber with the trees from 6 to 20 inches in diameter at breast height and the remainder are seedling and sapling stands with the majority of the trees less than 6 inches d.b.h.

Sixty-five thousand acres of pole-sized Douglas-fir is intermixed with the other forest lands. The largest block, nearly 7,500 acres, is on the Little North Santiam River and adjacent Elkhorn Creek. A second block of some 3,000 acres is found in the area surrounding Breitenbush Hot Springs. Three-fifths of the type area is intermixed with the farm lands of the valley, occurring along the streams and on the steeper slopes which are not cultivated. Age of these pole-sized stands is from 20 to 70 years (table 3) but the majority is fairly evenly distributed from 30 to 60 years. Stocking is generally satisfactory with 90 percent of the area classed as medium or better. The weighted average is 57 percent of fully stocked.

Pole-sized stands in the western hemlock, fir-mountain hemlock, and lodgepole pine types amount to 11,050 acres. Nearly 7,100 acres of this is in lodgepole pine for which age and stocking was not determined. Age on the other types varies from 40 to 100 years with the largest acreage in 60-year-old stands. The stocking averages nearly the same as that of the Douglas-fir pole stands.

As is shown in table 2, four-fifths of the pole-sized stands originated following fires and one-fifth on lands previously cut over.

Seedling and sapling stands of Douglas-fir cover nearly 46,500 acres, mainly in two large blocks. The first of these, containing 21,000 acres, is found on the headwaters of Abiqua and Silver Creeks on lands that were logged prior to 1930. Much of this area is poorly stocked; so thinly stocked that timber of the best quality will not be produced. A second area of this type, some 11,000 acres, extends along the North Santiam River, Breitenbush River, and French Creek in the vicinity of Detroit. In contrast with the large second-growth saw-timber and pole-sized Douglas-fir types comparatively little seedling and sapling acreage is found intermingled with the farm lands of the valley section. Age of these stands is from 10 to 30 years

Table 3.--Area of certain immature conifer types on unreserved and reserved lands, by age class and degree of stocking, as of October 1, 1944

(Acres)

Age class (years)	Degree of stocking	Total	Unreserved						Reserved			
			Total	10 Douglas-fir seedlings and saplings	9 Douglas-fir small second growth	16 Western hemlock seedlings and saplings	15 Western hemlock small second growth	24 Fir-mountain hemlock second growth	Total	10 Douglas-fir seedlings and saplings	9 Douglas-fir small second growth	24 Fir-mountain hemlock second growth
Total all ages	Good	16,005	15,900	3,625	10,635	115	275	1,250	105	45	60	
	Medium	77,715	74,370	22,915	46,935	250	215	4,055	3,345	215	755	2,375
	Poor	29,850	28,035	19,230	6,595			2,210	1,815	435	100	1,280
	Total	123,570	118,305	45,770	64,165	365	490	7,515	5,265	695	915	3,655
10	Good	1,280	1,240	1,125		115			40	40		
	Medium	14,455	14,300	14,050		250			155	155		
	Poor	16,835	16,665	16,665					170	170		
	Total	32,570	32,205	31,840		365			365	365		
20	Good	2,405	2,400	2,225				175	5	5		
	Medium	10,660	10,135	7,965		315		1,855	525			525
	Poor	6,260	4,715	2,565		255		1,895	1,545	265		1,280
	Total	19,325	17,250	12,755		570		3,925	2,075	270		1,805
30	Good	3,165	3,105	275		2,125			60		60	
	Medium	13,160	13,060	900		11,010			100	60	40	
	Poor	1,825	1,825			1,725			100			
	Total	18,150	17,990	1,175		14,860			160	60	100	
40	Good	3,425	3,425			3,425						
	Medium	17,885	17,445			16,765			440		440	
	Poor	1,840	1,740			1,525			100		100	
	Total	23,150	22,610			27,715			540		540	
50	Good	2,390	2,390			2,020						
	Medium	11,975	11,805			11,505					170	
	Poor	1,625	1,625			1,625						
	Total	15,990	15,820			15,150			170		170	
60	Good	3,160	3,160			3,065		95				
	Medium	8,565	6,715			6,460		215	40	1,850		1,850
	Poor	1,210	1,210			1,210						
	Total	12,935	11,085			10,735		310	40	1,850		1,850
70+	Good	180						180 1/2				
	Medium	1,015	910			880			30	105	105	
	Poor	255	255			255						
	Total	1,450	1,165			1,135		180	30	105	105	

1/ Actual age is 100 years.

with two-thirds in the ten-year-age class. Stocking is not as good as for the older pole stands, averaging only 45 percent of full stocking.

Seedling and sapling stands of western hemlock and the fir-mountain hemlock types are found on 8,050 acres, mainly at the higher elevations. Most of the stands are in the 20-year-age class and the stocking is 46 percent of fully stocked.

Three-fifths of the seedling and sapling stands originated on cut-over areas and two-fifths on old burns.

Hardwood Types

Hardwoods are found in comparatively pure stands on 11,085 acres of forest land. A large part of this acreage is in a narrow band adjacent to the Santiam and North Santiam Rivers, extending east of Stayton a few miles. Occasional large areas are found along the Willamette and Pudding Rivers, with smaller areas along the creeks and in the poorly drained swales. Nearly 30 percent was classed as saw-timber size, bearing trees 12 inches or more in diameter, with the largest part of this in black cottonwood. Black cottonwood was the dominant species on 62 percent of the total hardwood area, Oregon ash on 15 percent, red alder on 10 percent, bigleaf maple on 3 percent, and the remaining 10 percent was made up of varying mixtures of these species. Bigleaf maple and red alder often occur as an understory in old-growth coniferous stands. Very little cutting has occurred in these hardwood stands in the past. Some Oregon ash is used for fuel but the other species are utilized to a very small extent.

Recent Cutovers

The 29,270 acres of forest land that has been clear cut since 1930 was not examined to see if restocking had taken place. On much of this type, too short a time has elapsed since logging to determine if it will reseed from surrounding uncut stands. Much of the cutting is in small areas intermingled with the other forest land but there are exceptions to this. A block of nearly 5,700 acres of recent cut-over land is found at the head of Butte Creek, extending southward to Abiqua Creek. A continuous area of 2,000 acres is located in what is locally called the Green Basin south of Rocky Top. A second block of about this size occurs on the slopes east of Detroit. If not too far from a seed source, and if they are protected from fire, these clear-cut areas should restock naturally within a few years.

A comparison of the present cut-over areas with the forest types of 1933 shows that less than half of the recent cut-over area was originally in old-growth types. More than half of the 29,000 acres was in large second-growth Douglas-fir stands.

Deforested Lands

Areas which are currently deforested amount to only 2 percent of the forest lands of the county, 8,400 acres in all. These are of two types, burns and old nonrestocked cutovers, with burns accounting for all but 140 acres of the total. Some burns are recent but others date back many years. Several burns aggregating 4,000 acres, in the Abiqua Creek drainage southeast of Silverton, are believed to date back to the Silverton Fire of 1865. These areas are fern patches at the present and it is unlikely that they will restock naturally within the near future. The only large recent fire in the county is the Tumble Creek fire of 1941, which covered an area of some 1,650 acres on the slopes northwest of Detroit. Adjacent to this is an old burn of about 400 acres which occurred many years ago. The remaining 2,200 acres of burns is in smaller areas scattered throughout the mountain and foot-hill zones.

The forest inventory of 1933 showed there was 26,600 acres of cut-over land at that time. Eighty-four percent of this was recent cutovers which were not examined for stocking but the remainder had been logged previous to 1920 and had not restocked by 1930. All of this land was found to be restocked at the present time with the exception of 140 acres which was classed as old nonrestocked cutovers (type 35A).

Noncommercial Types

Four percent of the forest lands was classified as noncommercial, occupying 18,800 acres. Three-fifths of this area is in the subalpine type (type 33) which is found at high elevations in the mountains. This subalpine type is important for watershed protection and for recreational use. Oak woodlands (type 4) cover some 5,600 acres in the foothill and valley zones. Many of these woodlands are very scrubby in character but some of the better quality ones have been cut for fuelwood. Non-commercial rocky areas (type 38) make up the remainder of the non-commercial types, about 2,300 acres. These are areas too rocky to grow good timber but are within the commercial timber range, usually found in the mountains.

Productive Capacity

The productive capacity of forest land varies according to the climatic conditions, the variations in soil, and to a lesser extent, biotic conditions. The productive capacity or site quality of the 389,900 acres of commercial coniferous forest land was rated by three standards according to type. The site classification for Douglas-fir was used for western redcedar and the Douglas-fir types. The spruce-hemlock classification was used for the western hemlock and the fir-mountain hemlock types. There is no site classification in common use for lodgepole pine so it could not be rated. In the classification, site I indicates the best growing conditions and site V the worst (table 4). No site I was found

Table 4.--Area of unreserved and reserved commercial forest land by site quality class^{1/}, as of October 1, 1944

Kind of forest land and site quality class	Total		Unreserved		Reserved	
	Acres	Percent	Acres	Percent	Acres	Percent
<u>All sites</u>						
Douglas-fir	307,395	78.8	301,390	79.7	6,005	50.2
Spruce-hemlock	75,425	19.4	69,495	18.4	5,930	49.6
Lodgepole pine	7,075	1.8	7,050	1.9	25	0.2
Total	389,895	100.0	377,935	100.0	11,960	100.0
<u>Douglas-fir site</u>						
Site class II	23,360	7.6	21,605	7.2	1,755	29.2
Site class III	240,385	78.2	236,885	78.6	3,500	58.3
Site class IV	43,650	14.2	42,900	14.2	750	12.5
Total	307,395	100.0	301,390	100.0	6,005	100.0
<u>Spruce-hemlock site</u>						
Site class III	10,710	14.2	10,675	15.4	35	0.6
Site class IV	57,325	76.0	54,315	78.1	3,010	50.8
Site class V	7,390	9.8	4,505	6.5	2,885	48.6
Total	75,425	100.0	69,495	100.0	5,930	100.0
<u>Lodgepole pine site</u>						
Total	7,075	100.0	7,050	100.0	25	100.0

^{1/} The "site quality" of a forest area is its relative productive capacity determined by biotic, climatic, and soil conditions. The index of site quality is the average height of the dominant stand at the age of 100 years. Five site quality classes are recognized for both Douglas-fir and spruce-hemlock types, class I being the highest. In the survey, the spruce-hemlock classification was used for the fir-mountain hemlock types as well as for the western hemlock types. Land occupied by lodgepole pine was not classified as to productivity.

in the county. Nearly four-fifths (78 percent) of the Douglas-fir types were average (site III) with 8 percent in site II, and 14 percent in site IV. Sites are much poorer at the higher elevations where western hemlock and fir-mountain hemlock types are found. Seventy-six percent of these types was rated as site IV with 14 percent site III and 10 percent as site V. These percents indicate that the productive capacity of Marion County coniferous land is slightly under the average for the lands on the west slope of the Cascade Range.

Saw-Timber Volume

The reinventory showed that the forests of the county contained nearly 6.8 billion board feet, log scale, Scribner rule. Volume data by species and ownership are given in table 5. Volume is included for all coniferous trees 16 inches and larger in diameter and for hardwood species 12 inches and larger.

Douglas-fir volume, 4.7 billion board feet, is by far the largest of any species. Nearly one-quarter of this is in large old growth, 39 percent in small second growth, and 35 percent in large second growth. Only 2 percent is in small second growth. Western hemlock makes up 17 percent of the total with nearly 1.2 billion board feet. The balsam firs account for 480 million, or 7 percent. Mountain hemlock with a little over 3 percent, and the twelve remaining species with a total of a little less than 3 percent, account for the remainder.

Forest Ownership

In considering the forest situation in a county, information is needed as to the ownership of lands and timber, since the policy of the owners will affect the handling of the lands. In the reinventory nine ownership classes were recognized--five Federal, two State, county, and private. Three of these classes--two Federal and one State--are in a reserved status, that is, cutting for commodity production is prohibited through Federal or State legislation. Lands in these areas are preserved for historical or recreational purposes.

National Forest

The 189,300 acres of unreserved forest land within the Willamette and Mt. Hood National Forests, administered by the Forest Service, comprises 45 percent of the forest land of the county and is the largest ownership. Two-thirds of this acreage is in saw-timber stands, one-eighth each in pole timber and seedlings and saplings, and the remainder in other types. Only 2,600 acres is in recent cutovers and deforested burns. In spite of the fact that these national forest lands are at the higher elevations where the productive capacity is less, they contain nearly 4.8 billion board feet, 71 percent of the saw-timber volume of the county. This includes two-thirds of the large old-growth

Table 5.--Volume of timber by ownership and species as of October 1, 1944
(Thousand board feet, log scale, Scribner rule)

Species	Total	Unreserved							Reserved			
		Total	Private	State	County	Federal			Total	State	Federal	
						Revested land grant	Public domain	National forest			Park	National forest
All species												
Conifers	6,744,450	6,629,450	1,269,372	163,926	2,553	412,641	5,007	4,775,951	115,000	7,763	46,119	61,118
Hardwoods	31,709	31,442	11,853	532		748		18,309	267		161	106
Total	6,776,159	6,660,892	1,281,225	164,458	2,553	413,389	5,007	4,794,260	115,267	7,763	46,280	61,224
Conifers (trees 16 inches d.b.h. and larger)												
Douglas-fir												
Large old growth	1,136,411	1,133,492	237,403	38,618		99,516		757,955	2,919		2,843	76
Small old growth	1,851,227	1,830,816	118,191	21,422		32,246		1,658,957	20,411		1,920	18,491
Large second growth	1,655,216	1,598,066	712,701	75,522	1,949	247,934	5,007	554,953	57,150	7,665	37,201	12,284
Small second growth	83,014	79,085	64,731	3,457	604	5,271		5,012	3,929	98	3,630	201
Western hemlock												
Large	1,040,754	1,034,843	107,911	19,505		21,927		885,500	5,911		472	5,439
Small	120,125	119,475	11,864	2,157		2,436		103,008	650		53	597
Mountain hemlock	233,626	223,845		3				223,842	9,781			9,781
Western redcedar	78,867	78,854	3,025	185				75,644	13			13
Alaska yellow-cedar	4,959	4,959						4,959				
California incense-cedar	157	157						157				
Western white pine	48,266	48,072	2,627	49		333		45,063	194			194
Sugar pine	2,230	2,230	39					2,191				
Lodgepole pine	114	114						114	100			100
Pacific silver fir	173,539	169,317	3,042	560		10		165,705	4,222			4,222
Grand fir	10,714	10,704				18		10,686	10			10
Noble fir	289,258	279,548	7,838	2,428		2,950		266,332	9,710			9,710
Alpine fir	6,935	6,935						6,935				
Western larch	671	671						671				
Engelmann spruce	8,367	8,367						8,367				
Total	6,744,450	6,629,450	1,269,372	163,926	2,553	412,641	5,007	4,775,951	115,000	7,763	46,119	61,118
Hardwoods (trees 12 inches d.b.h. and larger) ^{1/}												
Red alder	3,613	3,573	649	78		109		2,737	40		24	15
Bigleaf maple	19,293	19,066	2,496	454		609		15,507	227		137	90
Black cottonwood	8,188	8,188	8,093			30		65				
Oregon ash	615	615	615									
Total	31,709	31,442	11,853	532		748		18,309	267		161	106

^{1/} In addition, there was estimated to be 23,435 cords of oak of all sizes and 464 cords of bigleaf maple, 3,717 cords of black cottonwood, and 5,995 cords of ash in trees smaller than 12 inches d.b.h. on private lands.

Douglas-fir, 90 percent of the small old-growth Douglas-fir, one-third of the large second-growth Douglas-fir, 85 percent of the western hemlock, and 92 percent of the noble fir volume.

Private

Lands in private ownership comprise the second largest classification, some 174,500 acres, or nearly 42 percent of the total forest land of the county. Only 35 percent of this is in saw-timber types with the majority in large second-growth Douglas-fir. Pole stands account for 26 percent and seedling and sapling stands for an additional 14 percent. Lands without a forest cover amount to 16 percent with nearly 23,000 acres in recent cutovers and 4,400 acres in burns. Two-thirds of the remaining area of 16,400 acres is in hardwood types and the rest is noncommercial forest land. About 55 percent of the forest land in private ownership is intermingled with the farm lands of the valley and foothill zones, principally in large second-growth saw timber, pole stands, and hardwood types.

Nearly 1.3 billion board feet of timber is on private lands, 19 percent of the county total. Eighty-nine percent is Douglas-fir, 9 percent hemlock, and the remaining 2 percent is made up of nine different species. Large second-growth Douglas-fir has the most volume with 713 million board feet in this species alone.

Revested Grant Lands

Revested lands of the Oregon and California Railroad grant are the third largest ownership, comprising 21,555 acres of forest land. A little over three-fifths of this is in saw-timber stands, principally Douglas-fir, and the remainder is about equally divided between pole stands, seedling and sapling stands, and recent cutovers. These lands support a saw-timber stand of 413 million board feet, 85 percent of which is Douglas-fir.

State

The State of Oregon owns nearly 16,000 acres of forest land in an unreserved status, nearly 45 percent of which is in Douglas-fir saw-timber types. Most of this land has been transferred from the county after tax foreclosure. These State-owned lands have a stand of 164 million board feet of saw-timber, 85 percent of which is Douglas-fir.

Other Unreserved Ownerships

Minor public ownership of forest land in the county includes the 1,200 acres owned by the county, 1,090 acres of the Warm Springs Indian Reservation along the crest of the Cascade Range, and 365 acres in public domain. The timber stand is very small, amounting to only 7.5 million board feet.

Reserved Ownerships

Fifteen thousand eight hundred acres of forest land is reserved from commodity cutting at the present time. The largest area, 10,500 acres, is in the Mount Jefferson Wild Area, part of the Mount Hood and Willamette National Forests, extending northwest from Mount Jefferson. This rough, high mountain region is primarily valuable for its scenic and recreational values but does contain a timber stand of some 61 million board feet. About half of this is Douglas-fir with the remainder divided between western hemlock, mountain hemlock, and the balsam firs.

The Silver Creek Falls State Park and the adjoining Silver Creek Recreational Area, administered by the State and the National Park Service respectively, together comprise 5,300 acres of forest land. Nearly all of this area is in Douglas-fir types with a total stand of nearly 54 million board feet.

Forest Depletion

The forests of Marion County are being utilized for many products at the present time. Logs are cut for sawing into lumber, for pulpwood, for shingles, and for veneer. Smaller trees are used for piles, poles, posts, and fuel wood. Besides this industrial utilization, there is the loss caused by fires and the gradual, but considerable, loss occasioned by tree-killing insects, decay, and windthrow.

Sawlog production records extend back as far as 1925 (table 6). The annual cut for the years 1925-29 did not vary far from the average of 123 million. Depression years caused violent fluctuations with the low in 1932 when only 55 million feet was cut. Recovery was rapid with sawlog production reaching 101 million in 1936, but it fell off again so that the average for the period was only 82 million. Stimulated by the war requirements, production of logs again increased and reached a high of nearly 183 million board feet in 1942. It has dropped since then but was in the neighborhood of 155 million feet in 1944. The five-year average for 1940-44 was approximately 136 million feet per year. During the period since 1925, 80 percent of the volume of sawlogs produced has been Douglas-fir with 16 percent western hemlock and the remaining 4 percent a mixture of other species. From 1925 to 1929, a large volume of logs was shipped into the county so that lumber production greatly exceed log production.

Table 6.--Average annual production of sawlogs and lumber by five-year periods

1925 - 1944

Period	Average annual production	
	Sawlogs M board feet, log scale Scribner rule	Lumber M board feet lumber tally
1925 - 29	123,505	198,559
1930 - 34	78,210	92,460
1935 - 39	82,136	82,151
1940 - 44	135,827	141,120

Yearly statistics for the volume of material cut for fuel wood, pulpwood, piling, poles, and posts are not available. A study made for 1930 ^{1/} showed that in that year 22.6 million board feet of sawlog-sized trees and 4.3 million cubic feet of smaller trees were cut for these products. Demand for these particular products varies from year to year, but it is believed that the present production is about the same as that of 1930.

Although some timber is destroyed by fire each year, the county has had no large, destructive forest fires since the original inventory. Fire records show that an average of 400 acres of timberland has burned over each year, but much of this has been reproduction stands so that the sawlog loss has been very light.

Forest Industries

Although agriculture is dominant, the wood products industries of the county employ a large number of men. Logging and sawmilling are the principal occupations, but other groups, such as pulp and paper, planing mills, and minor wood products account for a share of the total.

Logging and sawmilling were two of the first industries established by the pioneers. Logging is still a major industry, being carried on by some 40 to 50 individuals or companies during 1944. None of these were large. Although several companies produced from 15 to 18 million feet of logs, the average was less than 4 million, ranging down to only a few thousand for the smallest. Average log production by 5-year periods is shown in table 6.

In the majority of the years since 1925, from 20 to 29 sawmills have operated. Sawmills of the county produced a little over 215 million board feet of lumber in 1925, the earliest year for which records are available, and a larger production than any year since then. Table 6 shows the average annual lumber production by 5-year periods. Lumber production will drop sharply with the closing of the Silver Falls Timber Company sawmill early in 1945.

A new industry entered the county late in 1921 when the Oregon Pulp and Paper Company at Salem first started operating. Built for a capacity of 110 tons of sulfite pulp, some 100 thousand board feet of logs are used each day.

A veneer plant near Detroit was built in 1945 to produce green veneer to be shipped elsewhere for drying and fabrication. A few small shingle mills and other small plants complete the list of wood-using plants of the county.

^{1/} Johnson, Herman M. The production and consumption of minor timber products in Oregon and Washington. Pacific Northwest Forest and Range Experiment Station, 1931. Office report.

The forests of Marion County have considerable recreational value. The area surrounding Silver Creek Falls, embracing the State Park and the Silver Creek Recreational Area, is very highly used. Another area of concentrated use is around Breitenbush Hot Springs where hundreds come each summer to visit the hot springs and to hike and fish. The national forest has provided several camp grounds located at Breitenbush Lake, Elk Lake, and along the Breitenbush and North Santiam Rivers which are used in season. The scenic area surrounding Mount Jefferson is more remote but is available to those who wish to hike or take horseback trips into the region. All of these recreational areas are reasonably close to the centers of population of the Willamette Valley so can be reached within a short time.

Forest Growth

The depletion of the forests caused by logging, fire, and other agencies is partially made up by growth on the younger age classes. Stands of 160 years of age or less, amounting to 208 thousand acres in unreserved ownerships, are currently growing at the rate of 44 million board feet a year, including trees 15.1 inches and larger, or 18 million cubic feet (table 7). Eighty-four percent of this growth is occurring on the Douglas-fir types. Stands older than 160 years, some 136,000 acres, are assumed to be in a static condition with mortality losses from wind-throw, decay, and other causes equaling the growth on the remaining trees. Growth on the nearly 9,000 acres of young stands in reserved ownerships amounts to 1.8 million board feet, or 0.7 million cubic feet.

Current annual growth indicates the amount of growth that is taking place under the condition of the stands at the present time but does not indicate their potential growth capacity. Therefore, a second type of growth estimate, known as potential annual growth, was computed. This estimate assumes that the forests of the county are being intensively managed on a 100-year rotation with all age classes equally represented and that the stands average 75 percent of full stocking. Under these conditions, growth on conifer stands in unreserved ownerships will be 108 million board feet (table 8), or $2\frac{1}{2}$ times the present growth for trees 15.1 inches in diameter and larger. Cubic-foot growth will be twice what it is now or about 36 million cubic feet.

If, in addition to the intensive management contemplated, utilization standards also increase to the point where trees 11.1 inches and larger in diameter are merchantable, the potential growth of the conifer lands amounts to 168 million board feet yearly. This is 50 percent more growth than occurs under utilization standards as they are at the present time.

Table 7.--Current annual growth of growing stands on lands in unreserved and reserved ownership by utilization standard and forest type, 1944.

Forest type	Area of growing stands (thousands of acres)	Current annual growth		
		Of trees 15.1" d.b.h. & larger (millions of board feet)	Of trees 11.1" d.b.h. & larger (millions of board feet)	Of trees 5.1" d.b.h. & larger (millions of cubic feet)
<u>Total</u>				
Douglas-fir	180.1	39.0	67.9	16.2
Western hemlock	0.9	0.1	0.3	0.1
Fir-mt. hemlock	25.0	6.4	7.5	1.7
Total	206.0	45.5	75.7	18.0
Hardwoods	11.0	0.5	0.5	0.5
TOTAL, all types	217.0	46.0	76.2	18.5
<u>Unreserved</u>				
Douglas-fir	174.9	37.2	65.6	15.9
Western hemlock	0.9	0.1	0.3	0.1
Fir-mt. hemlock	21.3	6.4	6.5	1.3
Total	197.1	43.7	72.4	17.3
Hardwoods	11.0	0.5 ^{1/}	0.5	0.5
TOTAL, all types	208.1	44.2	72.9	17.8
<u>Reserved</u>				
Douglas-fir	5.2	1.8	2.3	0.3
Western hemlock				
Fir-mt. hemlock	3.7		1.0	0.4
Total	8.9	1.8	3.3	0.7
Hardwoods				
TOTAL, all types	8.9	1.8	3.3	0.7

^{1/} Includes growth on trees 11.1 inches d.b.h. and larger.

Table 8.--Potential annual growth on commercial conifer land^{1/} in unreserved and reserved ownership by utilization standard and forest type group

Forest type group	Area (thousands of acres)	Potential annual growth		
		Of trees 15.1" d.b.h. & larger (millions of board feet)	Of trees 11.1" d.b.h. & larger (millions of board feet)	Of trees 5.1" d.b.h. & larger (millions of cubic feet)
<u>Total</u>				
Douglas-fir	307.4	89.2	142.9	30.1
Spruce-hemlock	75.4	22.1	30.8	6.6
Total	382.8	111.3	172.7	36.7
<u>Unreserved</u>				
Douglas-fir	301.4	87.2	138.9	29.5
Spruce-hemlock	69.5	20.9	29.0	6.2
Total	370.9	108.1	167.9	35.7
<u>Reserved</u>				
Douglas-fir	6.0	2.0	3.0	0.6
Spruce-hemlock	5.9	1.2	1.8	0.4
Total	11.9	3.2	4.8	1.0

^{1/} Does not include lodgepole pine type.

Comparison of Inventories

Although there are many interacting factors to consider, an idea of the trend of the forest resource of the county can be obtained by comparing the statistics for the two inventories showing the changes that have occurred in the intervening 11 years.

Forest Land

(In thousands of acres)

<u>Forest Type</u>	<u>1933</u>	<u>1944</u>	<u>Percent change</u>
Conifer saw timber	228	222	- 3
Conifer second growth	83	76	- 8
Conifer seedling and sapling stands	38	55	+ 45
Hardwoods	9	11	+ 22
Nonrestocked cutovers and burns	9	8	- 11
Recent cutovers	23	29	+ 26
Noncommercial forests	21	19	- 10
Total forest land	<u>411</u>	<u>420</u>	+ 2

Saw-Timber Volume

(In millions of board feet)

<u>Species Group</u>	<u>1933</u>	<u>1944</u>	<u>Percent change</u>
Douglas-fir old growth	3,632	2,988	- 17
Douglas-fir second growth	2,198	1,738	- 21
Pulp species	2,245	1,883	- 16
Other conifers	146	135	- 8
Hardwoods	43	32	- 26
Total volume	8,264	6,776	- 18

In spite of the 17 percent decrease in Douglas-fir old-growth volume, the area of saw-timber stands has only decreased 3 percent in the period. This is because a considerable area of pole stands about 70 years old in the original inventory was classed as large Douglas-fir second-growth saw timber in the reinventory. Conifer second-growth stands show an 8 percent decrease because of this change in classification. Conifer seedling and sapling stands show a 45 percent increase since relatively little of the original acreage was reclassified as conifer second growth and a large additional acreage came in through the restocking of 1933 recent cutovers. The decrease in Douglas-fir second-growth volume, 17 percent, is caused by the area of large second-growth Douglas-fir that has been cut over recently and also because of a change in the method of mapping the valley zone of the county. This change in method has also resulted in the total forest area increasing about two percent.

Summary

Although the natural resources of Marion County are primarily agricultural, the timberlands of the county are sufficient to provide for a permanent forest industry of some size. With half of the forest lands in saw-timber types, there is a basis for continued harvesting of forest products. A third of the area is in younger age classes, which are fairly well stocked and are increasing in volume quite rapidly. A very small acreage is in nonrestocked cutovers and in burns. With 48 percent of the forest land and 81 percent of the timber volume in public ownership, management policies should be relatively stable.

Current annual growth on the 208 thousand acres of growing forest, in unreserved ownerships, is estimated to be 44 million board feet yearly. Under more intensive management practices, the potential annual growth of the conifer lands is 108 million board feet.

A measure of the annual cut allowable under the present composition of mature and immature timber is that obtained by the Hanzlik method. This takes into consideration the present merchantable timber volume and the mean annual growth of immature stands, on the unreserved lands, for the first rotation. For the production of saw timber under the general practices prevailing at this time, the allowable annual cut is calculated at 112 million board feet.^{2/} This assumes a 100-year rotation and that 60 percent of the burns and recently cut-over land will promptly and adequately restock. The mean annual growth and the estimated future volume of the immature stands are based on the utilization of trees 11.1 inches d.b.h. and larger.

Production of sawlogs has increased during the war years, reaching nearly 183 million board feet in 1942, but the average for the period 1940-44 was only 136 million. Adding the estimated production of minor products brings the total cutting depletion to 158 million feet yearly. This is about 40 percent more than the allowable annual cut calculated by the Hanzlik method.

Sawlog production is not balanced by ownership classes. Most of the sawlogs are coming from private land as is indicated by the fact that nearly four-fifths of the recently cut-over land is in private ownership. As a result of the depletion of private timber, the largest sawmill in the county closed early in 1945. Also much of the recent cutting has not been from the 480 million board feet of mature timber in private ownership but has been from the large second-growth Douglas-fir type, a type which is at an age where it is producing clear material at a high rate. Cutting of these stands may be justified as a war measure but should not continue if the best use is to be made of the forest lands.

The 100,000 acres of forest land intermingled with the farm lands of the valley and foothill zones affords opportunities for more intensive management as part of the farm units. This is nearly a quarter of the forest land of the county. Although only average in site quality, it is readily accessible throughout the year so that work can be done in off-seasons when farm work is not pressing. Depending on the age of the stands, thinnings for fuel wood, poles, piles, or pulpwood can be made with the better trees reserved for the main crop of sawlogs.

^{2/} Allowable cut equals the volume of merchantable mature timber divided by the number of years in the rotation plus the actual mean annual increment of the immature stands for the rotation. The mean annual increment of the immature stands is based on utilization of trees 11.1 inches d.b.h. and larger. In making the computation, nearly 400 million board feet of such little-used species as mountain hemlock, alpine fir, Engelmann spruce, and other minor species was excluded from the mature timber volume.