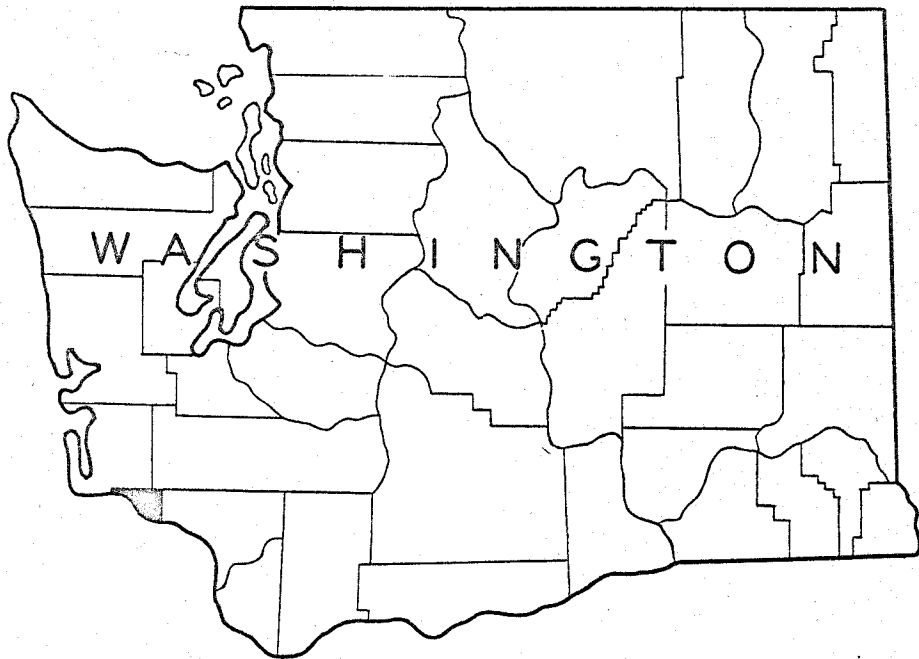


FOREST STATISTICS
FOR
WAHAKIAKUM COUNTY, WASHINGTON

FROM THE FOREST SURVEY INVENTORY REVISED IN 1940

FOREST SURVEY REPORT NO. 80



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

STEPHEN N. WYCKOFF, DIRECTOR

W. COWLIN, IN CHARGE OF FOREST SURVEY F. L. MORAVETS, ASSISTANT

PORTLAND, OREGON

FEBRUARY 14, 1941

SD144

1A13

A3

FIGURE 1

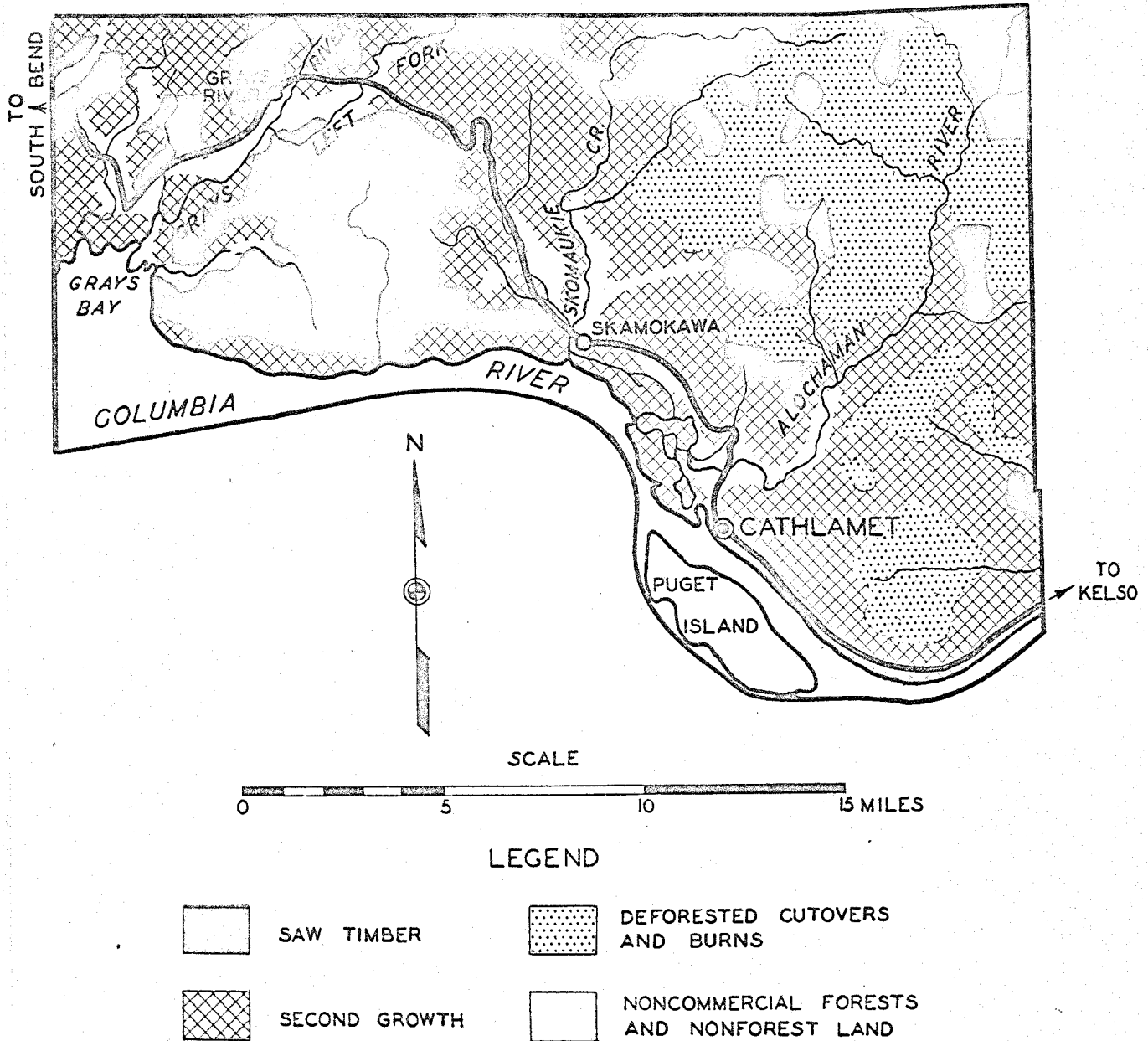
NO. 80-

OUTLINE MAP

OF

WAHKIAKUM COUNTY, WASHINGTON

1941



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 1930-1933, inclusive*. In 1937 work of keeping the survey up to date was commenced in counties in which there had been extensive depletion since the original survey. The original forest inventory of Wahkiakum County, Washington, was conducted in 1931. Later it was made current as of January 1, 1933, by adjustment for cutting depletion, and in 1934 a statistical report summarizing statistics on timber volume, forest type area, and site quality was issued. In 1940 the county's forests were again inventoried in order to adjust the statistics to comply with changes in forest type areas and timber volumes resulting from cutting and fire, restocking of cut-over and burned-over areas, and changes in land ownership since the original inventory.

This report, which supersedes the one issued in 1934, gives results of the reinventory and briefly outlines the forest situation in the county.

* 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. Regional reports will be issued which will present findings for each region as a whole. The regional reports will include an interpretation of the forest-survey data and a comprehensive economic analysis of the regional forest situation.

FOREST STATISTICS FOR WAHKIAKUM COUNTY, WASHINGTON

Contents

	<u>Page</u>
Introduction	1
Extent and character of the forests	1
Saw-timber types	2
Second-growth types	6
Deforested lands	6
Hardwoods	8
Productive capacity of forest land	8
Merchantable timber volume	10
Utilization of the forests	12
Forest growth	13
Conclusion	14

Figures

1. Outline map of Wahkiakum County, Washington	Inside cover
2. Generalized forest types by ownership class	5
3. Distribution of saw-timber volume by species and ownership class	10

Tables

1. Area, in acres, of all forest cover types, by ownership class	3
2. Area, in acres, of generalized forest types, by ownership class	4
3. Area, in acres, of certain immature conifer forest types, by age class and degree of stocking	7
4. Land areas, forest land areas, and commercial conifer areas, by site quality class	9
5. Volume of timber by species and ownership class	11
6. Current annual growth by forest types	13

FOREST STATISTICS FOR WAHKIAKUM COUNTY, WASHINGTON^{1/}

By F. L. Moravets^{2/}

As a result of fire, insect attacks, and cutting, virgin forests cover less than a fifth of the forest land in Wahkiakum County. On about half the county's forest land the original forest has been replaced by satisfactory stocked stands of thrifty, immature forests ranging from seedling to saw-timber size. This land is highly productive and if the remaining forest land can be restored to as satisfactory a condition future yields should compare favorably in quantity to harvests of the past decade and a half.

In species and size of material future yields will vary considerably from those of the past. During the last 15 years approximately one-half of the total volume of sawlog production has been old-growth Douglas-fir of large size, and western hemlock has supplied 35 percent of the total. The current inventory of the forests of the county, however, forecasts a decreasing volume of fir and an increasing volume of hemlock. Sawlog production statistics for 1939 show the cut of hemlock to be twice that of Douglas-fir, whereas 10 years earlier in 1929 the volume of fir sawlogs was nearly two and one-half times that of hemlock sawlogs.

The following analysis of the statistical data, resulting from the reinventory of 1940, will cover the extent and character of the forests of the county, their utilization and rate of depletion, and the rate of their replenishment through growth.

Extent and Character of the Forests

Wahkiakum, the smallest mainland county in the State of Washington, has a total land area of 174,260 acres. Of this total 157,860 acres, or approximately 91 percent, was classified by the forest survey as forest land. The remaining 16,400 acres, classified as nonforest land, consists of cultivated land, stump pastures, marshland, and town sites.

The county occupies a sector of southwestern Washington bordering on the Columbia River and lying inland from the Pacific Ocean from 15 to

^{1/} Assistance in the compilation of the data contained in this report was furnished by the personnel of Work Projects Administration official project 65-2-94-144.

^{2/} The field work of the revised inventory of the county's forests was done by M. J. Lauridsen, and the compilation of the data was done by Edna L. Hunt, T. J. Rowe, and W. E. Zeuthen.

40 miles. It straddles the Coast Range which gives it a broken topography characterized by steep slopes, sharp ridges, and deep stream courses. Roughly, the western and southern portions of the county lie in the so-called fog belt of western Washington, a region characterized by heavy precipitation and forested with densely stocked stands of western hemlock and Sitka spruce; the northern and eastern portions lie in a region of somewhat lesser precipitation in which Douglas-fir is the predominant tree.

Before lumbering operations began practically all of the county was clothed with either old-growth forests or second-growth forests in which there were scattered old-growth trees. Now, after an early period of selective logging by bull teams and nearly three decades of large-scale steam logging operations, the forest type map of the county appears as a patchwork of types of all categories--recent cut-over areas, old nonre-stocked cut-over areas, restocked areas occupied by second-growth stands of varying ages and densities, selectively-cut areas, and virgin stands--in which areas of second growth form the dominant pattern^{3/} (fig 1).

The acreage occupied by each of the detailed forest types mapped in the county is shown in table 1 by ownership class; the acreage of the generalized forest types is shown in table 2, also by ownership class.

Saw-Timber Types

Logging has progressed throughout all parts of the county until only small scattered remnants of the original stands of old-growth timber remain. Of the total area occupied by trees of saw-timber size (about 20 inches or more diameter breast height) of approximately 46 thousand acres, only about three-fifths is stocked with old-growth timber; the remainder is stocked with thrifty second-growth stands. The earliest logging in the county was a form of light selection cutting in which large Douglas-fir, Sitka spruce, and western redcedar were removed from mixed stands predominantly western hemlock. Residual stands resulting from these operations are composed principally of thrifty immature hemlock, the majority of the volume being in trees about 80 years of age.

The bulk of the saw timber is in the western portion of the county. One solid body of timber of about 20 thousand acres lies between Skomaukie Creek and Grays River. With the exception of a few scattered islands of old-growth Douglas-fir and Sitka spruce, this area is stocked with stands in which western hemlock comprises from 70 to 100 percent of the volume. In the southern half of this body of timber scattered Douglas-fir and spruce were removed in an early day. Also in this portion of the county

^{3/} One-inch-to-the-mile county type maps and $\frac{1}{4}$ -inch-to-the-mile lithographed State type maps have been prepared to show the location and extent of the forest types. For information on them, address Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland, Oreg.

Table 1.-Area, in acres, of all forest cover types, by ownership class
Data corrected to October 1, 1940

Survey type no.	Type definition	Private	State ^{1/}	County	Municipal	Federal		Total
						Public domain	Military reserve	
6	Douglas-fir Large old growth	3,010	1,515		135			4,660
7	Small old growth	140		45				185
8	Large second growth	65						65
9	Small second growth	8,760	1,540	700	135			11,135
10	Seedlings and saplings	2,540	4,740	345	210			7,835
11	Sitka spruce Large	420	110					530
12	Small	5,995	195	490				6,680
14	Western hemlock Large	28,175	6,515	1,120		135	5	35,950
15	Small	21,485	4,325	1,245	55		635	27,745
16	Seedlings and saplings	9,365	6,675	780	135			16,955
17	Western redcedar Large	945	155	10				1,110
23	Fir-mountain hemlock Large	2,035	1,085					3,120
31.5	Hardwood Large	3,760	240	515				4,540
31	Small	1,825	260	25	20	25		2,130
35	Nonrestocked cutover Cut prior to 1920	2,880	2,915	1,630				7,425
35A	Cut from 1920-29, incl.	5,570	3,310	250				9,130
36	Recent cutover Cut since 1930	14,140	3,515	635				18,290
37	Deforested burn	295		80				375
	Total forest types	111,405	37,095	7,870	690	160	640	157,860
3	Nonforest land Cultivated	15,055	55	255	10			15,375
2	Other nonforest	1,025						1,025
	Total	127,485	37,150	8,125	700	160	640	174,260

Table 2.-Area, in acres, of generalized forest types, by ownership class
Data corrected to October 1, 1940

Type definition	Private	State ^{1/}	County	Municipal	Federal		Total
					Public domain	Military reserve	
Conifer saw timber Types 6, 7, 8, 11, 14, 17, and 23	34,790	9,380	1,175	135	135	5	45,620
Conifer second growth Types 9, 12, and 15							
On cut-over areas	31,240	4,555	1,980	190		635	38,600
On old burns	5,000	1,505	455				6,960
Total	36,240	6,060	2,435	190		635	45,560
Conifer seedlings and saplings Types 10 and 16							
On cut-over areas	11,675	11,230	1,120	345			24,370
On old burns	230	185	5				420
Total	11,905	11,415	1,125	345			24,790
Recent cut-over areas Type 36	14,140	3,515	635				18,290
Nonrestocked cut-over and burned areas Types 35, 35A, and 37	8,745	6,225	1,960				16,930
Hardwoods Types 31 and 31.5	5,585	500	540	20	25		6,670
Total forest types	111,405	37,095	7,870	690	160	640	157,860
Nonforest land Types 2 and 3	16,080	55	255	10			16,400
Total	127,485	37,150	8,125	700	160	640	174,260

^{1/} Available for cutting.

there are four smaller bodies of saw timber from 1 to 4 thousand acres in extent. These are mixed stands in which hemlock comprises the bulk of the volume.

In the eastern portion of the county most of the acreage of saw timber is found in two tracts; one, near the headwaters of Skomaukie Creek, is comprised of mixed stands of Pacific silver fir and western hemlock; the other, in the upper Alochaman River drainage, is stocked principally with stands in which old-growth Douglas-fir predominates.

Saw-timber types occupy approximately 29 percent of the total acreage of forest land in the county. The ratio of their total area to that of each of the other generalized forest types is shown graphically by ownership class in figure 2.

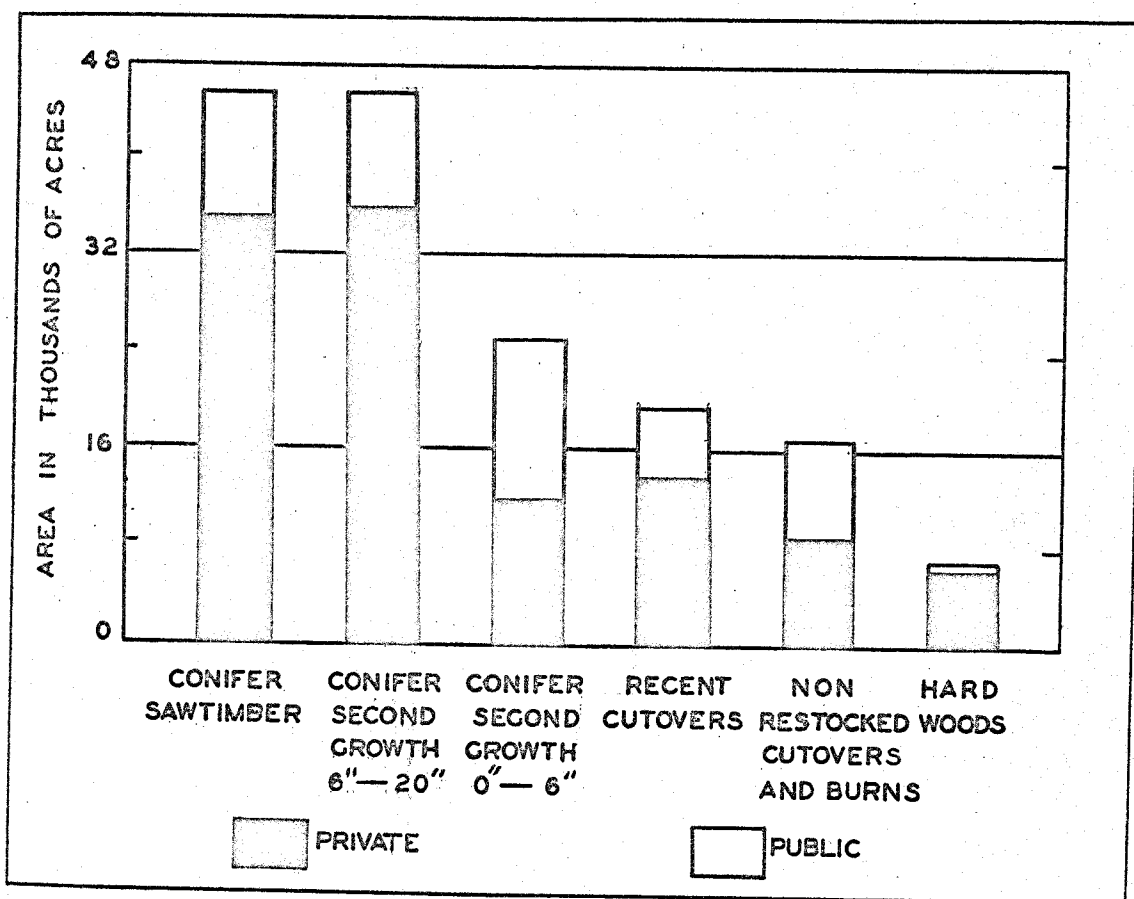


Figure 2. Generalized forest types by ownership class (from table 2).

Seventy-six percent of the area of saw-timber types is privately owned; 21 percent is owned by the State of Washington; and most of the remainder is currently in county ownership as a result of tax foreclosure.

Second-Growth Types

In addition to the immature timber of saw-timber size in the county, there is a total area of approximately 70 thousand acres stocked with second-growth timber of less than saw-timber size. Sixty-three thousand acres, or 90 percent of this area, is restocked clear-cut or selectively-cut land; the remainder is restocked burns.

As in the saw-timber stands, but to an even greater degree, hemlock dominates in the composition of the second-growth stands; this species comprises a majority of the number of stems in stands on 45 thousand acres. These hemlock second-growth types average high in density of stocking; stands on approximately 25 thousand acres were classified as well stocked and on an additional 12 thousand acres as of medium stocking. Table 3, which gives the area of immature conifer types by age class and degree of stocking, shows a fairly even distribution of the hemlock second-growth stands by age class from the 10-year to the 60-year class.

The Douglas-fir second-growth types, which are located almost exclusively in the eastern half of the county, cover a total of about 19 thousand acres. They, too, average high in density of stocking and are evenly distributed among the first six 10-year age classes.

Second-growth types in which Sitka spruce is the principal tree occupy about 7 thousand acres of bottomland along the Columbia River. As a rule they are poorly stocked and mostly in the 90-year age class.

Sixty-eight percent of the total acreage of second-growth types less than saw-timber size is in private ownership; the State owns approximately 25 percent and the county 5 percent. In the past areas stocked with second growth that have passed to county ownership through tax foreclosure have soon been disposed of through tax sales.

Deforested Lands

All deforested lands in the county that have not been cleared for agricultural use were classified as recent clear-cut areas logged since January 1, 1930, old nonrestocked clear-cut areas logged prior to 1930, and nonrestocked burns.

Recent clear-cut areas which total about 18 thousand acres are concentrated very largely in one area in the upper Alochaman River drainage; there are only a few small areas other than this large one. Because of the relatively short time since the date of logging, no examination to determine the condition of restocking was made of the area. However, it is probable that a considerable portion of it is now restocked with seedlings. Also there are several islands of green timber in various parts of the area which will furnish a seed supply. If fire is kept out the area should not become a problem. Approximately 77 percent of the recent cut-over land is privately owned.

Table 3.-Area, in acres, of certain immature conifer forest types,
by age class and degree of stocking
Data corrected to October 1, 1940

Age class (years)	Degree of stocking	Type number and name					Total
		10 Douglas-fir seedlings and saplings	16 Western hemlock seedlings and saplings	9 Douglas-fir small second growth	12 Sitka spruce small second growth	15 Western hemlock small second growth	
10	Good	2,030	1,515				3,545
	Medium	60	4,390				4,450
	Poor	745	3,660				4,405
	Total	<u>2,835</u>	<u>9,565</u>				<u>12,400</u>
20	Good	1,635	3,700			60	5,395
	Medium	1,485	2,915				4,400
	Poor	<u>1,880</u>	<u>775</u>			25	2,680
	Total	<u>5,000</u>	<u>7,390</u>			<u>85</u>	<u>12,475</u>
30	Good			3,000	30	3,670	6,700
	Medium			525	50	425	1,000
	Poor			555	145	430	1,130
	Total			<u>4,080</u>	<u>225</u>	<u>4,525</u>	<u>8,830</u>
40	Good			1,885		3,755	5,640
	Medium			300	555	1,335	2,190
	Poor			290	<u>155</u>	<u>305</u>	750
	Total			<u>2,475</u>	<u>710</u>	<u>5,395</u>	<u>8,580</u>
50	Good			1,980		10,835	12,815
	Medium			150		2,330	2,480
	Poor			220		850	1,070
	Total			<u>2,350</u>		<u>14,015</u>	<u>16,365</u>
60	Good			1,325		1,515	2,840
	Medium			385		670	1,055
	Poor			30	1,205	45	1,280
	Total			<u>1,740</u>	<u>1,205</u>	<u>2,230</u>	<u>5,175</u>
70	Good			490		130	620
	Medium						
	Poor						
	Total			<u>490</u>		<u>130</u>	<u>620</u>
80	Good						
	Medium						
	Poor					870	870
	Total					<u>870</u>	<u>870</u>
90+	Good						
	Medium						
	Poor				1,065	425	1,490
	Total				<u>3,475</u>	<u>70</u>	<u>3,545</u>
Total all ages	Good	3,665	5,215	8,680			37,555
	Medium	1,545	7,305	1,360	30	19,965	17,065
	Poor	<u>2,625</u>	<u>4,435</u>	<u>1,095</u>	<u>1,670</u>	<u>5,185</u>	<u>15,730</u>
	Total	<u>7,835</u>	<u>16,955</u>	<u>11,135</u>	<u>4,980</u>	<u>2,595</u>	<u>70,350</u>
					<u>6,680</u>	<u>27,745</u>	

The old nonrestocked cut-over areas which total nearly 17 thousand acres are the problem areas in the county. This total acreage is comprised of four areas of from 2 to 4 thousand acres each and several smaller areas almost entirely in the Alochaman River and Skomaukie Creek drainages. Originally most of them restocked following the slashing fire but recurring fires have killed the reproduction. Because of their extent and the absence of stands of seed-producing age near by, some of the large areas appear to have small chance of restocking naturally in a reasonable length of time and should be planted. It is interesting to note that approximately 9 thousand acres of these lands were logged in the decade 1920-1929. Reference to statistics obtained in the original inventory of 1932 shows the total area cut over during the decade to be about 19 thousand acres, which indicates that a little more than one-half of this acreage had become restocked by 1940.

The State has acquired about 6 thousand acres of nonrestocked cut-over land and has done some planting in the eastern part of the county.

The total area of 375 acres classified as nonrestocked burns is comprised of a few scattered areas and presents no serious problem of idle land.

Hardwoods

Three hardwoods--red alder, northern black cottonwood, and bigleaf maple--attain merchantable size and quality in the county but alder alone stocks any appreciable area. Stands of this species occurring along stream courses and on lower slopes cover a total of about 6 thousand acres. Cottonwood, which occurs on the bottomlands along the Columbia River, is found in pure stands on a few hundred acres and also in mixture with second-growth spruce. Maple occurs as an understory tree in conifer stands.

Productive Capacity of Forest Land

All conifer forest land in the county was classified by the survey according to its site quality, or relative capacity for growing forests. A Douglas-fir classification of five site quality classes was used for all lands occupied by Douglas-fir types, and a spruce-hemlock classification of a similar number of classes was used for lands occupied by western hemlock, Sitka spruce, and balsam fir-hemlock types. Deforested cut-over and burned-over areas were classified on the basis of the original type.

Table 4 summarizes results of the site classification. Approximately 33 thousand acres was allocated to the Douglas-fir classification and 118 thousand acres to the spruce-hemlock classification. Eighty-five percent of the Douglas-fir land and 72 percent of the spruce-hemlock land is of site quality class II or better, a high productive capacity in comparison to the average for the Douglas-fir region of western Oregon and western Washington.

Table 4.-Land areas, forest land areas, and commercial conifer areas,
by site quality class^{1/}
Data corrected to October 1, 1940

Kind of forest and site quality class	Total area		Area in forest land	Area in commer- cial conifers
	<u>Acres</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Commercial conifer				
Douglas-fir				
Class I	1,145	0.7	0.7	0.8
Class II	26,665	15.3	16.9	17.6
Class III	4,250	2.5	2.7	2.8
Class IV	590	.3	.4	.4
Class V	175	.1	.1	.1
Total	32,825	18.9	20.8	21.7
Spruce-hemlock				
Class I	4,960	2.8	3.2	3.3
Class II	79,905	45.8	50.6	52.9
Class III	26,830	15.4	17.0	17.7
Class IV	6,020	3.5	3.8	4.0
Class V	650	.4	.4	.4
Total	118,365	67.9	75.0	78.3
Total commercial conifer	151,190	86.8	95.8	100.0
Hardwood	6,670	3.8	4.2	
Total other than commercial conifer	6,670	3.8	4.2	
All forest types	157,860	90.6	100.0	
Nonforest types	16,400	9.4		
Grand total	174,260	100.0		

^{1/} Deforested areas, types 35, 36, and 37, were classified as to site on the basis of original type. The "site quality" of a forest area is its relative productive capacity, determined by climatic, soil, topographic, and other factors. 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 Douglas-fir classifications were used not only for types in which this species is dominant, but also for other types for which no site quality classifications have been developed.

Merchantable Timber Volume

The volume of merchantable conifer timber 16 inches or more d.b.h. was computed to be 2,175 million board feet, log scale, Scribner rule, and the volume of hardwood timber 12 inches or more d.b.h. totaled an additional 36 million board feet.

The preponderance of western hemlock in the county is clearly shown in table 5, which gives the volume by species and ownership class, and also in figure 3. Hemlock comprised nearly 58 percent of the total volume of conifers, Douglas-fir 16 percent, Sitka spruce 11 percent, and the remainder was western redcedar and the balsam firs. Approximately two-thirds of the Douglas-fir volume is in old-growth trees.

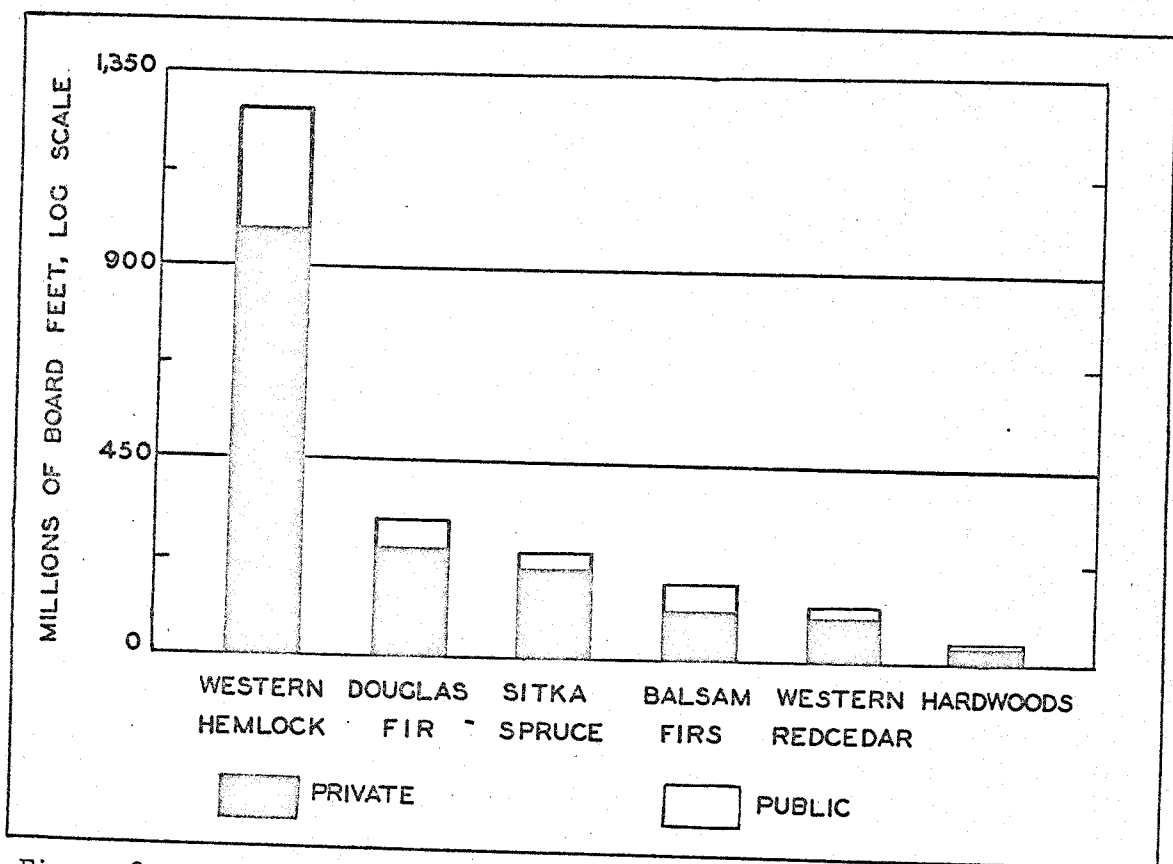


Figure 3. Distribution of saw-timber volume by species and ownership class (from table 5).

Seventy-seven percent of the total volume of timber in the county is privately owned, 19 percent is on State lands, and 3 percent is in county ownership. The remaining 1 percent is on federally-owned military reservation and public domain lands and a municipally-owned watershed.

Table 5.-Volume of timber by species and ownership class
Data corrected to October 1, 1940

Trees 16" and more d.b.h.^{1/}
Thousands of board feet, log scale, Scribner rule

Survey symbol	Species	Private	State ^{2/}	County	Municipal	Federal		Total
						Public domain	Military reserve	
DA	Douglas-fir Large old growth	134,169	48,026	456	1,053			183,704
DB	Small old growth	27,964	9,776	304	216			38,260
DC	Large second growth	36,170	6,867	1,381	68	271	497	45,254
DD	Small second growth	64,272	9,788	4,281	1,127			79,468
SA	Sitka spruce Large	129,500	24,339	3,684		543	994	159,060
SB	Small	77,679	6,643	4,980	81	271	497	90,151
HA	Western hemlock Large	710,350	184,794	24,373		2,717	3,975	926,209
HB	Small	286,496	43,814	14,113	1,088	1,359	3,478	350,348
C	Western redcedar Live	93,279	21,317	3,962	67	271	497	119,393
KC	Dead	2,853	2,543					5,396
A	Pacific silver fir	102,351	64,169	4,137				170,657
NF	Noble fir	6,811						6,811
RA	Hardwoods Red alder	24,633	2,396	1,831	11	125		28,996
BC	Northern black cottonwood	3,764	98	1,849				5,711
OM	Bigleaf maple	775		5				780
	Total	1,701,066	424,570	65,356	3,711	5,557	9,938	2,210,198

^{1/} Trees of hardwood species taken from 12" and more d.b.h.
^{2/} Available for cutting.

Utilization of the Forests

Although the forests of the county have furnished logs and other material from the time of the first white settlement, large-scale utilization did not begin until the advent of steam logging equipment. Sawlog production statistics are not available prior to 1925 but since that date the county's forests have furnished an annual cut in relation to their total acreage comparable to the cuts of other western Washington counties in which lumbering operations have been active. The output of logs has also been fairly stable even during the depression years of 1931-33. The average annual cut for the 15-year period 1925-39 was approximately 80 million board feet. Peak of production was reached during the first 5 years of this period when the average was about 112 million board feet. Beginning in 1930 the trend has been gradually downward; average annual production during the last 5 years of the period was approximately 82 percent of the average for the entire period.

In 1940 there was one fairly large logging operation and several small ones in the county. The large operation, in the upper Alochaman River drainage, was using steam equipment principally and clear cutting. Logs were transported to the Columbia River by railroad. Utilization on this operation was quite complete. The other operations were logging with tractors and transported the logs to the river in trucks.

Only a small portion of the volume of sawlogs cut in the county has been manufactured locally. Situated as the county is on the Columbia River, a log market has been readily available for all grades of logs. Also, the largest log producer, a pulp company, has transported all of its output of hemlock, balsam firs, and lower-grade spruce to its own plant farther up the river.

Last year there was one sawmill and a few small shingle mills in the county. The sawmill, operated by the pulp company, cut only spruce and concentrated on high-grade dimension and airplane stock. Cants not suitable for such material were resawn into short clear bolts by cutting out the knots and then sent to an adjacent box factory which manufactured cheese-package shooks. However, the box factory has been discontinued recently. All waste material from the sawmill suitable for pulp is chipped and sent in barges to the company's pulp plant.

Bureau of the Census statistics for 1940 are not yet available but the 1930 statistics show that 26 percent of the gainfully employed in the county was engaged in forest industries, such as logging and milling, and 27 percent of the total population was directly dependent upon the forest industries.

A total of approximately 15 thousand acres of bottomland along the Columbia River and the larger streams in the county has been cleared of forest growth for agricultural use. Most of this acreage has been

cleared for several decades but some clearing is still in progress. Most recent clearing operations have been on Puget Island which lies in the Columbia River and on bottomlands at the mouths of the streams entering the Columbia River. These lands have been diked and are gradually being cleared, principally for dairy farms.

Forest Growth

After the inventory of the forests of the county had been completed and the rate at which they are being depleted was determined, the next step was to calculate the rate at which they were being replenished through growth.

On the basis of data obtained in the reinventory of 1940, the immature conifer stands were found to occupy approximately 91 thousand acres, or 57 percent of the total acreage of forest land. Of this area of growing types, a total of 65 thousand acres was occupied by western hemlock types, 19 thousand acres by Douglas-fir types, and 7 thousand acres by Sitka spruce types.

The total current annual growth on trees 15.1 inches or more d.b.h. was calculated to be 52,253 thousand board feet and on trees 5.1 inches or more d.b.h. 12,987 thousand cubic feet. Table 6 shows these calculated increments by forest type.

Table 6.-Current annual growth by forest types

Type	Current annual volume increment on--	
	Trees 15.6 inches or more d.b.h.	Trees 3.6 inches or more d.b.h.
	<u>M board feet</u>	<u>M cubic feet</u>
Western hemlock	43,832	9,840
Douglas-fir	4,814	2,686
Sitka spruce	3,607	461
Total	52,253	12,987

The growing stands in the hemlock type average about 50 years of age and on the whole are satisfactorily stocked. The stands on about 20 thousand acres are in the 80-year age class, an age close to that of maximum board-foot volume increment in hemlock. The Douglas-fir stands average a little over 30 years of age but have a fairly high degree of stocking. The stands on approximately 4 thousand acres are nearly at the age of greatest board-foot volume increment. The spruce stands, while averaging about 80 years in age, are for the most part poorly stocked and occupy lands of low productive capacity.

The current annual growth on hardwood stands was calculated to be about 1,000 thousand board feet and 170 thousand cubic feet.

The potential annual growth, or the average annual growth that could be obtained on the county's forest land under forest management, was also computed in board feet and cubic feet according to the same standards used in calculating current annual growth. The potential annual board-foot growth on lands occupied by conifer forests was computed to be about 99 million board feet and the cubic-foot growth to be about 22 million cubic feet. Approximately 85 percent of the board-foot growth and 81 percent of the cubic-foot growth is on lands classified by the survey as spruce-hemlock sites.

Conclusion

The prospects for sustained-yield forest management probably are more encouraging in Wahkiakum County than in any other county in western Washington because of the physical condition of the forest resource and the reasonably stable ownership. The transition from liquidation to sustained-yield management can be made without drastic curtailment of timber cutting or serious dislocation of local industry if properly planned and coordinated

With forest land comprising 91 percent of the gross land area, and over one-half of this forest land stocked with rapidly growing stands of second growth, evenly distributed from seedling to saw-timber size, future yields of timber should closely approach the average annual volume of cutting depletion of the last 15 years. Growth calculations show a current annual increment of 52 million board feet and a potential annual increment, if all forest lands in the county are kept producing at from 65 to 75 percent of their capacity, of 99 million board feet. Before such a yield will be possible the present deforested lands will have to be brought into a productive state and stocking improved where unsatisfactory. Sawlog production statistics for the period 1925-39 show an average annual cut of 80 million board feet and in some recent years a cut below the current annual growth estimate of 52 million. Future crops of timber will be predominantly western hemlock whereas the bulk of the volume of sawlog production in the past has been Douglas-fir of large old growth. The size of the timber will be smaller since only a small volume of large old-growth timber remains and the second-growth stands will undoubtedly be managed on a relatively short rotation that will not produce large timber.

The factor of stable ownership, a requisite of sustained-yield forest management, is present here in the concentration of the saw-timber and second-growth stands chiefly in two large ownerships--a pulp company and the State of Washington--both of whom are interested in maintaining timber yields.

Provided effective utilization can be made of the extensive hemlock stands it appears that the county need not endure a period of failing forest industries and a long wait for future forest crops. Also, if all forest lands are kept productive, it will be possible to substantially increase future annual cuts.

This cannot be accomplished, however, unless premature cutting of second-growth forests is checked and satisfactory regeneration secured following cutting of existing forests. Finally, present and future forests must be adequately protected against fire.