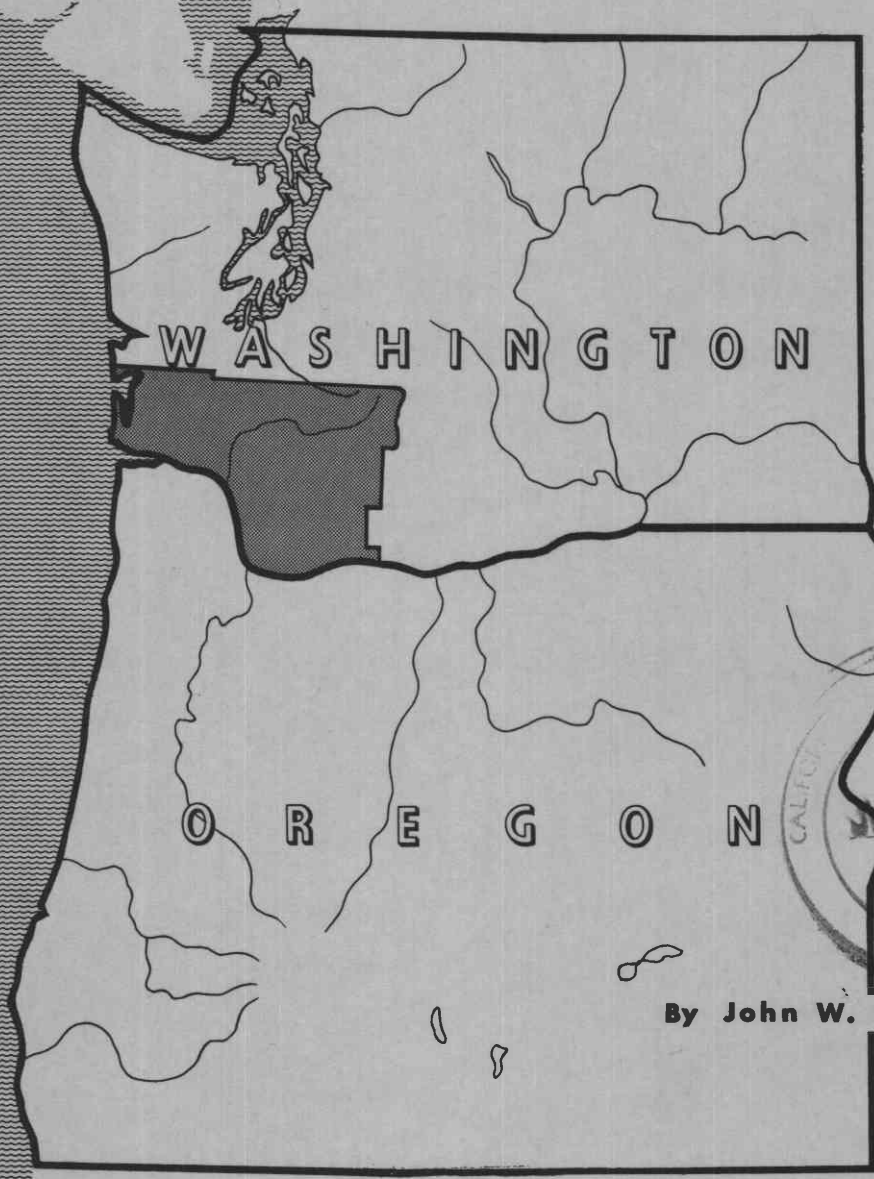
# Timber Resource Statistics for SOUTHWEST WASHINGTON






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 miscellaneous 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)*

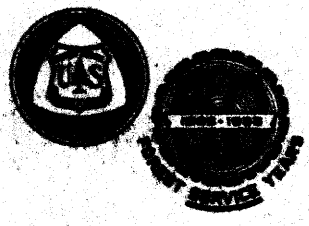
## RECENT FOREST SURVEY PUBLICATIONS

| 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.



GPO 985-664