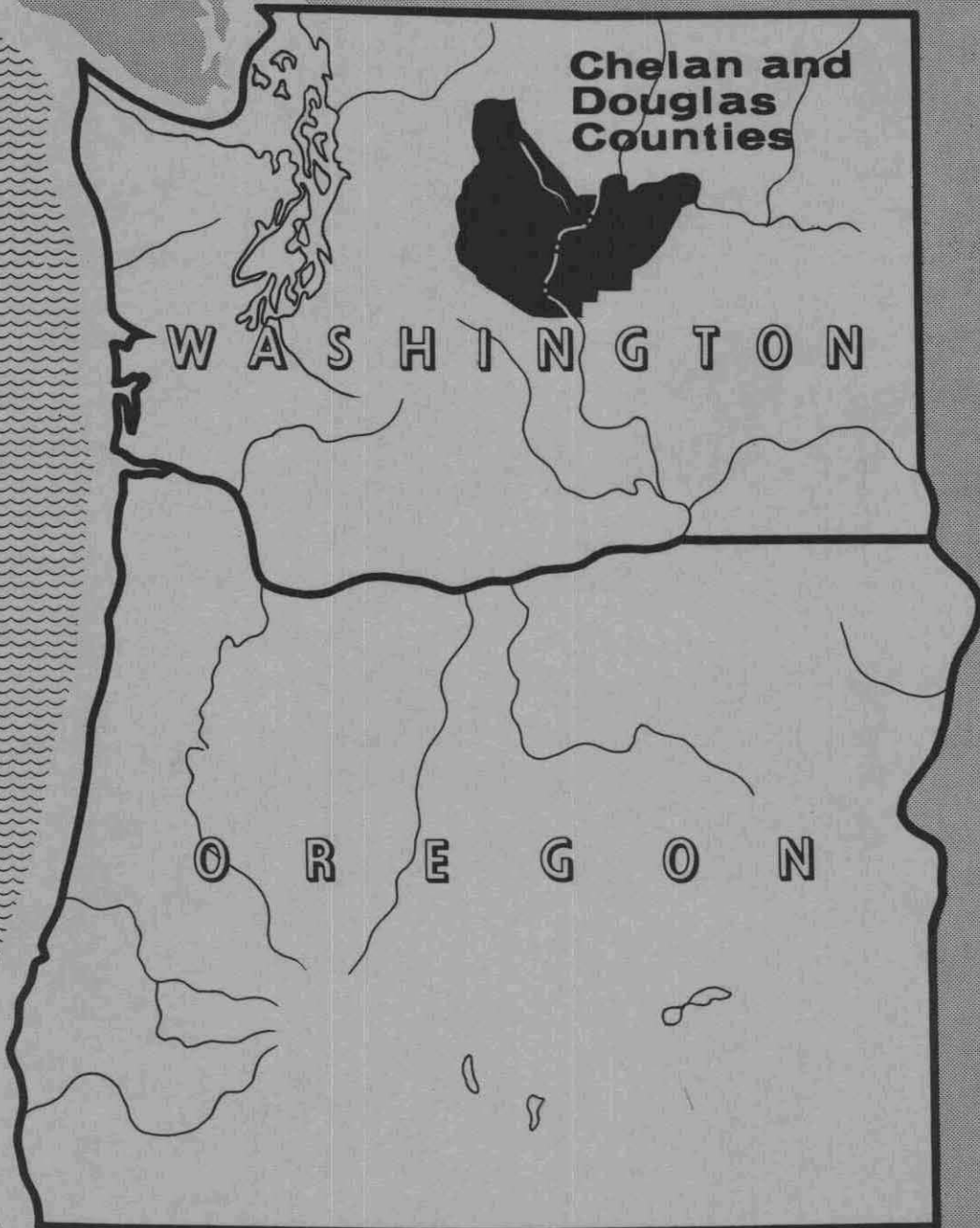


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Forest Statistics for



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



U. S. FOREST SERVICE
RESOURCE BULLETIN PNW-5

MAY 1963

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

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

FOREST STATISTICS FOR
CHELAN AND DOUGLAS COUNTIES, WASHINGTON, 1959-60

by

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FOREST AND RANGE EXPERIMENT STATION
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FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

PREFACE

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

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

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

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

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CHELAN AND DOUGLAS COUNTIES' FOREST RESOURCE IN BRIEF

COMMERCIAL FOREST LAND--

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

GROWING-STOCK VOLUME--

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

SAWTIMBER VOLUME--

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

NATIONAL FOREST OWNERSHIP--

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

OTHER PUBLIC OWNERSHIP--

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

FOREST INDUSTRY OWNERSHIP--

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

FARMER AND MISCELLANEOUS PRIVATE OWNERSHIP--

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

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

Counties, 1959-60

(In acres)

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

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

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

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

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

Chelan and Douglas Counties, 1959-60

(In acres)

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

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

(In acres)

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

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

(In acres)

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

1/ Not applicable.

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

(In acres)

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

^{1/} White fir type includes both white and grand fir species.

^{2/} Includes quaking aspen.

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

(In acres)

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

1/ Less than 500 acres.

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

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

1/ Less than 500,000 cubic feet.

2/ Softwoods--193 million board feet (International $\frac{1}{4}$ -inch rule), 172 million board feet (Scribner rule).

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

Timber and ownership classes	All species	Softwoods	Hardwoods
	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>	<u>Million</u> <u>cu. ft.</u>
Growing stock: ^{1/}			
National Forest	2,018	2,017	1
Other public	110	110	--
Forest industry	248	246	2
Farmer and miscellaneous private	109	99	10
All ownerships	2,485	2,472	13
	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>
Live sawtimber, ^{2/} (International ½-inch rule):			
National Forest	8,557	8,556	1
Other public	623	623	--
Forest industry	1,237	1,231	6
Farmer and miscellaneous private	463	432	31
All ownerships	10,880	10,842	38
Live sawtimber (Scribner rule): ^{2/}			
National Forest	7,616	7,615	1
Other public	572	572	--
Forest industry	1,116	1,110	6
Farmer and miscellaneous private	416	386	30
All ownerships	9,720	9,683	37

^{1/} Trees 5.0 inches d.b.h. and larger.

^{2/} Trees 11.0 inches d.b.h. and larger.

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

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

^{1/} Less than 500,000 cubic feet.

Table 10.--Volume of live sawtimber on commercial forest land by species and diameter classes,

Chelan and Douglas Counties, 1959-60 (International $\frac{1}{4}$ -inch rule)

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

^{1/} Less than 500,000 board feet.

Table 11.--Volume of live sawtimber on commercial forest land, by species and diameter classes,

Chelan and Douglas Counties, 1959-60 (Scribner rule)

Species	Diameter class (inches at breast height)									
	All classes	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 24.9	25.0- 26.9	27.0- 28.9
----- Million board feet -----										
Softwoods:										
Douglas-fir	3,081	148	231	291	298	1,272	604	237		
Ponderosa pine	2,260	54	85	116	190	974	651	190		
Western white pine	281	21	24	30	42	94	50	20		
Lodgepole pine	191	71	47	34	20	19	--	--		
Whitebark pine	14	3	1	4	1	5	--	--		
Grand fir	1,337	74	116	108	178	566	260	35		
Pacific silver fir	375	19	20	22	27	231	48	8		
Noble fir	22	3	1	5	4	6	3	--		
Subalpine fir	429	51	65	51	58	136	68	--		
Engelmann spruce	652	20	27	40	37	218	211	99		
Mountain hemlock	186	5	6	7	10	118	40	--		
Western hemlock	516	22	27	19	39	122	122	165		
Alaska-cedar	10	1	1	2	1	5	--	--		
Western redcedar	233	5	15	9	12	80	86	26		
Western larch	95	4	8	16	17	27	23	--		
Subalpine larch	1	(1/)	(1/)	1	--	--	--	--		
Total	9,683	501	674	755	934	3,873	2,166	780		
Hardwoods:										
Quaking aspen	1	--	1	--	--	--	--	--		
Black cottonwood	34	--	1	3	2	13	8	7		
Other hardwoods	2	(1/)	2	--	--	--	--	--		
Total	37	--	4	3	2	13	8	7		
All species	9,720	501	678	758	936	3,886	2,174	787		

1/ Less than 500,000 board feet.

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

Ownership class	:	:	:	:
	: Growing stock,	: Sawtimber,	: Sawtimber,	
	: all species ^{1/}	: all species ^{1/}	: all species ^{1/}	
	:	: (International	: (Scribner	
	:	: ½-inch rule)	: rule)	
	:	:	:	
	Million cu. ft.	-----	Million bd. ft.	-----
National Forest	3		14	13
Other public	--		--	--
Forest industry	3		17	16
Farmer and miscellaneous private	1		2	1
All ownerships	7		33	30

^{1/} All softwoods; only negligible amount of hardwood mortality recorded.

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

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

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

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

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

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

^{1/} For the years 1950-54, data for State and private owner-
ships were not separated.

ACCURACY OF 1960 REINVENTORY DATA

Forest Area and Timber Volume

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

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

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

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

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

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

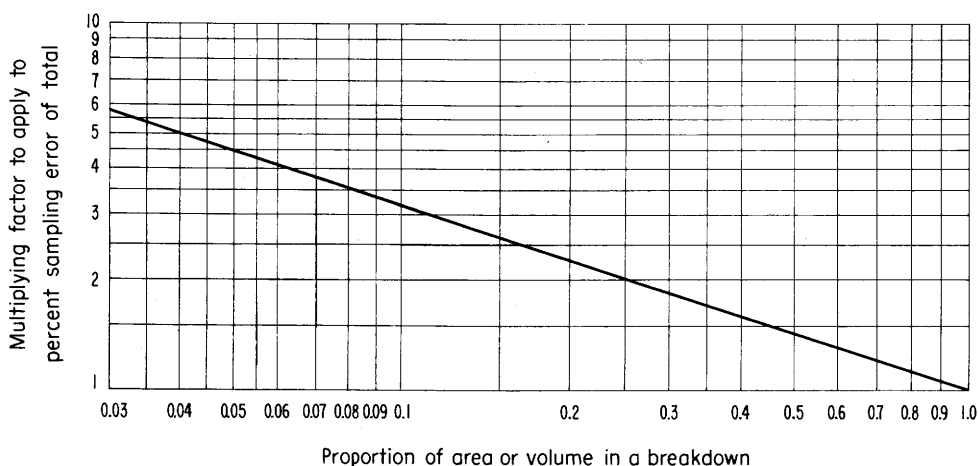


Figure 1.--Ratio of sampling error of an area or volume breakdown to sampling error of total area or volume.

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

DIFFERENCES IN RESULTS OF INVENTORIES

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

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

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

(In acres)

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

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

(In million board feet, Scribner rule)

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

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

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

FOREST SURVEY PROCEDURES

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

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

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

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

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

DEFINITIONS OF TERMS

Land Area

Total Land Area

Includes dry land and unmeandered water surfaces.

Forest Land Area

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

Nonforest Land Area

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

Forest Land Classes

Commercial Forest Land Area

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

Noncommercial Forest Land Area

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

Types

Commercial Forest Land Type

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

Noncommercial Forest Land Types

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

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

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

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

Tree-Size Classes

Sawtimber Tree

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

Poletimber Tree

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

Sapling and Seedling Trees

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

Cull Tree

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

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

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

Mortality Tree

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

Salvable Dead Tree

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

Stand-Size Classes

Sawtimber Stand

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

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

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

Poletimber Stand

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

Sapling and Seedling Stand

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

Nonstocked

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

Stocking

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

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

Well-Stocked Stand

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

Medium-Stocked Stand

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

Poorly Stocked Stand

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

Nonstocked

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

Timber Volume

Live Sawtimber Volume

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

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

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

Growing Stock

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

All-Timber Volume

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

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

Ownership Classes

National Forest Lands

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

Other Federal Lands

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

State, County, and Municipal Lands

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

Forest Industry Lands

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

Farmer-Owned Lands

Lands owned by operators of farms.

Miscellaneous Private Lands

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

TREE SPECIES

Tree species found in Chelan and Douglas Counties include:

Softwoods:

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

Hardwoods:

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

RECENT FOREST SURVEY REPORTS

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

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