

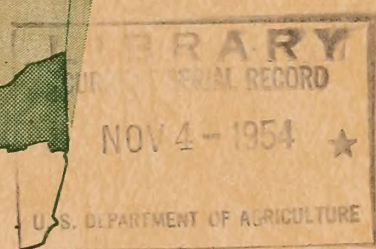
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FOREST STATISTICS FOR THE GLACIATED REGION OF OHIO



CENTRAL STATES
FOREST EXPERIMENT STATION

COLUMBUS, OHIO

W. G. MCGINNIES, DIRECTOR

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

FOREWORD

This is the first of two preliminary reports on forest areas and timber volumes in Ohio. It is a product of the Forest Survey of the Central States, an activity of the Central States Forest Experiment Station and a part of the nationwide survey of forest resources being made by the Forest Service, U. S. Department of Agriculture.

Field work for the survey in the Glaciated Region of Ohio was done during the period August 1951 to January 1953.

Forest Survey reports are the result of a group effort. From initial planning to final compilation the following people have made contributions to this forest inventory report.

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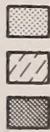
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OHIO



AREAS COVERED
IN THIS REPORT

PERCENT
FOREST



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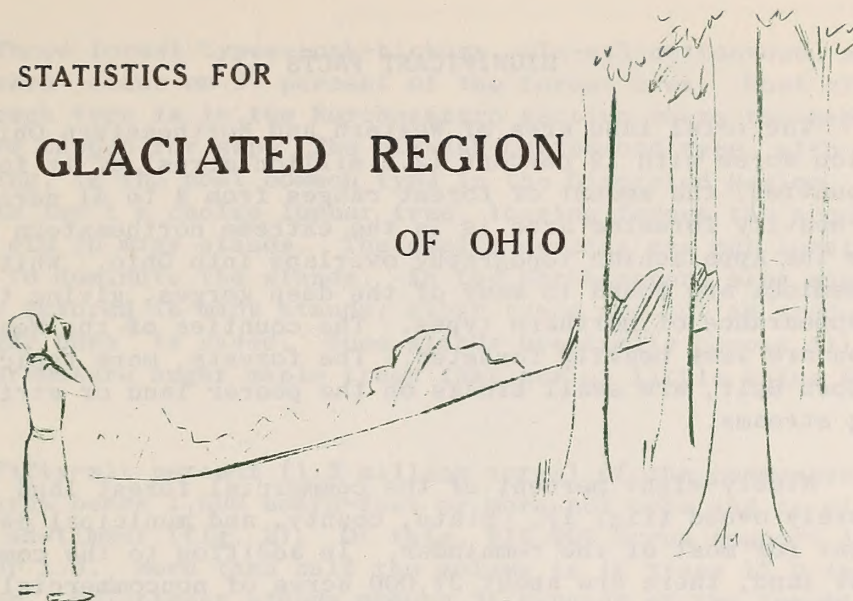
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Frontispiece.--Forest survey regions in Ohio.

FOREST STATISTICS FOR

THE GLACIATED REGION

OF OHIO



In this report forest-area and timber-volume statistics for Western and Northeastern Ohio (frontispiece) are shown separately. Regional boundaries were established in order to group counties having similar forest, soil, and economic conditions. The two forest regions include most of the areas commonly known as the Ohio Corn Belt and the Dairy Region.

Western Ohio includes a large share of the State's level-to-rolling, glaciated land. Farming and manufacturing are the main activities here. Forests are largely confined to the "back forties" and the banks of streams--places that are too rough or too wet to farm or that the owner has not gotten around to clearing. Woodland grazing, destructive to the forest, is common practice. Although markets exist for high-quality logs, a certain amount of mature timber is kept from the market because it is in small lots or because of the owner's indifference or his desire to keep the trees.

Northeastern Ohio's topography becomes rougher from west to east, culminating in the Alleghany foothills. Tree species here are more typical of northern hardwood forests, and the stands often occur in deep gorges and on swampy uplands. The forests of this area are best known as a source of maple syrup and "car blocking." Maple products are a traditional and lucrative sideline on many farms. Management favors the larger trees, the best sap producers, at the expense of younger growing stock, with the result that many stands will not be perpetuated. The steel mills of the Mahoning Valley provide a ready market for "car blocking," short timbers used to hold heavy steel pieces on railroad cars. This market makes cutting pole-sized and poorly formed trees profitable; such trees would not ordinarily be cut as sawlogs elsewhere in the State.

SIGNIFICANT FACTS

The total land area of Western and Northeastern Ohio is 18 million acres with 12 percent (2.2 million acres) of it forested.^{1/} By counties, the amount of forest ranges from 4 to 41 percent. The most heavily forested area is in the extreme northeastern counties where the Appalachian topography overlaps into Ohio. White pine and hemlock are found in many of the deep gorges, giving the stands the appearance of northern types. The counties of the Western region are less heavily forested. The forests, more typical of the Corn Belt, are small blocks on the poorer land or stringers along streams.

Ninety-eight percent of the commercial forest land is privately owned (fig. 1). State, county, and municipal ownerships account for most of the remainder. In addition to the commercial forest land, there are about 37,000 acres of noncommercial (reserved) forest land in public ownership. Many of the reserved forests are in municipal parks and watersheds. All of the forest area, including reserved areas, is capable of growing commercial timber. Throughout the Glaciated Region, farmers own 78 percent of the commercial forest land, but in the Northeastern area more than one-third of the forest land is owned by industries and other private, non-farm concerns.

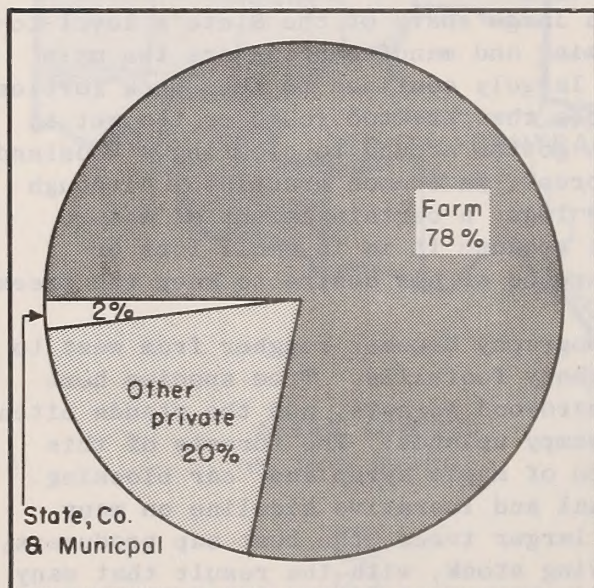


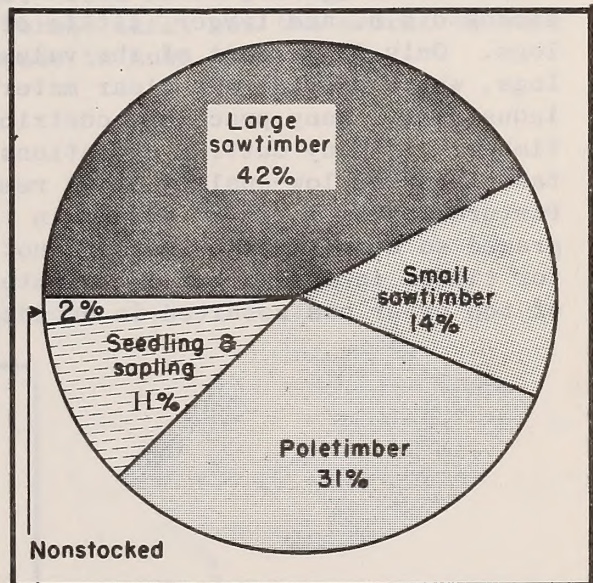
Figure 1.--Forest-land ownership.

^{1/} For definition of forest land see page 28.

Three forest types--oak-hickory, elm-ash-cottonwood, and maple-beech--occur on 97 percent of the forest area. Most of the maple-beech type is in the Northeastern section where the maple trees are tapped for sap. The elm-ash-cottonwood type, with elm dominating, is the most common type in the Glaciated Region. Because elm isn't a choice lumber tree, logging favors the accumulation of elm in many stands. The choice species are cut leaving the elm to dominate the stands. In the Northeastern area sugar maple is favored in many stands; other trees are cut as needed but the "sugar bush" is saved. Some stands eventually become filled with over-mature sugar maple trees that are of little value for lumber.

Fifty-six percent (1.2 million acres) of the commercial forest area bears 1,500 board-feet or more per acre and is classified as sawtimber (fig. 2). Of this, 916,000 acres support large sawtimber i.e., more than half the volume is in trees 15.0 inches or larger. Poletimber stands occupy 31 percent of the forest area, seedling and sapling stands 11 percent. The remainder is nonstocked.

Figure 2.--Forest area by stand-size class.



In the Glaciated Region, sawtimber totals 7.1 billion board-feet. About 77 percent (fig. 3) of this volume is in stands classed as large sawtimber. About 17 percent is in small sawtimber stands, and only about 6 percent is scattered in the other stand-size classes. Many stands are dominated by elm, which makes up about 20 percent of the board-foot volume; all oaks combined account for only 28 percent of the volume. Maple and beech account for another 20 percent of the volume and the remaining 32 percent is scattered among many species.

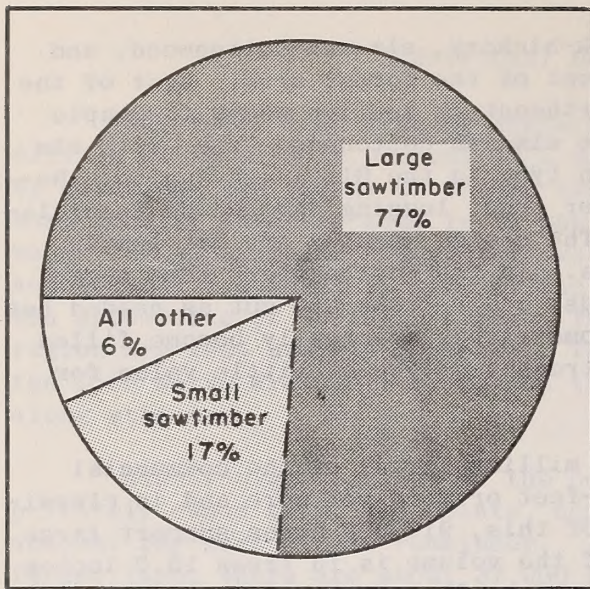


Figure 3.--Sawtimber volume by stand-size class.

Although 71 percent of the board-foot volume is in trees 15 inches d.b.h. and larger, little of this volume is in high-quality logs. Only 23 percent of the volume (fig. 4) is in grade 1 and 2 logs, which provide the clear material demanded by many wood-using industries. Many practices contribute to the low quality of the timber. In many cutting operations, only the better trees are taken and the low-quality trees remain to produce the next crop. Pastureland is in great demand in this region and many stands are grazed so heavily that they are noticeably damaged. Little demand for timber in some areas or no interest in the timber on the part of the owner has resulted in decadent stands.

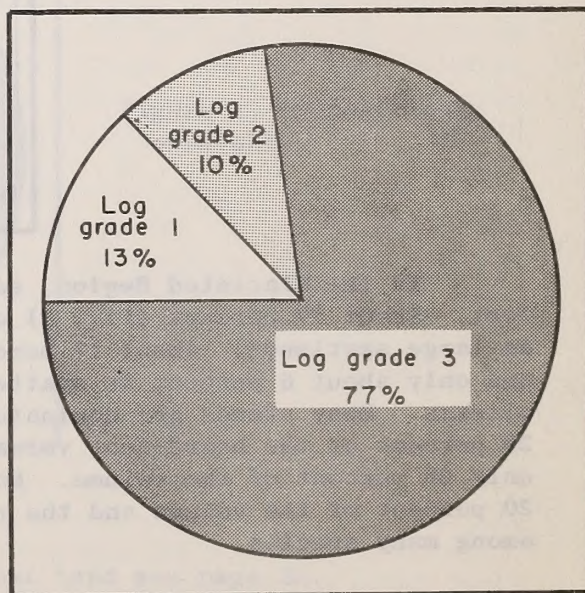


Figure 4.--Hardwood sawtimber volume by log grade.

The sawtimber stands average 5,400 board-feet per acre; those that are classed as large sawtimber average 6,000 board-feet per acre. This average volume is high for the Central States but the quality and species composition of the stands could be greatly improved. Immediate improvement calls for cutting that will remove overmature and other poor-risk trees and culls. While the car-blocking market encourages clear cutting, thereby greatly delaying the time when the stands can be cut again, this market does provide an outlet for low-quality trees that otherwise might not be harvested.

The total growing-stock volume in the Glaciated Region is 1,737 million cubic feet. The average volume per acre, 792 cubic feet, could be more than doubled by intensive management. Seventy-three percent of the growing-stock volume is in sawtimber trees and 27 percent is in poletimber trees.

In addition to the growing stock, the Glaciated Region has 632 million cubic feet of sound wood in cull trees and in the limbs of merchantable sawtimber trees. This is an average of 288 cubic feet or about 4 1/2 cords per forest acre, but the amount of such wood available in sawtimber stands is much greater.



NORTHEASTERN OHIO

Table 1.--Forest and nonforest area by county, 1952

County	Total	Forest area	Percent	Nonforest area	
	land area ^{1/}			Thousand acres	Percent
	Thousand acres	Thousand acres		Thousand acres	Percent
Ashland	268	51	19	217	81
Ashtabula	452	119	26	333	74
Columbiana	342	78	23	264	77
Cuyahoga	292	55	19	237	81
Erie	169	23	14	146	86
Geauga	260	107	41	153	59
Huron	318	47	15	271	85
Lake	148	46	31	102	69
Lorain	317	48	15	269	85
Mahoning	268	53	20	215	80
Medina	271	44	16	227	84
Portage	323	76	24	247	76
Richland	318	55	17	263	83
Stark	367	47	13	320	87
Summit	264	49	19	215	81
Trumbull	397	91	23	306	77
Wayne	353	39	11	314	89
All counties	5,127	1,028	20	4,099	80

^{1/} Source: Area of the U. S. 1950. U. S. Bureau of the Census.

NORTHEASTERN OHIO

Table 2.--Commercial forest area by ownership class, 1952

Ownership class	Commercial forest area	
	<u>Thousand acres</u>	<u>Percent</u>
Public:		
State	12	1.2
County & municipal	11	1.1
Total public	23	2.3
Private:		
Farm	613	61.1
Industrial & other	368	36.6
Total private	981	97.7
All ownerships	1,004	100.0

NORTHEASTERN OHIO

Table 3.--Commercial forest area by forest type and stand-size class, 1952
(In thousands of acres)

Forest type	Total	Stand-size class					
		Large sawtimber stands	Small sawtimber stands	Pole- timber stands	Seedling & sapling stands	Nonstocked and other areas	
	<u>Percent</u>						
Oak-pine	8	0.8	4	--	--	4	--
Oak-hickory	360	35.8	94	42	132	82	10
Oak-gum	46	4.6	9	10	21	6	--
Elm-ash- cottonwood	326	32.5	94	71	138	23	--
Maple-beech	264	26.3	144	30	54	36	--
All types	1,004	100.0	345	153	345	151	10
Percent	100.0		34.4	15.2	34.4	15.0	1.0

NORTHEASTERN OHIO

Table 4.--Sawtimber volume on commercial forest area by species and stand-size class, 1952
(In million board-feet)

Species	Total	Percent	Large sawtimber stands	Small sawtimber stands	Pole- timber stands	Seedling & sapling stands ^{1/}
Pine	11	0.4	11	--	--	--
Other softwoods	47	1.6	36	10	1	--
White oak	198	6.9	169	24	3	2
Other white oaks	60	2.1	32	19	8	1
Black oak	113	4.0	91	13	9	--
Northern red oak	194	6.8	133	44	14	3
Scarlet oak	22	.8	18	3	1	--
Other red oaks	86	3.0	49	18	18	1
Hickory	98	3.4	64	21	12	1
Ash	191	6.7	131	49	11	--
American elm	465	16.3	294	117	40	14
Slippery elm	93	3.2	57	23	13	--
Cottonwood	27	.9	10	16	1	--
Yellow-poplar	125	4.4	69	42	10	4
Sugar maple	336	11.8	310	16	7	3
Soft maple	190	6.6	134	42	14	--
Sycamore	68	2.4	47	18	2	1
Beech	291	10.2	254	32	5	--
Black walnut	23	.8	17	5	1	--
Post species ^{2/}	18	.6	17	1	--	--
Other hardwoods	202	7.1	138	40	21	3
All species	2,858	100.0	2,081	553	191	33
Percent		100.0	72.8	19.4	6.7	1.1

^{1/} Includes the volume on nonstocked and other areas.

^{2/} See page 32 for species list.

NORTHEASTERN OHIO

Table 5.--Sawtimber volume on commercial forest area by species and tree-diameter class, 1952
(In million board-feet)

Species	Total	Tree-diameter class (inches)												
		12	14	16	18	20	22	24	26	28+				
Pine	11	--	--	--	--	--	--	11	--	--	--	--	--	--
Other softwoods	47	1/16	12	14	5	--	--	--	--	--	--	6	6	52
White oak	198	19	23	30	32	21	9	6	6	6	6	6	6	5
Other white oaks	60	15	12	6	9	2	--	11	--	--	--	11	5	18
Black oak	113	10	8	15	2	16	16	8	20	17	17	17	43	43
Northern red oak	194	29	26	28	16	11	14	10	17	17	17	17	17	43
Scarlet oak	22	4	--	2	5	2	8	--	1	--	--	--	--	--
Other red oaks	86	24	22	16	15	2	2	5	--	--	--	--	--	--
Hickory	98	29	26	17	9	7	10	--	--	--	--	--	--	--
Ash	191	31	51	39	21	15	19	10	5	5	5	5	5	53
American elm	465	82	80	74	36	50	43	21	26	26	26	26	26	53
Slippery elm	93	17	19	7	16	14	2	3	10	10	10	10	10	5
Cottonwood	27	3	8	7	2	--	3	4	--	--	--	--	--	--
Yellow-poplar	125	15	27	14	25	16	11	17	--	--	--	--	--	--
Sugar maple	336	42	35	39	52	76	38	23	27	27	27	27	27	4
Soft maple	190	36	30	30	17	32	14	7	15	15	15	15	15	9
Sycamore	68	6	12	8	13	8	6	11	4	4	4	4	4	--
Beech	291	22	27	48	47	36	48	31	25	25	25	25	25	7
Black walnut	23	4	7	5	1	--	6	--	--	--	--	--	--	--
Post species	18	3	4	7	2	2	--	--	--	--	--	--	--	--
Other hardwoods	202	58	38	45	22	11	18	5	5	5	5	5	5	--
All species	2,858	465	467	451	347	321	267	183	161	161	161	161	161	196
Percent	100.0	16.3	16.3	15.8	12.2	11.2	9.3	6.4	5.6	5.6	5.6	5.6	5.6	6.9

1/ Includes 7 million board-feet of the 10-inch diameter class.

NORTHEASTERN OHIO

Table 6.--Hardwood sawtimber volume by species group
and log grade, 1952

Species group	Total	Log grade 1		Log grade 2		Log grade 3	
	volume	Million	Percent	Million	Percent	Million	Percent
	<u>board-</u> <u>feet</u>	<u>board-</u> <u>feet</u>		<u>board-</u> <u>feet</u>		<u>board-</u> <u>feet</u>	
White oaks ^{1/}	258	24	9	19	8	215	83
Red oaks ^{2/}	415	47	11	18	4	350	85
Hickory	98	--	--	3	3	95	97
Elms	558	73	13	68	12	417	75
Yellow-poplar	125	25	20	19	15	81	65
Sugar maple	336	47	14	41	12	248	74
Other hardwoods	1,010	76	8	83	8	851	84
All hardwoods	2,800	292	10	251	9	2,257	81

^{1/} Includes white oak, chestnut oak, and other white oaks.

^{2/} Includes black oak, northern red oak, and other red oaks.

NORTHEASTERN OHIO

Table 7.--Total cubic volume of sound material on commercial forest area by species and class of material, 1952

(In million cubic feet)

Species	: Total : sound : material:	: Growing stock				: Other material		
		: Total:	: Sawlog : portion:	: Upper : stem:	: tim- : ber:	: Total: : trees:	: Cull : limbs	: Hardwood : 1/ : 2/
Pine	1.8	1.8	1.6	0.2	--	--	--	--
Other softwoods	10.6	10.3	7.7	1.0	1.6	0.3	0.3	--
White oak	51.7	39.8	29.8	4.1	5.9	11.9	.7	11.2
Other white oaks	24.2	18.9	9.6	1.9	7.4	5.3	1.9	3.4
Black oak	29.6	22.8	17.4	2.4	3.0	6.8	.4	6.4
Northern red oak	57.0	44.0	29.9	4.5	9.6	13.0	1.9	11.1
Scarlet oak	6.6	4.4	3.3	.5	.6	2.2	.7	1.5
Other red oaks	31.2	26.5	13.5	2.3	10.7	4.7	.2	4.5
Hickory	50.3	43.2	15.6	2.5	25.1	7.1	1.4	5.7
Ash	71.0	55.1	30.1	4.2	20.8	15.9	3.4	12.5
American elm	156.6	125.3	72.5	13.0	39.8	31.3	6.0	25.3
Slippery elm	35.7	29.0	14.4	2.3	12.3	6.7	1.4	5.3
Cottonwood	7.4	5.5	4.4	.5	.6	1.9	.1	1.8
Yellow-poplar	32.4	24.4	19.2	1.8	3.4	8.0	.1	7.9
Sugar maple	103.2	73.1	51.1	6.9	15.1	30.1	8.5	21.6
Soft maple	80.7	57.1	29.7	4.6	22.8	23.6	10.0	13.6
Sycamore	17.9	12.7	10.3	1.2	1.2	5.2	.8	4.4
Beech	106.5	58.9	43.1	6.4	9.4	47.6	22.0	25.6
Black walnut	8.4	6.8	3.6	.7	2.5	1.6	.4	1.2
Post species	12.2	10.1	2.9	.5	6.7	2.1	.9	1.2
Other hardwoods	97.0	74.4	32.2	4.9	37.3	22.6	8.3	14.3
Noncommercial	10.4	--	--	--	--	10.4	9.6	.8
All species	1,002.4	744.1	441.9	66.4	235.8	258.3	79.0	179.3

1/ Sound bole volume only.

2/ Limbs of both merchantable and cull hardwood trees of sawtimber size, to a minimum diameter of 4.0 inches inside bark.

NORTHEASTERN OHIO

Table 8.--Cubic volume of growing stock on commercial forest
area by species and stand-size class, 1952

(In million cubic feet)

Species	Total	Percent	Large sawtimber: stands	Small sawtimber: stands	Pole- timber: stands	Seedling & sapling stands ^{1/}
Pine	1.8	0.2	1.8	--	--	--
Other softwoods	10.3	1.4	7.9	2.0	0.4	--
White oak	39.8	5.3	29.5	6.8	3.1	0.4
Other white oaks	18.9	2.6	6.2	7.1	4.6	1.0
Black oak	22.8	3.1	15.7	4.8	2.2	.1
Northern red oak	44.0	5.9	26.3	10.7	6.5	.5
Scarlet oak	4.4	.6	3.4	.6	.4	--
Other red oaks	26.5	3.6	10.8	6.5	8.9	.3
Hickory	43.2	5.8	18.7	9.0	14.4	1.1
Ash	55.1	7.4	30.1	15.8	9.2	--
American elm	125.3	16.8	63.6	33.3	25.6	2.8
Slippery elm	29.0	3.9	14.4	8.4	6.2	--
Cottonwood	5.5	.7	1.7	3.1	.7	--
Yellow-poplar	24.4	3.3	12.4	8.3	2.9	.8
Sugar maple	73.1	9.8	59.9	6.7	5.3	1.2
Soft maple	57.1	7.7	30.1	16.3	10.6	.1
Sycamore	12.7	1.7	8.3	3.5	.7	.2
Beech	58.9	7.9	47.2	8.2	3.1	.4
Black walnut	6.8	.9	3.9	2.0	.9	--
Post species	10.1	1.4	6.2	.3	3.3	.3
Other hardwoods	74.4	10.0	35.5	15.4	21.2	2.3
All species	744.1	100.0	433.6	168.8	130.2	11.5
Percent	100.0		58.3	22.7	17.5	1.5

^{1/} Includes the volume on nonstocked and other areas.

NORTHEASTERN OHIO

Table 9.--Cubic volume of growing stock on commercial forest area
by stand-size class and tree-diameter class, 1952

(In million cubic feet)

Tree-diameter: class (inches)	Stand-size class				Seedling & sapling ^{1/}	All classes	Percent
	Large sawtimber	Small sawtimber	Pole timber	Seedling & sapling ^{1/}			
6	15.0	12.7	31.0	1.6	60.3	8.1	
8	25.0	24.3	34.9	3.1	87.3	11.7	
10	30.7	29.0	29.3	.8	89.8	12.1	
12	36.7	38.3	14.1	1.7	90.8	12.2	
14	42.5	36.3	7.1	1.0	86.9	11.7	
16	60.8	14.6	4.2	.8	80.4	10.8	
18	48.2	7.3	3.8	--	59.3	8.0	
20	49.7	2.4	1.8	.6	54.5	7.3	
22	41.4	1.3	1.8	.3	44.8	6.0	
24	28.6	1.3	.2	--	30.1	4.0	
26	24.9	--	1.7	--	26.6	3.6	
28+	30.1	1.3	.3	1.6	33.3	4.5	
Total	433.6	168.8	130.2	11.5	744.1	100.0	

^{1/} Includes volume on nonstocked and other areas.

NORTHEASTERN OHIO

Table 10.--Average volume per acre by stand-size class, 1952

Stand-size class	Average volume per acre	
	<u>Board-feet</u>	<u>Cubic feet</u> ^{1/}
Large sawtimber stands	6,032	1,256.8
Small sawtimber stands	3,614	1,103.3
Poletimber stands	554	377.4
Seedling and sapling stands ^{2/}	205	71.4
All classes	2,847	741.1

^{1/} Growing stock only.

^{2/} Includes the volume on nonstocked and other areas.

WESTERN OHIO

Table 1.--Forest and nonforest area by county, 1952

County	Total		Forest area		Nonforest area	
	land area ^{1/}					
	<u>Thousand</u> <u>acres</u>	<u>Thousand</u> <u>acres</u>	<u>Percent</u>	<u>Thousand</u> <u>acres</u>	<u>Percent</u>	
Allen	262	24	9	238	91	
Auglaize	256	25	10	231	90	
Brown	314	49	16	265	84	
Butler	301	26	9	275	91	
Champaign	277	25	9	252	91	
Clark	257	21	8	236	92	
Clermont	293	59	20	234	80	
Clinton	264	23	9	241	91	
Crawford	259	26	10	233	90	
Darke	387	25	6	362	94	
Defiance	262	31	12	231	88	
Delaware	294	26	9	268	91	
Fairfield	323	43	13	280	87	
Fayette	260	10	4	250	96	
Franklin	344	18	5	326	95	
Fulton	260	23	9	237	91	
Greene	266	21	8	245	92	
Hamilton	265	53	20	212	80	
Hancock	341	25	7	316	93	
Hardin	299	24	8	275	92	
Henry	266	17	6	249	94	
Knox	335	48	14	287	86	
Licking	439	64	15	375	85	
Logan	295	26	9	269	91	
Lucas	220	26	12	194	88	

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Table 1.--Forest and nonforest area by county, 1952 (cont.)

County	Total	Forest area	Percent	Nonforest area	
	land area ^{1/}			Thousand acres	Percent
	Thousand acres	Thousand acres	Percent	Thousand acres	Percent
Madison	297	17	6	280	94
Marion	259	14	5	245	95
Mercer	291	25	9	266	91
Miami	260	15	6	245	94
Montgomery	298	20	7	278	93
Morrow	259	35	14	224	86
Ottawa	168	18	11	150	89
Paulding	266	19	7	247	93
Pickaway	325	14	4	311	96
Preble	274	25	9	249	91
Putnam	311	20	6	291	94
Sandusky	262	21	8	241	92
Seneca	353	34	10	319	90
Shelby	262	26	10	236	90
Union	278	18	6	260	94
Van Wert	262	18	7	244	93
Warren	261	35	13	226	87
Williams	269	28	10	241	90
Wood	396	20	5	376	95
Wyandot	260	22	8	238	92
All counties	12,950	1,202	9	11,748	91

^{1/} Source: Area of the U. S. 1950. U. S. Bureau of the Census.

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Table 2.--Commercial forest area by ownership class, 1952

Ownership class	Commercial forest area	
	<u>Thousand acres</u>	<u>Percent</u>
Public:		
State	6	0.5
County & municipal	4	.3
Total public	10	0.8
Private:		
Farm	1,110	93.4
Industrial & other	69	5.8
Total private	1,179	99.2
All ownerships	1,189	100.0

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Table 3.--Commercial forest area by forest type and stand-size class, 1952
(In thousands of acres)

Forest type	Total	Stand-size class					
		Large sawtimber stands	Small sawtimber stands	Pole- timber stands	Seedling & sapling stands	Nonstocked and other areas	
		<u>Percent</u>					
Oak-pine	5 0.4	--	--	5	--	--	
Oak-hickory	480 40.4	248	77	113	26	16	
Oak-gum	11 .9	--	6	5	--	--	
Elm-ash-							
cottonwood	578 48.6	232	72	206	65	3	
Maple-beech	115 9.7	91	11	8	5	--	
All types	1,189 100.0	571	166	337	96	19	
Percent	100.0	48.0	14.0	28.3	8.1	1.6	

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Table 4.--Sawtimber volume on commercial forest area by species and stand-size class, 1952
(In million board-feet)

Species	Total	Large : sawtimber : stands	Small : sawtimber : stands	Pole- : timber : stands	Seedling & sapling : stands ^{1/}
<u>Percent</u>					
Softwoods	1	(2/)	(2/)	1	--
White oak	404	9.5	356	32	16
Chestnut oak	23	.5	2	20	1
Other white oaks	230	5.4	216	14	(2/)
Black oak	118	2.8	93	17	8
Northern red oak	332	7.8	293	34	4
Scarlet oak	57	1.3	43	13	1
Other red oaks	137	3.2	68	66	3
Hickory	382	9.0	310	52	20
White ash	299	7.0	204	84	8
Black ash	31	.7	23	5	3
American elm	711	16.7	572	102	34
Slippery elm	112	2.6	87	20	5
Cottonwood	87	2.1	78	2	4
Yellow-poplar	52	1.2	26	19	7
Sugar maple	296	7.0	257	29	10
Soft maple	220	5.2	199	20	1
Sycamore	203	4.8	178	15	7
Beech	179	4.2	172	7	--
Black walnut	86	2.0	53	20	13
Post species	5	.1	1	1	3
Other hardwoods	295	6.9	183	69	40
All species	4,260	100.0	3,414	642	188
Percent	100.0		80.1	15.1	4.4

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.5 million board-feet or 0.05 percent.

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Table 5.--Sawtimber volume on commercial forest area by species and tree-diameter class, 1952
(In million board-feet)

Species	Total	Tree-diameter class (inches)																
		10	12	14	16	18	20	22	24	26	28	30	32					
Softwoods	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White oak	404	21	33	35	50	50	36	37	45	26	33	24	64					
Chestnut oak	23	4	7	7	5	5	--	--	--	--	--	--	--	--	--	--	--	--
Other white oaks	230	15	20	24	19	19	37	19	26	10	4	21	35					
Black oak	118	11	10	15	12	12	13	15	24	12	6	--	--					
Northern red oak	332	12	22	29	32	32	51	31	14	48	9	52	32					
Scarlet oak	57	7	5	14	2	2	11	3	3	5	3	--	--					
Other red oaks	137	20	27	26	13	13	19	12	2	--	--	--	18					
Hickory	382	81	98	65	56	56	45	7	16	--	8	6	--					
White ash	299	61	55	47	37	37	31	27	14	4	3	12	8					
Black ash	31	7	5	8	3	3	4	2	2	--	--	--	--					
American elm	711	76	97	104	99	99	74	72	61	44	19	23	42					
Slippery elm	112	20	20	36	11	11	7	3	8	--	--	7	--					
Cottonwood	87	3	5	11	15	15	15	22	6	5	5	--	--					
Yellow-poplar	52	7	11	2	8	8	--	7	17	--	--	--	--					
Sugar maple	296	32	51	28	40	40	60	31	24	11	9	3	7					
Soft maple	220	18	23	35	33	33	36	19	7	18	10	13	8					
Sycamore	203	18	27	11	15	15	28	21	37	8	8	5	25					
Beech	179	11	16	29	31	31	42	35	11	--	--	--	4					
Black walnut	86	16	23	22	18	18	3	3	--	1	--	--	--					
Post species	5	4	1	--	--	--	--	--	--	--	--	--	--					
Other hardwoods	295	64	65	41	38	38	24	23	10	17	--	7	6					
All species	4,260	1	508	621	589	537	536	389	327	209	117	173	253					
Percent	100.0 (1/)	11.9	14.6	13.8	12.6	12.6	12.6	9.1	7.7	4.9	2.8	4.1	5.9					

1/ Less than 0.05 percent.

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Table 6.--Hardwood sawtimber volume by species group
and log grade, 1952

Species group	Total	Log grade 1		Log grade 2		Log grade 3		
	volume	board-	board-	Percent	board-	Percent	board-	Percent
	Million	feet	feet		feet		feet	
White oaks ^{1/}	657	150	23	47	7	460	70	
Red oaks ^{2/}	644	76	12	28	4	540	84	
Hickory	382	30	8	66	17	286	75	
Elms	823	180	22	95	11	548	67	
Yellow-poplar	52	--	--	15	29	37	71	
Sugar maple	296	41	14	29	10	226	76	
Other hardwoods	1,405	160	11	132	10	1,113	79	
All hardwoods	4,259	637	15	412	10	3,210	75	

^{1/} Includes white oak, chestnut oak, and other white oaks.

^{2/} Includes black oak, northern red oak, and other red oaks.

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Table 7.--Total cubic volume of sound material on commercial forest area by species and class of material, 1952
(In million cubic feet)

Species	: Total : sound : material	: Growing stock				: Other material			
		: Total	: Sawtimber trees	: Pole-	: Cull	: Hardwood	: Sawlog	: Upper tim-	: Total trees
		: portion	: stem	: ber	: Total	: 1/	: 2/		
Softwoods	0.3	0.3	0.2	--	0.1	--	--	--	--
White oak	99.7	77.0	60.3	9.1	7.6	22.7	1.3	21.4	
Chestnut oak	6.3	4.7	3.7	.6	.4	1.6	.3	1.3	
Other white oaks	62.4	47.9	35.2	5.8	6.9	14.5	2.1	12.4	
Black oak	31.9	24.7	18.1	2.6	4.0	7.2	.4	6.8	
Northern red oak	85.8	63.7	50.1	6.9	6.7	22.1	3.1	19.0	
Scarlet oak	14.7	10.4	8.7	1.2	.5	4.3	.8	3.5	
Other red oaks	41.9	31.5	21.1	3.0	7.4	10.4	2.0	8.4	
Hickory	133.2	107.6	59.7	8.3	39.6	25.6	2.9	22.7	
White ash	105.6	83.4	46.9	7.0	29.5	22.2	4.4	17.8	
Black ash	12.8	9.7	5.0	.8	3.9	3.1	.9	2.2	
American elm	224.2	166.4	109.7	18.4	38.3	57.8	15.7	42.1	
Slippery elm	44.5	35.9	17.7	2.8	15.4	8.6	1.7	6.9	
Cottonwood	21.9	16.1	13.4	1.9	.8	5.8	.8	5.0	
Yellow-poplar	14.1	11.1	7.8	.9	2.4	3.0	(3/)	3.0	
Sugar maple	94.3	63.6	44.9	6.6	12.1	30.7	10.6	20.1	
Soft maple	73.6	46.2	33.7	5.4	7.1	27.4	11.4	16.0	
Sycamore	52.6	39.4	30.2	3.6	5.6	13.2	1.4	11.8	
Beech	74.0	34.1	26.3	4.0	3.8	39.9	20.3	19.6	
Black walnut	31.2	24.0	13.6	2.6	7.8	7.2	2.0	5.2	
Post species	19.5	13.3	1.0	.2	12.1	6.2	3.8	2.4	
Other hardwoods	117.0	81.8	46.6	7.7	27.5	35.2	14.2	21.0	
Noncommercial	5.4	--	--	--	--	5.4	4.8	.6	
All species	1,366.9	992.8	653.9	99.4	239.5	374.1	104.9	269.2	

1/ Sound bole volume only.

2/ Limbs of both merchantable and cull hardwood trees of sawtimber size, to a 4-inch minimum diameter.

3/ Less than 0.05 million cubic feet or 0.05 percent.

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Table 8.--Cubic volume of growing stock on commercial forest area by species and stand-size class, 1952
(In million cubic feet)

Species	Total	Percent	Large : sawtimber stands	Small : sawtimber stands	Pole- : timber stands	Seedling : & sapling stands
Softwoods	0.3	(2/)	0.1	0.1	0.1	--
White oak	77.0	7.8	62.0	8.6	6.3	0.1
Chestnut oak	4.7	.5	.5	3.9	.3	--
Other white oaks	47.9	4.8	40.3	5.5	1.9	.2
Black oak	24.7	2.5	17.3	3.9	3.4	.1
Northern red oak	63.7	6.4	51.6	7.4	4.1	.6
Scarlet oak	10.4	1.1	7.4	2.7	.3	--
Other red oaks	31.5	3.2	11.8	16.1	3.6	--
Hickory	107.6	10.8	71.5	17.7	18.1	.3
White ash	83.4	8.4	45.2	26.0	11.4	.8
Black ash	9.7	1.0	5.8	2.8	.9	.2
American elm	166.4	16.8	119.8	27.7	18.3	.6
Slippery elm	35.9	3.6	23.3	7.1	5.4	.1
Cottonwood	16.1	1.6	14.5	.3	.8	.5
Yellow-poplar	11.1	1.1	4.7	4.4	2.0	--
Sugar maple	63.6	6.4	50.8	9.0	3.8	--
Soft maple	46.2	4.7	40.2	5.1	.9	--
Sycamore	39.4	4.0	31.5	3.3	4.1	.5
Beech	34.1	3.4	31.6	1.4	1.1	--
Black walnut	24.0	2.4	11.4	6.2	6.4	--
Post species	13.3	1.3	.8	.6	11.3	.6
Other hardwoods	81.8	8.2	43.4	18.3	18.9	1.2
All species	992.8	100.0	685.5	178.1	123.4	5.8
Percent	100.0		69.1	17.9	12.4	.6

1/ Includes the volume on nonstocked and other areas.

2/ Less than 0.05 cubic feet or 0.05 percent.

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Table 9.--Cubic volume of growing stock on commercial forest area
by stand-size class and tree-diameter class, 1952

(In million cubic feet)

Tree-diameter: class (inches)	Stand-size class				Seedling & sapling ¹	All classes	Percent
	Large sawtimber:	Small sawtimber:	Pole timber:	Seedling & sapling ¹			
6	15.8	9.5	26.0	1.6	52.9	5.3	
8	30.0	22.4	34.6	1.1	88.1	8.9	
10	43.7	27.0	27.9	.1	98.7	9.9	
12	50.8	36.9	13.3	.2	101.2	10.2	
14	70.0	37.1	8.0	.8	115.9	11.7	
16	81.7	18.2	5.3	.8	106.0	10.7	
18	79.3	11.9	1.7	--	92.9	9.3	
20	80.7	7.7	2.6	--	91.0	9.2	
22	59.6	5.2	.4	.6	65.8	6.6	
24	49.8	.7	1.3	--	51.8	5.2	
26	34.4	.3	--	--	34.7	3.5	
28	17.8	.6	1.3	--	19.7	2.0	
30	30.6	.6	--	.6	31.8	3.2	
32	41.3	--	1.0	--	42.3	4.3	
Total	685.5	178.1	123.4	5.8	992.8	100.0	

¹/ Includes volume on nonstocked and other areas.

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Table 10.--Average volume per acre by stand-size class, 1952

Stand-size class	Average volume per acre	
	<u>Board-feet</u>	<u>Cubic feet</u> ^{1/}
Large sawtimber stands	5,979	1,200.5
Small sawtimber stands	3,867	1,072.9
Poletimber stands	558	366.2
Seedling and sapling stands ^{2/}	139	50.4
All classes	3,583	835.0

^{1/} Growing stock only.

^{2/} Includes the volume on nonstocked areas.

FOREST SURVEY METHODS

The inventory of the forest resources of Western and North-eastern Ohio involved an office study of aerial photographs and a field examination of randomly selected forest and nonforest plots.

The percentage of forest land in each county was obtained by placing a transparent template marked with uniformly spaced dots over aerial photographs and counting the number of dots falling on forest and nonforest areas. The percentage of forest dots in a county, multiplied by the total area gave a preliminary estimate of the forest area. This was later adjusted after field examination indicated the number of plots that had changed since the aerial photos were taken.

A selected number of forest dots were marked on the photographs. The acre surrounding each dot was examined under stereoscope and was classified by stand-size class on the basis of the height, crown width, and number of trees on the plot. Plots to be examined in the field were then randomly drawn. In drawing, greatest weight was given to the stand-size classes containing the largest timber volume. In addition, nonforest plots were selected for field examination to measure the conversion of open land to forest since the photographs were taken.

The selected field plots were marked on the photographs. Field crews located these points on the ground and established 1/5-acre circular plots for which species, size, quality, and growth of trees and other data were recorded.

The following tabulation gives the number of dots and plots examined for each region.

	<u>Western Region</u>	<u>North- eastern Region</u>
Number of photo dots counted for forest-area determination	123,769	48,073
Number of plots stereoscopically examined on photos	4,109	2,395
Number of forest plots field examined	632	426
Number of nonforest plots field examined	21	41

ACCURACY OF DATA

Statistical analysis of the commercial forest-area and timber-volume data shows the following sampling errors^{2/} for each Region:

	<u>COMMERCIAL FOREST AREA</u> :		<u>GROWING-STOCK VOLUME</u>	
	<u>Total</u> :	<u>Sampling error</u> :	<u>Total</u> :	<u>Sampling error</u>
	<u>Thousand</u>		<u>Million</u>	
	<u>acres</u>	<u>Percent</u>	<u>cubic feet</u>	<u>Percent</u>
Western	1,189	± 2.6	992.8	± 3.1
Northeastern	1,004	± 2.5	744.1	± 3.9

These estimates of sampling error do not include errors resulting from mistakes in measurement or judgment. All phases of field and office work were closely supervised to keep such errors to a minimum. Since the percentage error increases with each subdivision of the total, small acreages or volumes may have large errors and may therefore indicate only relative magnitudes.

^{2/} At one standard deviation; that is, the chances are two out of three that the calculated acreages and volumes do not differ from the totals that would have been obtained by 100-percent measurement by more than the errors shown in the tabulation.

EXPLANATION OF TERMS

Forest land.--Includes (a) land which is at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and which have not been developed for other use; (c) afforested areas.

The minimum area that qualifies as forest land is one acre. Strips of timber must be at least 120 feet wide to qualify. Conversely, clearings, streams, and unimproved treeless strips less than one acre in area or less than 120 feet in width within forest areas are classified as forest land. Improved rights-of-way such as graded roads, railroads, or transmission lines are classified as nonforest regardless of width.

Commercial forest land.--Forest land which is (a) producing, or physically capable of producing, usable crops of wood (usually sawtimber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Noncommercial forest land.--Forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land.

Forest types

Oak-pine.--Forests in which 50 percent or more of the stand is hardwoods, usually upland oaks, but in which southern pines make up 25-49 percent of the stand. (Common associates include gum, hickory, and yellow-poplar.)

Oak-hickory.--Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination, except where pines comprise 25-49 percent in which case the stand would be classified "oak-pine." (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum.--Bottom-land forests in which 50 percent or more of the stand is tupelo, blackgum, sweetgum, or oaks, singly or in combination. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-cottonwood.--Forests in which 50 percent or more of the stand is elm, ash, or cottonwood, singly or in combination. (Common associates include willow, sycamore, beech, and maple.)

Maple-beech.--Forests in which 50 percent or more of the stand is sugar maple or beech, singly or in combination. (Common associates include hemlock, elm, basswood, and white pine.)

Aspen.--Forests in which 50 percent or more of the stand is aspen or balsam poplar, singly or in combination.

Tree classes

Sawtimber tree.--A live softwood (coniferous) tree at least 9.0 inches d.b.h. or live hardwood tree of commercial species at least 11.0 inches d.b.h., with a sound butt log at least 8 feet long, or with at least half of the gross board-foot volume of the tree in sound material.

Poletimber tree.--A live, sound tree at least 5.0 inches d.b.h. but less than sawtimber size that gives promise of becoming a sawtimber tree.

Seedling and sapling trees.--Trees of commercial species less than 5.0 inches in diameter at breast height.

Cull tree.--A live tree at least 5.0 inches d.b.h. that does not qualify as a sawtimber or poletimber tree because of species, poor form, limbiness, rot, or other defect.

Volume estimates

Board-foot volume includes the sound volume of sawlogs in sawtimber trees to a minimum top d.i.b. of 6 inches for softwoods and 8 inches for hardwoods. Volume deductions have been made for rot, crook, and other defects. Board-foot volumes are shown in terms of the International 1/4-inch log rule, which measures the approximate yeild of green lumber cut to standard specifications.

Cubic-foot volume

Total volume includes the sound wood inside bark in both sound and cull living trees 5.0 inches d.b.h. and larger, from the stump to a minimum top diameter of 4.0 inches inside bark. It includes the upper stems of softwood trees and the upper stems and limbs of hardwoods.

Growing stock includes the volume of sound wood inside bark in the stem portion of sawtimber and poletimber trees from stump to a minimum top d.i.b. of 4 inches.

Stand-size class

Large sawtimber.--Stands having a net volume of 1,500 or more board-feet per acre in sawtimber trees, and having more than half of this volume in trees 15.0 inches d.b.h. and larger.

Small sawtimber.--Stands having a net volume of 1,500 or more board-feet per acre in sawtimber trees, and having at least half of this volume in trees smaller than 15.0 inches d.b.h.

Poletimber.--Stands failing to meet the sawtimber-stand specifications, but at least 10 percent stocked with poletimber and larger trees and with at least half the minimum stocking in poletimber trees.

Seedlings and saplings.--Stands not qualifying as either sawtimber or poletimber stands but having at least 150 seedlings and saplings of commercial species per acre.

Nonstocked.--Commercial forest land not qualifying for any other class.

Hardwood log grades

Grade 1.--Butt logs at least 13.0 inches (uppers at least 16 inches) in diameter inside bark with five-sixths of the surface on the three best faces clear of defect in not more than two cuttings, (minimum length of cutting variable, 3-7 feet, depending upon log diameter and position in tree). Minimum log length 12 feet. On the average such logs will yield at least 65 percent No. 1 common and better lumber.

Grade 2.--Logs at least 11 inches in diameter inside bark with two-thirds of the surface on the three best faces clear of defect in not more than three cuttings, (minimum length of cutting, 3 feet). Minimum log length 12 feet. On the average such logs will yield at least 40 percent No. 1 common and better lumber.

Grade 3.--Merchantable logs at least 8.0 inches in diameter inside bark at the small end, 8 feet long, and 50 percent sound which do not meet the requirements of higher grades. On the average such logs will yield less than 25 percent No. 1 common and better lumber or will be suitable for ties or timbers.

Principal Tree Species^{1/}

Softwoods

Pine includes:

Shortleaf pine	-	<u>Pinus echinata</u>
Pitch pine	-	<u>P. rigida</u>
Virginia pine	-	<u>P. virginiana</u>
Eastern white pine	-	<u>P. strobus</u>

"Other softwoods" includes:

Eastern redcedar	-	<u>Juniperus virginiana</u>
Eastern hemlock	-	<u>Tsuga canadensis</u>
Baldcypress	-	<u>Taxodium distichum</u>
Exotic conifers (Scotch pine, Norway spruce, etc.)	-	

Hardwoods

White oak	-	<u>Quercus alba</u>
Chestnut oak	-	<u>Q. prinus</u>
"Other white oaks" includes:		
Swamp white oak	-	<u>Q. bicolor</u>
Swamp chestnut oak	-	<u>Q. michauxii</u>
Post oak	-	<u>Q. stellata</u>
Overcup oak	-	<u>Q. lyrata</u>
Bur oak	-	<u>Q. macrocarpa</u>
Chinkapin oak	-	<u>Q. muehlenbergii</u>
Black oak	-	<u>Q. velutina</u>
Northern red oak	-	<u>Q. rubra</u>
Scarlet oak	-	<u>Q. coccinea</u>
"Other red oaks" includes:		
Southern red oak	-	<u>Q. falcata</u>
Pin oak	-	<u>Q. palustris</u>
Willow oak	-	<u>Q. phellos</u>
Shingle oak	-	<u>Q. imbricaria</u>
Hickory	-	<u>Carya spp.</u>
White ash includes:		
White ash	-	<u>Fraxinus americana</u>
Green ash	-	<u>F. pennsylvanica</u>

^{1/} Source of nomenclature: Check List of the Native and Naturalized Trees of the U. S., Agriculture Handbook No. 41, Forest Service, Washington, D. C., 1953.

Black ash includes:	
Black ash	- <u>F. nigra</u>
Blue ash	- <u>F. quadrangulata</u>
Slippery elm	- <u>Ulmus rubra</u>
"Other elms" includes:	
American elm	- <u>U. americana</u>
Rock elm	- <u>U. thomasi</u>
Winged elm	- <u>U. alata</u>
Cottonwood includes:	
Eastern cottonwood	- <u>Populus deltoides</u>
Swamp cottonwood	- <u>P. heterophylla</u>
Yellow-poplar	- <u>Liriodendron tulipifera</u>
Sugar maple includes:	
Sugar maple	- <u>Acer saccharum</u>
Black maple	- <u>A. nigrum</u>
Soft maple includes:	
Boxelder	- <u>A. negundo</u>
Red maple	- <u>A. rubrum</u>
Silver maple	- <u>A. saccharinum</u>
Sycamore	- <u>Platanus occidentalis</u>
Beech	- <u>Fagus grandifolia</u>
Black walnut	- <u>Juglans nigra</u>
"Post species" includes:	
Black locust	- <u>Robinia pseudoacacia</u>
Catalpa	- <u>Catalpa spp.</u>
Osage-orange	- <u>Maclura pomifera</u>
Red mulberry	- <u>Morus rubra</u>
Sassafras	-- <u>Sassafras albidum</u>

"Other hardwoods" includes all other commercial hardwood species.

"Noncommercial species" includes hawthorn, redbud, hophornbeam, hornbeam, serviceberry, and others.

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