

NORTHEASTERN FOREST EXPERIMENT STATION
OFFICE LIBRARY

FOREST STATISTICS
OF
INDIANA



CENTRAL STATES
FOREST EXPERIMENT STATION
Columbus 13, Ohio
PHILIP A. BRIEGLEB, DIRECTOR

FOREST SURVEY RELEASE NO. 15

JANUARY 1953

Library

Northeastern Forest Experiment Station
Forest Service-U.S. Dept. of Agriculture

FOREST STATISTICS OF INDIANA

These people have collected and compiled data or in some other way helped to prepare this report:

R. K. Winters, Chief, Division of Forest Economics

Field Inventory

M. E. Becker, Supervisor; R. E. Doyle, T. A. Harrington,
B. H. Mauer, W. B. Metcalf, G. N. Semmens, E. F. Youngblood

Photo Interpretation

K. E. Moessner, Supervisor; F. D. Brunson, C. E. Jensen

Drafting

R. W. Smith, K. W. Chrisemer

Drain Survey

J. T. Morgan

Statistical Computations

Lake F. Compton, Margaret Peirsol, Mary Lou Sterner,
Pauline Ramaley, Violet Powell

Growth and Statistical Procedures

G. L. Schnur

Report Preparation

R. K. Winters, O. K. Hutchison

Stenographic Service

Edith Clark, Virginia Simone

Cooperating Agencies

Purdue University

Department of Forestry, E. R. Martell, Head
Indiana Extension Service

E. J. Lott, State Extension Forester

A. T. Parrish, W. L. Fix, A. N. Liming, Harold Scholten,
District Extension Foresters

Indiana Department of Conservation

Division of Forestry

R. F. Wilcox, State Forester

C. R. Leslie, K. I. Shumaker, District Foresters

FOREWORD

The Forest Survey is a Nation-wide activity of the Forest Service. The fivefold purpose of the Forest Survey is (1) to make a field inventory of the present supply of standing timber; (2) to find out how fast this supply is being increased through growth; (3) to find out how fast it is being diminished through industrial and domestic uses, windfall, fire, disease, and other causes; (4) to determine the present consumption of and the probable future trend in requirements for forest products; and (5) to interpret and correlate these findings with existing and anticipated economic conditions, as an aid in formulating both private and public policies for use of land suitable for forest production.

The Forest Survey is conducted in the various regions by the forest experiment stations of the Forest Service. In Indiana the project is directed by the Central States Forest Experiment Station with headquarters in Columbus, Ohio.

This Survey Release presents the more significant preliminary statistics on the forest area, timber volume, timber growth, and timber drain for the State of Indiana. Later, an analytical report for the State will be published which will interpret statistics on forest area, timber volume, growth, and drain in the light of existing and anticipated economic conditions.

CONTENTS

	<u>Page</u>
Significant forest statistics for the State of Indiana	1
Significance of the forest statistics.	6
State tables	7
Forest and nonforest area by regions.	8
Commercial forest area by forest type and stand- size class	9
Net volume of live saw timber and growing stock on commercial forest area by regions.	10
Saw-timber volume on commercial forest area by species and stand-size class	11
Saw-timber volume on commercial forest area by species and tree-diameter class.	12
Hardwood saw-timber volume by species group and log grade.	13
Total cubic volume of sound wood on commercial forest area by species and class of material	14
Cubic volume of growing stock on commercial forest area by species and stand-size class	15
Cubic volume of growing stock on commercial forest area by stand-size class and tree-diameter class . .	16
Average volume per acre by stand-size class	17
Standard summary tables.	18
Land area by major classes of land.	19
Commercial forest land area by ownership and stand-size classes	20
Area of commercial forest land by major forest types.	21

Net volume of live saw timber and growing stock on commercial forest land by stand-size class. . . .	22
Net volume of live saw timber and growing stock on commercial forest land by ownership class	23
Net volume of live saw timber and growing stock on commercial forest land by species	24
Net volume of live saw timber on commercial forest land by diameter class and species	25
Net volume of all timber on commercial forest land by class of material and species group	26
Net annual growth, annual mortality, and commodity drain on live saw timber and growing stock on commercial forest land by species group.	27
Total output of timber products and commodity drain on live saw timber and growing stock	28
Forest Survey procedure.	29
Accuracy of data	30
Explanation of terms used.	31
Species listed	35

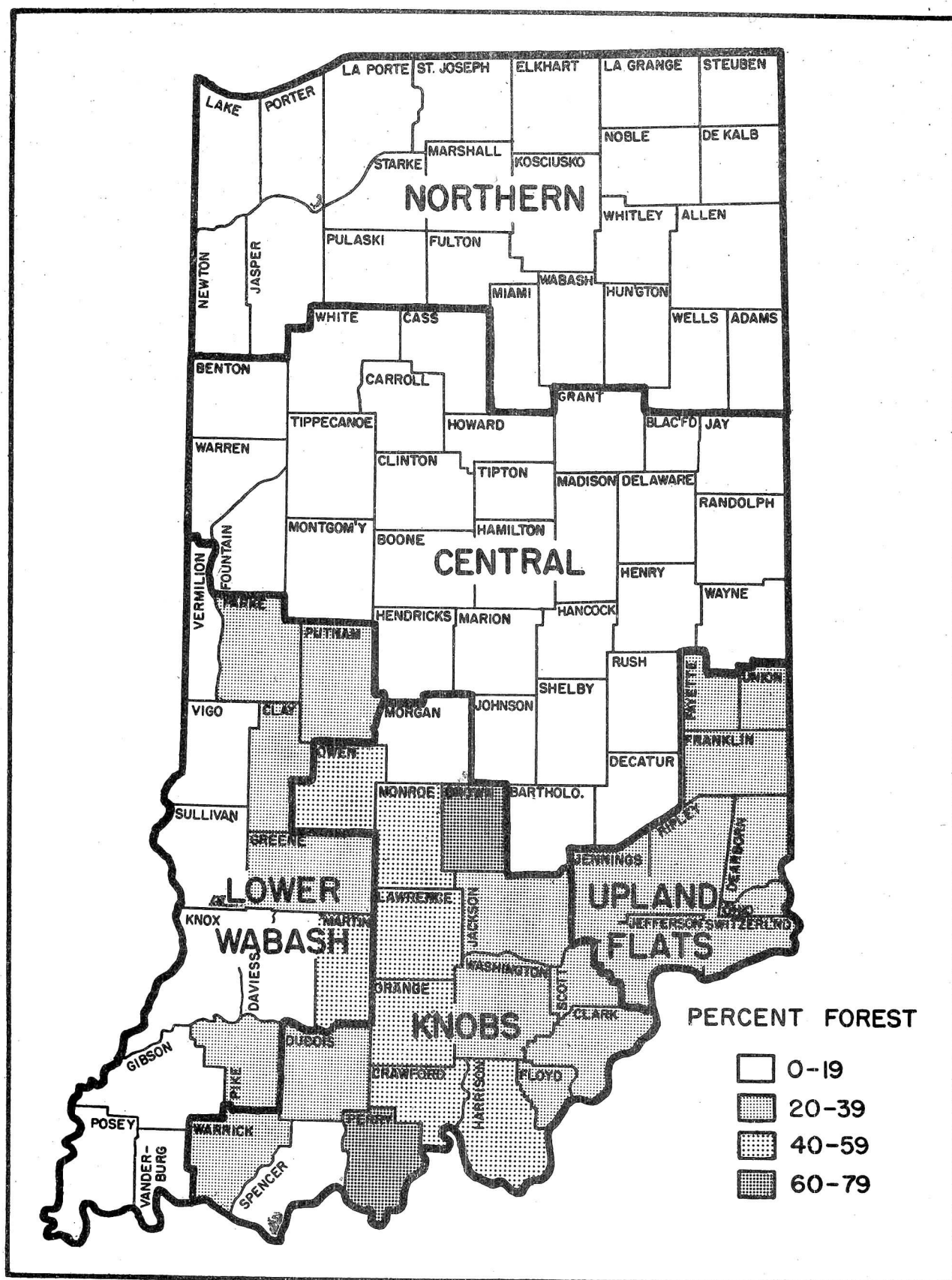
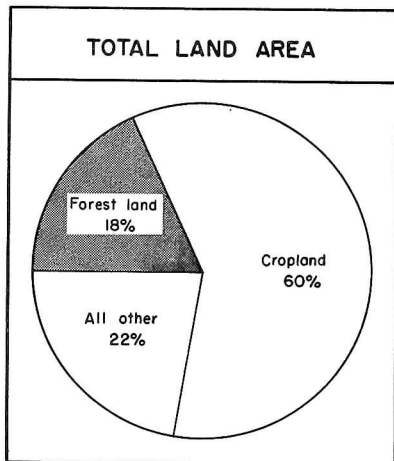


Figure 1.--Forest Survey regions and proportion of forest land by county, 1950.

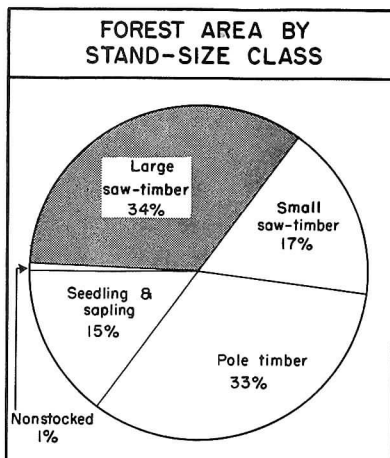
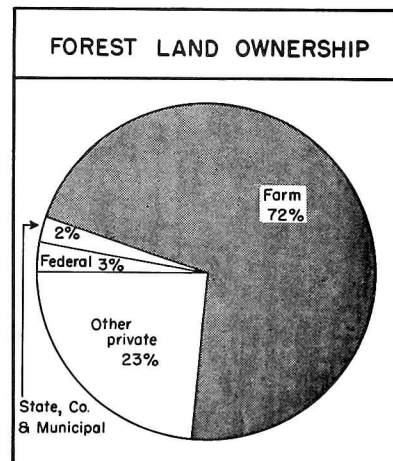
SIGNIFICANT FOREST STATISTICS FOR THE STATE OF INDIANA

AREA



The area of forest land^{1/} in Indiana is 4.1 million acres. The proportion of the area in forest is greatest in the Knobs Region (fig. 1) where the relatively rough topography discourages farming on many areas. In the fertile cornbelt (Northern and Central Regions) the forest area averages 7 to 10 percent of the total land area. Although all of the forest area is potentially of commercial importance, 58,000 acres, chiefly in parks and recreation areas, have been reserved from cutting.

Ninety-five percent of the commercial forest area is privately owned. The federally owned forest land is about equally divided between the Hoosier National Forest and military depots. The remaining public forest land is nearly all in state forests and parks.

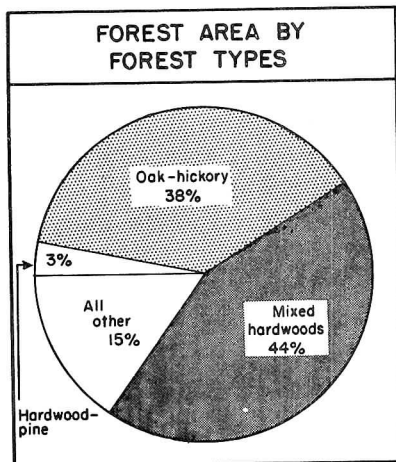


Fifty-one percent of the commercial forest area bears saw-timber stands. Large saw-timber stands occupy a larger proportion of the forest area in the Northern and Central Regions than in the others. The large saw-timber stands average nearly 5,800 board feet per acre and the small saw-timber stands average slightly more than 3,000.

The pole-timber stands average 362 cubic feet per acre, while seedling and sapling stands and nonstocked areas average 46 and 158 cubic feet per acre, respectively. Almost all of the

^{1/} For definitions of terms used see page 31.

nonstocked areas in this State are heavily grazed with only a few scattered saw-timber trees remaining. Most nonstocked areas should eventually restock satisfactorily if adequately protected from fire and grazing.

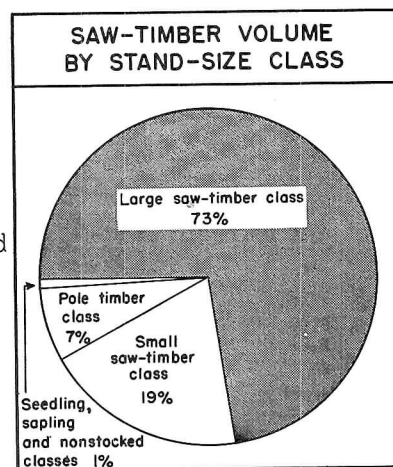


Approximately 82 percent of the forest area bears two timber types--the oak-hickory and mixed hardwoods types. Various species of oak and hickory account for 82 percent of the volume in the oak-hickory type, which is found mainly on the drier sites. The mixed hardwoods type is found chiefly on moist but well-drained sites. In Indiana the principal species in this type are: elm, ash, sugar maple, hickory, yellow-poplar, northern red oak, and beech. The oak-pine type is restricted to the southern three regions--mainly the Knobs. The area of the "other" type group is principally lowland hardwoods,

but includes also a small area of maple-beech-birch type and pin-oak flats.

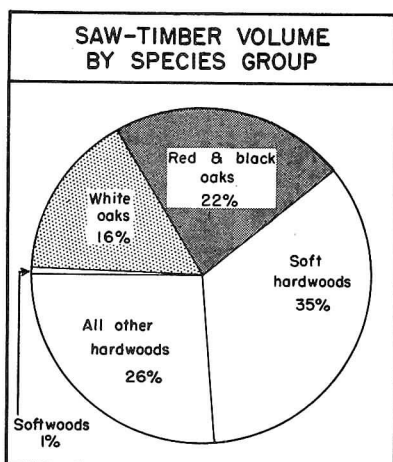
SAW-TIMBER VOLUME

Ninety-two percent of the 11.0 billion board feet^{2/} (Intl. 1/4-inch log scale) of saw timber is found in saw-timber stands. The average volume per acre for saw-timber stands is 4,866 board feet and for the total forest area is 2,722 board feet. Although this average volume is greater than for some of the adjoining states, it is still only about half the volume of average- to well-stocked stands.



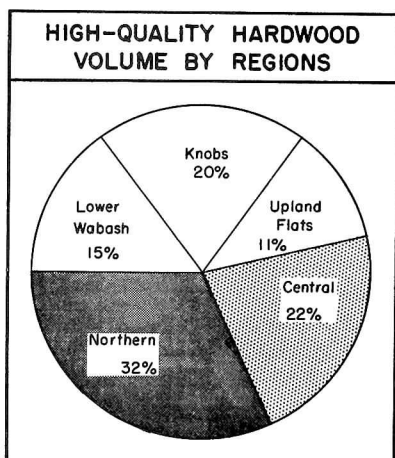
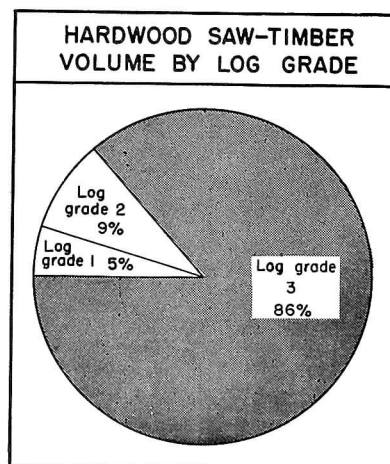
^{2/} The commercial forest area and saw-timber volume are increased 20 percent and 78 percent, respectively, over the corresponding figures for the 1945 forest reappraisal report. Present figures differ from the 1945 estimates partly because different definitions of forest area and commercial volume were used, and partly because of the greater intensity of the Forest Survey. The data presented here are based upon a thorough and systematic survey of Indiana forest resources.

Forty-two percent of the saw-timber volume is in the Central and Northern Regions though these regions possess only 29 percent of the commercial forest area. The Knobs Region with 41 percent of the forest area has 31 percent of the saw-timber volume.



Hardwood species account for 99 percent of the board-foot volume. Various species of oak account for 38 percent of the total, and species often classed as soft hardwoods such as yellow-poplar, soft maple, sweetgum, basswood, etc., make up 35 percent of the volume.

Only 14 percent of the hardwood saw-timber volume is in high-quality (grades 1 and 2) logs. Of this, nearly one-third is in the Northern Region even though this Region contains only 22 percent of the board-foot volume in the State. Apparently the farm woods in this relatively prosperous portion of the State are not as severely cut as they are elsewhere. Seventy-four percent of the board-foot volume in the Northern Region is in trees 16 inches or larger in diameter.

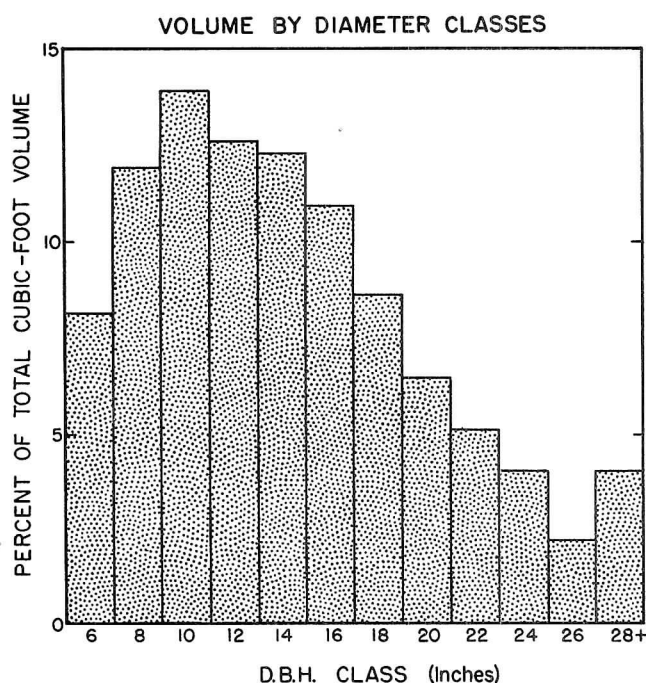


Ordinarily hardwood trees do not contain grade 1 or 2 sawlogs until they reach the 16-inch d.b.h. class. Accordingly, 3.7 billion of the 9.4 billion board feet in grade 3 sawlogs are in trees that are too small to contain logs of a higher grade. Many of these trees will contain high-quality sawlogs after they have had a chance to grow. A part of the remaining 5.7 billion board feet in grade 3 sawlogs is in top logs that are also too small to qualify for a higher grade. However, much of the low-quality volume is in logs that are too rough and defective ever to qualify as grade 1 and 2 sawlogs.

In addition to the large volume of low-quality sawlogs mentioned, 214 million cubic feet of sound wood occurs in cull saw-timber-size trees. The gross volume of these cull trees is equivalent to 3,228 million board feet--29 percent of the commercial saw-timber volume. About one of every seven saw-timber-size trees is a sound or rotten cull that occupies valuable growing space but produces no usable growth.

GROWING-STOCK VOLUME

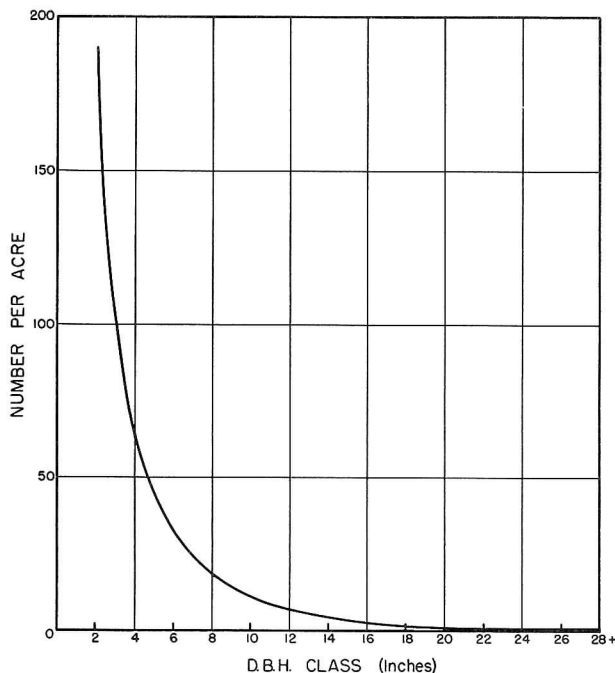
The growing stock (all sound trees 5.0 inches d.b.h. and larger) has a volume of 2,598 million cubic feet. This is an average of 642 cubic feet per acre of commercial forest land. The Central Region has the highest average volume of growing stock per acre--818 cubic feet. The Lower Wabash Region has the lowest--567 cubic feet.



One-third of the growing-stock volume is in trees of the 6-inch, 8-inch, and 10-inch diameter classes. The largest proportion of the cubic-foot volume is in the 10-inch diameter class. Nearly 60 percent of the volume in pole-size trees is found as an understory in saw-timber stands; about 40 percent of the volume in pole-size trees occurs on pole-timber areas. Most of the desirable commercial species are about as well or better represented in the pole-size trees as they are

in trees of saw-timber size. This indicates that these species are likely to be as well represented in future saw-timber stands.

TREE STOCKING BY DIAMETER CLASS

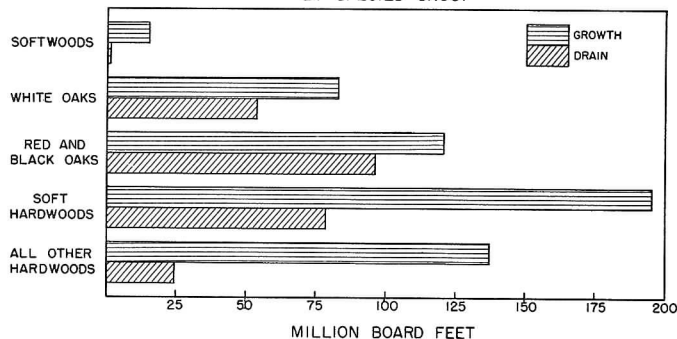


The forest area averages 338 sound trees per acre. Of these, 76 percent are in the 2-inch and 4-inch diameter classes. The 6-inch, 8-inch, and 10-inch diameter classes have 19 percent of the total number of sound trees, and 5 percent is in the larger diameter classes. The low growing stock volume and the small number of trees in the larger diameter classes indicate an understocked condition of the forest area. Nevertheless, the number of trees in the small diameter classes and the species representation in pole-size trees indicate

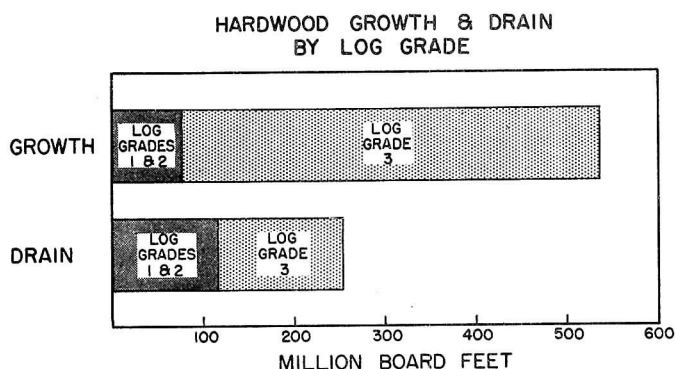
that the growing stock volume of Indiana forests can rapidly be built up through better protection from fire and grazing and through improved forest management and cutting practices.

GROWTH-DRAIN BALANCE

SAW-TIMBER GROWTH & DRAIN BY SPECIES GROUP



The net growth of Indiana's forest in 1949 was 551 million board feet and the drain for the same year was 254 million board feet. Furthermore, growth exceeded drain for each of the principal species groups. Growth of high-quality saw timber, however, did not equal drain.



Of the total hardwood board-foot growth 85 million board feet were in high-quality sawlogs (grades 1 and 2). About 117 million board feet of the total hardwood drain were in high-quality sawlogs. Current cutting, therefore, is gradually reducing

the reservoir of high-quality timber, even though the board-foot volume is being built up.

SIGNIFICANCE OF THE FOREST STATISTICS

Indiana is largely supported by industry and agriculture; timber growing and forest industries, while locally important, do not at present play a large part in the state's economy. In the southern part, forests occupy about one-third of the land area, and local income derived directly or indirectly from the forests is important. The state's forests could be more important if developed to maximum productivity. Any successful improvement program must be supported by the private landowners, because they own 95 percent of the forest land.

The forests of Indiana are understocked, especially with larger trees. If adequately protected and soundly managed, the Indiana forests could eventually support two and possibly three times the present volume. Then the annual cut could be correspondingly increased. This would in turn make possible a larger local forest industry and would provide more wages and other local income.

The solution of the forestry problem in Indiana rests largely in the hands of thousands of small woodland owners. They must be convinced that woodland grazing, repeated burning, and "high grading" are detrimental to their own best interests. Landowner education will help but the development of cheaper ways to log and market low-quality trees and to remove culls will go far toward prompting the landowner to improve forest management. If the forest growing stock is to be built up to the point where it can make its maximum contribution to the state's economy, positive action by landowners must be taken.

STATE TABLES

Table 1.--Forest and nonforest area by regions, 1950

Region	: Total land area ^{1/}	:	Forest area	:	Nonforest area
	<u>Thousand acres</u>		<u>Thousand acres</u> <u>Percent</u>		<u>Thousand acres</u> <u>Percent</u>
Lower Wabash	3,695		796 22		2,899 78
Knobs	4,194		1,668 40		2,526 60
Upland Flats	1,649		457 28		1,192 72
Central	7,281		517 7		6,764 93
Northern	6,352		665 10		5,687 90
All regions	23,171		4,103 18		19,068 82

^{1/} Source: Areas of the United States 1950, U. S. Bureau of the Census.

Table 2.--Commercial forest area by forest type and stand-size class, 1950

Forest type	Total	Large saw- timber stands	Small saw- timber stands	Pole- timber stands	Seedling and sapling stands	Non- stocked stands
	<u>Thousand acres</u>	<u>Percent</u>	<u>Thousand acres</u>			
Oak-pine	120	3.0	--	10	51	59
Oak-hickory	1,533	37.9	407	360	534	229
Maple-beech-birch	188	4.6	128	34	24	--
Mixed hardwoods	1,774	43.8	644	242	604	268
Pin-oak flats	63	1.6	27	11	16	9
Lowland hardwoods	367	9.1	178	43	108	35
All types	4,045	--	1,384	700	1,337	600
Percent		100.0	34.2	17.3	33.1	14.8
						0.6

Table 3.--Net volume of live saw timber and growing stock
on commercial forest area by regions, 1950

Region	Saw timber	Growing stock
	<u>Million bd. ft.</u>	<u>Million cu. ft.</u>
Lower Wabash	1,831	449.4
Knobs	3,392	947.7
Upland Flats	1,159	275.9
Central	2,145	421.4
Northern	2,483	503.5
All regions	11,010	2,597.9

Table 4.--Saw-timber volume on commercial forest area by species
and stand-size class, 1950

Species	Total	Large: saw- timber: stands	Small: saw- timber: stands	Pole- timber: stands	Seedling: and sapling: stands	Non- stocked stands	
	<u>Million bd. ft.</u>	<u>Per- cent</u>	<u>Million board feet</u>				
Pine	40	.3	--	36	2	2	--
Other softwoods	11	.1	5	--	5	1	--
White oak	1,297	11.8	826	358	113	--	--
Chestnut oak	101	.9	31	63	7	--	--
Other white oaks	382	3.5	332	29	15	5	1
Black oak	1,165	10.6	702	349	110	2	2
Northern red oak	985	8.9	773	185	26	--	1
Other red oaks	327	3.0	238	62	22	1	4
Hickory	876	8.0	553	227	84	12	--
Ash	530	4.8	366	116	30	15	3
Elm	1,101	10.0	901	125	70	2	3
Cottonwood	153	1.4	129	17	7	--	--
Yellow-poplar	579	5.3	396	99	78	6	--
Basswood	135	1.2	110	17	8	--	--
Sweetgum	161	1.5	129	26	6	--	--
Blackgum	123	1.1	102	10	11	--	--
Sugar maple	857	7.8	697	128	29	3	--
Soft maple	448	4.1	389	44	15	(1/)	--
Sycamore	390	3.5	305	40	38	4	3
Beech	708	6.4	623	51	21	13	--
Black walnut	208	1.9	130	46	29	(1/)	3
Other hardwoods	433	3.9	268	108	53	1	3
All species	11,010		8,005	2,136	779	67	23
Percent	100.0		72.7	19.4	7.1	0.6	0.2

1/ Less than 0.5 million board feet.

Table 5.--Saw-timber volume on commercial forest area by species
and tree-diameter class, 1950

Species	Total	10 inches	12-14 inches	16-18 inches	20-22 inches	24-26 inches	28 inches and over
- - - - - Million board feet - - - - -							
Pine	40	13	17	5	5	--	--
Other softwoods	11	4	4	1	2	--	--
White oak	1,297	--	506	378	240	89	84
Chestnut oak	101	--	67	27	7	--	--
Other white oaks	382	--	64	98	83	59	78
Black oak	1,165	--	440	371	212	112	30
Northern red oak	985	--	257	310	185	116	117
Other red oaks	327	--	95	92	51	46	43
Hickory	876	--	426	257	109	46	38
Ash	530	--	238	159	61	55	17
Elm	1,101	--	326	307	214	166	88
Cottonwood	153	--	31	32	35	21	34
Yellow-poplar	579	--	191	192	136	18	42
Basswood	135	--	50	38	24	17	6
Sweetgum	161	--	58	54	38	11	--
Blackgum	123	--	39	41	19	17	7
Sugar maple	857	--	291	276	188	54	48
Soft maple	448	--	111	139	107	59	32
Sycamore	390	--	105	127	79	54	25
Beech	708	--	99	243	169	160	37
Black walnut	208	--	92	84	25	7	--
Other hardwoods	433	--	251	116	44	17	5
All species	11,010	17	3,758	3,347	2,033	1,124	731
Percent	100.0	0.2	34.1	30.4	18.5	10.2	6.6

Table 6.--Hardwood saw-timber volume by species group and log grade, 1950

Species group	Volume	Log grade 1		Log grade 2		Log grade 3	
	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>	<u>Percent</u>	<u>Million</u> <u>bd. ft.</u>	<u>Percent</u>	<u>Million</u> <u>bd. ft.</u>	<u>Percent</u>
White oaks ^{1/}	1,780	67	3.8	144	8.1	1,569	88.1
Red oaks ^{2/}	2,477	118	4.8	199	8.0	2,160	87.2
Other hardwoods	6,702	347	5.2	646	9.6	5,709	85.2
All hardwoods	10,959	532	4.9	989	9.0	9,438	86.1

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

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

Table 7.--Total cubic volume of sound wood on commercial forest area by species and class of material, 1950

Species	Growing stock					
	Total	Total	Saw-	Pole-	Cull	Limbs ^{2/}
			timber	timber	trees	
			trees ^{1/}	trees		
- - - - - Million cubic feet - - - - -						
Pine	17.2	16.8	9.0	7.8	0.4	--
Other softwoods	8.2	7.0	3.2	3.8	1.2	--
White oak	435.2	314.1	204.3	109.8	9.5	111.6
Chestnut oak	43.5	32.5	16.5	16.0	1.4	9.6
Other white oaks	117.3	77.1	58.1	19.0	4.9	35.3
Black oak	384.9	264.3	184.0	80.3	13.2	107.4
Northern red oak	271.7	179.5	149.8	29.7	7.3	84.9
Other red oaks	116.7	79.6	51.0	28.6	5.5	31.6
Hickory	331.4	246.4	139.1	107.3	8.5	76.5
Ash	209.6	153.3	85.6	67.7	7.6	48.7
Elm	381.4	246.4	169.3	77.1	27.2	107.8
Cottonwood	45.8	29.3	23.8	5.5	2.1	14.4
Yellow-poplar	172.2	118.7	91.0	27.7	4.5	49.0
Basswood	49.7	29.1	21.1	8.0	4.4	16.2
Sweetgum	63.2	47.9	26.7	21.2	1.2	14.1
Blackgum	44.2	29.0	19.6	9.4	2.6	12.6
Sugar maple	335.5	205.7	129.7	76.0	31.1	98.7
Soft maple	198.8	98.8	70.4	28.4	31.7	68.3
Sycamore	111.7	69.2	60.8	8.4	6.0	36.5
Beech	311.5	115.1	103.0	12.1	64.3	132.1
Black walnut	88.0	59.2	33.2	26.0	6.4	22.4
Other hardwoods	253.7	178.9	71.9	107.0	25.6	49.2
Noncommercial species	10.5	--	--	--	9.4	1.1
All species	4,001.9	2,597.9	1,721.1	876.8	276.0	1,128.0
Percent	100.0	64.9	43.0	21.9	6.9	28.2

- ^{1/} Volume computed to a 4-inch top d.i.b. or to the potential limit of the tree for sawlogs whichever occurred first.
- ^{2/} Limbs of live hardwood saw-timber trees and saw-timber-size cull hardwood trees to a minimum diameter of 4.0 inches inside bark.

Table 8.--Cubic volume of growing stock on commercial forest area
by species and stand-size class, 1950

Species	Total	: Large: Small: Pole: Seedling: Non-					
		: saw-	: saw-	: timber:	: sapling:	: stocked	
		: stands:	: stands:	: stands:	: stands:	: stands	
	Million cu. ft.	Per cent	- - - -	Million cubic feet-	- - - -		
Pine	16.8	0.6	--	10.0	5.3	1.5	--
Other softwoods	7.0	0.3	2.1	0.1	4.4	0.4	--
White oak	314.1	12.1	142.0	105.8	65.1	1.2	--
Chestnut oak	32.5	1.2	6.8	17.4	8.3	--	--
Other white oaks	77.1	3.0	55.5	9.9	10.0	1.6	0.1
Black oak	264.3	10.2	119.2	82.7	59.8	2.4	.2
Northern red oak	179.5	6.9	122.8	39.1	17.3	.1	.2
Other red oaks	79.6	3.1	41.3	17.6	19.1	1.1	.5
Hickory	246.4	9.5	114.5	71.1	56.2	4.5	.1
Ash	153.3	5.9	84.1	39.9	26.4	2.5	.4
Elm	246.4	9.5	172.8	35.3	36.3	1.5	.5
Cottonwood	29.3	1.1	21.1	4.9	3.2	.1	--
Yellow-poplar	118.7	4.6	66.9	22.3	27.2	2.3	--
Basswood	29.1	1.1	21.2	4.6	2.9	.4	--
Sweetgum	47.9	1.8	27.9	8.2	11.8	--	--
Blackgum	29.0	1.1	18.9	5.0	5.1	--	--
Sugar maple	205.7	7.9	133.8	46.5	24.1	1.3	--
Soft maple	98.8	3.8	72.5	14.8	11.3	.2	--
Sycamore	69.2	2.7	50.1	8.0	9.3	1.2	.6
Beech	115.1	4.4	96.8	11.3	5.2	1.8	--
Black walnut	59.2	2.3	28.7	12.6	16.1	1.3	.5
Other hardwoods	178.9	6.9	75.4	40.3	60.1	2.4	.7
All species	2,597.9	1,474.4	607.4	484.5	27.8	3.8	
Percent	100.0	56.8	23.4	18.6	1.1	0.1	

Table 9.--Cubic volume of growing stock on commercial forest area by stand-size class and tree-diameter class, 1950

Stand-size class	Total	6-8 inches	10 inches	12-14 inches	16-18 inches	20-22 inches	24-26 inches	28 inches and larger
<u>- Million cubic feet -</u>								
Large saw timber	1,474.4	138.8	117.3	285.6	405.0	278.8	151.2	97.7
Small saw timber	607.4	130.5	122.6	268.5	69.2	13.3	2.1	1.2
Pole timber	484.5	237.4	117.8	86.9	30.6	5.0	4.5	2.3
Seedling and sapling	27.8	13.2	3.7	4.7	1.2	--	3.2	1.8
Nonstocked	3.8	--	.3	.6	.6	.2	1.2	.9
All classes	2,597.9	519.9	361.7	646.3	506.6	297.3	162.2	103.9
Percent	100.0	20.0	13.9	24.9	19.5	11.5	6.2	4.0

Table 10.--Average volume per acre by stand-size class, 1950

Stand-size class	Average volume per acre	
	Board feet	Cubic feet ^{1/}
Large saw-timber stands	5,784	1,065.3
Small saw-timber stands	3,051	867.7
Pole-timber stands	583	362.4
Seedling and sapling stands	112	46.3
Nonstocked stands	958	158.3
All classes	2,722	642.2

^{1/} Growing stock only.

STANDARD SUMMARY TABLES

The following tables summarize the foregoing data in a form that will be found in all Forest Survey state or subregional reports. Readers can thus combine or compare these data with similar data for other areas.

Table 11.--Land area by major classes of land, 1950

Class of land	:	Area
		<u>Thousand acres</u>
Forest:		
Commercial		4,045
Noncommercial:		
Reserved from commercial timber use		58
Unproductive for timber use		0
Total forest land		4,103
Nonforest		19,068
Total, all classes		23,171

Table 12.--Commercial forest land area by ownership
and stand-size classes, 1950

Ownership class	Total	Saw- timber stands	Pole- timber stands	Seedling: and sapling stands	Non- stocked ^{1/} stands
- - - - -Thousand acres - - - - -					
Federal:					
National forest	66	24	28	14	--
Indian	0	0	0	0	0
Other	60	31	18	10	1
Total	126	55	46	24	1
State	93	48	45	--	--
County and municipal	2	1	1	(<u>2/</u>)	--
Private	3,824	1,980	1,245	576	23
All ownerships	4,045	2,084	1,337	600	24

^{1/} Includes areas not classified elsewhere.

^{2/} Less than 500 acres.

Table 13.--Area of commercial forest land
by major forest types, 1950

Forest type	:	Thousand acres
Oak-pine	:	120
Oak-hickory	:	1,533
Maple-beech-birch	:	188
Mixed hardwoods	:	1,774
Pin-oak flats	:	63
Lowland hardwoods	:	367
Total	:	4,045

Table 14.--Net volume of live saw timber and growing stock on commercial forest land by stand-size class, 1950

Stand-size class	⋮ Saw timber	⋮ Growing stock
	<u>Million bd. ft.</u>	<u>Million cu. ft.</u>
Saw-timber stands	10,141	2,081.8
Pole-timber stands	779	484.5
Seedling and sapling stands	67	27.8
Nonstocked and other areas not classified elsewhere	<u>23</u>	<u>3.8</u>
Total	11,010	2,597.9

Table 15.--Net volume of live saw timber and growing stock on commercial forest land by ownership class, 1950

Ownership class	Saw timber	Growing stock
	<u>Million bd. ft.</u>	<u>Million cu. ft.</u>
Federal:		
National forest	99	32.8
Indian	0	0
Other	158	36.8
Total	257	69.6
State	174	57.0
County and municipal	6	1.4
Private:		
Farm	7,956	1,858.6
Industrial and other	2,617	611.3
Total	10,573	2,469.9
All ownerships	11,010	2,597.9

Table 16.--Net volume of live saw timber and growing stock
on commercial forest land by species, 1950

Species	Saw timber	Growing stock
	<u>Million bd. ft.</u>	<u>Million cu. ft.</u>
Softwoods:		
Pine ^{1/}	40	16.8
Cypress	2	.4
Other eastern softwoods	9	6.6
Total softwoods	51	23.8
Hardwoods:		
White oak	1,297	314.1
Other white oaks ^{2/}	483	109.6
Red oaks ^{3/}	985	179.5
Other red oaks ^{4/}	1,492	343.9
Sugar maple	857	205.7
Soft maples	448	98.8
Beech	708	115.1
Sweetgum	161	47.9
Tupelo and blackgum	123	29.0
Ash	530	153.3
Hickory	876	246.4
Cottonwood	153	29.3
Basswood	135	29.1
Yellow-poplar	579	118.7
Black walnut	208	59.2
Other eastern hardwoods	1,924	494.5
Total hardwoods	10,959	2,574.1
All species	11,010	2,597.9

^{1/} Mostly Virginia pine, but includes small amounts of shortleaf, red, and other pines.

^{2/} Includes chestnut oak and species listed under "other white oaks" on page 35.

^{3/} Includes species listed under "northern red oak" on page 35.

^{4/} Includes species listed under "black oak" and "other red oaks" on page 35.

Table 17.--Net volume of live saw timber on commercial forest
land by diameter class and species, 1950

Species	Diameter class (inches)						Total
	: 10:	12 :	14 :	16 :	18 :	20+ :	
- - - - - Million board feet - - - - -							
Softwoods:							
Pine	13	14	3	5	--	5	40
Other eastern softwoods	4	4	--	1	--	2	11
Total softwoods	17	18	3	6	--	7	51
Hardwoods:							
White oak		242	264	231	147	413	1,297
Other white oaks		67	64	74	51	227	483
Red oaks		112	145	135	175	418	985
Other red oaks		237	298	261	202	494	1,492
Sugar maple		142	149	162	114	290	857
Beech		42	57	95	148	366	708
Sweetgum		31	27	23	31	49	161
Tupelo and blackgum		15	24	29	12	43	123
Yellow-poplar		79	112	127	65	196	579
Other eastern hardwoods		787	843	717	542	1,385	4,274
Total hardwoods		1,754	1,983	1,854	1,487	3,881	10,959
All species	17	1,772	1,986	1,860	1,487	3,888	11,010

Table 18.--Net volume of all timber on commercial forest land
by class of material and species group, 1950

Class of material	Total	Softwoods	Hardwoods
- - - <u>Million cubic feet</u> - - -			
Growing stock:			
Saw-timber trees			
Sawlog portion	1,671.9	9.3	1,662.6
Upper stem portion	49.2	2.9	46.3
Total saw timber	1,721.1	12.2	1,708.9
Pole-timber trees	876.8	11.6	865.2
Total growing stock	2,597.9	23.8	2,574.1
Other material:			
Sound cull trees	52.7	1.6	51.1
Rotten cull trees	223.3	(1/)	223.3
Hardwood limbs	1,128.0	--	1,128.0
Salvable dead trees	--	--	--
Total other material	1,404.0	1.6	1,402.4
Total, all timber	4,001.9	25.4	3,976.5

1/ Less than .05 million cubic feet.

Table 19.--Net annual growth, annual mortality, and commodity drain on live saw timber and growing stock on commercial forest land by species group, 1950^{1/}

Item	Saw timber			Growing stock		
	: Total	: Soft-	: Hard-	: Total	: Soft-	: Hard-
	: : woods	: woods	: woods	: : woods	: woods	: woods
	<u>-Million board feet-</u>			<u>-Million cubic feet-</u>		
Net annual growth	551	15	536	106.6	1.8	104.8
Annual mortality	19	(2/)	19	6.2	0.1	6.1
Commodity drain:						
Timber products	218.1	0.4	217.7	40.5	0.2	40.3
Logging waste	36.1	--	36.1	6.0	--	6.0
Total ^{1/}	254.2	0.4	253.8	46.5	0.2	46.3

^{1/} Though commodity drain was determined for the year 1949 (table 23), the total drain figure can be considered representative of the total drain in 1950.

^{2/} Less than 0.5 million board feet.

Table 20.--Total output of timber products and commodity drain on live saw timber and growing stock, 1949

Product	Volume of products cut ^{1/}			Commodity drain : on saw timber			Commodity drain : on growing stock		
	Standard unit	Number	M cu. ft.	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
				Million bd. ft.			Million cu. ft.		
Sawlogs	M bd. ft. ^{2/}	161,146	22,381	190.9	0.4	190.5	27.4	0.1	27.3
Veneer logs and bolts	M bd. ft.	11,596	1,611	13.9	--	13.9	2.0	--	2.0
Cooperage logs & bolts	M bd. ft.	4,637	644	5.6	--	5.6	.8	--	.8
Pulpwood logs	M bd. ft.	0	0	--	--	--	--	--	--
Pulpwood bolts	Std. cords ^{3/}	8,688	556	(5/)	--	(5/)	.6	--	.6
Fuelwood	Std. cords	437,962	27,595	34.9	--	34.9	11.3	--	11.3
Piling	M linear feet	0	0	--	--	--	--	--	--
Poles	M pieces	0	0	--	--	--	--	--	--
Posts	M pieces	4,340,193	2,939	2.7	--	2.7	2.3	.1	2.2
Hewn ties	M pieces	26,025	160	1.3	--	1.3	.2	--	.2
Mine timbers	M cu. ft.	1,100,000	821	--	--	--	.8	--	.8
Miscellaneous ^{4/}	M cu. ft.	1,087,017	1,072	4.9	--	4.9	1.1	--	1.1
Total	xxxx	xxxx	57,779	254.2	0.4	253.8	46.5	0.2	46.3

^{1/} Includes material from both growing stock and other miscellaneous sources.

^{2/} International 1/4" rule.

^{3/} Rough wood basis.

^{4/} Includes chemical wood, excelsior, handle stock, shingle bolts, etc.

^{5/} Less than .05 million bd. ft.

FOREST SURVEY PROCEDURE

The inventory of the forest resources of Indiana was made during the period November 1949 to December 1950. The sampling procedure used involved an office study of aerial photographs and a field examination of randomly selected forest and nonforest plots.

The proportion 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 from forest to non-forest and vice versa since the date of aerial photography.

Systematically selected dots falling on forest land were marked on the photographs. The acre surrounding each marked 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 randomly drawn from those classified under stereoscope. This selection was weighted, giving the most weight to the larger stand-size classes. In addition, several nonforest plots were selected for field examination to find out how much open land had become forested since the date of photography.

The locations of the selected field plots were marked on the photographs, which were then sent to the field. Crews of two men located these points on the ground. On forest land a 1/5-acre circular plot was established and species, size, quality, and growth of trees were recorded.

The following tabulation gives the number of dots and plots examined for the State as a whole.

Number of photo dots counted for forest-area determination	195,941
Number of plots stereoscopically examined on photos	9,700
Number of forest plots field examined	1,789
Number of nonforest plots field examined	292

ACCURACY OF DATA

Statistical analysis of commercial forest-area and timber-volume data shows the following sampling errors^{3/} for the State as a whole:

<u>Commercial forest area</u>		<u>Growing stock volume</u>	
(M acres)	(Percent)	(Million cu. ft.)	(Percent)
±48.6	±1.2	±46.3	±1.8

These estimates of sampling error do not include errors resulting from the development and application of volume tables and cull factors, or from mistakes in measurement or judgment. All phases of field and office work were closely supervised to keep these 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.

^{3/} At one standard deviation; i.e., 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 above.

EXPLANATION OF TERMS USED

Forest land.--Includes (a) lands which are 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; and (d) chaparral areas.

The minimum area that will qualify as forest land is 1 acre. Strips of timber must be at least 120 feet wide before the area will qualify as forest land. Conversely, clearings, streams, and unimproved treeless strips less than 1 acre in area or less than 120 feet in width within forest areas will be classified as forest land. Improved rights-of-way such as graded roads, railroads, or transmission lines will be 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 saw timber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Reserved forest land.--Forest land that has been withdrawn from timber utilization through statute, ordinance, or administrative order.

Forest types

Oak-pine.--Forests of pines, oaks, and other hardwoods in which pines comprise 25-50 percent of the dominant and codominant trees.

Oak-hickory.--Forests of hardwoods in which oaks and hickories comprise at least 50 percent of the dominant and codominant trees, except where pines comprise 25 percent or more, in which case the stand would be classified as hardwood-pine.

Maple-beech-birch.--Forests in which at least 50 percent of the dominant and codominant trees are sugar maple or beech, singly or in combination.

Mixed hardwoods.--Forests in which 50 percent or more of the stand is upland ash, elm, basswood, walnut, soft maples, or associated species, singly or in combination except where pines comprise 25 percent or more of the stand, in which case the stand would be classed as hardwood-pine.

Pin-oak flats.--Forests on poorly drained flats in which 25 percent of the dominant and codominant trees are pin oaks.

Lowland hardwoods.--Forests on characteristically moist to wet sites where 50 percent or more of the stand is composed of sycamore, hackberry, honey locust, blackgum, sweetgum, southern cypress, ash, elm, willow, cottonwood, and red and silver maple, singly or in combination.

Tree classes

Saw-timber tree.--A live softwood (coniferous) tree at least 9.0 inches d.b.h. or live hardwood (deciduous) 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 volume of the tree in sound material.

Pole-timber tree.--A live, sound tree of commercial species at least 5.0 inches d.b.h. but less than saw-timber size that is now merchantable or gives promise of becoming merchantable.

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 saw-timber or pole-timber tree because of species, poor form, limbiness, rot, or other defect.

Volume estimates

Board-foot volume includes the sound volume of sawlogs in saw-timber 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 yield 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 saw-timber and pole-timber trees from stump to a minimum top d.i.b. of 4 inches, or to the limit of potential merchantability for saw timber.

Stand-size class

Large saw timber.--Stands having a minimum net volume of 1500 board feet per acre and having more than half of this volume in trees 15.0 inches d.b.h. and larger.

Small saw timber.--Stands having a net volume of 1500 board feet per acre and having at least half of this volume in trees smaller than 15.0 inches d.b.h.

Pole timber.--Stands failing to meet the saw-timber stand specifications, but at least 10 percent stocked with pole-timber and larger trees and with at least half the minimum stocking in pole-timber trees.

Seedlings and saplings.--Stands not qualifying as either saw-timber or pole-timber 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^{4/}

Grade 1.--Butt logs at least 14.0 inches (upper logs at least 16 inches) in diameter inside bark at the small end. Minimum length of butt logs is 10 feet; 8 feet for upper logs. Five-sixths of the surface on the three best faces must be clear of defect. Two clear cuttings are allowed on any face, but the minimum length of cuttings is 7 feet for butt logs and 5 feet for upper logs. Cull deductions including sweep cannot exceed 25 percent for butt logs and 40 percent for upper logs. On the average such logs will normally yield at least 65 percent No. 1 common and better lumber.

Grade 2.--Logs at least 12 inches in diameter inside bark at the small end. Minimum length is 8 feet. Two-thirds of the surface on the three best faces must be clear of defect. Three clear cuttings are allowed on any face, but the minimum length of cuttings is 3 feet. Cull deductions including sweep cannot exceed 50 percent. On the average such logs for most species will normally yield at least 40 percent No. 1 common and better lumber.

^{4/} The hardwood log grades used are essentially those published as "Interim Sawlog Grades for Southern Hardwoods," by C. R. Lockard and R. D. Carpenter, Southern Forest Experiment Station, 1946. Persons interested in detailed specifications should consult this publication.

Grade 3.--Logs at least 8 inches in diameter inside bark at the small end. Minimum length is 8 feet. Minimum standards require that these logs be at least 50 percent sound and qualify at least for manufacture of local-use lumber or railroad ties and timbers. On the average such logs for most species in Indiana will normally yield less than 25 percent No. 1 common and better lumber.

SPECIES LISTED

Softwoods

Pine includes:

Virginia pine
Shortleaf pine
Pitch pine
White pine

- Pinus virginiana
- Pinus echinata
- Pinus rigida
- Pinus strobus

Other softwoods include:

Baldcypress
Redcedar
Hemlock

- Taxodium distichum
- Juniperus virginiana
- Tsuga canadensis

Hardwoods

White oak

Chestnut oak

Other white oaks include:

Post oak
Swamp white oak
Swamp chestnut oak
Overcup oak
Bur oak
Chinquapin oak

- Quercus alba
- Quercus montana
- Quercus stellata
- Quercus bicolor
- Quercus prinus
- Quercus lyrata
- Quercus macrocarpa
- Quercus muehlenbergii

Black oak includes:

Black oak
Scarlet oak

- Quercus velutina
- Quercus coccinea

Northern red oak includes:

Northern red oak
Swamp red oak

- Quercus borealis
- Quercus falcata var.
pagodaefolia
- Quercus falcata var.
leucophylla

Cherrybark oak

Other red oaks include:

Southern red oak
Pin oak
Willow oak
Water oak
Shingle oak

- Quercus falcata
- Quercus palustris
- Quercus phellos
- Quercus nigra
- Quercus imbricaria

Hickory

Elm

- Carya spp.
- Ulmus spp.

Soft maple includes:

Red maple
Silver maple
Boxelder

- Acer rubrum
- Acer saccharinum
- Acer negundo
- Acer saccharum
- Platanus occidentalis
- Fraxinus spp.

Sugar maple

Sycamore (American)

Ash

Yellow-poplar	- <u>Liriodendron tulipifera</u>
Cottonwood (Eastern)	- <u>Populus deltoides</u>
Cottonwood (Swamp)	- <u>Populus heterophylla</u>
Sweetgum	- <u>Liquidambar styraciflua</u>
Blackgum	- <u>Nyssa sylvatica</u>
Blackgum (Swamp)	- <u>Nyssa aquatica</u>
Beech	- <u>Fagus grandifolia</u>
Black walnut	- <u>Juglans nigra</u>
Other hardwoods - include all other commercial hardwood species.	

Noncommercial species - include species that do not normally have commercial value such as hawthorn, redbud, hornbeam, hophornbeam, alder, and serviceberry.

TERRITORY SERVED BY THE
CENTRAL STATES FOREST EXPERIMENT STATION
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

