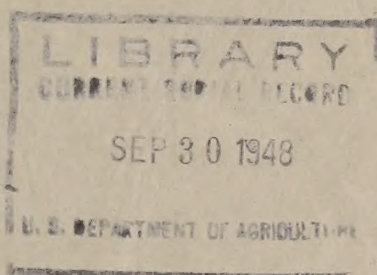



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**FOREST RESOURCES
OF THE
SOUTHWESTERN OZARK REGION
IN
MISSOURI**



 **CENTRAL STATES**
FOREST EXPERIMENT STATION
Columbus 13, Ohio

Harold L. Mitchell, Director

FOREST RESOURCES
OF THE
SOUTHWESTERN OZARK REGION

IN
MISSOURI

BY
THE FOREST SURVEY ORGANIZATION

at the

Central States Forest Experiment Station

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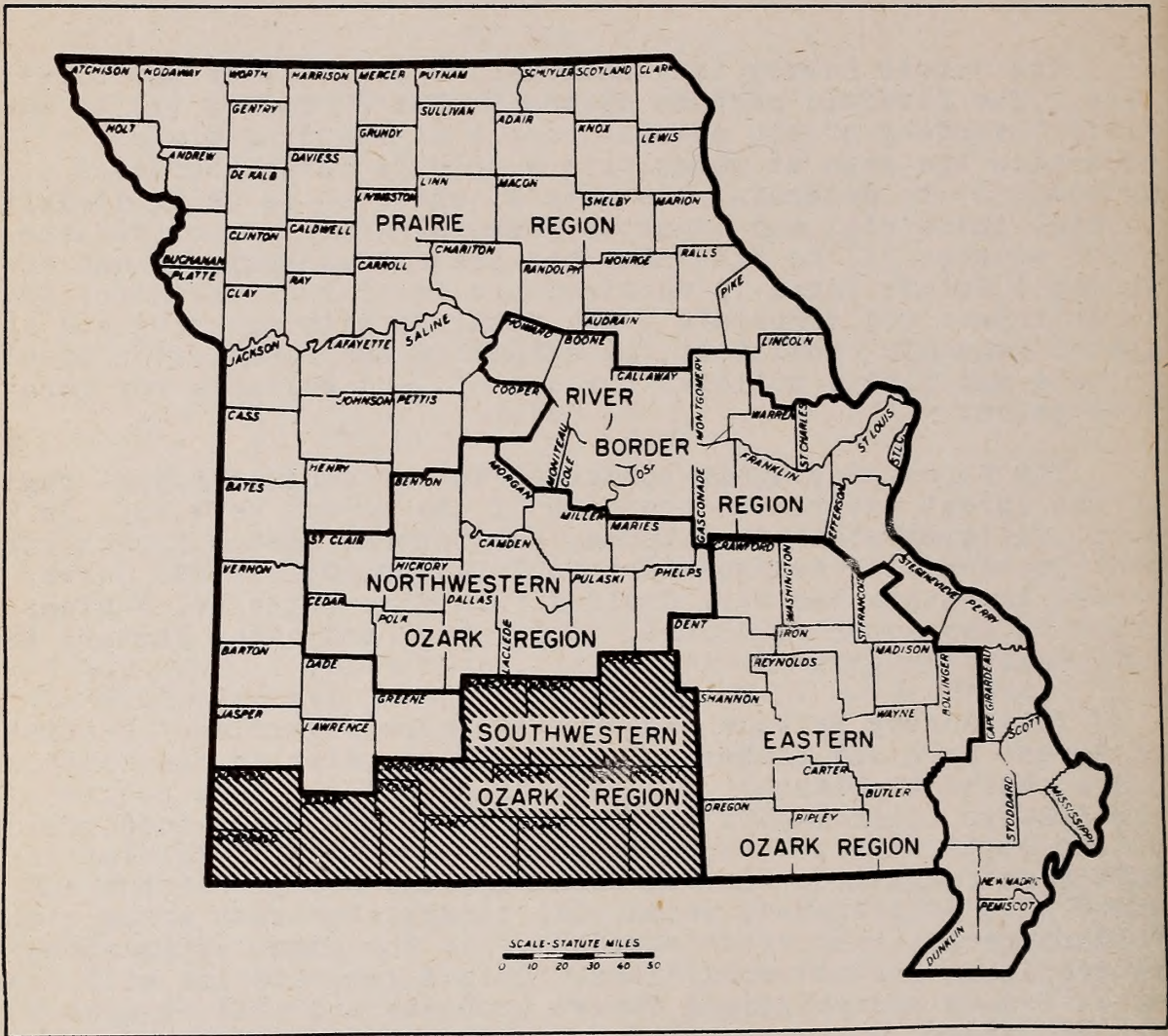
O. K. Hutchison, K. L. Quigley, and J. E. Wiggins did the photo interpreting work under the direction of K. E. Moessner. The office compilations were made by Margaret Peirsol, Betty Quilligan, Mary Lou Sterner, and Florence Karinen under the supervision of Lake Compton. G. L. Schnur prepared the volume tables and determined the statistical accuracy of tabular figures. Virginia Tomlinson, Alberta Hiatt, and Bonnie Jo Williams did the stenographic work and C. E. Hamm and K. W. Chrisemer the drafting.

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 ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which it is being diminished through industrial and domestic uses, windfall, fire, disease, and other causes; (4) to determine the present consumption 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 the formulation of both private and public policies for use of land suitable for forest production.

The Forest Survey is conducted in the various forest regions by the forest experiment stations of the Forest Service. In Missouri, the project is directed by the Central States Forest Experiment Station with headquarters in Columbus, Ohio. For Survey purposes, the State has been divided into five principal regions based on character of forest, topography, and other factors that influence tree growth.

This Survey Release presents the more significant statistics on forest area and timber volume in 12 counties in the Southwestern Ozark region of Missouri. A similar report has been published for the Eastern Ozark region and releases for the other subdivisions of the State will be issued as soon as statistical tabulations have been completed. Later, an analytical report for the entire State will be prepared, which will interpret forest area, timber volume, growth, and drain statistics in the light of existing and anticipated economic conditions. This interpretation will focus attention on the principal forest problems and will suggest possible solutions.



LOCATION OF SOUTHWESTERN OZARK REGION

SIGNIFICANT FACTS CONCERNING THE FOREST RESOURCES

OF THE SOUTHWESTERN OZARK REGION

The Southwestern Ozark region (see map on opposite page) straddles the backbone of the Ozark range in southwestern Missouri. Short, steep hills prevail in most of the area, gradually merging into the prairies on the western border. The rougher portions of the region are heavily forested. Two counties, Taney and Ozark, have more than 70 percent of their land area in forests. Newton County, the most lightly forested county, has 33 percent forest land. Of the 5.5 million acres in the 12 counties in the region, 3.1 million acres or 57 percent are forested.

Ninety percent of the commercial forest area is privately owned. The Mark Twain National Forest makes up most of the publicly owned forest land.

Stands with sufficient volume to be classified as saw timber (see Explanation of Terms Used on page 17) occupy only 9 percent of the forest area. Pole-timber stands occur on 41 percent, and seedling and sapling stands on 36 percent of the forest area. Poorly stocked areas, chiefly pastured woodland, make up 14 percent. The unusually small proportion of saw-timber stands in the region is attributed to (1) repeated cuttings for ties, sawlogs, and farm timbers, (2) the prevalence of poor timber sites, (3) woodland grazing, and (4) frequent fires.

The total volume of saw timber is two billion board feet. Black oak is the most abundant species, accounting for nearly one-third of the total volume. White oak and the post oak group each make up 18 percent. Only one-third of the board-foot volume is in saw-timber stands; the remaining two-thirds is in scattered trees of sawlog size in stands classified as pole timber, seedling and sapling, and poorly stocked. More than one-half of the volume is in trees in the 12-14-inch diameter class.

The cubic volume of pole-size trees and the sawlog portion of saw-timber trees is 705 million cubic feet. More than one-half of this volume is in trees less than 11.0 inches in diameter.

The average saw-timber volume per forest acre is 635 board feet. The average cubic-foot volume of pole-size trees and the sawlog portion of saw-timber trees is 227 cubic feet.

The total cubic-foot volume of all material including tops and limbs of hardwoods, cull trees, and trees of noncommercial species is 1.5 billion cubic feet. The sound wood in cull trees and in trees of noncommercial species accounts for more than one-third of the total volume, indicating the large proportion of the

growing space occupied by trees of little or no commercial value. The removal of these trees from the stands to provide opportunity for growth of trees of better quality is a major forestry problem in the region.

Table 1.--Forest and nonforest area by county, 1947

County	Total land area ^{1/}		Forest area		Nonforest area	
	Thousand		Thousand	Percent	Thousand	Percent
	acres		acres		acres	
Barry	512		211	41	301	59
Christian	363		172	47	191	53
Douglas	518		311	60	207	40
Howell	589		364	62	225	38
McDonald	346		219	63	127	37
Newton	403		131	33	272	67
Ozark	484		354	73	130	27
Stone	325		163	56	142	44
Taney	419		320	76	99	24
Texas	757		489	65	268	35
Webster	377		159	42	218	58
Wright	438		217	49	221	51
All counties	5,531		3,130	57	2,401	43

^{1/} Source: Area of the United States 1940, U. S. Bureau of Census

Table 2.--Commercial forest area by ownership class, 1947

Ownership class	Commercial forest area <u>1/</u>	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National forest	276	8.9
Other	16	.5
Total	<u>292</u>	9.4
State	5	.2
Private	2,814	90.4
All ownerships	<u>3,111</u>	100.0

1/ Does not include 19,000 acres of forest land classified as non-commercial.

Table 3.--Commercial forest area by forest type
and stand-size class, 1947

Forest type	Total		Saw-timber area	Pole-timber area	Seedling & sapling area	Poorly stocked area
	<u>M acres</u>	<u>Percent</u>	<u>M acres</u>	<u>M acres</u>	<u>M acres</u>	<u>M acres</u>
Shortleaf pine	102	3.3	13	52	37	0
Cedar-hdwd.	233	7.5	0	46	98	89
Oak-pine	135	4.3	30	75	30	0
Oak-hickory <u>1/</u>	2,356	75.8	158	960	925	313
White oak	113	3.6	34	58	15	6
Mixed hdwd.	60	1.9	8	23	15	14
Bottomland hdwd.	112	3.6	30*	47	15	20
All types	3,111		273	1,261	1,135	442
Percent		100.0	8.8	40.5	36.5	14.2

1/ Includes a small area of scrub hardwood type amounting to less than one percent of the commercial forest area.

Table 4.--Saw-timber volume on commercial forest area by species and stand-size class, 1947

Species	Total	Saw-timber area	Pole-timber area	Seedling & sapling area	Poorly stocked area
	Million bd. ft.	Percent	Million bd. ft.	Million bd. ft.	Million bd. ft.
Shortleaf pine	171	8.6	147	25	1
Redcedar	4	.2			
White oak	362	18.3	92	124	70
Post oak group	357	18.0	54	146	124
Black oak	627	31.7	286	173	134
Scarlet oak	64	3.3	25	32	5
Northern red oak	70	3.6	20	54	7
Other red oaks	15	.8			
Hickory	99	5.0	14	48	28
Black gum	19	1.0			
Elm	44	2.2			
Sycamore	63	3.2			
Ash	24	1.2	76	80	35
Black walnut	34	1.7			
Other hardwoods	23	1.2			
All species	1,976	100.0	714	682	404
Percent		100.0	36.2	34.5	20.4

Table 5.--Saw-timber volume on commercial forest area by species and tree-diameter class, 1947

Species	Total	Tree-diameter class			
		10 2/ inches	12-14 inches	16-18 inches	20 inches and larger
	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>	<u>Million</u> <u>bd. ft.</u>
Shortleaf pine <u>1/</u>	175	53	72	30	20
White oak	362	--	212	124	26
Post oak group	357	--	207	103	47
Black oak	627	--	292	195	140
Scarlet oak	64	--	47	15	2
Other red oaks	85	--	49	20	16
Hickory	99	--	81	18	0
Other hardwoods	207	--	98	66	43
All species	1,976	53	1,058	571	294
Percent	100.0	2.7	53.5	28.9	14.9

1/ Includes the volume of redcedar.

2/ Ten-inch diameter class shown separately because in this diameter class, saw-timber volume includes softwood trees, but not hardwoods.

Table 6.--Cubic-foot volume on commercial forest area by species and stand-size class, 1947

Species	Total		Saw-timber area	Pole-timber area	Seedling & sapling area	Poorly stocked area
	<u>Million cu. ft.</u>	<u>Percent</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>
Shortleaf pine	69.7	9.9	36.9	34.3	1.6	2.0
Redcedar	5.1	.7				
White oak	117.1	16.6	28.5	56.8	15.7	16.1
Post oak group	149.0	21.1	14.1	82.0	40.0	12.9
Black oak	194.7	27.6	56.3	95.7	36.3	6.4
Scarlet oak	19.7	2.8	5.8	11.6	1.9	.4
Northern red oak	20.6	2.9	3.8	19.6	1.4	1.5
Other red oaks	5.7	.8				
Hickory	60.4	8.6	10.1	35.4	10.6	4.3
Black gum	3.8	.6	18.5	29.6	9.7	5.2
Elm	19.6	2.8				
Sycamore	14.1	2.0				
Ash	6.4	.9				
Black walnut	9.2	1.3				
Other hardwoods	9.9	1.4				
All species	705.0		174.0	365.0	117.2	48.8
Percent		100.0	24.7	51.8	16.6	6.9

Table 7.--Cubic-foot volume on commercial forest area
by stand-size class and tree-diameter class, 1947

Stand-size class	Total	Tree-diameter class				
		6-8 : inches	10 <u>1/</u> : inches	12-14 : inches	16-18 : inches	20 inches and larger
	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>	<u>Million cu. ft.</u>
Saw timber	174.0	25.4	31.0	55.6	39.3	22.7
Pole timber	365.0	158.6	90.7	77.3	24.5	13.9
Seedling & sapling	117.2	26.5	20.4	39.2	20.9	10.2
Poorly stocked	48.8	10.3	8.7	13.4	12.3	4.1
All classes	705.0	220.8	150.8	185.5	97.0	50.9
Percent	100.0	31.3	21.4	26.3	13.8	7.2

1/ Ten-inch diameter class shown separately because saw-timber volume includes softwood trees in this diameter class, but not hardwoods.

Table 8.--Average volume per acre by stand-size class, 1947

Stand-size class	Average volume per acre	
	<u>Board feet</u>	<u>Cubic feet</u>
Saw timber	2,615	637
Pole timber	541	289
Seedling & sapling	356	103
Poorly stocked	398	110
All classes	635	227

Table 9.--Total cubic-foot volume of sound wood on commercial forest area by species and class of material, 1947

Species	Total	Saw-timber trees			Pole-timber trees	Cull trees ^{2/}
		Total	Sawlog portion	Tops & limbs ^{1/}		
	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.
Shortleaf pine ^{3/}	75.7	37.5	31.0	6.5	37.3	0.9
White oak	204.9	101.9	58.6	43.3	58.5	44.5
Post oak group	359.1	123.2	69.5	53.7	79.5	156.4
Black oak	352.6	186.2	105.0	81.2	89.7	76.7
Scarlet oak	37.5	19.1	10.8	8.3	8.9	9.5
Other red oaks	54.4	24.2	13.8	10.4	12.5	17.7
Hickory	92.2	29.1	16.4	12.7	44.0	19.1
Other hardwoods	130.0	61.5	34.7	26.8	28.3	40.2
Noncommercial species	182.5	--	--	--	--	182.5
All species	1,488.9	582.7	339.8	242.9	358.7	547.5
Percent	100.0	39.1	22.8	16.3	24.1	36.8

^{1/} Not included in the cubic-foot volumes shown in Tables 6 and 7 excepting the 6.5 million cubic feet in tops of softwood trees.

^{2/} Not included in the cubic-foot volume shown in Tables 6 and 7.

^{3/} Includes 5.4 million cubic feet of redcedar.

APPENDIX



EXPLANATION OF TERMS USED

Forest land - Land bearing forest growth or land from which the forest has been removed but which shows evidence of past forest occupancy and which is not now in other use. To qualify as forest, an area must: (1) be at least 100 feet wide; (2) be at least one acre in area; (3) have a sufficient number of trees to provide 10 percent crown coverage, or (4) lacking 10 percent crown coverage, be likely to remain in forest use.

Commercial forest land - Forest land bearing or capable of bearing timber of commercial character and economically available now or prospectively for commercial use and not withdrawn from such use.

Noncommercial forest land - Forest land not qualifying as commercial forest land. Two classes of forest area are included: (1) commercially valuable forest land withdrawn from timber use for such purposes as parks, game refuges, military reservations, or reservoir protection; and (2) forest land which because of poor growing conditions will not produce trees of commercial quality.

Forest types

Shortleaf pine - Stands in which pine trees comprise at least 60 percent of the dominant and codominant trees.

Cedar-hardwoods - Stands in which redcedar comprises at least 20 percent of the dominant and codominant trees.

Oak-pine - Stands of pine, oaks, and other hardwoods in which pines comprise 20-60 percent of the dominant and codominant trees.

Oak-hickory - Stands of hardwoods in which oaks and hickories comprise at least 60 percent of the dominant and codominant trees.

Mixed hardwoods - Stands of mixed hardwood species not qualifying for other hardwood types. Principal species include elm, maple, basswood, and black walnut in mixture with oaks and hickories.

Bottomland hardwoods - Stands on the alluvial bottoms of rivers and streams. The principal species include sycamore, willow, elm, blackgum, sweetgum, soft maple, oaks, hickory, cottonwood, and cypress.

White oak - Stands in which white oak (Quercus alba) comprises at least 60 percent of the dominant and codominant trees.

Tree classes

Sound saw-timber tree - A coniferous tree at least 9.0 inches d.b.h. (diameter outside bark at 4.5 feet above ground), or a hardwood tree 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.

Sound pole-timber tree - A tree at least 5.0 inches d.b.h. but less than saw-timber size, which now is or gives promise of becoming a sound merchantable tree.

Cull tree - A tree that does not qualify as a sound pole-timber or saw-timber tree because of poor form, limbiness, rot, or other defect.

Volume estimates

Board-foot volume - Includes the volume of that portion of saw-timber trees merchantable for sawlogs. Volume deductions have been made for rot, crook, and other defects. Board-foot volumes are shown in the International 1/4 inch log rule, which approximates green lumber tally.

Cubic-foot volume - Except where specifically noted, includes the volume of sound wood inside bark in: (1) the saw-timber portion of sound trees, (2) the upper stems of saw-timber-size conifers to a minimum diameter of 4 inches inside bark, and (3) the sound pole-timber trees to the same minimum top diameter.

Stand-size class

Saw timber - Stands having a minimum net volume of 1500 board feet per acre.

Pole timber - Stands having a net volume of less than 1500 board feet per acre but which are at least 10 percent stocked with pole-size and larger trees. At least one-half the minimum stocking must be in pole-size trees.

Seedlings and saplings - Stands not qualifying either for saw timber or pole timber but having at least 300 seedlings and saplings of commercial species per acre.

Poorly stocked - Commercial forest land not qualifying for any other class, including denuded areas.

Species listed

Shortleaf pine - Pinus echinata.

Redcedar - Eastern redcedar - Juniperus virginiana

White oak - Quercus alba

Post oak group includes:

Post oak - Quercus stellata

Swamp white oak - Quercus bicolor

Swamp chestnut oak - Quercus prinus.

Overcup oak - Quercus lyrata

Bur oak - Quercus macrocarpa

Chinquapin oak - Quercus muehlenbergii

Post oak is the principal species.

Black oak - Quercus velutina

Scarlet oak - Quercus coccinea

Northern red oak - Quercus borealis.

Other red oaks include:

Southern red oak - Quercus falcata

Pin oak - Quercus palustris

Willow oak - Quercus phellos

Water oak - Quercus nigra

Shingle oak - Quercus imbricaria

Hickory - includes all species of hickory (Carya)

Blackgum - Nyssa sylvatica - Nyssa aquatica

Elm - includes all species of elm (Ulmus)

Sycamore - Platanus occidentalis

Ash - includes all species of ash (Fraxinus)

Black walnut - Juglans nigra

Other hardwoods - includes all other commercial hardwood species

Noncommercial species - includes species which do not normally have commercial value such as blackjack oak, sassafras, blue beech, ironwood, alder, redbud and service berry.

FOREST SURVEY PROCEDURE

The inventory of the forest resources of the Southwestern Ozark region was made in February and March 1947. A sampling procedure was used involving an office study of aerial photographs and a field examination of randomly selected forest and nonforest plots.

The proportion of forest land by counties was obtained by placing over each photograph a transparent template with four uniformly spaced dots and counting the number of dots falling on forest and on nonforest areas. The percentage of forest dots in a county applied to the total land area gave a preliminary estimate of the forest acreage.

The location of alternate dots falling on forest land was marked on the photograph. The acre surrounding each marked dot was examined under stereoscope and classified by stand-size class on the basis of the height, crown width, and density of trees on the plot.

Plots for field examination were selected from those photo classified as follows:

Saw timber - - - - -	1 in 5
Pole timber - - - - -	1 in 10
Seedling & sapling - - - - -	1 in 20
Poorly stocked - - - - -	1 in 10

In addition, every 50th nonforest plot was selected for field examination to measure the movement of nonforest land to forest.

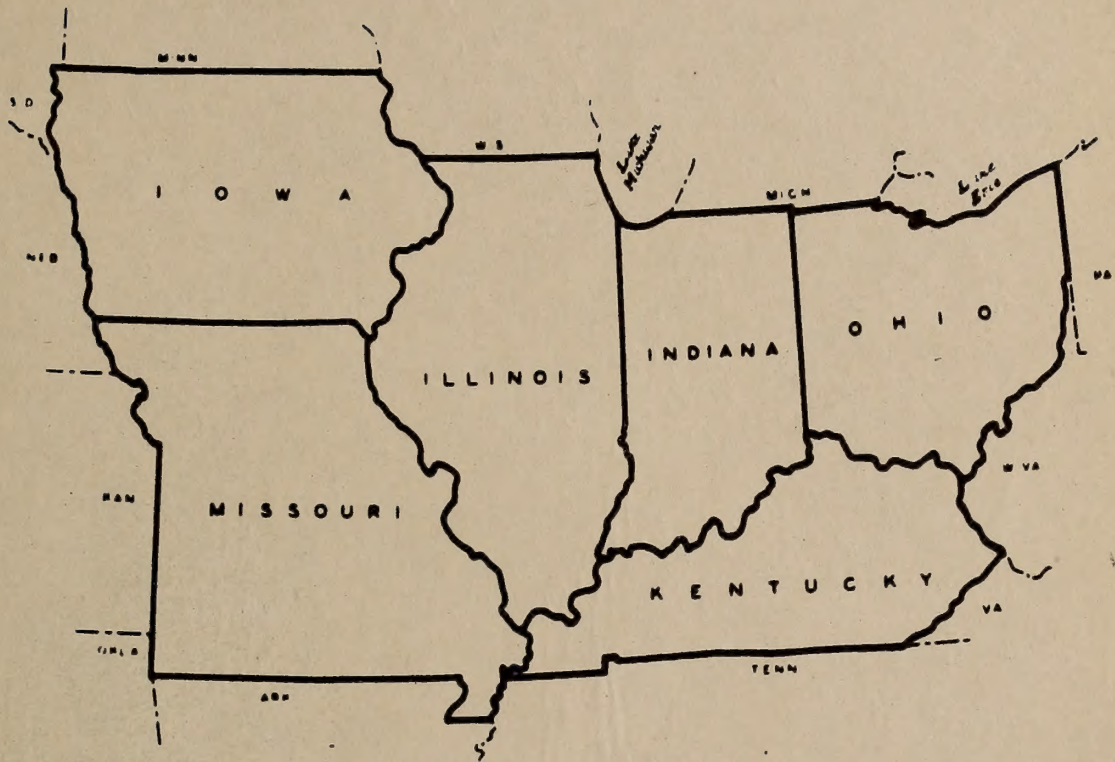
The locations of the selected plots were marked on the photographs which were then sent to the field. Crews of two men each located these points on the ground and at each established a 1/5 acre plot on which they recorded the species, size, condition, and growth rate of trees, and the forest type and site quality of plots. A field check of the photo interpreter's stand-size-class determination was also made. The field examination also provided a basis for adjusting the preliminary estimate of forest and nonforest area.

A total of 18,620 dots were counted on the photos for forest area determination. Stereoscopic examinations were made on 5,917 forest plots to determine stand-size class, and 678 plots were examined on the ground. These photo and field examinations provided the basic data for computation of forest area and timber volume statistics for the region.

ACCURACY OF DATA

Forest area - Statistical analysis of the forest area data for the Southwestern Ozark region shows a sampling error of ± 1.6 percent of the total forest area or $\pm 50,000$ acres, at a level of one standard deviation. The error of estimate increases with each subdivision of the total forest area so that small tabular acreages may have large errors and therefore indicate only relative magnitudes. The sampling error of the forest area estimate of individual counties is within ± 10 percent.

Timber volume - The sampling error of the total board-foot volume in the region is ± 6.7 percent or ± 132 million board feet. This does not include the errors of volume tables, cull factors, or other phases of the inventory work for which satisfactory methods of measuring accuracy have not been developed. All phases of field work and computations were closely supervised to keep these errors at a minimum. Again the error of estimate increases with each subdivision of the total volume so that small volumes indicate only relative magnitudes.



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CENTRAL STATES FOREST EXPERIMENT STATION
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