

FOREST RESOURCES
OF THE
RIVERBORDER REGION
IN
MISSOURI

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

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FOREST RESOURCES
OF THE
RIVERBORDER REGION
IN
MISSOURI
BY
THE FOREST SURVEY ORGANIZATION
at the

Central States Forest Experiment Station

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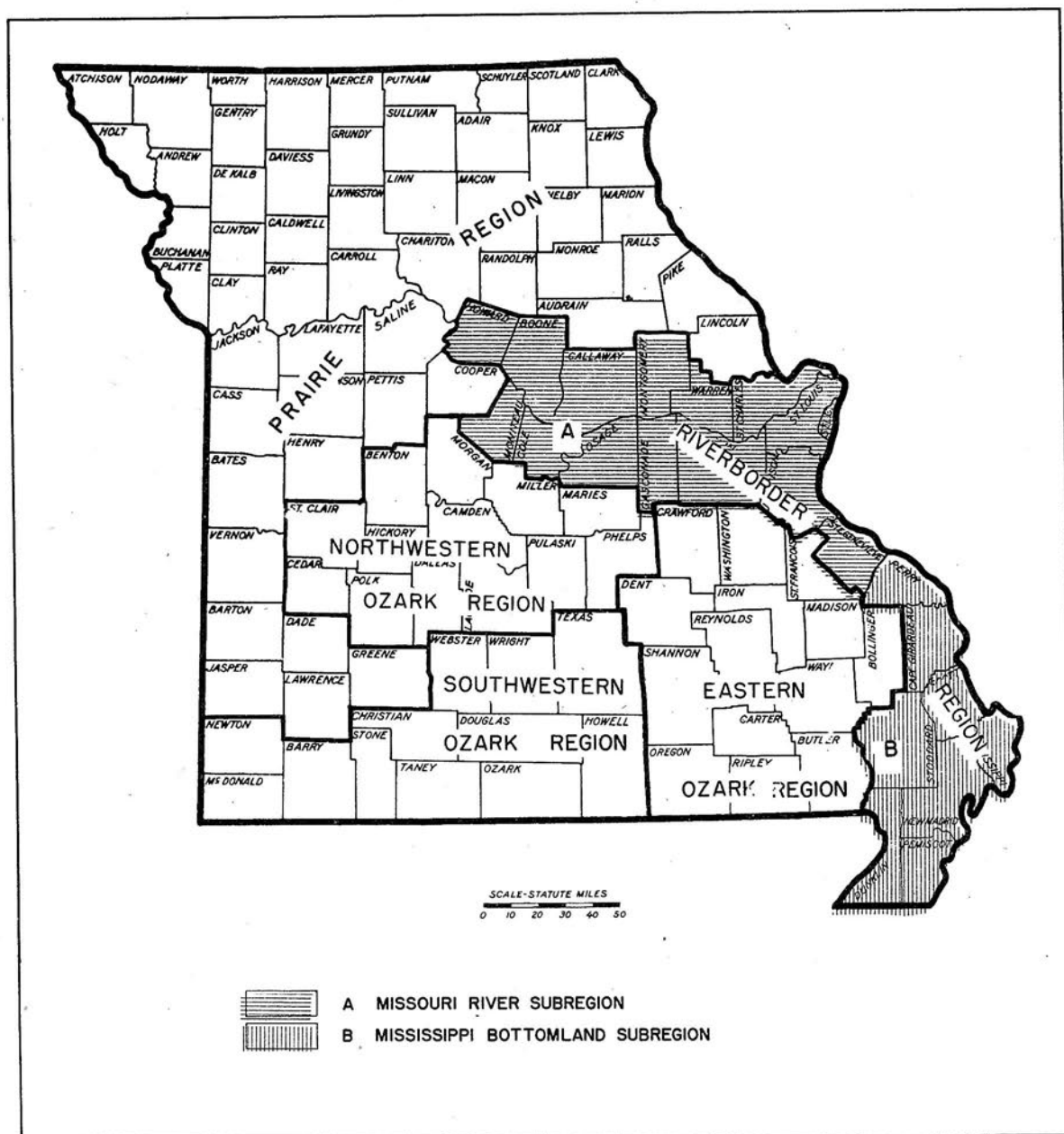
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FOREWORD

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 the Riverborder region of eastern Missouri. Similar releases have been issued for the other forest regions of the State. A summary release giving similar data for the entire State will be published shortly. Later an analytical report for the State will be published, 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 RIVERBORDER REGION IN MISSOURI

SIGNIFICANT FACTS CONCERNING THE FOREST RESOURCES

OF THE RIVERBORDER REGION

The Riverborder region includes the counties adjoining the lower Missouri River and the bottomland counties in the southeastern or "boot-heel" portion of the State. The northern counties cover the transition zone from Ozark to Prairie conditions and the forests show characteristics of both regions. The southern counties include the alluvial bottomlands that are the beginning of the great Mississippi delta extending to the Gulf of Mexico.

The total land area in the region is 8 million acres of which 31 percent is forested. The Missouri River subregion is 36 percent forested and the Mississippi bottomland subregion is 21 percent. Practically all of the forest area is in private ownership.

Saw-timber stands occupy 20 percent of the forest area, a higher percentage than in any other Missouri region. Pole-timber stands occur on 45 percent of the area, seedling and sapling stands on 23 percent, and 12 percent is poorly stocked.

The total volume of saw timber in the region is 2.8 billion board feet. White oak is the most common species, accounting for 30 percent of the saw-timber volume. Other oaks make up an additional 27 percent. Cypress, hickory, elm, and cottonwood comprise most of the remaining volume.

The total volume of sound material in pole trees and the saw-log portion of saw-timber trees is 960 million cubic feet. Approximately one-half of this volume is in trees less than 11 inches in diameter at breast height.

The average saw-timber volume per forest acre is 1,149 board feet. The average cubic volume, including pole trees and the saw-log portion of saw-timber trees, is 390 cubic feet per acre. These average volumes are larger than the averages for any of the other Missouri regions.

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

A. MISSOURI RIVER SUBREGION

County	Total land area <u>1/</u>	Forest area	Nonforest area
	<u>Thousand acres</u>	<u>Thousand acres</u> <u>Percent</u>	<u>Thousand acres</u> <u>Percent</u>
Boone	437	91 21	346 79
Calloway	534	172 32	362 68
Cole	247	79 32	168 68
Franklin	597	261 44	336 56
Gasconade	333	183 55	150 45
Howard	300	42 14	258 86
Jefferson	427	230 54	197 46
Moniteau	268	55 20	213 80
Montgomery	341	99 29	242 71
Osage	384	212 55	172 45
St. Charles	359	89 25	270 75
St. Louis <u>2/</u>	357	62 17	295 83
Ste. Genevieve	320	183 57	137 43
Warren	274	131 48	143 52
Total	5,178	1,889 36	3,289 64

B. MISSISSIPPI BOTTOMLAND SUBREGION

Cape Girardeau	369	89 24	280 76
Dunklin	347	59 17	288 83
Mississippi	263	59 23	204 77
New Madrid	435	74 17	361 83
Pemiscot	312	30 10	282 90
Perry	305	111 36	194 64
Scott	267	30 11	237 89
Stoddard	536	129 24	407 76
Total	2,834	581 21	2,253 79
Total River- border region	8,012	2,470 31	5,542 69

1/ Source: Area of the United States 1940, U. S. Bureau of the Census.2/ Includes St. Louis City.

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

Ownership class	Commercial forest area <u>1/</u>	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National forest	10	.4
Other	11	.5
Total	21	.9
State	3	.1
Private	2,437	99.0
All ownerships	2,461	100.0

1/ Does not include 9,000 acres of forest land classified as non-commercial.

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

Forest type	Total		Saw- timber area	Pole- timber area	Seedling & sapling area	Poorly stocked area
	M acres	Percent	M acres	M acres	M acres	M acres
Cedar-hdwd.	131	5.3	4	69	32	26
Oak-pine	23	0.9	4	11	8	0
Oak-hickory	1,226	49.8	138	634	368	86
White oak	356	14.5	125	223	8	0
Mixed hdwd.	148	6.0	32	29	48	39
Pin oak flats	169	6.9	48	63	32	26
Bottomland hdwd.	361	14.7	142	69	64	86
Scrub hdwd.	47	1.9	0	11	16	20
All types	2,461		493	1,109	576	283
Percent		100.0	20.1	45.0	23.4	11.5

Table 4.--Saw-timber volume on commercial forest area by species
and stand-size class, Riverborder region, 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	21	.7)	14	29	4
Redcedar	28	1.0)			8
Cypress	187	6.6	179	0	8
White oak	853	30.2	467	255	89
Post oak group	174	6.2	64	81	12
Black oak	240	8.5	123	77	33
Northern red oak	124	4.4	75	29	11
Scarlet oak	70	2.5)			5
Other red oaks	156	5.5)	118	70	33
Hickory	157	5.6	107	34	2
Elm	188	6.6	88	23	11
Sycamore	100	3.5	67	8	2
Cottonwood	175	6.2	159	7	4
Ash	62	2.2)			5
Sugar maple	18	.6)			
Soft maple	45	1.6)	251	46	38
Black walnut	32	1.1)			19
Other hdwds.	197	7.0)			
All species	2,827		1,712	659	239
Percent		100.0	60.5	23.3	8.5

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

Species	Total	Tree-diameter class			
		10 1/2 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>
Pine and cedar	49	15	27	7	0
Cypress	187	6	28	54	99
White oak	853	--	428	216	209
Post oak group	174	--	90	50	34
Black oak	240	--	100	67	73
Northern red oak	124	--	53	38	33
Other red oaks	226	--	93	62	71
Hickory	157	--	72	51	34
Elm	188	--	99	44	45
Sycamore	100	--	23	14	63
Cottonwood	175	--	70	59	46
Other hardwoods	354	--	185	106	63
All species	2,827	21	1,268	768	770
Percent	100.0	.7	44.9	27.2	27.2

1/ Ten-inch diameter class shown separately because in this 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, Riverborder region, 1947

Species	Total	Saw-timber area	Pole-timber area	Seedling & sapling area	Poorly stocked area
	Million cu. ft. Percent	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.
Shortleaf pine	5.2 .5)				
Redcedar	26.9 2.8)	4.0	24.2	2.2	1.7
Cypress	40.2 4.2	38.4	0	.2	1.6
White oak	286.0 29.8	109.2	148.1	21.0	7.7
Post oak group	88.4 9.2	18.6	57.7	7.0	5.1
Black oak	80.3 8.3	25.3	46.6	7.1	1.3
Northern red oak	36.6 3.8	15.0	18.1	2.0	1.5
Scarlet oak	24.6 2.6)				
Other red oaks	45.4 4.7)	23.9	36.4	5.8	3.9
Hickory	68.4 7.1	26.8	35.4	2.8	3.4
Elm	60.2 6.3	23.6	16.7	6.8	13.1
Sycamore	19.9 2.1	11.7	2.6	.2	5.4
Cottonwood	43.5 4.5	37.3	4.8	.6	.8
Ash	16.4 1.7)				
Sugar maple	12.4 1.3)				
Soft maple	20.8 2.2)	72.4	41.7	11.9	8.4
Black walnut	16.0 1.7)				
Other hardwoods	68.8 7.2)				
All species	960.0	406.2	432.3	67.6	53.9
Percent	100.0	42.4	45.0	7.0	5.6

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

Stand-size class	Tree-diameter class					
	Total	6-8 inches	10 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 area	406.2	59.4	64.7	106.7	79.1	96.3
Pole-timber area	432.3	201.2	121.0	76.0	21.4	12.7
Seedling and sapling area	67.6	17.0	10.8	18.0	15.9	5.9
Poorly stocked area	53.9	9.4	8.9	16.3	10.1	9.2
Total	960.0	287.0	205.4	217.0	126.5	124.1
Percent	100.0	29.9	21.4	22.6	13.2	12.9

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

Stand-size class	Average volume per acre	
	<u>Board feet</u>	<u>Cubic feet</u>
Saw-timber area	3,473	824
Pole-timber area	594	390
Seedling & sapling area	415	117
Poorly stocked area	767	191
All classes	1,149	390

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

Species	Total	Saw-timber trees			Pole-timber trees	Cull trees
		Total	Sawlog portion	Tops & limbs 1/		
	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.	Million cu. ft.
Pine and cedar	32.1	15.8	13.4	2.4	16.3	0
Cypress	42.7	39.0	27.7	11.3	1.2	2.5
White oak	453.4	234.3	135.3	99.0	150.7	68.4
Post oak group	182.0	58.0	33.0	25.0	55.4	68.6
Black oak	151.3	67.9	38.7	29.2	41.6	41.8
Northern red oak	69.7	33.8	19.5	14.3	17.1	18.8
Other red oaks	127.1	63.2	36.0	27.2	34.0	29.9
Hickory	105.7	44.8	25.5	19.3	42.9	18.0
Elm	129.9	53.0	30.2	22.8	30.0	46.9
Sycamore	43.6	27.7	16.0	11.7	3.9	12.0
Cottonwood	67.4	49.5	28.6	20.9	14.9	3.0
Other hardwoods	262.1	99.6	57.0	42.6	77.4	85.1
Noncommercial species 2/	15.5	--	--	--	--	15.5
All species	1,682.5	786.6	460.9	325.7	485.4	410.5
Percent	100.0	46.8	27.4	19.4	28.8	24.4

1/ Not included in the cubic-foot volumes shown in Tables 6 & 7 excepting the 2.4 and 11.3 million cubic feet included in tops of pine, cedar, and cypress.

2/ Not included in the cubic-foot volumes shown in Tables 6 & 7.

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

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.

White oak - Stands in which white oak (Quercus alba) comprises 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.

Pin-oak flats - Stands of pin oak and other hardwoods occurring on poorly drained flats. Associate species include soft maple, elm, hickory, and sweetgum.

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.

Scrub hardwoods - Stands in which scrub oak or other noncommercial tree species comprise 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. Includes a small volume of other pines occurring in plantations.

Redcedar - Eastern redcedar - Juniperus virginiana

Cypress - Taxodium distichum

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

Black oak - Quercus velutina

Northern red oak - Quercus borealis

Scarlet oak - Quercus coccinea

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)

Elm - includes all species of elm (Ulmus)

Sycamore - Platanus occidentalis

Cottonwood - Populus deltoides

Ash - includes all species of ash (Fraxinus)

Sugar maple - Acer saccharophorum

Soft maple includes:

Red maple - Acer rubrum

Silver maple - Acer saccharinum

Boxelder - Acer negundo

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 Riverborder region was made in July, August, and September 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 on alternate flight lines a transparent template with 12 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 every third dot 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.

Approximately 42,880 dots were counted on the photos for forest area determination. Stereoscopic examinations were made on 4,056 forest plots to determine stand-size class, and 560 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 Riverborder region shows a sampling error of ± 2.5 percent of the total forest area or $\pm 61,750$ 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.

Timber volume - The sampling error of the total board-foot volume in the region is ± 6.4 percent or ± 181 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.

