



# Monthly Review

F E D E R A L R E S E R V E B A N K O F S T . L O U I S

Volume XXIX

DECEMBER 1, 1947

Number 12

## Forest Resources in the Eighth Federal Reserve District

*Data presented in this article are largely a collection and summary of work done by other agencies and individuals. Among those who have cooperated in supplying data are state departments of forestry, and forestry departments of the various universities in the seven states included in the district, the American Forestry Association and the U. S. Forest Service, including the Southern Forest Experiment Station at New Orleans, the Central States Forest Experiment Station at Columbus, Ohio, and other divisions of the Forest Service. In addition, extension foresters, farm foresters, and many individuals from the above-named organizations were very helpful in furnishing material.*

\* \* \*

The Eighth Federal Reserve District is generally considered agricultural, yet 43 per cent of the total land area in the district is covered with forest. Basic and finished lumber industries, which include processing from logging to furniture manufacture, employed 93,000 people in the Eighth Federal Reserve District in 1940, representing 19 per cent of total employment in manufacturing industries for that year. In certain areas, timbering and related industries are of much greater importance. For instance, in Arkansas nearly 37,000 people were employed in basic and finished lumber industries representing 63 per cent of total manufacturing employment in that state. In addition, practically every farmer in the district receives income in some form from forests and forest products to supplement the generally low level of farm income characteristic of this district.

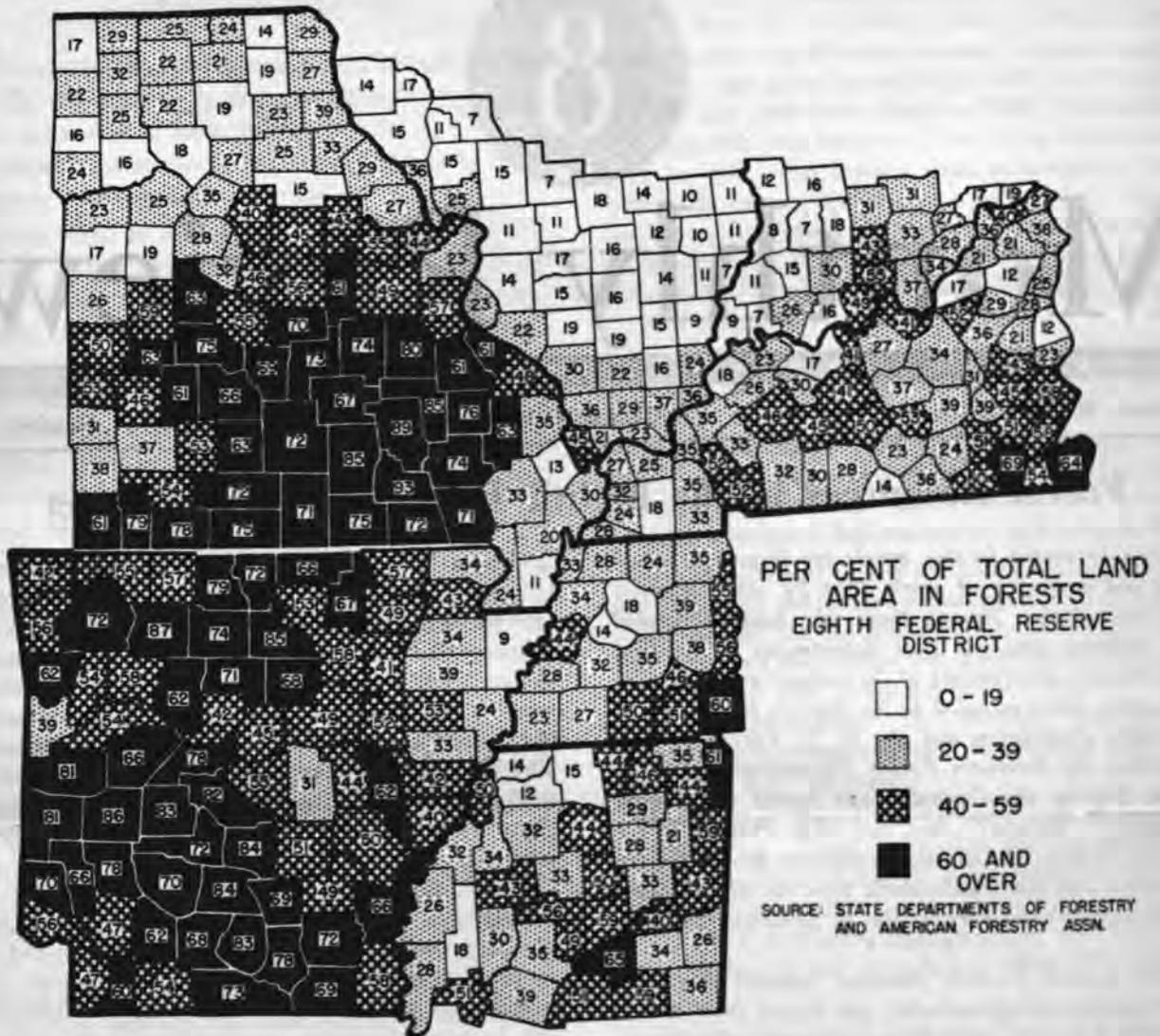
Forests have generally been considered a virtually inexhaustible natural resource and, except on the part of those intimately connected with phases of forestry, little thought has been given to possible deterioration and elimination. Virtually all of the

land area in the Eighth District was once covered by trees. However, in early years, trees were viewed as little more than obstacles in the path of farmers who wished to bring virgin soil into cultivation. Thus, a vast amount of the original timber was burned in order to plant crops. Later, remaining tracts were exploited by destructive cutting. The best trees were cut, leaving the poorer quality trees on the land. In some instances, insufficient growth of good saplings for adequate restocking was left.

Today, practically no virgin timber remains in the district. The remaining forest trees are largely second growth. The war caused another round of severe cuts of the best quality trees to provide the tremendous amount of lumber needed for temporary housing, barracks, shipbuilding, new factory buildings, warehouses and other emergency needs. Now, the huge postwar demand for lumber is a further drain on our declining timber supply.

An inventory and appraisal of our remaining timber resources thus appears in order. We need to know more about the possibilities for future growth and yield, and what these mean in terms of present and prospective income, employment, and industrial development in the district. This article will be concerned with the basic timber resources of the area; industrial phases will be discussed in later articles.

This project is in keeping with the regional research program of the Federal Reserve Bank of St. Louis, as outlined in the February, 1947 issue of this *Review*. The major objective of this program is to point out possible ways and means to raise the general level of prosperity of the district and yet leave our resources for the next generation in the best possible condition.



**EXTENT OF FOREST LAND**

A total of 54 million acres of land, representing more than two-fifths of the total land area in the Eighth Federal Reserve District, is covered with forest.<sup>1</sup> The extent of forest land in each district state portion varies from approximately three-fifths of the total land area in Arkansas to less than one-fifth of the district portion of Illinois. Only in Indiana and Illinois does forest cover less than one-third of the total land area.

On the accompanying table, the proportion of land in forest in the district portion of Eighth District states is compared to the percentage of forest land in each entire state since certain data are not available for the district proper. The Eighth Dis-

**TABLE I  
FOREST ACREAGE IN EIGHTH DISTRICT STATES IN 1945**

	Entire State		District Portion	
	Forest Land <sup>1</sup> (Thousands of Acres)	Percentage of Land Forested	Forest Land (Thousands of Acres)	Percentage of Land Forested
Arkansas .....	20,036	59%	20,036 <sup>1</sup>	59%
Missouri .....	19,142	43	17,537 <sup>2</sup>	47
Mississippi .....	15,889	52	5,165 <sup>3</sup>	38
Tennessee .....	12,165	45	2,502 <sup>4</sup>	16
Kentucky .....	11,857	46	5,015 <sup>5</sup>	35
Indiana .....	3,445	15	1,427 <sup>6</sup>	24
Illinois .....	3,396	10	2,248 <sup>6</sup>	17
Total .....	85,910*	39	53,929	43

<sup>1</sup> Preliminary Data, Reappraisal Project, U.S. Forest Service, July, 1946.

<sup>2</sup> State Departments of Forestry of respective states.

<sup>3</sup> State Department of Forestry and American Forestry Association, Forestry Resources of Tennessee.

<sup>4</sup> American Forestry Association, R. Brundage, Forest Resource Appraisal.

<sup>5</sup> Illinois Technical Forestry Association, A Plan for Forestry in Illinois.

<sup>6</sup> State Departments of Forestry and American Forestry Association total acreages were 1 per cent more than total of U.S. Forest Service.

trict portions of Missouri, Indiana, and Illinois are more densely forested than their areas outside the district. In contrast, district portions of Kentucky, Tennessee, and Mississippi are less densely forested

<sup>1</sup> A wide variation exists as to quality and density of merchantable timber on forest land and many acres classified as forest land have no merchantable timber at this time.

than the portions of these states outside the district. This difference between the proportion of land in forest in the Eighth District sections of the various states and the state areas outside the district should be kept in mind in subsequent discussions involving state totals.

Areas with the highest proportion of forest land are in general the more hilly and mountainous parts of Missouri and Arkansas. In 75 of the 362 district counties, more than three-fifths of the land area is covered with forest. Seventy of these 75 counties are located in the Ozarks of Missouri and Arkansas and the Ouachita and Piedmont regions of Arkansas. In 14 of the counties, more than four-fifths of the area is forest land. The less densely forested areas are found north of the Missouri River in Missouri, in the entire states of Illinois and Indiana, and along the delta land of Arkansas and Mississippi.

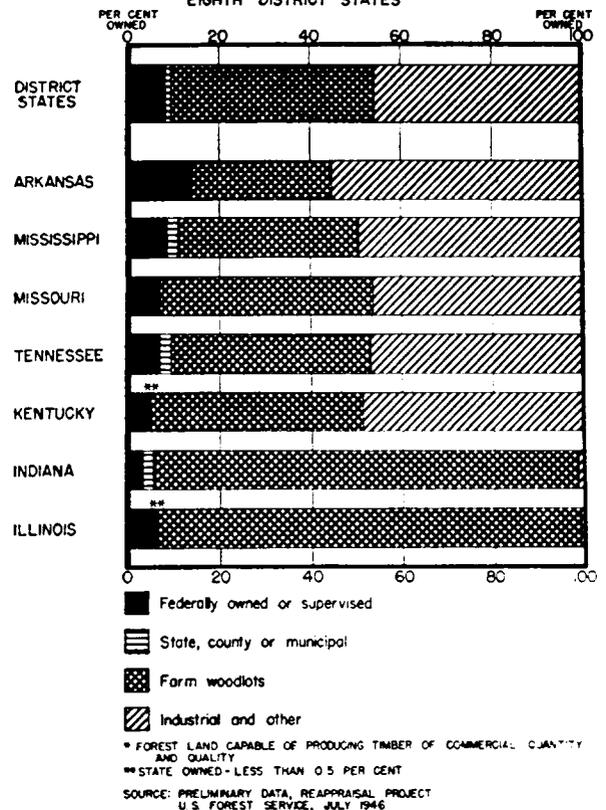
The accompanying map points out clearly the importance of good forest management practices to Eighth District economic welfare. Many communities are located in counties having from 50 to 75 per cent of land area in forest. They should be vitally concerned, therefore, with forests and forest yields. If maximum prosperity is to be achieved, the development and increasing productivity of forests in such areas should have a high priority in community development programs.

### OWNERSHIP OF FOREST LAND

About 91 per cent of the forest area in Eighth District states is under private ownership, being about equally divided between farm and industrial or other nonfarm owners. For the district as a whole, therefore, the maintenance of present production or increasing present yield of forests for the immediate future depends almost entirely upon what private owners do with their forest land. The Federal Government, although holding only a small share of district states' forest area in comparison with private owners, owns 7 million acres of forest land, or 8 per cent of the total. Its ownership tends to be concentrated in large tracts and for some counties practically all forest land is Federally owned. All but one-eighth of Federally owned woodland is in national forests. The balance of nonprivate woodland in the district, about 1 per cent of the total, is under state, county, or municipal ownership. Federal ownership is important in Arkansas, Mississippi, and Tennessee. In Arkansas, 2.6 million acres, or 13 per cent of the total forest acreage, is owned by the Federal Government. One million acres are Federally owned in Mississippi and Tennessee.

The type of forest ownership varies considerably among the states in the district. Of the 20 million acres of commercial forest land in Arkansas, less than one-third is in farm woodlots, while over 90 per cent of the woodland in Illinois and Indiana is in farm woodlots. More than half of all woodland in Arkansas is owned by industrial and other nonfarm owners. Nonfarm owners also hold approximately half of all forest land in Missouri, Tennessee, Mississippi, and Kentucky. Thus, a forestry improvement program in Indiana and Illinois should be directed primarily to farm woodlot owners. Forestry programs in other district states must, in addition, be aimed at industrial and other nonfarm owners. In this connection, forest under private nonfarm, nonindustrial ownership may present a particular problem, since a large portion of this acreage is also nonresident owned. No estimate is available as to the extent of such holdings, but they are believed to be considerable. Frequently, these forests either are left completely alone with no cutting and stand improvement, or destructive cutting on a contract basis is permitted from time to time.

OWNERSHIP OF COMMERCIAL FORESTS\*  
EIGHTH DISTRICT STATES



Industrial forest holdings are increasing, especially in the Mid-South states. Such holdings are large so that good management by a few firms makes a substantial contribution to timber production. Considerable areas have been, and are being, placed on a sustained yield basis by these commercial firms.

**Size of Private Holdings**—The bulk of privately owned forest land consists of relatively small tracts. In district states, 88 per cent of the forest land is held in tracts of less than 5,000 acres, varying from 79 per cent of the forest land in Arkansas to 100 per cent in Indiana and Illinois. Tracts larger than 50,000 acres are important only in Arkansas, Mississippi, and Tennessee where 16, 9, and 6 per cent, respectively, of the total forest land is held in tracts of this size.

TABLE II

**OWNERSHIP OF PRIVATE COMMERCIAL FORESTS IN EIGHTH DISTRICT STATES IN 1945, BY SIZE OF HOLDING**

	Total Private Forests <sup>1</sup> (Thousands of Acres)	Per Cent of Private Forest Acreage in Holdings of:		
		Less Than 5,000 Acres	5,000 to 50,000 Acres	More Than 50,000 Acres
Arkansas .....	17,179	79%	5%	16%
Missouri .....	17,560	96	2	2
Mississippi .....	14,151	88	8	9
Tennessee .....	10,762	84	10	6
Kentucky .....	11,125	92	6	2
Indiana .....	3,178	100	---	---
Illinois .....	3,117	100	---	---
District states....	77,072	88	5	7

<sup>1</sup> Includes farm, industrial and non-farm private commercial forests.

Source: Preliminary Data from Reappraisal of the Forest Situation, U.S. Forest Service.

The United States Forest Service classifies all holdings of less than 5,000 acres as small. Further breakdown in terms of size of holding would be desirable in order to separate the small, farm woodlots (which could furnish only part-time employment) from the larger holdings. Acreages of less than 240 acres generally would be in this small, farm woodlot class.

According to data obtained from the Crossett "Farm Forestry Forty" (an experimental plot maintained by the Southern Forest Experiment Station in Arkansas), a woodlot of about 240 acres, well-stocked and under intensive management, will keep one man busy the year-round. A woodland of 300 to 1,000 acres under intensive management will require more than one man. The stumpage value alone on intensively managed, well-stocked holdings of over 1,000 acres should yield at least \$2,000 per year after deducting for real estate taxes. (This is equivalent to only half the per acre stumpage value of timber growth on the *Crossett Forty*.) Thus the stumpage value of a 1,000 to 5,000 acre forest investment represents a reasonably good annual income.

**KIND AND VOLUME OF TIMBER**

Hardwood species cover the major part of the forest land in Eighth District states with practically all timber in Indiana, Illinois, and Missouri of the hardwood type. Pure stands of hardwood species also cover four-fifths of the forest land in Kentucky, two-thirds of that in Tennessee and Arkansas, and one-fourth of that in Mississippi. Only Arkansas and Mississippi contain considerable acreages of pure pine. However, mixed pine and hardwood stands may be found over wide areas of Arkansas, Mississippi, Tennessee, and Kentucky. The latter two states also have small areas covered with mixed cedar and hardwood stands.

TABLE III

**PROPORTION OF FOREST LAND IN VARIOUS SPECIES IN EIGHTH DISTRICT STATES (Per cent of Total Forest Acreage)**

	Upland Hardwoods		Bottomland Hardwoods	Pine and Hardwoods	Pine	Cedar and Hardwoods
	Arkansas <sup>1</sup> .....	41%	18%	18%	21%	---
Missouri <sup>1</sup> .....	89	6	4	---	---	1
Mississippi <sup>1</sup> .....	12	14	51	23	---	---
Tennessee <sup>2</sup> .....	60	6	24	4	---	6
Kentucky <sup>3</sup> .....	81	2	12	---	---	5
Indiana <sup>4</sup> .....	59	40	---	---	1	---
Illinois <sup>5</sup> .....	76	24	---	---	---	---
District states .....	56	12	20	10	---	2

<sup>1</sup> State Departments of Forestry of respective states.

<sup>2</sup> State Department of Forestry and American Forestry Association "Forest Resources of Tennessee".

<sup>3</sup> American Forestry Association.

<sup>4</sup> R. Brundage, Purdue University, and American Forestry Association.

<sup>5</sup> Illinois Technical Forestry Association.

There has been a tendency over a period of years not only for reduction in acreage and density of forest growth, but also for deterioration in the quality of existing stands. High-quality trees have been cut and poor-quality trees have been left to take their place. Successive cuts of this nature have caused additional deterioration of species and quality. In upland stands, for instance, scrub oak and hickory have taken the place of more desirable species. Red and black oak have replaced white oak. Even white oak trees are less valuable in thin stands which result in short, limby trees of relatively small sawtimber value.

In the Mid-South, pine trees have been cut, leaving hardwood species of less commercial value. Under present high prices, many of the less desirable species can be harvested profitably, but under prewar prices much of this undesirable growth would not pay harvesting costs. In any improvement program, stand improvement must be one of the first considerations. The initial cuts will be least valuable, but later cuts will yield more and more profits as the more valuable species mature.

**Volume of Timber**—The total volume of sawtimber in Eighth District states is estimated at 112 billion board feet, nearly two-thirds of which is hardwood. One-third of the total is in Arkansas, one-fourth in Mississippi, and one-eighth each in Tennessee and Kentucky. Only 15 per cent of the sawtimber is found in Indiana, Illinois, and Missouri combined.<sup>2</sup>

An indication of value of forests and extent to which some have been depleted can be obtained by comparing forest acreage and volume of timber. Missouri, for instance, with 22 per cent of forest land in Eighth District states, has only 6 per cent of estimated sawtimber in the district. Two states, Arkansas and Mississippi, with two-fifths of the timbered land, have more than three-fifths of the sawtimber in district states. Together, they have 85 per cent of the softwood sawtimber.

**Understocked Forest Land**—The lack of sawtimber volume in the Eighth District becomes understandable in view of the tremendous acreages in district states classified as seedling, sapling, poorly stocked and denuded areas. In all, 31 million acres are classified in these categories, representing 37 per cent of all forest land. Seedling and sapling areas consist of land with at least 40 per cent coverage of commercial species less than five inches in diameter. Poorly stocked and denuded land is a catch-all classification, including any land that cannot be classified as seedling and sapling or better.

**TABLE IV**  
**SEEDLING, SAPLING AND POORLY STOCKED AREAS OF COMMERCIAL FOREST LAND IN EIGHTH DISTRICT STATES<sup>1</sup>**

	Total Commercial Forest Area <sup>2</sup>	Seedling and Sapling Area <sup>2</sup>	Poorly Stocked and Denuded Area <sup>2</sup>	Proportion of Total Forest Land	
				Seedling and Sapling Area	Poorly Stocked and Denuded Area
	(Thousands of Acres)				
Arkansas	19,928	2,127	2,097	11%	11%
Missouri	18,837	10,886	3,660	58	19
Mississippi	15,868	1,021	2,995	6	19
Tennessee	11,850	2,141	771	18	7
Kentucky	11,694	1,150	1,576	10	14
Indiana	3,358	747	424	22	13
Illinois	3,319	806	794	24	24
District states	84,854	18,878	12,317	22	15

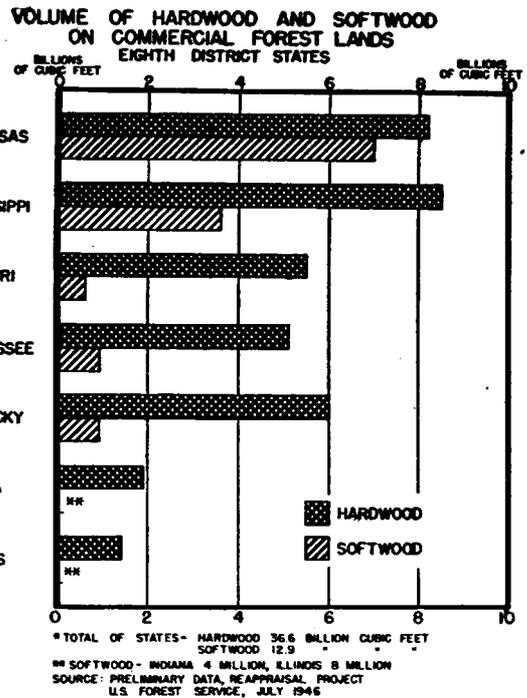
<sup>1</sup> Forest status as of January, 1945, Reappraisal Project, U.S. Forest Service, July, 1946.

<sup>2</sup> Areas with at least 40 per cent of area covered with commercial species less than 5 inches diameter, and less than two cords per acre in trees above 5 inches in diameter.

<sup>3</sup> Lands that do not qualify as sawtimber, pole, seedling or sapling areas.

In addition to sapling, poorly stocked and denuded forest areas, another 20 per cent of total

<sup>2</sup> Forest Service estimates. As a rule, these estimates are somewhat smaller than estimates made by the American Forestry Association. In district states the latter averaged about 9 per cent above the former with greatest variations in Illinois, Arkansas, and Missouri.



forest land in this region is classified as pole timber, too small for sawtimber but large enough for cordwood (5-inch diameter and larger). This leaves only 43 per cent of the forest area, or 36 million acres, classified as sawtimber area in the seven district states.

More than three-fourths of forest lands in Missouri are classified as sapling areas or poorly stocked and denuded areas. Nearly half the forest land in Illinois and one-third in Indiana falls in this classification. Between 20 and 25 per cent of forest land in other district states is classified as having smaller than pole-sized timber. Proper management over a long period of time will be necessary to bring these areas into sawtimber production.

**GROWTH AND DRAIN**

Growth of all timber in Eighth District states was about 2.6 billion cubic feet in 1944. Sawtimber growth was 6.2 billion board feet.<sup>3</sup> Fifty per cent of all timber growth and 63 per cent of the sawtimber growth took place in Arkansas and Mississippi. Nearly 40 per cent of the sawtimber growth was softwood, but only 28 per cent of all

<sup>3</sup> Sawtimber includes trees at least 10 inches in diameter in the four northern states; pine and cypress in the three southern states must be nine inches in diameter and hardwoods 13 inches. All measurements are taken 4 1/2 feet from the ground.

timber, including pole timber and sapling growth, was softwood.

Growth on a per-acre basis was highest in Mississippi, where the sawtimber growth, including

**TABLE V**  
CURRENT ANNUAL GROWTH OF ALL TIMBER AND SAWTIMBER ON COMMERCIAL FOREST LAND IN EIGHTH DISTRICT STATES<sup>1</sup>

	All Timber Growth		Sawtimber Growth			
	Total Hardwood	Softwood	Total Hardwood	Softwood		
	(Million Cubic Feet)		(Million Board Feet)			
Arkansas .....	670	332	1,929	743	1,186	
Missouri .....	341	309	388	351	37	
Mississippi .....	667	403	1,866	962	904	
Tennessee .....	247	192	847	621	226	
Kentucky .....	475	416	638	555	83	
Indiana .....	137	136	298	296	2	
Illinois .....	104	104	208	207	1	
District states .....	2,641	1,892	749	6,174	3,735	2,439

<sup>1</sup> Preliminary Data, Reappraisal Project, U.S. Forest Service, July, 1945.

both hard and soft woods, averaged 118 board feet per acre. Growth rate for softwood (5 per cent) was higher than for hardwood (2.5 to 3 per cent) in Arkansas. Missouri, with a large acreage of sapling and denuded areas, averaged only 21 board feet of growth per acre of sawtimber on all forest land. Likewise, total growth of 18 cubic feet per acre in Missouri was lower than in any other of the Eighth District states.

At the present rate of cutting, drain (which refers to timber cut and destroyed) exceeds annual growth in most areas. Sawtimber growth was only two-thirds as much as drain, but growth of all timber nearly equaled drain in district states in 1944. In that year growth was 88 and 79 per cent of drain, respectively, in Arkansas and Tennessee. Total softwood growth in Arkansas in 1944 exceeded total softwood drain in spite of the fact that sawtimber cut was greater than growth. This indicates large numbers of immature trees. A similar situation existed in Mississippi in the case of hardwoods in 1944. If total softwood growth can be maintained in excess of total drain over a period of years, annual growth of sawtimber should increase gradually. Excess of hardwood growth over drain is not necessarily desirable unless the growth consists of high-quality trees. Cutting of poor-quality timber and low value species usually is not profitable at normal prices, and growth of such timber may do little more than intensify management problems. Total growth of all timber in Illinois was about two-thirds as much as total drain for all purposes in 1945. In Indiana, total growth about equaled drain.

Sawtimber cutting exceeded sawtimber growth by higher percentages than over-all cutting exceeded total growth. In the three Mid-South states, Mississippi, Tennessee, and Arkansas, sawtimber growth was 63, 69, and 70 per cent, respectively, of

**TABLE VI**

DRAIN FROM ALL TIMBER AND SAWTIMBER ON COMMERCIAL FOREST LAND IN EIGHTH DISTRICT STATES, 1944<sup>1</sup>

	All Timber		Sawtimber <sup>2</sup>			
	Total Hardwood	Softwood	Total Hardwood	Softwood		
	(Million Cubic Feet)		(Million Board Feet)			
Arkansas <sup>3</sup> .....	761	482	2,741	1,485	1,256	
Missouri <sup>4</sup> .....	304	289	15	594	53	
Mississippi <sup>3</sup> .....	705	359	346	2,948	1,334	1,614
Tennessee <sup>3</sup> .....	311	205	106	1,222	836	386
Kentucky <sup>4</sup> .....	262	237	25	110	646	64
Indiana <sup>4</sup> .....	137	137	.....	261	261	.....
Illinois <sup>4</sup> .....	158	158	.....	224	224	.....
District states <sup>5</sup> .....	2,638	1,867	771	8,700	5,327	3,373

<sup>1</sup> Includes timber cut for commodities, destroyed by fire, wind and disease.

<sup>2</sup> Pines 9 inches diameter at breast height and larger, hardwoods 13 inches d.b.h. and larger in 3 Mid-South states and 10 inches d.b.h. and larger in 4 northern states.

<sup>3</sup> Reappraisal of Forest Situation, U.S. Forest Service.

<sup>4</sup> Estimates of Central States Forest Experiment Station, Columbus, Ohio. Based on regional data from Reappraisal of Forest Situation.

<sup>5</sup> Drain for district states = 31 cu. ft. of all timber per acre and 103 bd. ft. of sawtimber per acre of commercial forest land.

the annual drain in 1944. Growth of softwood sawtimber in Arkansas, however, lacked only 6 per cent of equaling drain in 1944.

**Fire Protection**—Fire damage accounts to a considerable extent for the low growth rate of forests in many areas. In Mississippi the five-year average, 1941-45, of forest land burned was 3.7 million acres. The loss of timber from fire in the United States totaled 460 million cubic feet, 1934-43, which is equivalent to 4 per cent of all timber cut for commodity use. Adequate protection would be of considerable value in decreasing the excess of drain over growth and especially in facilitating growth of young stock and in reducing the number of cull trees. In Mississippi, for instance, from 1941 to 1945, 22 per cent of unprotected areas were burned, compared with only 2 per cent of protected areas.

**TABLE VII**

TIMBER ACREAGE HAVING FIRE PROTECTION IN EIGHTH DISTRICT STATES, 1945

	Protected <sup>1</sup> (thousands of acres)	Per Cent of Forest Land Protected
Arkansas .....	11,000 <sup>2</sup>	55%
Missouri .....	3,693 <sup>2</sup>	19
Mississippi .....	6,000 <sup>2</sup>	40
Tennessee .....	5,500 <sup>4</sup>	45
Kentucky .....	1,671 <sup>2</sup>	14
Indiana .....	1,581 <sup>5</sup>	46
Illinois .....	1,490 <sup>6</sup>	45
District states .....	30,935	36

<sup>1</sup> All acreage classified as under some form of protection. No measure of adequacy of protection is given.

<sup>2</sup> State Departments of Forestry of respective states.

<sup>3</sup> Mississippi State Forest Service, What Forest and Forest Industries Mean to Mississippi.

<sup>4</sup> Tennessee State Forestry Division and American Forestry Association, The Forest Resources of Tennessee.

<sup>5</sup> R. Brundage, Purdue University.

<sup>6</sup> Illinois Technical Forestry Association, A Plan for Forestry in Illinois, January, 1947.

Only 36 per cent of the forest land in Eighth District states received any fire protection in 1945, and much of that was inadequate. Only 14 per cent of Kentucky forest land received protection and less than one-fifth of the forest was protected in Missouri. Arkansas, with 55 per cent of forest area protected, had the highest percentage under protection. About 45 per cent of the forests were protected in Indiana, Illinois, and Tennessee, and 40 per cent of those in Mississippi.

A more intensive educational program needs to be launched to convince farmers and other timber owners that burning pastures and woodland is not an economical method of improving early pastures or of clearing land to make plowing easier the following year. Considerable areas are burned as a result of firing pastures and woodlands merely to drive out game.

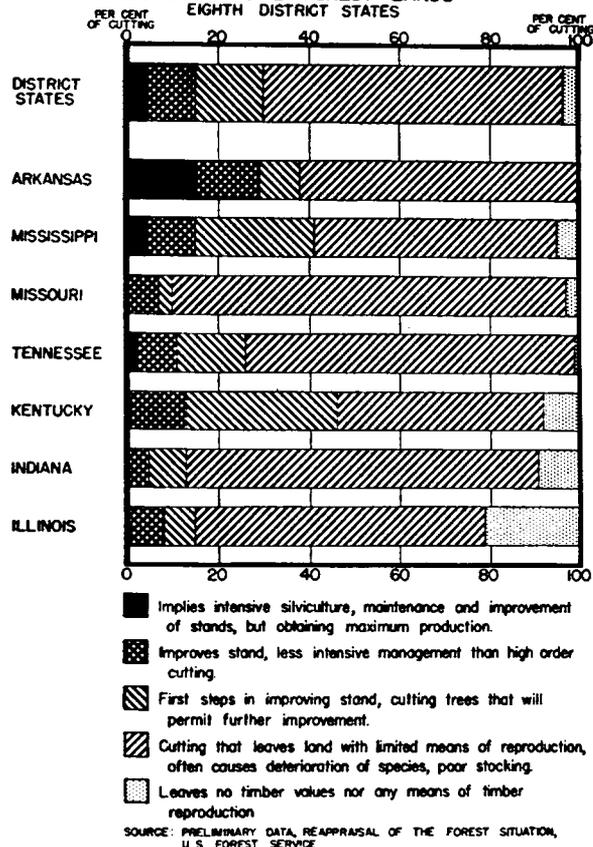
**Management Practices**—Another method of increasing forest yield and balancing drain and growth is intensification and improvement of management practices. Cutting methods on 70 per cent of the forest land in Eighth District states are classified as poor or destructive. Poor cutting practices leave land with only limited means of reproduction, without any merchantable timber, and with but few trees, which are generally of low-quality species. Destructive cutting is even worse than poor cutting.

Only 15 per cent of forest land in district states was rated with good and high-order cutting. Good cutting improves stands, but only in high-order cutting is maximum production and improvement of stand and quality achieved. High-order cutting is practiced to an appreciable extent only in the three Mid-South states, Arkansas, Mississippi, and Tennessee, where 15, 4, and 2 per cent of the woodlands, respectively, rated high-order cutting. Fair and good cutting in Kentucky, however, exceeded the total fair, good, and high-order cutting in all other district states.

Large timber tracts (larger than 50,000 acres) generally were under better management than the smaller timber tracts in the three Mid-South states, Arkansas, Mississippi and Tennessee. Generally, more nonfarm-owned tracts rated fair or better cutting practices than farm-owned woodlots in this area. In other words, commercial lumber companies have placed sizable areas under good forest management and on a sustained yield basis. Eighty-six per cent of the privately owned large holdings in Arkansas are being operated under good or high-order management.

In contrast to the condition in the Mid-South, the

CHARACTER OF TIMBER CUTTING PRACTICES ON COMMERCIAL FOREST LANDS EIGHTH DISTRICT STATES



four northern states of the district have a higher proportion of farm-owned woodland than nonfarm woodland under fair or better management. This is accounted for by the fact that a higher proportion of nonfarm woodland in the four northern states probably is in smaller holdings that do not lend themselves as well to sustained yield management as do farm woodlots and larger holdings.

**POTENTIAL FOREST PRODUCTION**

The possibilities are good for sustained timber production in Eighth District states despite the fact that current annual drain of sawtimber is approximately half-again as large as growth. Potential sawtimber growth estimates made by various state agencies in the district indicate that good management practices could triple the current rate of growth. These estimates were made on the basis of results obtained on experimental woodlots and a number of typical farm woodlots for which data were recorded.

This productive capacity, of course, cannot be attained overnight. Since the annual growth rate depends to a considerable extent upon the volume

of standing timber, some tracts will require many years to build up stands to a high growth rate. However, this does not mean that all cutting must cease on such tracts. Understocked stands require some cuts to remove the defective, crooked, and low-quality trees of both sawlog and smaller sizes.

TABLE VIII

PRESENT TIMBER GROWTH AND POTENTIAL TIMBER GROWTH UNDER REASONABLY GOOD MANAGEMENT IN EIGHTH DISTRICT STATES<sup>1</sup>

	Present Sawtimber Growth <sup>2</sup> (Bd. Ft. Per Acre)	Potential Sawtimber Growth Good Management (Bd. Ft. Per Acre)
Arkansas .....	97	250-300 <sup>3</sup>
Missouri .....	21	63- 84 <sup>3</sup>
Mississippi .....	118	300 <sup>3</sup>
Tennessee .....	72	216 <sup>4</sup>
Kentucky .....	55	140 <sup>4</sup>
Indiana .....	89	192 <sup>4</sup>
Illinois .....	63	250 <sup>7</sup>
District states .....	73	.....

<sup>1</sup> Good management includes fire protection, protection from grazing, selective cutting and a fair stand.

<sup>2</sup> Preliminary Data, Reappraisal Project, U.S. Forest Service, July, 1946.

<sup>3</sup> State Departments of Forestry of respective states.

<sup>4</sup> American Forestry Association and State Forestry Division, The Forest Resources of Tennessee, 1946.

<sup>5</sup> Based on University of Kentucky estimates, cir. 404, 1945.

<sup>6</sup> R. Brundage, Purdue University.

<sup>7</sup> Based on estimates by Illinois Technical Forestry Association.

In fact, stands in most forest regions can be built up in volume at the same time that substantial cuts are made. Some foresters recommend a cutting every five years for best response even on average farm woodlots, but cuts should take less than growth anticipated in the next five years. Cuts would increase progressively in size from half the growth on light stands to 100 per cent of the growth on heavy stands.

As indicated by their low-producing woodlots, farmers are possibly the worst offenders against proper forest management practices. Their holdings are small, yet in the aggregate they own 46 per cent of all district states' woodland, and they need to increase their income. But the question arises, "Does it pay the small woodlot owner to practice good forest management?" The following case studies of small farm-size woodlots provide an answer.

The "Farm Forestry Forty" in the Crossett Experimental Forest near Crossett, Arkansas, is an excellent demonstration of the possibilities of loblolly and shortleaf pine woodlots in the southern part of the district. When made a part of the Crossett Experimental Forest in 1937, this 40-acre tract contained a stand of shortleaf-loblolly pine and hardwood which is fairly representative of the average-to-better tracts in the area. The Experiment Station began cutting over the tract, following sound forestry practices, so that only those trees which should be harvested were removed.

Each year the cut has been approximately equal to the growth.

During this nine-year period under sustained yield management, 110,536 board feet of logs, 273 cords of pulpwood, 153 cords of fuelwood, and 288 fence posts have been cut from this 40-acre tract.

TABLE IX

NINE YEAR CUTTING RECORD ON CROSSETT 40-ACRE FARM FORESTRY TRACT

	1938-43 Average	1944	1945	1946	Total 9 Years
Logs (bd. ft.).....	11,955	13,904	13,144	11,760	110,536
Pulpwood (cords) .....	35.9	18.3	15.3	24.2	273.4
Fuelwood (cords) .....	20.7	10.3	12.0	6.6	153.2
Posts (number) .....	29	35	42	36	288

NINE YEAR RECORD OF STUMPAGE, LABOR AND EQUIPMENT RETURNS ON CROSSETT 40-ACRE FARM FORESTRY TRACT

Value delivered .....	\$573.99	\$607.62	\$603.73	\$678.32	\$5,333.60
Stumpage value .....	143.38	220.04	196.55	227.92	1,504.79
Stumpage value per acre..	3.58	5.50	4.91	5.70	37.61
Returns per hour for cutting and delivery (stumpage deducted) .....	0.56 <sup>1</sup>	0.92	0.98	1.09	.....

<sup>1</sup> Computed by using average man hours per unit required for the 1943-46 period.

Source: U.S. Forestry Service, Southern Forest Experiment Station, Cutting Records Farm Forestry 40.

This represents an annual cut of more than 300 board feet per acre of logs alone.

These products had a stumpage value of \$1,505, or \$4.18 per acre, per year. Moreover, the owner could have received, in addition to the above stumpage value, two months of profitable employment annually for cutting and delivering the products to market.

In addition to the above income from the tract, the stand of timber has improved and the quality of the forest is far better today than when the cutting started. Low-grade red gum has been removed and replaced by more valuable species. Thus not only is substantial income being received from this acreage, but the prospective future production and ultimate value of the stand has been increased.

A farm in Jo Daviess County, Illinois, serves as a good example of woodlot possibilities in the hardwood area of the district.<sup>4</sup> This woodlot was pastured for 30 years prior to 1932. It was well stocked with a stand of mature trees, consisting of red, black, and white oak, as the major species. Before the first selective cutting was made in 1940, only dead trees and a few large trees for sawlogs had been removed. The 1940 cutting removed seven cords of fuelwood per acre, with a total value of \$6 per cord. By 1945, new growth on this tract had amounted to 1,332 board feet per acre, or 266 board feet per acre annually. At local 1945 stumpage prices, the value of annual per acre growth was \$2.74.

<sup>4</sup> From data obtained by Illinois Extension Service.

The two case studies presented, and the possible growth-rate estimates given, represent only a theoretical potential that could be obtained. This growth rate for the district proper is not likely to be reached for many years, if at all. Still, it indicates the possibility of expanding forestry products in the area. And, it might be noted, there is no great need to increase our output by 200 per cent overnight.

In the first place, it is not necessary to triple or even double the present growth rate to satisfy cur-

rent needs for timber production. If good management practices were placed into effect on one-half of the forest acres and the annual growth rate were doubled, the average growth rate for all forest land would rise to 109.5 board feet per acre and approximately equal the current rate of drain. To reach even this desirable growth rate, however, educational institutions, state forestry departments, and others interested in the future of the timber industry have a big job in bringing into effect good forest management practices on the small woodlots which still make up most of our forest-covered land.

#### SUMMARY AND CONCLUSIONS

1. Forestry is and should continue to be an important industry in the Eighth Federal Reserve District, since forests cover 43 per cent of the total land area, and most of this forest acreage is not suited for cropping. Hardwood trees make up the bulk of timber in the district. Pine is important only in the three southern states.

2. Ninety-one per cent of forest land in the district states is owned by private individuals, divided nearly equally between farm and nonfarm owners, with only 9 per cent state and Federally owned. Thus private individuals will determine to a great extent the future of timber production.

3. A total of 31 million acres, or 37 per cent, of the forest land in the district states is classified as sapling, poorly stocked, or denuded land. Only 36 million acres, or 43 per cent, of the forest land is classified as sawtimber. Considerable time and good management thus will be necessary before more than half of our district forests can produce high-quality timber. If reasonably good management were in effect on all district forest land, the present rate of timber growth could be tripled.

4. Cutting practices on 70 per cent of the forest land in district states were rated poor or destructive. Large lumber companies in the southern part of the district have many timber tracts on which

they are doing a good job of management on a sustained yield basis. However, only 15 per cent of all forest land in the district states, including all national forest acreage, is well managed.

5. Successive cuts of better trees have caused deterioration of species and quality. One of the first things to consider in terms of forestry improvement, therefore, must be selective cutting for improvement of stands.

6. Sawtimber growth in the district states was only two-thirds as much as drain in 1944. However, total growth of all timber was 95 per cent of drain. An excess of drain over growth for a period of years will deplete timber resources at an increasing rate.

7. Adequate fire protection is an important factor in balancing growth and drain. According to 1945 data, only 36 per cent of the district states' forest areas are receiving fire protection of any kind. In Mississippi, areas with fire protection had less than one-tenth the fire damage of nonprotected areas.

8. Under intensive management timber tracts of 200 to 300 acres can provide one man profitable year-round employment. Stumpage value alone of timber tracts of 1,000 acres and over will yield under intensive management a reasonably good retirement income.

Donald L. Henry  
Clifton B. Luttrell